Australian Government
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Manufacturing Skills Australia

MCM04 Competitive Manufacturing Training Package

Volume 2 of 2

Version Number: 3
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ISC INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MCM04
Competitive Manufacturing Training Package

This is Volume 1 of a 2-volume set. This volume should not be used in isolation but in the context of the complete set for the Competitive Manufacturing Training Package.

The material contained within this volume is part of the endorsed component of the Competitive Manufacturing Training Package endorsed by the National Training Quality Council in September, 2004 and agreed by the Ministers.

Volume 2 of 2
Competitive Manufacturing Training Package (Units of Competency)

Covering the manufacturing sectors of:

Automotive Manufacturing

Chemical, Hydrocarbons and Oil Refining

Food Processing

Furnishing

Manufactured Mineral Products

Metal and Engineering

Sugar Milling

Textiles, Clothing and Footwear

Plastics, Rubber and Cable making, and related sectors

Volume 1 Background, Qualifications Framework, Assessment Guidelines

Volume 2 Competency Standards

This Training Package is to be reviewed by 31 July 2006.

MCM04 - Competitive Manufacturing Training Package

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This work is the result of wide consultations with Australian industry participants. It is a collaborative view and does not necessarily represent the view of DEST or any specific body. For the sake of brevity it may omit factors which could be pertinent in particular cases.

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Version Modification History

The version details of this endorsed Training Package are in the table below. The latest information is at the top of the table.

Version	Release Date	Comments
1	September, 2004	Initial release
2	April, 2005	Inclusion of Certificates III and IV in Manufacturing Technology and new units of competency. Minor corrections (including to the diagram) to clarify packaging rules for Certificates III and IV in Competitive Manufacturing Replacement of Assessment Guidelines to reflect the endorsement of TAA04.
3	April 2006	Inclusion of Certificate II in Competitive Manufacturing, Certificate II in Manufacturing Technology as well as their new units of competency and additional elective units for existing qualifications.

Qualifications Framework

The Australian Qualifications Framework

What is the Australian Qualifications Framework?

A brief overview of the Australian Qualifications Framework (AQF) follows. For a full explanation of the AQF see the *AQF Implementation Handbook, 3rd Edition 2002*. You can download it from the Australian Qualifications Advisory Board (AQFAB) website (www.aqf.edu.au) or obtain a hard copy by contacting AQFAB on phone 03 9639 1606 or by emailing AQFAB on aqfab@curriculum.edu.au

The AQF provides a comprehensive, nationally consistent framework for all qualifications in post-compulsory education and training in Australia. In the vocational education and training (VET) sector it assists national consistency for all trainees, learners, employers and providers by enabling national recognition of qualifications and Statements of Attainment.

Training Package qualifications in the VET sector must comply with the titles and guidelines of the AQF. Endorsed Training Packages provide a unique title for each AQF qualification which must always be reproduced accurately.

Qualifications

Training Packages can incorporate the following eight AQF qualifications.

- Certificate I in ...
- Certificate II in ...
- Certificate III in ...
- Certificate IV in ...
- Diploma of ...
- Advanced Diploma of ...
- Vocational Graduate Certificate of ...
- Vocational Graduate Diploma of ...

On completion of the requirements defined in the Training Package, a Registered Training Organisation (RTO) may issue a nationally recognised AQF qualification. Issuance of AQF qualifications must comply with the advice provided in the *AQF Implementation Handbook* and the Australian Quality Training Framework *Standards for Registered Training Organisations*, particularly Standard 10.

Statement of Attainment

Where an AQF qualification is partially achieved through the achievement of one or more endorsed units of competency, an RTO may issue a Statement of Attainment. Issuance of Statements of Attainment must comply with the advice provided in the *AQF Implementation Handbook* and the Australian Quality Training Framework *Standards for Registered Training Organisations*, particularly Standard 10.

Under the *Standards for Registered Training Organisations*, RTOs must recognise the achievement of competencies as recorded on a qualification or Statement of Attainment issued by other RTOs. Given this, recognised competencies can progressively build towards a full AQF qualification.

AQF Guidelines and Learning Outcomes

The *AQF Implementation Handbook* provides a comprehensive guideline for each AQF qualification. A summary of the learning outcome characteristics and their distinguishing features for each VET related AQF qualification is provided below.

Certificate I

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and skills would prepare a person to perform a defined range of activities most of which may be routine and predictable.

Applications may include a variety of employment related skills including preparatory access and participation skills, broad-based induction skills and/or specific workplace skills. They may also include participation in a team or work group.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate knowledge by recall in a narrow range of areas;
- demonstrate basic practical skills, such as the use of relevant tools;
- perform a sequence of routine tasks given clear direction
- receive and pass on messages/information.

Certificate II

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and skills would prepare a person to perform in a range of varied activities or knowledge application where there is a clearly defined range of contexts in which the choice of actions required is usually clear and there is limited complexity in the range of operations to be applied.

Performance of a prescribed range of functions involving known routines and procedures and some accountability for the quality of outcomes.

Applications may include some complex or non-routine activities involving individual responsibility or autonomy and/or collaboration with others as part of a group or team.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate basic operational knowledge in a moderate range of areas;
- apply a defined range of skills;
- apply known solutions to a limited range of predictable problems;
- perform a range of tasks where choice between a limited range of options is required;
- assess and record information from varied sources;
- take limited responsibility for own outputs in work and learning.

Certificate III

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and competencies would cover selecting, adapting and transferring skills and knowledge to new environments and providing technical advice and some leadership in resolution of specified problems. This would be applied across a range of roles in a variety of contexts with some complexity in the extent and choice of options available.

Performance of a defined range of skilled operations, usually within a range of broader related activities involving known routines, methods and procedures, where some discretion and judgement is required in the section of equipment, services or contingency measures

and within known time constraints.

Applications may involve some responsibility for others. Participation in teams including group or team co-ordination may be involved.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate some relevant theoretical knowledge
- apply a range of well-developed skills
- apply known solutions to a variety of predictable problems
- perform processes that require a range of well-developed skills where some discretion and judgement is required
- interpret available information, using discretion and judgement
- take responsibility for own outputs in work and learning
- take limited responsibility for the output of others.

Certificate IV

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and competencies would cover a broad range of varied activities or application in a wider variety of contexts most of which are complex and non-routine. Leadership and guidance are involved when organising activities of self and others as well as contributing to technical solutions of a non-routine or contingency nature.

Performance of a broad range of skilled applications including the requirement to evaluate and analyse current practices, develop new criteria and procedures for performing current practices and provision of some leadership and guidance to others in the application and planning of the skills. Applications involve responsibility for, and limited organisation of, others.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating some theoretical concepts
- apply solutions to a defined range of unpredictable problems
- identify and apply skill and knowledge areas to a wide variety of contexts, with depth in some areas
- identify, analyse and evaluate information from a variety of sources
- take responsibility for own outputs in relation to specified quality standards
- take limited responsibility for the quantity and quality of the output of others.

Diploma

Characteristics of Learning Outcomes

Breadth, depth and complexity covering planning and initiation of alternative approaches to skills or knowledge applications across a broad range of technical and/or management requirements, evaluation and co-ordination.

The self directed application of knowledge and skills, with substantial depth in some areas where judgement is required in planning and selecting appropriate equipment, services and techniques for self and others.

Applications involve participation in development of strategic initiatives as well as personal

responsibility and autonomy in performing complex technical operations or organising others. It may include participation in teams including teams concerned with planning and evaluation functions. Group or team co-ordination may be involved.

The degree of emphasis on breadth as against depth of knowledge and skills may vary between qualifications granted at this level.

Distinguishing Features of Learning Outcomes

Do the competencies or learning outcomes enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating theoretical concepts, with substantial depth in some areas
- analyse and plan approaches to technical problems or management requirements
- transfer and apply theoretical concepts and/or technical or creative skills to a range of situations
- evaluate information, using it to forecast for planning or research purposes
- take responsibility for own outputs in relation to broad quantity and quality parameters
- take some responsibility for the achievement of group outcomes.

Advanced Diploma

Characteristics of Learning Outcomes

Breadth, depth and complexity involving analysis, design, planning, execution and evaluation across a range of technical and/or management functions including development of new criteria or applications or knowledge or procedures.

The application of a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts in relation to either varied or highly specific functions. Contribution to the development of a broad plan, budget or strategy is involved and accountability and responsibility for self and others in achieving the outcomes is involved.

Applications involve significant judgement in planning, design, technical or leadership/guidance functions related to products, services, operations or procedures.

The degree of emphasis on breadth as against depth of knowledge and skills may vary between qualifications granted at this level.

Distinguishing Features of Learning Outcomes

Do the competencies or learning outcomes enable an individual with this qualification to:

- demonstrate understanding of specialised knowledge with depth in some areas
- analyse, diagnose, design and execute judgements across a broad range of technical or management functions
- generate ideas through the analysis of information and concepts at an abstract level
- demonstrate a command of wide-ranging, highly specialised technical, creative or conceptual skills
- demonstrate accountability for personal outputs within broad parameters
- demonstrate accountability for personal and group outcomes within broad parameters.

Vocational Graduate Certificate

Characteristics of competencies or learning outcomes

- The self-directed development and achievement of broad and specialised areas of knowledge and skills, building on prior knowledge and skills.

- Substantial breadth and complexity involving the initiation, analysis, design, planning, execution and evaluation of technical and management functions in highly varied and highly specialised contexts.
- Applications involve making significant, high-level, independent judgements in major broad or planning, design, operational, technical and management functions in highly varied and specialised contexts. They may include responsibility and broad ranging accountability for the structure, management and output of the work or functions of others.
- The degree of emphasis on breadth, as opposed to depth, of knowledge and skills may vary between qualifications granted at this level.

Distinguishing features of learning outcomes

- Demonstrate the self-directed development and achievement of broad and specialised areas of knowledge and skills, building on prior knowledge and skills.
- Initiate, analyse, design, plan, execute and evaluate major broad or technical and management functions in highly varied and highly specialised contexts.
- Generate and evaluate ideas through the analysis of information and concepts at an abstract level.
- Demonstrate a command of wide-ranging, highly specialised technical, creative or conceptual skills in complex contexts.
- Demonstrate responsibility and broad-ranging accountability for the structure, management and output of the work or functions of others.

Vocational Graduate Diploma

Characteristics of competencies or learning outcomes

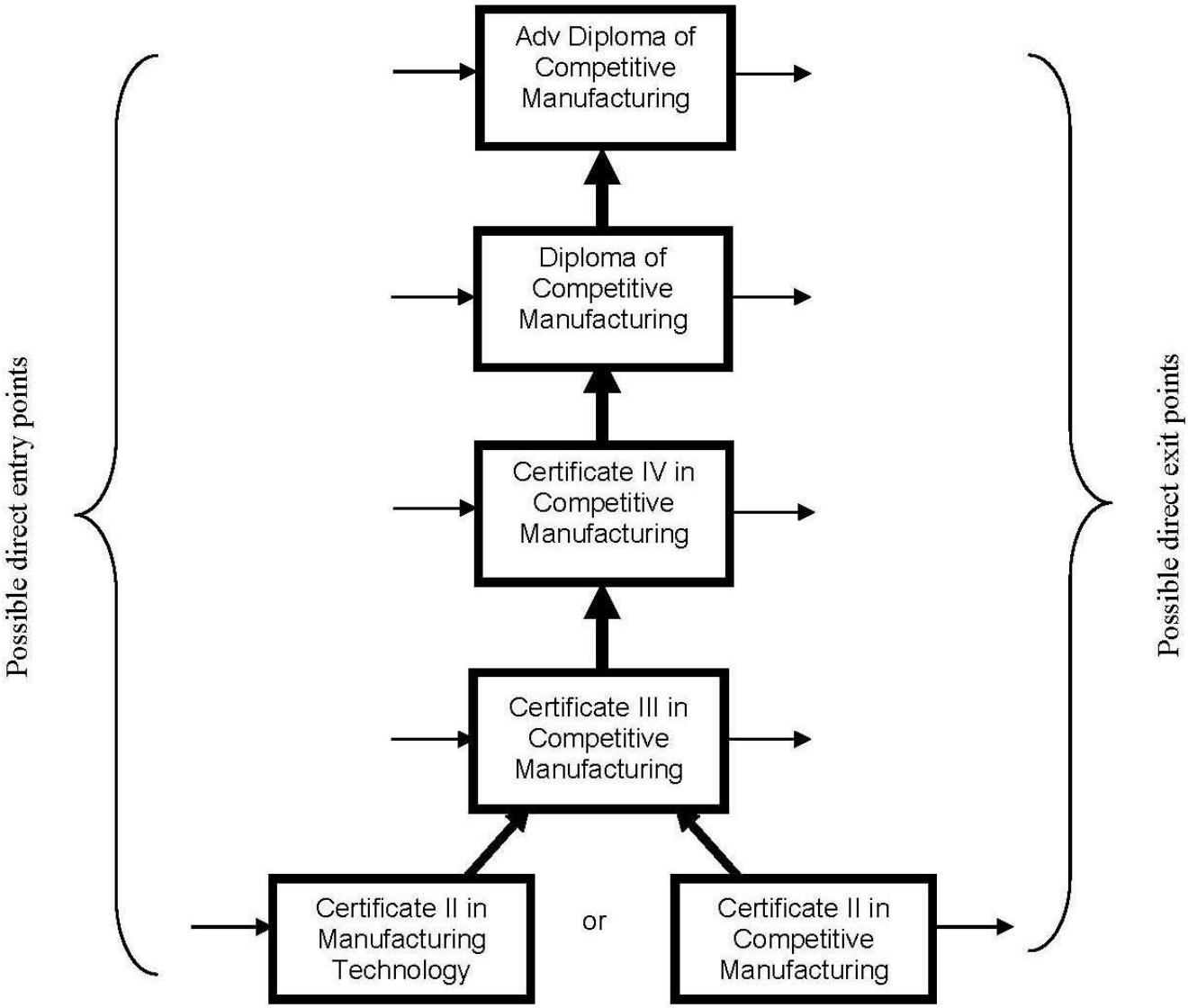
- The self-directed development and achievement of broad and specialised areas of knowledge and skills, building on prior knowledge and skills.
- Substantial breadth, depth and complexity involving the initiation, analysis, design, planning, execution and evaluation of major functions, both broad and highly specialised, in highly varied and highly specialised contexts.
- Further specialisation within a systematic and coherent body of knowledge.
- Applications involve making high-level, fully independent, complex judgements in broad planning, design, operational, technical and management functions in highly varied and highly specialised contexts. They may include full responsibility and accountability for all aspects of work and functions of others, including planning, budgeting and strategy development.
- The degree of emphasis on breadth, as opposed to depth, of knowledge and skills may vary between qualifications granted at this level.

Distinguishing features of learning outcomes

- Demonstrate the self-directed development and achievement of broad and highly specialised areas of knowledge and skills, building on prior knowledge and skills.
- Initiate, analyse, design, plan, execute and evaluate major functions, both broad and within highly varied and highly specialised contexts.
- Generate and evaluate complex ideas through the analysis of information and concepts at an abstract level.
- Demonstrate an expert command of wide-ranging, highly specialised, technical, creative or conceptual skills in complex and highly specialised or varied contexts.
- Demonstrate full responsibility and accountability for personal outputs.
- Demonstrate full responsibility and accountability for all aspects of the work or functions of others, including planning, budgeting and strategy.

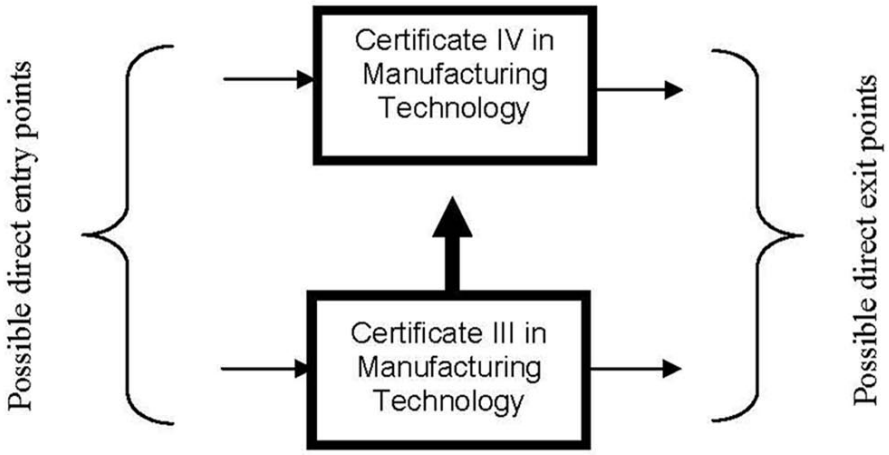
Qualification Pathways for Competitive Manufacturing

The diagram below represents a model of the available qualifications and pathways. Details are in the qualifications framework. Contact Manufacturing Skills Australia { www.mskills.com.au } for further details.



Qualification Pathways for Manufacturing Technology

The diagram below represents a model of the available qualifications and pathways. Details are in the qualifications framework. Contact Manufacturing Skills Australia { www.mskills.com.au } for further details.



General Advice - Competitive Manufacturing Qualifications

Qualifications may be awarded by a Registered Training Organisation (RTO) when competencies which meet the specified packaging requirements have been achieved. Competencies achieved which do not combine to make a certificate may be recognised by a Statement of Attainment issued by an RTO.

Competencies have been categorised into systems, change/interpersonal and tools units. The Certificate III requires a total of 8 units while each of the other qualifications requires a total of 10 units/an additional 10 units comprised of:

- a **minimum** number of MCM **systems** units from the specified list
- a **minimum** number of MCM **change/interpersonal** units from the specified list
- a **minimum** number of MCM **tools** units from the specified list
- the **balance** may be comprised of additional MCM units, or relevant units imported from another Training Package with a **maximum** number of imported units per qualification.

For people undertaking a structured learning program in CMI, competency is required in additional (new) units for each subsequent qualification (see later for details).

A structured Competitive Manufacturing learning program

Entry to any qualification may be at any level. A person can enter a program of training at any level.

New Apprenticeships

All Competitive Manufacturing Certificates within this Training Package are potential New Apprenticeships. However these qualifications have been developed primarily for existing manufacturing workers, especially those working as or likely to become team leaders. For this reason existing worker New Apprenticeships may be more appropriate than application to school leavers.

VET in Schools

The delivery and assessment of competencies aligned to AQF 2 under this Training Package in appropriately designed VET in schools programs is encouraged. However, due to the requirements to demonstrate competency, it would be difficult for a school to assess and award qualifications within MCM04 except in close partnership with an appropriate organisation from the industry. The AQTF rules are the overriding requirements in this regard.

The Certificate II in Manufacturing Technology has been developed specifically for use as a VET in schools program.

Prerequisites

Some units of competency have stated prerequisites (these have been kept to a minimum). In any approved training scheme, it is expected that competency will be attained in the prerequisite units before it is attained in the unit having the prerequisites. Imported units of competency may also have prerequisites which should be observed. In this situation a unit with two prerequisites will be counted as three units towards the qualification once competency has been attained in all units.

In an assessment of existing competency, it is possible to assess the unit and its prerequisites

together as an integrated assessment. In this situation as well, a unit with two prerequisites will be counted as three units towards the qualification once competency has been attained in all units.

Note that the achievement of prerequisite competencies will be recognised for the award of the qualification, regardless of the method by which the participant has gained the competencies (e.g. prior learning and/or experience). A person entering at AQF 3 and proceeding through the qualifications in an orderly manner might be expected to be assessed on the prerequisites. A person entering at a higher AQF level might expect to be able to demonstrate their competence in the prerequisite in any of a number of ways, including an assessment integrated with the higher unit. RTOs developing formal learning pathways may find the prerequisite trail useful in designing a hierarchical learning program, or they may choose to integrate the prerequisite unit into the higher level unit for purposes of delivery and assessment, or some other approach.

General Advice - Manufacturing Technology Qualifications

The following information sets out units and pathways that can be taken in the Certificate III and the Certificate IV in Manufacturing Technology. These qualifications have been developed to be delivered as part of a cadetship contract of training often called a Technology Cadetship. It is intended at a later date to expand Technology Cadetship related qualifications into additional areas and to also develop higher AQF level qualifications.

The units listed for both qualifications are taken from a number of existing Training Packages. These units have been examined for suitability in a cadetship environment and repackaged to suit entry level technology based training in manufacturing.

Qualifications may be awarded by a Registered Training Organisation (RTO) when competencies which meet the specified packaging requirements have been achieved. Competencies achieved which do not combine to make a certificate may be recognised by a Statement of Attainment issued by an RTO.

Structure of Technology Cadetships

The Technology Cadetship related qualifications are very flexible qualifications with a minimum number of core units and pathways that maximise flexibility. The electives have been chosen to give entry and operational skills in a wide range of manufacturing technology application areas. Each qualification consists of pathway options. Each pathway indicates the units that may be taken in that particular pathway. It is intended at a later date to add additional units and pathways to the qualifications.

Certificate III in Manufacturing Technology

This is comprised of ten units of competency and is normally delivered as part of a one year Technology Cadetship. There are two core units that must be completed for all pathways as well as eight electives.

Certificate IV in Manufacturing Technology

This is comprised of fifteen units of competency and is normally delivered as part of a two year Technology Cadetship. There are three core units that must be completed for all pathways.

Pathways

The Certificates III and IV in Manufacturing Technology have the same pathways available within each qualification, with each pathway offering an opportunity for significant choice in electives. The pathways are:

- CAD/Drafting pathway
- Manufacturing Operations pathway
- Laboratory Operations pathway
- Technical Officer pathway

Reference to these pathways may be included on any qualification statement that is issued. This could be achieved by adding the pathway descriptor below the formal title of the qualification as shown in example 1 or by an additional sentence as shown in example 2 below.

Example 1

Certificate III in Manufacturing Technology

Manufacturing Operations pathway

Example 2

Certificate III in Manufacturing Technology

Achieved through the Manufacturing Operations pathway

It should also be noted that a person holding the Metal and Engineering Training Package Certificate III in Engineering - Technician will satisfy all of the requirements for a Certificate III in Manufacturing Technology, and with an additional five units of competency from the particular pathway chosen will satisfy the requirements for a Certificate IV in Manufacturing Technology.

Key Competencies

The key competencies for the Certificate III in Manufacturing Technology and the Certificate IV in Manufacturing Technology are described in general terms earlier in this Volume One of the Competitive Manufacturing Training Package (MCM04).

The Key Competencies and the Certificate III in Manufacturing Technology

The following describes a typical application of the Key Competencies at Certificate III level.

The Certificate III in Manufacturing Technology qualification is aimed at school leavers who have completed Year 12 and who will require a level of competence needed to participate as members of their team and interact with supervisors and managers. The Certificate III in Manufacturing Technology is seen as the beginning of a career pathway in Technician skills and it is anticipated that many students will complete the qualification and proceed to further study at the Diploma and the Advanced Diploma level.

Performance level two of the key competencies requires a level of skill to manage activities requiring the selection, application and integration of a number of elements and to select from established criteria to judge quality of process and outcome. This was assessed as the most appropriate general level for key competency integration at the CMI Certificate III and also the Certificate IV level Manufacturing Technology qualification level. These qualifications are made up of technician level skills that require exercise of judgement and generally the equivalent of year 12 English, Mathematics and Science ability.

Each individual key competency was also examined to confirm that performance level two was appropriate for the Certificate III and IV qualifications and any exception to the Performance Level 2 Key Competency specification is noted.

It also needs to be noted that ' *?the current definitions are problematic. The industry or workplace context is generally seen as far more indicative in determining the degree of difficulty of the application of the Key Competencies than the prescribed and abstracted*

performance?' (Ref: Australian National Training Authority, Template for the Print Version of a Training Package, February 2001, Appendix J) CMI and Technology Cadetship consultations have confirmed the importance of the workplace context and RTOs should exercise discretion in assessing the level of Key Competencies to integrate into CMI delivery.

1. Collecting, analysing and organising information

The execution of the competencies required for Certificate III always require the collection, analysis and organisation of data/information. A typical application would be a technology cadet who would need to clarify the purpose of a technical test and access and record information from a variety of sources. The person would be assessing information for relevance, accuracy and completeness in terms of the test to be undertaken. At this level this would be performed in accordance with relevant organisation procedures.

2. Communicating ideas and information

The Technology Cadet will be required to adapt modes and styles of communication to suit the enterprise environment and the purpose of the communication. The cadet will work closely with supervisors and qualified technicians and will be required to discuss specifications and technical processes. At this level this communication would be in accordance with organisation procedures.

3. Planning and organising activities

Self planning and organising (within an overall framework) is required from all employees in a competitive manufacturing organisation including Technology Cadets. They will have responsibility for achieving objectives and maximising the quality of outcomes or processes consistent with their level of responsibility and in accordance with procedures.

4. Working with others and in teams

Working in teams is fundamental to the way most competitive manufacturing organisations work. Teams may be single level work area teams, multidisciplinary, multi-level teams, permanent teams, ad hoc teams or any other combination of people may be termed a 'team'. As the Technology Cadet is in a learning environment within the enterprise working with others will be the norm.

5. Solving problems

This key competency requires performance level one in the CMI AQF 3 and 4 qualifications. At the Certificate III and IV level problems will typically be related to the process in some way, but may also be interpersonal or other problems. Many of the units focus on particular methods of identifying and solving problems. At this level the solving of problems would be in accordance with procedures and outcomes would always be checked with trainers and supervisors.

6. Using mathematical ideas and techniques

This key competency requires performance level two in the CMI AQF 3 and 4 qualifications. While some units do not require high level mathematical ideas and techniques the qualification as a whole requires skills appropriate to technician level work in manufacturing. This involves in most cases an ability to undertake and interpret tests, formulae or measurements that require performance level two mathematical ability.

7. Using technology

Technology cadets will be required to interact with the technology of the enterprise as a major activity. Increasingly this technology also includes interaction with digital technology in some way.

At the CMI Certificate III and IV level in a manufacturing organisation a person interprets the

purposes and objectives for the use of technology, and configures and manages a series of operations as a process, and selects technological practices to conform with the guidelines for health and safety, environmental impact and ethical practice, and uses them within those guidelines, and uses technological equipment and material proficiently for the prevailing environs and physical capacity. These interactions are in accordance with the procedures of the organisation.

Skill Sets

Definition

Skill sets are defined as single units of competency, or combinations of units of competency from an endorsed Training Package, which link to a licence or regulatory requirement, or defined industry need.

Wording on Statements of Attainment

Skill sets are a way of publicly identifying logical groupings of units of competency which meet an identified need or industry outcome. Skill sets are not qualifications.

Where skill sets are identified in a Training Package, the Statement of Attainment can set out the competencies a person has achieved in a way that is consistent and clear for employers and others. This is done by including the wording 'these competencies meet [the relevant skill set title or industry need is included]' on the Statement of Attainment. This wording applies only to skill sets that are formally identified as such in the endorsed Training Package.

All Statements of Attainment must include the wording 'A Statement of Attainment is issued by a Registered Training Organisation when an individual has completed one or more units of competency from a nationally recognised qualification'. The following may also be used 'these competencies form part of the [the relevant qualification(s) code and title are inserted]'.

This section below provides information on skill sets within this Training Package, with the following important disclaimer: **Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.**

Skill Sets in this Training Package

Where this section is blank, nationally recognised skill sets have yet to be identified in this industry.

Assessment Guidelines

Introduction

These Assessment Guidelines provide the endorsed framework for assessment of units of competency in this Training Package. They are designed to ensure that assessment is consistent with the Australian Quality Training Framework (AQTF) *Standards for Registered Training Organisations*. Assessments against the units of competency in this Training Package must be carried out in accordance with these Assessment Guidelines.

Assessment System Overview

This section provides an overview of the requirements for assessment when using this Training Package, including a summary of the AQTF requirements; licensing/registration requirements; and assessment pathways.

Benchmarks for Assessment

Assessment within the National Training Framework is the process of collecting evidence and making judgements about whether competency has been achieved to confirm whether an individual can perform to the standards expected in the workplace, as expressed in the relevant endorsed unit of competency.

In the areas of work covered by this Training Package, the endorsed units of competency are the benchmarks for assessment. As such, they provide the basis for nationally recognised Australian Qualifications Framework (AQF) qualifications and Statements of Attainment issued by Registered Training Organisations (RTOs).

Australian Quality Training Framework Assessment Requirements

Assessment leading to nationally recognised AQF qualifications and Statements of Attainment in the vocational education and training sector must meet the requirements of the AQTF as expressed in the *Standards for Registered Training Organisations.*

The *Standards for Registered Training Organisations* can be downloaded from the DEST website at *www.dest.gov.au* or can be obtained in hard copy from DEST. The following points summarise the assessment requirements under the AQTF.

Registration of Training Organisations

Assessment must be conducted by, or on behalf of, an RTO formally registered by a State or Territory Registering/Course Accrediting Body in accordance with the *Standards for Registered Training Organisations*. The RTO must have the specific units of competency and/or AQF qualifications on its scope of registration. See Section 1 of the *Standards for Registered Training Organisations*.

Quality Training and Assessment

Each RTO must have systems in place to plan for and provide quality training and assessment across all its operations. See Standard 1 of the *Standards for Registered Training Organisations*.

Assessor Competency Requirements

Each person involved in training, assessment or client service must be competent for the functions they perform. See Standard 7 of the *Standards for Registered Training Organisations* for assessor competency requirements. Standard 7 also specifies the competencies that must be held by trainers.

Assessment Requirements

The RTOs assessments must meet the requirements of the endorsed components of Training Packages within its scope of registration. See Standard 8 of the *Standards for Registered Training Organisations*.

Assessment Strategies

Each RTO must identify, negotiate, plan and implement appropriate learning and assessment strategies to meet the needs of each of its clients. See Standard 9 of the *Standards for Registered Training Organisations*.

Mutual Recognition

Each RTO must recognise the AQF qualifications and Statements of Attainment issued by any other RTO. See Standard 5 of the *Standards for Registered Training Organisations*.

Access and Equity and Client Services

Each RTO must apply access and equity principles, provide timely and appropriate information, advice and support services that assist clients to identify and achieve desired outcomes. This may include reasonable adjustment in assessment. See Standard 6 of the *Standards for Registered Training Organisations*.

Partnership Arrangements

RTOs must have, and comply with, written agreements with each organisation providing training and/or assessment on its behalf. See Standard 1.6 of *Standards for Registered Training Organisations*.

Recording Assessment Outcomes

Each RTO must have effective administration and records management procedures in place, and must record AQF qualifications and Statements of Attainment issued. See Standards 4 and 10.2 of the *Standards for Registered Training*.

Issuing AQF Qualifications and Statement of Attainment

Each RTO must issue AQF qualifications and Statements of Attainment that meet the requirements of the *AQF Implementation Handbook* and the endorsed Training Packages within the scope of its registration. An AQF qualification is issued once the full requirements for a qualification, as specified in the nationally endorsed Training Package are met. A Statement of Attainment is issued where the individual is assessed as competent against fewer units of competency than required for an AQF qualification. See Standard 10 and Section 2 of the *Standards for Registered Training Organisations*.

Licensing/Registration Requirements

This section provides information on licensing/registration requirements for this Training Package, with the following important disclaimer.

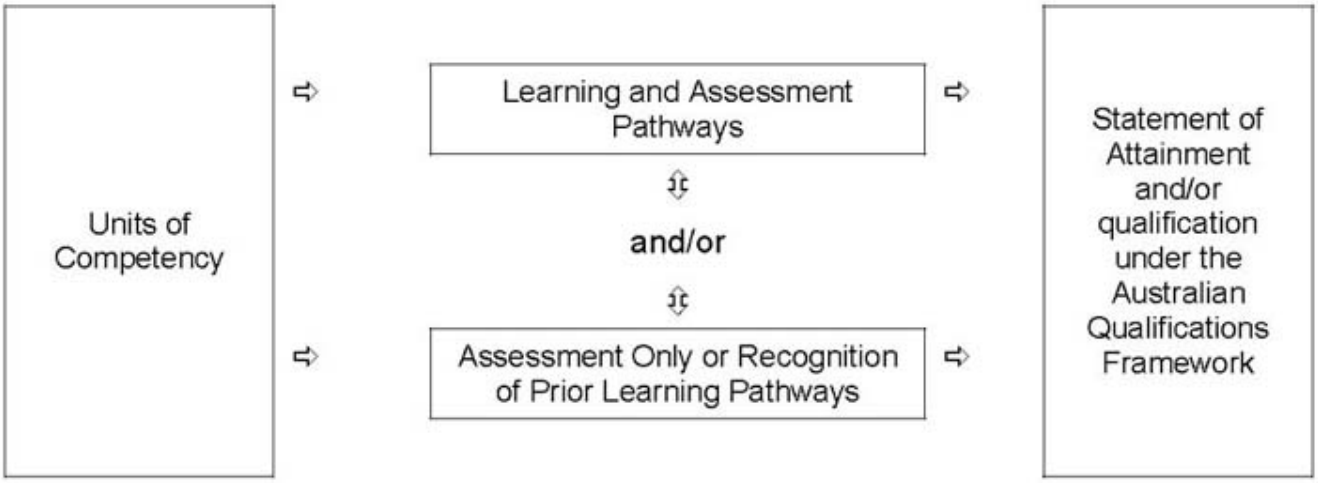
The developers of this Training Package, and ANTA, consider that no licensing or registration requirements apply to RTOs, assessors or candidates with respect to this Training Package. Contact the relevant State or Territory Department(s) to check if there are any licensing or registration requirements with which you must comply. For further information on this topic contact Manufacturing Skills Australia on (02) 9955 5500 or www.mskills.com.au .

Pathways

The competencies in this Training Package may be attained in a number of ways including through:

- formal or informal education and training
- experiences in the workplace
- general life experience, and/or
- any combination of the above.

Assessment under this Training Package leading to an AQF qualification or Statement of Attainment may follow a learning and assessment pathway, an assessment-only or recognition pathway, or a combination of the two as illustrated in the following diagram.



Each of these assessment pathways leads to full recognition of competencies held - the critical issue is that the candidate is competent, not how the competency was acquired.

Assessment, by any pathway, must comply with the assessment requirements set out in the *Standards for Registered Training Organisations*.

Learning and Assessment Pathways

Usually, learning and assessment are integrated, with assessment evidence being collected and feedback provided to the candidate at anytime throughout the learning and assessment process.

Learning and assessment pathways may include structured programs in a variety of contexts using a range of strategies to meet different learner needs. Structured learning and assessment programs could be: group-based, work-based, project-based, self-paced, action learning-based; conducted by distance or e-learning; and/or involve practice and experience in the workplace.

Learning and assessment pathways to suit New Apprenticeships have a mix of formal structured training and structured workplace experience with formative assessment activities through which candidates can acquire and demonstrate skills and knowledge from the relevant units of competency.

Assessment-Only or Recognition of Prior Learning Pathway

Competencies already held by individuals can be formally assessed against the units of competency in this Training Package, and should be recognised regardless of how, when or where they were achieved.

In an assessment-only or Recognition of Prior Learning (RPL) pathway, the candidate provides current, quality evidence of their competency against the relevant unit of competency. This process may be directed by the candidate and verified by the assessor, such as in the compilation of portfolios; or directed by the assessor, such as through observation of workplace performance and skills application, and oral and/or written assessment. Where the outcomes of this process indicate that the candidate is competent,

structured training is not required. The RPL requirements of Standard 8.2 of the *Standards for Registered Training Organisations* must be met.

As with all assessment, the assessor must be confident that the evidence indicates that the candidate is currently competent against the endorsed unit of competency. This evidence may take a variety of forms and might include certification, references from past employers, testimonials from clients, and work samples. The onus is on candidates to provide sufficient evidence to satisfy assessors that they currently hold the relevant competencies. In judging evidence, the assessor must ensure that the evidence of prior learning is:

- authentic (the candidates own work)
- valid (directly related to the current version of the relevant endorsed unit of competency)
- reliable (shows that the candidate consistently meets the endorsed unit of competency)
- current (reflects the candidates current capacity to perform the aspect of the work covered by the endorsed unit of competency), and
- sufficient (covers the full range of elements in the relevant unit of competency and addresses the four dimensions of competency, namely task skills, task management skills, contingency management skills, and job/role environment skills).

The assessment only or recognition of prior learning pathway is likely to be most appropriate in the following scenarios:

- candidates enrolling in qualifications who want recognition for prior learning or current competencies
- existing workers
- individuals with overseas qualifications
- recent migrants with established work histories
- people returning to the workplace, and
- people with disabilities or injuries requiring a change in career.

Combination of Pathways

Where candidates for assessment have gained competencies through work and life experience and gaps in their competence are identified, or where they require training in new areas, a combination of pathways may be appropriate.

In such situations, the candidate may undertake an initial assessment to determine their current competency. Once current competency is identified, a structured learning and assessment program ensures that the candidate acquires the required additional competencies identified as gaps.

Assessor Requirements

This section identifies the mandatory competencies for assessors, and clarifies how others may contribute to the assessment process where one person alone does not hold all the required competencies.

Assessor Competencies

The *Standards for Registered Training Organisations* specify mandatory competency requirements for assessors. For information, Standard 7.3 from the *Standards for Registered Training Organisations* follows:

7.3	**a**	The RTO must ensure that assessments are conducted by a person who has:

		• the following competencies* from the Training Package for Assessment and Workplace Training, or demonstrated equivalent competencies:
		  • TAAASS401A Plan and organise assessment;
		  • TAAASS402A Assess competence;

		• TAAASS404A Participate in assessment validation; • relevant vocational competencies, at least to the level being assessed.
	b	However, if a person does not have all of the competencies in Standards 7.3 **a** (i) and the vocational competencies as defined in 7.3 **a** (ii), one person with the competencies listed in Standard 7.3 **a** (i), and one or more persons who have the competencies listed in Standard 7.3 **a** (ii) may work together to conduct assessments.
		* A person who holds the competencies BSZ401A Plan assessment, BSZ402A Conduct assessment, and BSZ403A Review assessment from the Training Package for Assessment and Workplace Training will be accepted for the purposes of this standard. A person who has demonstrated equivalent competencies to BSZ401A and BSZ402A and BSZ403A in the period up to 12 months following publication of the Training and Assessment Training Package will also be accepted for the purposes of this standard.

MCM04 has adopted the ANTA model assessment guidelines as required. These model guidelines have been customised by the addition of Section 5 - Assessment for competitive manufacturing.

Designing Assessment Tools

This section provides an overview on the use and development of assessment tools.

Use of Assessment Tools

Assessment tools provide a means of collecting the evidence that assessors use in making judgements about whether candidates have achieved competency.

There is no set format or process for the design, production or development of assessment tools. Assessors may use prepared assessment tools, such as those specifically developed to support this Training Package, or they may develop their own.

Using Prepared Assessment Tools

If using prepared assessment tools, assessors should ensure these are benchmarked, or mapped, against the current version of the relevant unit of competency. This can be done by checking that the materials are listed on the National Training Information Service (http://www.ntis.gov.au). Materials on the list have been noted by the National Training Quality Council as meeting their quality criteria for Training Package support materials.

Developing Assessment Tools

When developing assessment tools, assessors must ensure that they:

- are benchmarked against the relevant unit or units of competency
- are reviewed as part of the validation of assessment strategies as required under 9.2 (i) of the *Standards for Registered Training Organisations*
- meet the assessment requirements expressed in the *Standards for Registered Training Organisations*, particularly Standards 8 and 9.

A key reference for assessors developing assessment tools is TAA04 Training and Assessment Training Package and the unit of competency TAAASS403A *Develop assessment tools*. There is no set format or process for the design, production or development of assessment materials.

Conducting Assessment

This section details the mandatory assessment requirements and provides information on equity in assessment including reasonable adjustment.

Mandatory Assessment Requirements

Assessments must meet the criteria set out in Standard 8 from the *Standards for Registered Training Organisations*. For information, Standard 8 from the *Standards for Registered Training Organisations* is reproduced below.

8		**RTO Assessments**
		The RTOs assessments meet the requirements of the endorsed components of Training Packages and the outcomes specified in accredited courses within the scope of its registration.
8.1		The RTO must ensure that assessments (including RPL):
	i.	comply with the assessment guidelines included in the applicable nationally endorsed Training Packages or the assessment requirements specified in accredited courses;
	ii.	lead to the issuing of a statement of attainment or qualification under the AQF when a person is assessed as competent against nationally endorsed unit(s) of competency in the applicable Training Package or modules specified in the applicable accredited course;
	iii.	are valid, reliable, fair and flexible;
	iv.	provide for applicants to be informed of the context and purpose of the assessment and the assessment process;
	v.	where relevant, focus on the application of knowledge and skill to standard of performance required in the workplace and cover all aspects workplace performance, including task skills, task management skills, contingency management skills and job role environment skills;
	vi.	involve the evaluation of sufficient evidence to enable judgements to be made about whether competency has been attained;
	vii.	provide for feedback to the applicant about the outcomes of the assessment process and guidance on future options in relation to those outcomes;
	viii.	are equitable for all persons, taking account of individual needs relevant to the assessment; and
	ix.	provide for reassessment on appeal.
8.2	a	The RTO must ensure that RPL is offered to all applicants on enrolment
	b	The RTO must have an RPL process that:
		i. is structured to minimise the time and cost to applicants; and ii. provides adequate information, support and opportunities for participants to engage in the RPL process.

Access and Equity

An individuals access to the assessment process should not be adversely affected by restrictions placed on the location or context of assessment beyond the requirements specified in this Training Package.

Reasonable adjustments can be made to ensure equity in assessment for people with disabilities. Adjustments include any changes to the assessment process or context that meet the individual needs of the person with a disability, but do not change competency outcomes. Such adjustments are considered reasonable if they do not impose an unjustifiable hardship on a training provider or employer. When assessing people with disabilities, assessors are encouraged to apply good practice assessment methods with sensitivity and flexibility.

Assessment for Competitive Manufacturing

General Issues

Assessment of competency will be in accordance with the relevant legislation applying in each State and Territory. The assessor has a legal duty under both legislation and common law duty of care to ensure that the assessment activities do not pose a risk to either the candidate or others (such as other workers or the community) who may be in the learning and assessment environment or affected by the learning or assessment activities.

Wherever possible integrated assessment, which reflects the grouping of competencies as they would be demonstrated in an actual work role, is the preferred means of assessment. The context of the assessment is defined in each unit of competency.

Assessment Considerations for 'Systems' and ' Change/interpersonal' Units

These units reflect the need to consider the system as a whole in competitive manufacturing and also that change is a regular part of life in competitive manufacturing. It may be difficult to assess these units independently and a better approach may be to integrate their assessment with that of one or more 'tools' units.

Project-based Assessment

Many of the units of competency (particularly those at Diploma and Advanced Diploma level) lend themselves to a project-based assessment as many of these competencies would be undertaken as part of a project in the workplace. Using these projects for assessment, or alternatively requiring the assessee to undertake a project specifically for assessment fits well with the competency. Where project-based assessment is undertaken, then care needs to be taken to not contaminate the evidence of competence with other factors which may occur but which are not directly related to the competency. It is also important for any external RTO to be aware of, and observe, any confidentiality issues which may arise during the project. The timing of project-based assessment needs to fit with the requirements of the organisation where the project is being conducted and this may not fit conveniently with any external timetable.

Integrated Assessment

It is the intention that the ability to perform the unit of competency as a whole be the key criterion in any assessment process.

Further, it is frequently appropriate to assess more than one unit of competency at the same time, either because the competencies combine to make a whole job component or because certain competencies are only practised in combination with other competencies in a particular workplace. The assessment of more than one unit of competency concurrently is desirable, provided adequate evidence is gathered for each competency involved.

Simulation

Where it is not possible to gather sufficient assessment evidence from a workplace then assessment may occur off the job in some circumstances. 'Off the job' means that the candidate is not in productive work at the time the evidence is gathered. In these instances an appropriate simulation must be used where the range of conditions and experiences reflects realistic workplace situations.

The true test of competency should always relate to whether the individual can perform to the standards expected in the workplace, as expressed in the units of competency.

Further Sources of Information

The section provides a listing of useful contacts and resources to assist assessors in planning, designing, conducting and reviewing of assessments against this Training Package.

Contacts

Manufacturing Skills Australia PO Box 289 NORTH SYDNEY NSW 2059

Ph 02 9955 5500 Fax 02 9955 8044 Web: www.mskills.com.au Email: info@mskills.com.au

Australian Training Products Ltd

Level 25, 150 Lonsdale Street

MELBOURNE VIC 3000

PO Box 12211

A'Beckett Street Post Office

MELBOURNE VIC 8006

Telephone: (03) 9655 0600

Fax: (03) 9639 4684

Web: *www.atpl.net.au*

Email: sales@atpl.net.au

Innovation and Business Industry Skills Council

Building B, Level 2

192 Burwood Road

Telephone: (03) 9815 7000

Fax: (03) 9815 7001

Email: virtual@ibsa.org.au

General Resources

Refer to http://antapubs.dest.gov.au/publications/search.asp to locate the following ANTA publications.

AQF Implementation Handbook, third Edition. Australian Qualifications Framework Advisory Board, 2002, aqf.edu.au

Australian Quality Training Framework (AQTF) - for general information go to: www.dest.gov.au/sectors

Australian Quality Training Framework (AQTF) - for resources and information go to:

www.dest.gov.au

Australian Quality Training Framework *Standards for Registered Training Organisations*, Australian National Training Authority, Melbourne, 2005. Available in hard copy from State and Territory Training Authorities or can be downloaded from www.dest.gov.au

TAA04 Training and Assessment Training Package. This is available from the Innovation and Business Skills Australia (IBSA) Industry Skills Council and can be viewed, and components downloaded, from the National Training Information Service (NTIS). National Training Information Service, an electronic database providing comprehensive information about RTOs, Training Packages and accredited courses - www.ntis.gov.au*Style Guide for Training Package Support Materials*, Australian National Training Authority, Melbourne, 2003. Can be downloaded from the ANTA page at www.dest.gov.au

Assessment Resources

Training Package Assessment Guides - a range of resources to assist RTOs in developing Training Package assessment materials developed by DEST with funding from the Department of Education, Training and Youth Affairs. It is made up of 10 separate titles, as described at the ANTA publications page of www.dest.gov.au. Go to www.resourcegenerator.gov.au/loadpage.asp?TPAG.htm

Printed and/or CD ROM versions of the Guides can be purchased from Australian Training Products (ATP). The resource includes the following guides:

- Training Package Assessment Materials Kit
- Assessing Competencies in Higher Qualifications
- Recognition Resource
- Kit to Support Assessor Training
- Candidates Kit: Guide to Assessment in New Apprenticeships
- Assessment Approaches for Small Workplaces
- Assessment Using Partnership Arrangements
- Strategies for ensuring Consistency in Assessment
- Networking for Assessors
- Quality Assurance Guide for Assessment

An additional guide "Delivery and Assessment Strategies" has been developed to complement these resources.

Assessment Tool Design and Conducting Assessment

VETASSESS AND; Western Australian Department of Training and Employment 2000, *Designing Tests - Guidelines for designing knowledge based tests for Training Packages*. Vocational Education and Assessment Centre 1997, Designing Workplace Assessment Tools, *A self-directed learning program*, NSW TAFE.

Manufacturing Learning Australia 2000, *Assessment Solutions*, Australian Training Products, Melbourne.

Rumsey, David 1994, *Assessment practical guide*, Australian Government Publishing Service, Canberra.

Assessor Training

Australian Committee on Training Curriculum (ACTRAC) 1994, *Assessor training program - learning materials*, Australian Training Products, Melbourne.

Australian National Training Authority, *A Guide for Professional* Development, ANTA,

Brisbane.

Australian Training Products Ltd *Assessment and Workplace Training, Training Package - Toolbox*, ATPL Melbourne.

Green, M, et al. 1997, *Key competencies professional development Package*, Department for Education and Childrens Services, South Australia.

Victorian TAFE Association 2000, *The professional development CD: A learning tool*, VTA, Melbourne.

Assessment System Design and Management

Office of Training and Further Education 1998, *Demonstrating best practice in VET project - assessment systems and processes*, OTFE Victoria.

Toop, L., Gibb, J. and; Worsnop, P. *Assessment system designs*, Australian Government Publishing Service, Canberra.

Western Australia Department of Training and VETASSESS 1998, *Kit for Skills Recognition Organisations*, WADOT, Perth.

MCMC411A Lead a competitive manufacturing team

Unit Descriptor

This unit covers the knowledge and skills needed by people who lead teams in a competitive manufacturing environment. The team may be operating in manufacturing or in a manufacturing support function e.g. maintenance, office, warehousing etc.

Application of the Unit

In a typical scenario, the team leader in a ***competitive manufacturing*** organisation needs to integrate a range of knowledge and skills. The team leader must lead and assist team members to understand and apply a holistic view of their job and the team's role within the organisation and the objectives that the team must meet as part of the competitive manufacturing system used by the enterprise.

Unit Sector

CMI Change/interpersonal

ELEMENT	PERFORMANCE CRITERIA
1. Facilitate the development of process and competitive manufacturing knowledge	1.1 Ensure necessary technical documentation and information about the process and ***competitive manufacturing*** is available to the team 1.2 Develop mentoring processes for team members 1.3 Structure team activities in a way which facilitates the ongoing development of the skills and knowledge of team members 1.4 Arrange for the provision of workforce development and training for team members as appropriate 1.5 Encourage team members to apply technical knowledge to the process.
2. Facilitate efficiency improvements in team activities	2.1 Ensure ***budgets, operating procedures*** and other related documentation is available to the team 2.2 Assist team members apply this information to the process responsibilities of the team 2.3 Encourage team members to identify ***waste*** 2.4 Develop an environment where efficiency improvements are recommended by team members
3. Resource and encourage a proactive maintenance approach	3.1 Develop communications between specialists outside the team and team members 3.2 Develop strategies to monitor and deal with ***key reliability issues*** 3.3 Resource and encourage team members to identify and take appropriate action on potential equipment problems 3.4 Arrange for workforce development and training for team members as required in proactive maintenance procedures and techniques

4. Implement process and organisation improvements	4.1 Plan the implementation of team suggested and externally directed improvements 4.2 Facilitate team member commitment to, and involvement in, the implementation planning of improvements and to follow improvements to their conclusion 4.3 Encourage the application of the 'plan, do, measure, improve, control' approach to the job 4.4 Arrange for workforce development and training as required to facilitate continued team involvement in improvement processes

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems control and data acquisition software (SCADA), enterprise resource planning systems (ERP), Manufacturing resource planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- just in time, kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems.

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector..

Team

Team may include work teams from all sections of the organisation including production, maintenance, technical, administration/finance, sales/marketing.

Budgets

Budgets include financial, time, materials/product and other business plans which are relevant to the team and the work area.

Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.
Key reliability issues	Key reliability issues are typically things like cleanliness, lubrication and correct adjustment which are most likely to lead to failure.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The competent person would be able to lead a competitive manufacturing team and facilitate their improving the process.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of effective team leadership would be required.
In what context should assessment occur?	Assessment needs to occur in an organisation implementing a competitive manufacturing environment or by a project.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other team leader units dealing with change/improvement in the organisation.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment

What evidence is required for demonstration of consistent performance?

Evidence from one significant manufacturing improvement or change process may be sufficient. For less significant improvement or changes, a range of changes will be needed to generate sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- communication techniques
- negotiation skills
- information finding and analysing/using skills
- team work

Knowledge

- understanding of the competitive manufacturing process or processes used at the enterprise

What are the specific resource requirements for this unit?

Access to an organisation implementing a significant change to or in competitive manufacturing.

MCMC614A Develop a communications strategy to support production

Unit Descriptor

This unit covers the knowledge and skills needed to develop and implement a communications strategy to support production in a competitive manufacturing environment.

Application of the Unit

In a typical scenario, a person (who may be a manager, technical specialist or other person) is required to analyse a situation to determine the required communication strategies from a wide range of possibilities and then implement that strategy or modify an existing strategy.

Unit Sector

CMI Interpersonal/change

ELEMENT	PERFORMANCE CRITERIA
1. Determine information needs of employees and manufacturing systems	1.1 Examine ***competitive manufacturing*** strategy and determine broad information framework 1.2 Examine the production process and its requirements and determine the information needs of production employees 1.3 Examine the maintenance strategy and determine the information needed by maintenance employees 1.4 Examine the office, logistics, sales, marketing and other areas supporting production and determine the information needs of employees 1.5 Discuss information used and desired with employees at all relevant levels 1.6 Examine control systems to determine their data needs
2. Select communication strategy	2.1 Analyse required information flows 2.2 Determine ***access requirements*** by information users 2.3 Evaluate suitability of ***communication media*** for required information flows and access 2.4 Discuss possible strategy with relevant stakeholders 2.5 Select an appropriate strategy or strategies.
3. Implement strategy	3.1 Develop list of what needs to be done 3.2 Determine resources required to implement strategy 3.3 Obtain authority for communication media to be developed 3.4 Monitor development of communication media and take appropriate corrective action as required 3.5 Deploy developed communication media
4. Monitor ongoing situation	4.1 Determine relevant indicators for communication strategy 4.2 Monitor indicators 4.3 Re-evaluate communication needs on a regular basis 4.4 Make improvements to the communication strategy as appropriate.

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems control and data acquisition software (SCADA), enterprise resource planning systems (ERP), Manufacturing resource planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- just in time, kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems.

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

Access requirements

Access requirements include:

- occasional access
- periodic access
- continual access
- visual/auditory/tactile access
- on line/hard copy access
- specific location
- many or generalised locations

Communication media	Communication media include: • manuals such as SOPs, OHS and training manuals, • aide memoir • verbal • signage • instruction displays • tags, isolations/lockouts • permits to work/clearances • operator reporting • visual factory type displays • painted walkways • tools/keys/buttons with a specific feel
Stakeholders	Includes team members, personnel officers, industrial officers, union delegates, production management, human relations management, financial management, engineering/ technical personnel.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

Assessment should aim to demonstrate that the person being assessed can develop a communication strategy which will meet the information needs of a competitive manufacturing organisation and its employees.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of developing/improving a communications strategy.
In what context should assessment occur?	Assessment will need to occur in a competitive manufacturing organisation and where the individual is responsible for the communication strategy or by case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available from an extended period of time and may be historic if the person has been in this role for some time.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- negotiating
- communication
- team work
- problem solving

Knowledge

- knowledge of communication media
- communication needs of the organisation and its individuals

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies is required. No other specific resources are required.

MCMT662A Develop a documentation control strategy for a manufacturing enterprise

Unit Descriptor

This unit covers the knowledge and skills needed to develop and implement a documentation control strategy for a manufacturing enterprise such as might be needed to comply with ISO9000 or other reasons.

Application of the Unit

In a typical scenario, a person (who may be a manager, technical specialist or other person) implementing a competitive manufacturing strategy is required to develop and/or improve a system to ensure manufacturing and related supporting documents are controlled in a manner which is appropriate for their use in the organisation.

Unit Sector

CMI Interpersonal/change

ELEMENT	PERFORMANCE CRITERIA
1. Identify and obtain agreement to document management standards	1.1 Establish an appropriate working group of stakeholders 1.2 Agree on purpose and scope of document management standards including interaction with production, maintenance, logistics, sales and marketing systems 1.3 Identify any relevant ***external standards and conventions*** 1.4 Agree on document control, tracking and updating processes 1.5 Document the document management standards and circulate to relevant stakeholders 1.6 Negotiate any variations
2. Determine document style and establish standards and conventions	2.1 Consider potential document style/s 2.2 Agree on document conventions and layout 2.3 Agree on standard symbols, abbreviations and similar 2.4 Produce a style sheet, document model or template as appropriate 2.5 Check document style conforms to document management standards 2.6 Circulate to relevant stakeholders and negotiate any variations
3. Implement document control strategy	3.1 Develop a document control strategy and procedures including arrangements ongoing review of strategy 3.2 Establish mechanisms to check documents conform to the control strategy 3.3 Arrange for appropriate staff development 3.4 Monitor implementation of document control strategy 3.5 Make improvements to the documentation control strategy as appropriate

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

External standards and conventions	External standards include ISO9000, AGPS *Style Manual*, Engineering and other technical standards, drawing standards, organisational style/marketing guides etc. External standards and conventions also include documentation requirements of suppliers, customers, and regulatory agencies.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to develop a document control strategy which will meet the needs of the organisation and its people

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of developing/improving a document control strategy.
In what context should assessment occur?	Assessment will need to occur in a competitive manufacturing organisation and where the individual is responsible for the document control strategy or by case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available from an extended period of time and may be historic if the person has been in this role for some time.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- negotiating
- communication
- team work
- problem solving
- relevant computer applications which may include:
  - word Processing
  - spreadsheets
  - database
  - drawing/CAD/CAM

Knowledge

- knowledge of documents and documentation control
- needs of the organisation and its individuals

What are the specific resource requirements for this unit?

Access to a workplace using or implementing document control strategies is required. No other specific resources are required.

MCMO290A Work safely in manufacturing

Unit Descriptor

This unit covers the knowledge and skills required to work safely in a simulated or trial manufacturing environment where there is a high degree of direct supervision. The unit covers identifying workplace occupational health and safety hazards, assessing risks and following instructions and procedures to control and minimise hazards. It also covers the participation in and contribution to OHS management issues in an appropriate manner.

Application of the Unit

This unit applies to a learning and assessment environment where access to normal production operations is not available . A typical environment will be for application in a VET in Schools delivery environment or other simulated or trial manufacturing environment where a high degree of direct supervision exists.

The unit covers the ability to identify and assess hazards and then follow the designated control procedures for minimising or eliminating the hazard. The unit also covers also require the taking of a proactive stance in improving workplace safety and the need to understand and comply with Acts, and workplace procedures and protocols.

Unit Sector

CMI OHS

ELEMENT	PERFORMANCE CRITERIA
1. Identify and assess workplace/job hazards.	1.1 Identify ***hazards*** in the job/work area 1.2 Describe the causes of such hazards 1.3 Identify ***likelihood of occurrence*** 1.4 Evaluate severity of possible risk.
2. Follow procedures for risk control.	2.1 Follow ***procedures*** for assessing and controlling risks 2.2 Identify the consequences of failing to follow these procedures 2.3 Whenever necessary, within the scope of responsibilities and competencies, follow ***incident*** and ***emergency*** procedures. 2.4 Report any hazard which is not able to be controlled adequately by procedures.
3. Initiate suggestions to enhance task/job-specific safety.	3.1 Raise task and/or job specific OHS issues with appropriate people in accordance with workplace procedures and relevant OHS legislative requirements 3.2 Contribute to ***participative arrangements*** for OHS management in the workplace within organisational procedures and the scope of responsibilities and competencies 3.3 Provide advice on hazards in work area in line with organisational OHS policies and procedures 3.4 Provide support in implementing procedures to control risks using the hierarchy of controls and in accordance with organisational procedures

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

It is expected that workers will be provided with clear directions, information, instruction, training and appropriate supervision regarding the relevant State/Territory OHS legislation, codes of practice, relevant industry standards, workplace procedures and work instructions.

Workplace	Workplace for this unit means a manufacturing environment specifically established for learning introductory manufacturing skills. It may be: • a school classroom or workshop equipped to teach manufacturing principles and practices • RTO premises equipped to teach manufacturing principles and practices • an enterprise environment where above average supervision exists and training is occurring. The normal production imperatives have been modified to take into account the training being delivered.
Hazards	Workplace hazards include: • hazardous materials • gases and liquids under pressure • moving machinery • cutting edges • electrical equipment • materials handling • working at heights, in restricted or confined spaces, or environments subjected to heat, noise, dusts or vapours.
Likelihood of occurrence	Likelihood of occurrence may include: • quantitative probabilities where appropriate • estimates in terms of 'low', 'medium' or ' high' • other appropriate non-quantitative estimates of probability
Procedures	Procedures includes work instructions, standard operating procedures, formulas/ recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of machinery and processes. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, ' procedures' also includes good operating practice as may be defined by industry codes of practice (eg Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

Incident	Incident includes everything which is not part of standard procedures and includes: • near misses • situations which may have resulted in an emergency if it were not for avoidance actions taken or good luck
Emergencies	Emergencies include: • accidents including those that do not result in injury • fires • chemical spills • bomb scares • Equipment malfunctions that pose significant risk including overheating, overspeed, electrical malfunctions such as "live" equipment etc.
Participative arrangements	Participative arrangements may include: • workplace meetings • suggestion schemes • regular communications with team leaders or management information sessions

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

Assessment for this unit of competency will be by case study, simulation or on an operating plant. The unit will be assessed in as holistic a manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations which may include disruptions to normal, smooth operation.

Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on an actual plant situation and may include walk throughs of the relevant competency components. Simulations may also include the use of case studies/ scenarios and role plays.

This unit of competency requires a significant body of knowledge which will be assessed through questioning and the use of what if scenarios.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?

It is essential that typical workplace OHS systems and State OHS regulations and relevant State and national industry standards are understood and that the importance of critical safety procedures is known. Competence must be demonstrated in the ability to recognise potential situations requiring action and then in implementing appropriate corrective action.

The emphasis should be on the exercise of duty of care responsibilities, not only within the general OHS Acts and regulations, but also within those applying to hazardous substances, dangerous goods and major hazards.

In particular look for evidence of:

- understanding of relevant workplace procedures including:
- hazard policies and procedures
- emergency, fire and accident procedures
- procedures for the use of personal protective clothing and equipment
- hazard identification and risk assessment procedures
- job operating procedures and work instructions
- knowledge and understanding of:
- potential hazards in the workplace
- the consultation processes, either general or specific to occupational health and safety
- occupational health and safety information
- knowledge of specific hazard policies and use of hazard procedures (eg, housekeeping and inspections).

These aspects may be best assessed using a range of scenarios, case studies or what ifs as the stimulus. These assessment activities should include a range of problems,

	including new, unusual and extreme situations, which may have been generated from an incident history of a plant, incidents from around the world, hazard analysis activities and similar sources.
In what context should assessment occur?	Assessment will need to occur in an organisation and/or using simulations.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other relevant units.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.
What evidence is required for demonstration of consistent performance?	Consistency should be demonstrated through the application of this knowledge and skills across a range of scenarios/situations.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- observation
- communication

Knowledge

Knowledge and understanding of typical workplace OHS system and state OHS regulations and relevant state and national industry standards sufficient to participate in OHS activities within the scope of their responsibilities and competencies.

The duty of care responsibilities that need to be exercised appropriate for the level and type of work being undertaken. This should cover not only requirements from general OHS acts and regulations, but also state and national standards applying to hazardous substances, dangerous goods and major hazards.

Competence includes the ability to:

- apply and describe:
- identification of hazards and assessment of risk in the workplace
- report hazards identified to the designated person
- locate, understand and follow workplace OHS procedures

- apply and explain:
- management systems and procedures for occupational health and safety
- the hierarchy of control (the preferred order of risk control measures from most to least preferred), that is:
- elimination
- substitution
- engineering controls
- administrative controls
- personal protective equipment.

What are the specific resource requirements for this unit?

A bank of scenarios/case studies/what ifs will be required as will a bank of questions which will be used to probe the reasoning behind the observable actions.

MCMP295A Operate manufacturing equipment

Unit Descriptor

This competency covers the operation of production equipment and the resolving of routine problems in a simulated or trial manufacturing environment where there is a high degree of direct supervision. This competency is intended to be applied to any item of routine production equipment.

This competency can be performed by operators working either independently or as part of a work team.

Application of the Unit

This unit applies to a learning and assessment environment where access to normal production operations is not available . A typical environment will be for application in a VET in Schools delivery environment or other simulated or trial manufacturing environment where a high degree of direct supervision exists.

The unit covers the making of a product or products to meet established quality standards and workplace requirements using routine manufacturing equipment. It includes:

- checking specifications and work requirements
- following established OHS and hazard minimisation procedures
- monitoring equipment operation and reporting process variations
- checking product for quality and conformity to specifications
- dealing with non-conforming products/materials in accordance with procedures
- identifying and rectifying/reporting on routine process problems
- completing pro-forma production logs and reports.

Unit Sector

CMI Production

ELEMENT	PERFORMANCE CRITERIA
1. Check job requirements.	1.1 Identify ***workplace*** requirements by following established ***procedures*** and practices 1.2 Identify product, materials and ***equipment*** requirements for job(s)
2. Control hazards.	2.1 Identify ***hazards*** in the production work area 2.2 Assess the risks arising from those hazards 2.3 Implement measures to control or avoid those risks in line with procedures and duty of care to fellow workers.

3. Prepare equipment for operation as required	3.1 Perform ***pre-start up checks*** 3.2 Suspected unusual or non standard product, materials and equipment are reported to an appropriate person 3.3 If required notify other team members on the intended equipment function and start up 3.4 Check/supply materials to equipment as required 3.5 Start up the item of equipment as required 3.6 Bring to specified conditions and build operating rate steadily, checking expected performance at various stages in accordance with procedures
4. Operate equipment	4.1 Monitor ***equipment operating conditions*** 4.2 Monitor ***product characteristics*** 4.3 Recognise conditions and characteristics which indicate a ***problem or a potential problem*** 4.4 Take ***appropriate action*** in response to problem or potential problem 4.5 Maintain supply of materials and removal of products as required 4.6 Complete required ***records*** 4.7 Keep equipment and work area in a clean, organised and safe condition
5. Prepare equipment for shut down as required	5.1 Perform emergency pause, stop or shutdown as required 5.2 Ensure equipment is free of product or purged as required 5.3 Shut down equipment in accordance with procedures 5.4 Make sure equipment and area is left in a safe condition and ready for ***need***

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Workplace	Workplace for this unit covers a manufacturing environment specifically established for learning introductory manufacturing skills. It may be: • a school classroom or workshop equipped to teach manufacturing principles and practices • RTO premises equipped to teach manufacturing principles and practices • an enterprise environment where above average supervision exists and training is occurring. The normal production imperatives have been modified to take into account the training being delivered.

Procedures	Procedures includes all work instructions, standard operating procedures, formulas/ recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of equipment and processes. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, ' procedures' also includes good operating practice as may be defined by industry codes of practice (eg Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
Equipment	Equipment for the purposes of this unit covers routine or common manufacturing equipment suitable for students operating in a simulated or trial manufacturing environment where there is a high degree of direct supervision. examples include but are not limited to: • guillotines • bending and folding machines • non CNC lathes, especially bench and training lathes • soldering equipment • pedestal drills • bench grinders
Hazards	Workplace hazards include: • hazardous materials • gases and liquids under pressure • moving machinery • cutting edges • electrical equipment • materials handling • environments subject to heat, noise, dusts or vapours.
Pre-start up checks	Pre-start up checks include: • visual checks • completing checklists • checking that safety guards, gates etc are in position and are operational • other checks required by standard operating procedures and manufacturer's instructions
Equipment operating conditions	Equipment operating conditions will be monitored using a range of techniques including: • monitoring of measured or indicated data as shown by gauges, charts etc., (eg. speed, hours on line, pressure, temperature, flow, vibration) • the senses of smell, sight, sound and feel as appropriate.

Product characteristics	Product characteristics includes: product quality • production rate • defect rate
Problem/potential problem	Problem/potential problem includes: • changes to operating conditions • adverse changes to product characteristics • adverse changes to waste
Appropriate action	Appropriate action includes: • making adjustments in accordance with procedures • stopping the equipment in accordance with procedures • reporting to appropriate person.
Records	Records include: • log sheets/books • job/work sheets • electronic/paper records • verbal/voicemail/email reports
Need	Need includes: • leaving the equipment ready for restart • leaving it safe for maintenance • preparing for a medium/long term shut down

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

The competent person will be able to carry out the day to day operation of a piece of production equipment, meeting the demands of productivity and quality while resolving routine problems.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?

It is essential that the equipment be understood and that the importance of critical material properties, settings and readings is known. Competence must be demonstrated in the ability to recognise and analyse potential or actual problem situations requiring action and then in implementing appropriate corrective action. The emphasis should be on the ability to avoid problems rather than on recovery from a problem.

Consistent performance should be demonstrated. In particular look to see that:

- process conditions are maintained within limits
- quality is monitored to minimise wastage
- start-up and shutdown occurs first time
- signals and alarms are responded to immediately
- process measurements are continually made or observed
- all OHS requirements are followed.
- early warning signs of equipment/processes needing attention or with potential problems are recognised
- the range of possible causes can be identified and analysed and the most likely cause determined
- appropriate action is taken to ensure a timely return to full performance
- obvious problems in related plant areas are recognised and an appropriate contribution made to their solution
- pre-start checks are made to ensure equipment is lined up to the plant in accordance with procedures and/or manufacturers specifications.

Besides assessing actual operation of manufacturing equipment many aspects may be also be assessed using a range of scenarios, case studies or what ifs as the assessment method. These assessment activities should include a range of problems, including new, unusual situations that may have been generated from past history

In what context should assessment occur?

Assessment will need to occur on an operating item of production equipment although some aspects especially problem solving may be assessed through simulation.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed concurrently with other relevant units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of

What evidence is required for demonstration of consistent performance?

Evidence of operation over an extended time covering a range of operating situations would be required.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- observation
- following procedures for start up, operation and shut down of equipment
- analysis
- problem solving
- communication
- documenting

Knowledge

- knowledge of:
- all major components of the equipment and describe the function of each
- principles of equipment operation
- equipment operating parameters
- equipment and product variables and their interactions.

- apply and/or explain:
- impact of materials and properties
- start-up and shutdown processes
- construction and limitations of the equipment
- out of specification situations

- distinguish between causes of faults such as:
- raw materials
- instrument failure/malfunction
- electrical failure/malfunction
- mechanical failure/malfunction
- variations in product parameters (temperature, flows, pressure & levels).

What are the specific resource requirements for this unit?

Access to an operating item of production equipment over an extended time.

MCMC413A Lead team culture improvement

Unit Descriptor

This unit covers the knowledge and skills required by a team leader to help develop a culture within the team appropriate for achieving competitive manufacturing.

Application of the Unit

In a typical scenario, an organisation has embarked on competitive manufacturing and a team leader is required to change / improve the team culture to be consistent with that required to maximise the benefits from competitive manufacturing and to view the team as part of the whole organisation.

Unit Sector

CMI Systems

ELEMENT	PERFORMANCE CRITERIA
1. Facilitate the team's understanding of the Competitive Manufacturing Strategy.	1.1 Communicate with all team members the objectives and benefits of the ***competitive manufacturing strategy*** 1.2 Review with the team members the techniques and methods that will be used in achieving the Competitive Manufacturing Strategy 1.3 Using a ***systems approach***, help team members understand how the team fits into the organisation 1.4 Establish appropriate communication and team work within the team and with other teams 1.5 Develop a work structure with the team that allows for everyone to participate in the application of the competitive manufacturing strategy
2. Facilitate application of knowledge about the importance of controlling variation in competitive manufacturing	2.1 Develop the application of a statistical approach by all team members to all relevant facets of the system with a view to reducing ***variation*** 2.2 Encourage the approach of building quality in and ensuring team members assist each other in meeting the requirement
3. Facilitate the development of skills and knowledge within the team	3.1 Encourage appropriate training for all team members 3.2 Encourage education and self-improvement activities by team members.
4. Facilitate the development of commitment within the team to the competitive manufacturing strategy	4.1 Ensure that the team has sufficient resources and adequate equipment available to meet the requirements of the competitive manufacturing strategy 4.2 Encourage the adoption of continuous improvement 4.3 Encourage employee acceptance of responsibility for the quality of their own work 4.4 Provide continuous feed back and communication of progress at all levels in implementing the strategy.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Competitive Manufacturing Strategy	Strategies may include one or more of: • Six sigma • Lean Manufacturing • Agile Manufacturing • Just in Time • Supply chain management • Value Chain Management • Total Quality • Pro Active maintenance • Elimination of waste • Balanced Scorecard
Variation	Variation is used to mean variation from quality standards and customer requirements as expressed in production schedules and technical specifications.
Systems approach	A systems approach enables persons to see how work gets done and effect of changes and shows the internal / external relationships through which products and services are produced and may include considerations of the role and requirements of: • customers • suppliers • employees • other value chain members • members of the public and community groups • other external individual, group or organisation. • technical processes and equipment • statutory and regulatory requirements including OHS and environment legislation and regulations • quality standards
Work structures	Teams may be self directed, cross functional etc. Structures are appropriate to the job and job steps are in a logical order

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

The competent person will be able to demonstrate the entwinement/integration of the elements of this unit in their application to the team.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?	Knowledge of change management principles underpinned by a quality philosophy such as Deming's Revised 14 points or Six Sigma principles, etc
In what context should assessment occur?	Assessment will need to occur in an organisation implementing/wishing to implement competitive manufacturing.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other relevant units.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment
What evidence is required for demonstration of consistent performance?	Evidence of consistent application of the principles and moving down the path should be sufficient evidence rathe than evidence of having arrived.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting

Knowledge

- Principles of change management
- Quality philosophy, eg Deming or Six Sigma etc

What are the specific resource requirements for this unit?

Access to an organisation implementing competitive manufacturing.

MCMC613A Facilitate holistic culture improvement in a manufacturing enterprise

Unit Descriptor

This unit covers the knowledge and skills required by a manager, to help develop a culture within the organisation appropriate for achieving competitive manufacturing.

Application of the Unit

In a typical scenario, an organisation has embarked on competitive manufacturing and a manager is seeking to change / improve the organisation culture to be consistent with that required to maximise the benefits from a competitive manufacturing strategy.

Unit Sector

CMI Systems

ELEMENT	PERFORMANCE CRITERIA
1. Facilitate a company wide appreciation for the Competitive Manufacturing strategy	1.1 Communicate with all levels of the organisation the objectives and benefits of a ***Competitive Manufacturing strategy***
	1.2 Communicate to all levels of the organisation the techniques and methods that will be used in achieving the Competitive Manufacturing strategy
	1.3 Facilitate the development of a ***systems approach*** to how the organisation works
	1.4 Demonstrate a constancy of purpose for the organisation in the push for the continual improvement in all activities
	1.5 Break down any communication barriers between parts of the organisation that may inhibit the competitive manufacturing strategy
	1.6 Develop a ***work structure*** that allows for everyone to participate and be heard in the transformation of the organisation
2. Facilitate application of knowledge about variation and ways to improve the production process	2.1 Develop the application of a statistical approach by all people to all facets of the production system with a view to reducing variation
	2.2 Encourage the approach of building quality in and eliminating the need for mass inspection
3. Facilitate the development of knowledge and skill acquisition.	3.1 Institute training on the job
	3.2 Institute a vigorous program of education and self-improvement for all employees
4. Facilitate the development of support within the organisation for competitive manufacturing practices	4.1 Ensure sufficient resources and adequate equipment is available to meet the requirements of the competitive manufacturing strategy
	4.2 Encourage acceptance of change
	4.3 Encourage employee commitment to and responsibility for the quality of their own work
	4.4 Provide continuous feed back and communication of progress at all levels in implementing the strategy

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Competitive Manufacturing strategy	Strategies may include one or more of: • Six sigma • Lean Manufacturing • Agile Manufacturing • Just in Time • Supply chain management • Value Chain Management • Total Quality • Pro Active maintenance • Elimination of waste • Balanced Scorecard • etc.
Systems approach	A systems approach enables persons to see how work gets done and effect of changes and shows the internal / external relationships through which products and services are produced and may include considerations of • customer • supplier • value chain member • member of the public • other external individual, group or organisation.
Work structures	May include use of teams, self directed, cross functional etc. Structures are appropriate to the job and job steps are in a logical order

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

The person being assessed should be able to demonstrate the integration of the elements of this unit in a holistic manner and show their application to the organisation.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of the review and understanding of a philosophy of Deming's 14 points (or similar) should be available
In what context should assessment occur?	Assessment will need to occur in an organisation implementing/wishing to implement competitive manufacturing.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other relevant units.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of assessment.
What evidence is required for demonstration of consistent performance?	Evidence of consistent application of the principles and moving down the path should be sufficient evidence rather than evidence of having arrived.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting

Knowledge

- Production or technical knowledge appropriate to the enterprise and the employee's position
- Principles of change management
- Deming's 14 points
- Deming's System of Profound Knowledge
- Or equivalent philosophy appropriate to or selected by the organisation.

What are the specific resource requirements for this unit?

Access to an organisation implementing competitive manufacturing.

MCMS405A Lead a manufacturing team using a balanced score card approach

Unit Descriptor

This unit covers the knowledge and skills required to lead a team in a manufacturing organisation where a balanced score card approach is used.

Application of the Unit

This unit applies to an environment where a team is operating in a manufacturing enterprise and the competitive manufacturing strategy of the enterprise is the balanced scorecard. The team leader is required to use balanced score card information to lead, assist and motivate team members and suggest improvements to both team effectiveness and the balanced score card strategy.

Unit Sector

CMI Systems

ELEMENT	PERFORMANCE CRITERIA
1. Interpret balanced score card results.	1.1 Identify pattern(s) of performance shown on strategy map 1.2 Identify ***actions indicated*** by score card results 1.3 Discuss results with team members and other relevant stakeholders 1.4 Develop required actions with team members 1.5 Develop implementation plans with team members 1.6 Facilitate the implementation of required actions from developed plans 1.7 Follow up on implementation to ensure it occurs as planned
2. Review key performance indicators (KPIs) in the balanced scorecard for the enterprise and the team	2.1 Relate team key performance indicators to strategy map/strategic objective 2.2 Review the actions required by team members to meet each key performance indicator 2.3 Compare current team actions to the optimal actions to achieve strategy 2.4 Discuss with team modifications to key performance indicators which will better meet strategy 2.5 Recommend amendments to key performance indicators to relevant personnel
3. Review reporting systems for balanced scorecard information	3.1 Review reports to ensure information needed by team and enterprise is available 3.2 Review the mix of operational and strategic information to ensure it is appropriate to the needs of the team 3.3 Review information provided for relevance and currency, and that it is meaningful and not excessive. 3.4 Recommend improvements to reports and reporting system as appropriate

4. Lead improvement to team total performance	4.1 Compare actual total team performance with desired total performance using key performance indicators and other balanced scorecard information 4.2 Discuss with team ways of improving total team performance 4.3 Lead processes for improvement in team total performance.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Balanced scorecard	The balanced scorecard is an approach to competitive manufacturing that sets out an enterprise's vision and strategy by establishing and measuring enterprise activity in a number of different perspectives in addition to the normal financial perspective. Other perspective areas are customer, environmental, internal business process and learning and growth. For each perspective area the balanced scorecard emphasises establishing and measuring performance (metrics)..
Actions indicated	Actions indicated may include: • corrective action for poor results • confirming action for acceptable results • taking steps to ensure actions for good results are consistently maintained • changes to performance indicators or performance measurement

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

Assessment should occur on the job in an environment where the balanced scorecard is being used to improve manufacturing performance.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of the use of a balanced score card should be available

In what context should assessment occur?

Assessment will need to occur in an organisation which is using or developing a balanced score card approach as a competitive manufacturing strategy

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed concurrently with other relevant units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment

What evidence is required for demonstration of consistent performance?

Generally use of a balanced score card at the team level over a period of time would be needed to generate sufficient evidence. It is unlikely that a single assessment event would provide sufficient evidence and project and portfolio approaches may be appropriate.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- identifying key performance indicators and their application at the team level
- analysis
- problem solving
- negotiating
- communication
- documenting

Knowledge

- components of the balanced score card including perspectives, feedback loops, metrics and reporting systems
- responsibilities of team personnel in a balanced scorecard strategy

What are the specific resource requirements for this unit?

Access to an organisation using the balanced scorecard approach.

MCMS604A Manage competitive manufacturing processes in a jobbing shop environment

Unit Descriptor

This unit covers the knowledge and skills required to prepare for, and manage the introduction of, a competitive manufacturing process in a jobbing/batching/contracting manufacturing environment.

Prerequisite Unit(s)

MCMT280A Undertake root cause analysis
MCMS601A Analyse and map a value chain
MCMT631A Undertake value analysis of product costs in terms of customer requirements

Application of the Unit

This unit applies to the introduction of competitive manufacturing processes in an environment where the enterprise specialises in one off or small batch product or process manufacturing or overhaul of equipment

This unit describes the skills needed to restructure the process, work organisation to allow the application of competitive manufacturing principles.

Unit Sector

CMI Systems

ELEMENT	PERFORMANCE CRITERIA
1. Analyse the existing manufacturing process.	1.1 Identify enterprise capability for products and processes 1.2 Identify the major processing steps in meeting customer order or orders 1.3 Consult with employees, managers and other major stakeholders on major expected benefits from a move to a ***competitive manufacturing strategy*** 1.4 Identify lead times, throughput times and waiting times throughout process of meeting a customer order 1.5 Identify ***variations*** within the process 1.6 Identify causes of the variations
2. Draft a virtual flow process	2.1 Map flow of information, material, and people for each product family 2.2 Draw a current state value stream map for the process as a virtual flow process. 2.3 Analyse the current value stream map for ***waste*** 2.4 Draft possible future state value stream map(s) 2.5 Calculate benefits flowing from future state map(s) 2.6 Consult with stakeholders to validate these benefits

3. Prepare proposals for process redesign	3.1 Identify options for the delivery of changes required to move to future state value stream map(s) 3.2 Plan as to how these changes might be implemented including resource, industrial relations, workforce development and occupational health and safety considerations and implications 3.3 Cost the proposed changes and determine benefit cost ratios 3.4 Prepare recommendations for change 3.5 Negotiate/consult with relevant ***stakeholders*** to establish the preferred option.
4. Implement the plan.	4.1 Arrange for altered process layout as required 4.2 Arrange for altered ***infrastructure needs*** as required 4.3 Monitor the implementation of the plan, making adjustments as required 4.4 Review the new value stream and check that expected benefits have been obtained 4.5 Put in place a continuous improvement mechanism for the new value stream.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Competitive manufacturing strategy	Competitive manufacturing strategy may include one or more of: • Six sigma • Lean Manufacturing • Agile Manufacturing • Just in Time • Supply chain management • Value Chain Management • Total Quality • Pro Active maintenance • Elimination of waste • Balanced Scorecard • Etc
Variations	Variations are deviations from desired targets and may cover variations in: • quality • time • cost. • OHS

Waste

Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit or features in the product. Within manufacturing, categories of waste include:

- excess production and early production
- delays
- movement and transport
- poor process design
- inventory
- inefficient performance of a process
- making defective items

Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.

Stakeholders

Stakeholders may include:

- Managers
- Supervisors
- Employees
- Shareholders
- OHS mechanisms/representatives
- IR mechanisms/representatives
- Suppliers
- Customers
- Service providers

Infrastructure needs

Infrastructure needs may include:

- physical infrastructure, including plant, equipment, tools, systems and processes
- information and control infrastructure
- work organisation including numbers of employees
- work structure and skills and knowledge held by employees

Workforce development and, where required, training

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

The unit requires an assessment as to whether the person being assessed will be competent to implement and manage a competitive manufacturing approach in a jobbing shop environment.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of the move to competitive manufacturing in a jobbing shop should be available
In what context should assessment occur?	Assessment will need to occur in a jobbing shop implementing/wishing to implement a competitive manufacturing strategy
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other relevant units.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment
What evidence is required for demonstration of consistent performance?	Generally assessment over a period of time would be needed to generate sufficient evidence. It is unlikely that a single assessment event would provide sufficient evidence and project and portfolio approaches are recommended

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting
- calculations

Knowledge

- processing requirements of products
- capabilities of equipment
- abilities and skills of personnel
- business requirements from project.

What are the specific resource requirements for this unit?

Access to a jobbing shop implementing competitive manufacturing.

MCMS605A Develop a balanced score card

Unit Descriptor

This unit covers the knowledge and skills required to develop and use a balanced score card approach to managing a manufacturing operation

Prerequisite Unit(s)

MCMT280A Undertake root cause analysis
MCMS601A Analyse and map a value chain
MCMT631A Undertake value analysis of product costs in terms of customer requirements

Application of the Unit

This unit covers the skills needed to develop or improve a balanced score card and facilitate its use for managing a manufacturing business. This competency covers the development of key performance indicators (KPIs) and type of metrics for a balanced score card but does not include the technical skills for related IT skills and similar.

Unit Sector

CMI Systems

ELEMENT	PERFORMANCE CRITERIA
1. Develop strategy map for balanced scorecard operation.	1.1 Develop strategic objectives of business/business unit in consultation with stakeholders 1.2 Check strategic objectives include those which make the business *unique* 1.3 Check with employees and customers that strategic objectives address real issues and problems 1.4 Categorise strategic objectives into the major perspectives of financial, customer, process and innovation and learning and growth 1.5 Add ***additional required perspectives*** and associated strategic objectives 1.6 Map strategic objectives showing cause/effect flows. 1.7 Validate strategy map with stakeholders
2. Develop key performance indicators (KPIs)	2.1 Identify possible key performance indicators for each strategic objective 2.2 Identify/develop appropriate metrics for each key performance indicator 2.3 Agree target key performance indicator levels 2.4 Check measures and key performance indicators encourage the behaviours required to meet the total performance goals
3. Develop reporting systems	3.1 Identify strategic and operational drivers 3.2 Align key performance indicators to strategic and operational drivers 3.3 Develop reporting structures which align responsibilities with reported information 3.4 Arrange for data to be collected and balanced score card reports to be generated and distributed 3.5 Arrange for reporting against strategy map

4. Implement balanced scorecard strategy.	4.1 Analyse pattern of performance as revealed by strategy map 4.2 Determine causes of poor performance as displayed by balanced score card 4.3 Take appropriate action to improve total performance

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Balanced scorecard	The balanced scorecard is an approach to competitive manufacturing that sets out an enterprise's vision and strategy by establishing and measuring enterprise activity in a number of different perspectives in addition to the normal financial perspective. Other perspective areas are customer, internal business process and learning and growth. For each perspective area the balanced scorecard emphasises establishing and measuring performance (metrics)..
Additional required perspectives	Additional required perspectives may include: • workforce • environment • OHS.

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

Assessment should cover a holistic view of an enterprise's operations and ability to establish a strategy for improvement across all areas using the balanced scorecard.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of the development and use of a balanced score card should be available
In what context should assessment occur?	Assessment will need to occur in an organisation which is using or developing a balanced scorecard approach as a competitive manufacturing strategy

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed concurrently with other relevant units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment

What evidence is required for demonstration of consistent performance?

Generally use of a balanced score card over a period of time would be needed to generate sufficient evidence. It is unlikely that a single assessment event would provide sufficient evidence and project and portfolio approaches may be appropriate.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- identifying key performance indicators and their application at the enterprise level
- analysis
- problem solving
- negotiating
- communication
- documenting
- calculations

Knowledge

- vision and mission of organisation
- strategic issues for the organisation
- balanced score card principles and components of the including perspectives, feedback loops, metrics and reporting systems
- KPI development principles
- Responsibilities of personnel at different organisational levels/within different organisational sections.

What are the specific resource requirements for this unit?

Access to an organisation using, or intending to use the balanced scorecard approach.

MCMS606A Introduce competitive manufacturing to a small or medium enterprise

Unit Descriptor

This unit covers the knowledge and skills required to introduce competitive manufacturing systems and tools into a small or medium manufacturing enterprise (SME)

Application of the Unit

In a typical scenario a small/medium manufacturing enterprise desires to introduce competitive manufacturing practices. Due to the limitations of being a SME, this may place some constraints on how competitive manufacturing is introduced and which aspects of competitive manufacturing are introduced

Unit Sector

CMI Systems

ELEMENT	PERFORMANCE CRITERIA
1. Analyse the current manufacturing systems and processes	1.1 Review the reasons for introducing ***competitive manufacturing*** and confirm the expected benefits with relevant ***stakeholders*** 1.2 Determine any ***internal limiting factors*** which will constrain the introduction of competitive manufacturing 1.3 Determine any ***external limiting factors*** which will constrain the introduction of competitive manufacturing 1.4 Quantify ***expected returns*** from achieving the benefits of introducing competitive manufacturing
2. Develop strategic and tactical plans to introduce competitive manufacturing to the SME	2.1 Develop a strategic plan for the SME that takes into account the nature of its business and relationships with suppliers and customers 2.2 Where required, seek authority for the implementation of the strategic plan 2.3 Identify ***components of competitive strategy*** which will yield quick returns 2.4 Identify ***actions which will free up required resources*** to allow for the introduction of competitive manufacturing 2.5 Develop achievable tactical plans which are compatible with strategy 2.6 Consult with relevant stakeholders to confirm tactical plans 2.7 ***Prioritise plans*** for order of implementation
3. Implement competitive manufacturing	3.1 Implement priority tactical plan 3.2 Determine benefits from change 3.3 Use benefits from priority plan to assist in the implementation of further tactical plans 3.4 Review progress towards strategic objectives and adjust plans as appropriate in consultation with relevant stakeholders

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Competitive manufacturing	Competitive manufacturing includes one or more of the following strategies: • Six sigma • Lean Manufacturing • Agile Manufacturing • Just in Time • Supply chain management • Value Chain Management • Total Quality • Pro Active maintenance • Elimination of waste • Balanced Scorecard • etc.
Stakeholders	Stakeholders may include: • Managers • Supervisors • Employees • Shareholders • Occupational Health and Safety Occupational Health and Safety OHS mechanisms/representatives • Workplace consultative representatives • Suppliers • Customers • Service providers
Internal limiting factors	Internal limiting factors may include: • free cash • management time and expertise • machinery • work organisation and workforce skills and knowledge
External limiting factors	External limiting factors may include lack of bargaining power or effective communication with: • suppliers • customers • financial institutions • other factors

Expected returns	Expected returns may include factors such as: • cost savings due to more consistent or higher quality • benefits from greater on-time delivery • savings from lower inventories, reduction in waste etc.
Components of competitive strategy	Components of competitive strategy may include any of the Competitive Manufacturing tools such as: • 5S • continuous improvement/kaizen blitz • JIT/quick changeover/kanban
Actions which will free up required resources	Actions which will free up required resources may include: • reduction of inventory • reduction of scrap • decreased throughput times.
Prioritise plans	Prioritise plans according to criteria such as: • greatest benefit • ease of implementation • best fit with strategy • available resources

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

The person being assessed will need to be able to implement a competitive manufacturing approach in a SME environment.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of the ability to analyse existing SME operations and to organise implementation of competitive manufacturing tools in a SME should be available.
In what context should assessment occur?	Assessment will need to occur in a SME which is implementing competitive manufacturing.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other relevant units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence of the development of plans and the beginning of their implementation should generate sufficient evidence

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting
- calculations

Knowledge

- overview of competitive manufacturing
- 5S
- improvement/continuous improvement/kaizen blitz
- JIT/quick changeover/pull/kanban
- Pro active maintenance
- value and supply chains

What are the specific resource requirements for this unit?

Access to a SME using, or intending to use competitive manufacturing.

MCMT280A Undertake root cause analysis

Unit Descriptor

This unit covers the knowledge and skills needed to undertake root cause analysis (RCA) by any person. This will often be done by people working in a team. This unit also covers the competencies needed by operators to contribute to an advanced maintenance strategy using RCA coupled with diagrams and charts.

Application of the Unit

In a typical scenario, the employee works in an organisation which is applying competitive manufacturing strategies. This involves the operator 'owning' their process, taking responsibility for it, undertaking root cause analysis of problems and generally contributing to increasing the ***uptime*** and general ***Overall Equipment Efficiency (OEE)***.

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Recognise problems	1.1 Identify equipment/plant characteristics indicative of a problem 1.2 Identify process conditions/product characteristics indicative of a problem 1.3 Use ***appropriate techniques/charts*** to define the problem
2. Implement quick fix	2.1 Recommend/implement a quick fix within the scope of competency and authority
3. Determine root cause	3.1 Identify a range of possible causes 3.2 Gather information to eliminate/confirm causes 3.3 Construct a cause and effect diagram from available data 3.4 Seek assistance as required 3.5 Identify root cause
4. Develop permanent solution	4.1 Identify a range of methods of eliminating the root cause/ breaking the ***cause tree*** 4.2 Select the most appropriate solution 4.3 Liaise with relevant people 4.4 Recommend or implement solution within the limits of competency and authority 4.5 Monitor implementation and make improvements as required

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the Performance Criteria is detailed here.

Root cause	There are many possible causes of any problem. Eliminating some will have no impact, others will ameliorate the problem. However, elimination of the root cause will eliminate the problem. There should only be one root cause for any problem and so the analysis should continue until this one cause is found. Elimination of the root cause permanently eliminates the problem.
Cause tree	The series of causes is referred to as the cause tree.Not all root causes are accessible and able to be eliminated. Breaking the cause tree is such a way that the problem cannot recur is an acceptable alternative. Not all situations can wait for the ***root cause analysis*** and eventual elimination of the root cause as there are serious current impacts. The ***quick fix*** will control these immediate impacts, but does not eliminate the root cause.
Uptime	Uptime refers to the overall availability of the plant - it is the inverse of downtime - or the unavailability of the plant. Ideal uptime is 100%.
Appropriate techniques/charts	Appropriate techniques/charts may include the following: • control charts • Pareto charts • run charts • flow charts • cause and effect diagrams • tree diagrams • 4W analysis.
Overall Equipment Efficiency (OEE)	Overall Equipment Efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is: where: • availability takes into account losses due to breakdown, set up and adjustments • performance takes into account losses due to minor stoppages, reduced speed and idling • quality rate takes into account t losses due to rejects, reworks and start up waste.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the Range Statement and the Assessment Guidelines of the relevant Training Package

Overview of assessment requirements

The competent operator will be able to recognise problems in their process and undertake a root cause analysis, either alone or with assistance and propose permanent solutions.

What critical aspects of evidence are required to demonstrate competency in this unit?

Evidence of root cause analyses undertaken should be available.

In what context should assessment occur?

Assessment will need to occur in an organisation implementing root cause analysis or by simulation or project.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed concurrently with other units dealing with the improvement of the process.

This unit could be co-assessed (and delivered) with:

- PMASUP390A Use structured problem solving tools
- *MEM15.1A Perform basic statistical quality control*.

This unit is related to *CMIT281A Implement a predictive maintenance strategy* as root cause analysis is one tool used in predictive maintenance.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Generally a range of root cause analysis activities will be required in order to generate sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting.

Knowledge

- root cause analysis methodology
- indicators of a problem
- principles of the process sufficient to undertake a RCA and propose solutions
- use of relevant analysis tools (cause/effect diagrams, Pareto charts, 4W etc).

What are the specific resource requirements for this unit?

Access to an organisation using root cause analysis.

MCMT423A Monitor a manufacturing levelled pull system

Unit Descriptor

This unit covers the knowledge and skills required to monitor the operation of a pull system in a competitive manufacturing environment and recommend improvements.

Application of the Unit

This unit covers the skills needed by a team leader working in a manufacturing enterprise using a pull manufacturing system. The unit covers the skills needed to monitor daily working of the system, identify problems and take appropriate action on problems. The manufacturing system may be a total pull system or it may be a mixed push/pull system.

If additional problem solving skills are required then the following units should be selected:

MCMT280A Undertake root cause analysis

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Monitor the pull system.	1.1 Identify the ***pacemaker*** process 1.2 Identify rate of production set by the pull system 1.3 Determine actual rate of production at key parts of the process 1.4 Identify ***types of inventories*** within process 1.5 Compare actual inventories with planned inventories 1.6 Note discrepancies between actual and planned rates and inventories
2. Take corrective action.	2.1 ***Determine cause***(s) of discrepancies 2.2 Determining ***action required*** to rectify causes of discrepancies 2.3 Take appropriate action in conjunction with relevant ***stakeholders***
3. Test/improve the pull system.	3.1 Identify recurrent discrepancies 3.2 Determine cause(s) of discrepancies 3.3 Determine action required to rectify cause 3.4 Identify unnecessary levels of inventories 3.5 Discuss impacts of reduced inventories with relevant stakeholders 3.6 Take/initiate appropriate action to rectify recurrent discrepancies/reduce levels of unnecessary inventory 3.7 Monitor the system to determine the effects of the change(s)

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Pull system	A pull system is a manufacturing system is one where: • manufacturing is done to order and not for holding large inventories of parts and completed stock • work flow along the production line is done according to demand pull from the next work stage • manufacturing is in response to customer demand The pull system must therefore be flexible and have cycle times set by parameters calculated from customer demand indicators
Pacemaker	Pacemaker processes is that process which sets the pace for the flow of manufacturing work through the enterprise
Types of inventories	Inventories within process may include: • cycle stock which reflects the replenishment quantity and frequency, • buffer stock to meet demand variability and forecast errors • safety stock required to guard against quality and delivery failures upstream.
Determine cause	Determine cause may include the individual/team leader: • analysing cause themselves • identifying that expert analysis is required and requesting this • setting up an improvement team to analyse cause

Action required	Action required include actions to align actual and planned rates of production and inventories. The actions will vary but can include changes to: • production processes • cycle times • equipment • work organisation • training and skill development of employees • The authority of the team leader may influence the actions required for example • actions which can be sanctioned by the individual team member • actions which can be sanctioned by the team leader • actions requiring management sanction • actions requiring expert intervention
stakeholders	Stakeholders include: • Managers • Supervisors • Employees • Shareholders • OHS mechanisms/representatives • IR mechanisms/representatives • Suppliers • Customers Service providers

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

The assessment should confirm the ability to understand and monitor a levelled demand pull system of manufacturing..

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of pull system improvementundertaken should be available
In what context should assessment occur?	Assessment will need to occur in an organisation using a pull system or by project.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed concurrently with other relevant units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment

What evidence is required for demonstration of consistent performance?

Generally a number of continuous improvements will be required to generate sufficient evidence

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting

Knowledge

- processing requirements of products
- capabilities of equipment
- abilities and skills of personnel

What are the specific resource requirements for this unit?

Access to an organisation using a pull system.

MCMT441A Facilitate continuous improvement in manufacturing

Unit Descriptor

This unit covers the knowledge and skills required to facilitate continuous improvement (kaizen) in an organisation.

Application of the Unit

In a typical scenario, this unit would apply to a team leader with responsibility for facilitating ongoing continuous improvement of the manufacturing process within the scope of their team's area of responsibility.

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Facilitate improvement team.	1.1 Assist the improvement team consider and select appropriate improvement projects 1.2 Facilitate resources and arrangements for the team to undertake improvement projects 1.3 Arrange for the provision of required data 1.4 Assist the improvement team develop ***scope and benefit statements*** 1.5 Organise for ongoing training of improvement team members as required
2. Build a continuous improvement process.	2.1 Organise for training as required for work group members 2.2 Encourage work group members to routinely monitor ***key process indicators*** 2.3 Build capacity in the work group to critically review the relevant parts of the value chain 2.4 Assist work group members to formalise improvement suggestions 2.5 Facilitate relevant resources and assist work group members to develop implementation plans 2.6 Monitor implementation of improvement plans taking appropriate actions to assist implementation where required.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Scope and benefit statements	Scope and benefit statements of improvement project may include: • description of the business • the target work process • what the key stakeholders seek from the improvement project • a mission for the event • a set of goals • a statement of the do's and don'ts for the improvement project.
Key process indicators	Key process indicators may include: • statistical process control data/charts • orders • lost time, injury and other OHS records • equipment reliability charts • etc.

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

Assessment should confirm the ability to facilitate the use of continuous improvement at a team level within a manufacturing organisation.

Specific evidence requirements

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of the facilitation of continuous improvement should be available
In what context should assessment occur?	Assessment will need to occur in an organisation using continuous improvement or by project.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed concurrently with other relevant units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment

What evidence is required for demonstration of consistent performance?

Generally routine continuous improvement by the work group and improvement team(s) from the work group would be needed to generate sufficient evidence

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- negotiation
- documenting

Knowledge

- continuous improvement process.

What are the specific resource requirements for this unit?

Access to an organisation using continuous improvement.

MCMT452A Apply statistics to processes in manufacturing

Unit Descriptor

This unit covers the knowledge and skills required to apply statistical theory and principles to the analysis and control of processes in manufacturing.

Application of the Unit

In a typical scenario, statistical process control is being used on a process in a manufacturing organisation. Usually this will be to monitor the process and determine when action needs to be taken. The appropriate action will then be taken in accordance with standard procedures.

To do this the person will apply their knowledge of frequency distribution and variation to the data/chart to distinguish between random and non-random variation and their understanding of the process and/or equipment to help interpret those results.

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Collect process data.	1.1 Interpret ***sampling scheme*** 1.2 Obtain measurements in accordance with standard ***procedures*** 1.3 ***Handle data*** as required.
2. Interpret data	2.1 Plot data on appropriate ***control chart*** 2.2 Distinguish between ***random*** and ***non-random*** patterns of results 2.3 Identify results outside the ***control limits*** 2.4 Recognise situations requiring action 2.5 Take appropriate action in accordance with standard procedures 2.6 Determine ***cost of non-conformance***
3. Calculate control limits.	3.1 Consult relevant stakeholders to determine ***appropriate limits***

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Sampling scheme	Sampling scheme may include: • sampling for attributes or sampling for variables • batch, continuous or custom made products • number of items/samples • size of sample • timing of sampling • location of sampling points • type of sample • number/type of measurements to be done on each sample • sampling equipment • measurement/testing equipment/methods
Procedures	Procedures includes all work instructions, standard operating procedures, formulas/ recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, ' procedures' also includes good operating practice as may be defined by industry codes of practice (eg Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
Handle data	Handle data may include: • calculating means, ranges, mean of means, standard deviation (using appropriate calculation aids) • entering data into a software package • recording data either in writing or electronically • other required manipulations of the data.
Control chart	Control charts may include: • run • tally • mean/range • attributes • other relevant charts
Random	Random variation is the term used in statistical control to refer to those variations for which no cause can be found.

Non-random	Non-random, also called identifiable cause, or assignable cause or special cause are those variations for which a cause can be found and so the cause of the variation eliminated. Non-random variation may also be used to predict possible breaches of the control limits.
Control limits	Control limits, also referred to as process capability are those limits within which the process will operate if it is 'under control'.
Cost of non-conformance	Cost of non-conformance includes: • reprocessing/rework • expediting • unplanned service • excess inventory • complaint handline • downtime • returns • scrap • labour costs • material costs • infrastructure costs/overhead • utility costs
Appropriate limits	Appropriate limits may include: • 1 sigma warning limits • 2 sigma warning limits • 3 sigma control limits • 6 sigma limits

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

The competent person will be able to apply statistical theory to a process to interpret and reduce its variation.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of the application of statistical theory to a process should be available
In what context should assessment occur?	Assessment will need to occur in an organisation implementing statistical process control or by project.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed concurrently with other units dealing with process capability and/or change management.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of

What evidence is required for demonstration of consistent performance?

Generally the application of statistics over a period of time would be required to generate sufficient evidence

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting
- calculations
- use of statistics

Knowledge

- sampling techniques
- purpose of sampling and measurement
- random, systematic, stratified sampling
- relevance, reliability and representativeness of samples/data collected
- purpose of replication of data for statistical control
- samples, populations, finite and infinite populations and the differences
- methods of calculating means, standard deviations and the like and their purpose in statistical control
- the causes of variation in a process
- the meaning of broad/ narrow frequency distributions/ range/standard deviations and skewed distributions in process terms
- types of control charts and their applications to different types of process/product and for different purposes
- process causes of variation and typical cause types of non-random variation
- non-process (eg measurement) causes of variation
- recognition of stable and unstable processes
- causes of stability/instability in the process
- calculation of control limits/process capability and the applications of different control limits
- the standard distribution curve and confidence limits.

What are the specific resource requirements for this unit?

Access to an organisation using statistical control.

MCMT453A Use six sigma techniques

Unit Descriptor

This unit covers the knowledge and skills required to apply six sigma techniques in the workplace. Six sigma is a statistical based technique for improving quality in manufacturing and other supporting processes.

Prerequisite Unit(s)

MCMT452A Apply statistics to processes in manufacturing

Application of the Unit

This unit applies where a statistical based strategy such as six sigma will be used to establish current quality performance and then to investigate and improve all or part of a process. This will be done with other members of the process team.

This unit has prerequisites of:

MCMT452A Apply statistics to processes in manufacturing

Depending on the scale of six sigma implementation in the enterprise the following units may also be relevant:

- MCMT450A Undertake process capability improvements
- MCMS401A Ensure process improvements are sustained
- MCMC410A Lead change in a manufacturing environment
- PMASUP390A Use structured problem solving tools

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Identify an area requiring improvement	1.1 Identify customer needs from process 1.2 Identify customer benefits delivered by process 1.3 Identify areas requiring improvement
2. Apply DMAIC process	2.1 Define improvement project 2.2 Acquire required measurements/data 2.3 Analyse data and determine possible process improvements 2.4 Develop and test improvement solutions 2.5 Control and standardise the improvement
3. Review and confirm improvement.	3.1 Determine and document benefits 3.2 Ensure procedures and other relevant documentation is updated for improved procedure 3.3 Review process data after an appropriate period and confirm the improvement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

DMAIC	DMAIC is a structured improvement process involving the following stages: • Define • measure • analyse • improve • control and standardise
Define	Definition of the project to include: • 'as is' process map • defining benefits from the project • problem statement • goal statement • project scope
Measurements	Measurements may include: • identification of key measures/attributes • sampling schedule for project
Analyse	Analyse may include: • statistical analysis of data • root cause analysis • use of various problem solving/analysis tools
Improvement	Improvement may include: • generation and testing of improvements • selection of appropriate improvements
Control and standardise	Control and standardise may include: • documenting • transferring ownership of improved process

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package.

Overview of assessment requirements

Assessment should confirm the ability to apply simple six sigma techniques in a manufacturing environment.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of applying all of the DMAIC stages to a manufacturing improvement project simple six sigmaundertaken should be available.
In what context should assessment occur?	Assessment will need to occur in an organisation implementing six sigma or by project. The project should be clearly defined. Work on the project can be undertaken as part of a team. However the individual skills and knowledge of the person undertaking the unit must be able to be separately assessed.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other units dealing with six sigma type work and/or change management. Depending on the project and the nature of the manufacturing operation the following units may be able to be assessed with this unit: • MCMT450A Undertake process capability improvements • MCMS401A Ensure process improvements are sustained • MCMC410 Lead change in a manufacturing environment • PMASUP390A Use structured problem solving tools
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Generally a number of small six sigma projects undertaken or active involvement in some larger six sigma projects would be required to generate sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting
- calculations
- use of statistics

Knowledge

- Charting such as Pareto Charts, fish bone diagrams
- Statistical principles
- Acceptance criteria/confidence levels
- Define, Measure, Analyse, Improve and Control (DMAIC) methods
- Six sigma principles

What are the specific resource requirements for this unit?

Access to an organisation using six sigma.

MCMT483A Support proactive maintenance

Unit Descriptor

This unit covers the knowledge and skills needed by a person who leads a production or maintenance team in a proactive maintenance environment.

Application of the Unit

This unit applies to a team leader in a ***competitive manufacturing*** organisation where proactive maintenance strategies such as Total Productive Maintenance (TPM) or Reliability Centred Maintenance (RCM) are used and the team leader needs to lead the team to take an active role in proactive maintenance. The unit assumes that team members and in particular the team leader are in possession of technical knowledge appropriate to their position about the manufacturing process and equipment and are able to apply this to the maintenance strategy.

The unit covers the leading of a team in proactive maintenance activities such as keeping records, visual checks, analysis of failures and effects on production, housekeeping etc. The unit does not cover breakdown maintenance, condition monitoring or non destructive testing.

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Lead team in monitoring process and equipment.	1.1 Demonstrate to team how to observe the process/equipment continuously and critically using appropriate senses (sight, hearing etc) to identify any potential or actual problems 1.2 Identify to team data indicators that must be monitored and recorded 1.3 Ensure team monitors identified data indicators frequently and critically 1.4 Ensure symptoms of operations outside the desired range of conditions and performance are recognised 1.5 Analyse cause of equipment non standard performance within scope of knowledge and skill 1.6 Ensure team members take timely and appropriate action to solve problem or to refer problem to appropriate manager or specialist
2. Apply proactive maintenance strategy.	2.1 Obtain and discuss maintenance strategy with relevant people 2.2 Identify aspects of maintenance strategy which require specific input from team 2.3 Discuss maintenance strategy with team members 2.4 Ensure team members have resources and training to be able to make the required contributions

3. Analyse standard procedures and work practices.	3.1 Examine team procedures and practices for compatibility with maintenance strategy 3.2 Identify areas where production procedures/practices should be changed to comply with maintenance strategy 3.3 Identify areas where maintenance strategy should change to comply with production procedures and practices 3.4 Identify other activities or areas where changes might increase equipment reliability 3.5 Take appropriate action to have the required changes made
4. Facilitate team contribution to proactive maintenance.	4.1 Monitor team's contribution to proactive maintenance 4.2 Arrange for competency development of team members as required 4.3 Facilitate ongoing examination by the team of process reliability and ***overall equipment efficiency (OEE)*** 4.4 Arrange for follow through and implementation of team originated improvements

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems control and data acquisition software (SCADA), enterprise resource planning systems (ERP), Manufacturing resource planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- just in time, kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems.

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

Team	***Team*** may include work teams from all sections of the organisation including production, maintenance, technical, administration/finance, sales/marketing.

Strategies may include:

Total Productive Maintenance (TPM)

Reliability Centred Maintenance (RCM)

Root Cause Analysis (RCA)

Mean Time Between Failures (MBTF)

Failure Mode and Effects Analysis (FMEA)

Condition monitoring

Total Preventative Maintenance/Total Productive Maintenance (TPM) which is an application of total quality management to maintenance with the intention of increasing reliability, getting it right first time and increasing ***Overall equipment efficiency (OEE).***

Reliability Centred Maintenance (RCM) moves maintenance from reactive, or even planned/programmed towards a focus on ***uptime*** and ***OEE.***

RCA There are many possible causes of any problem. Eliminating some will have no impact, others will ameliorate the problem. However elimination of the ***root cause*** will eliminate the problem. There should only be one ***root cause*** for any problem and so the analysis should continue until this one cause is found. Elimination of the ***root cause*** permanently eliminates the problem.

Uptime refers to the overall availability of the plant - it is the inverse of downtime - or the unavailability of the plant. Ideal uptime is 100%.

Overall equipment efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is:

OEE = availability x performance x quality rate

where:

- availability takes into account losses due to breakdown, set up and adjustments
- performance takes into account losses due to minor stoppages, reduced speed and idling
- quality rate takes into account t losses due to rejects, reworks and start up waste

Mean time between failure (MBTF) is one key measure of the effectiveness of a maintenance procedure, and is an indicator as to whether ***root causes*** are being found and resolved. If ***MBTF*** is reducing, then it is an indicator that the maintenance regime is failing.

Failure Mode and Effects Analysis (FMEA) is a systematic approach that identifies potential failure modes in a system, product, or manufacturing / assembly operation caused by either design or manufacturing / assembly process deficiencies. It also identifies critical or significant design or process characteristics that require special controls to prevent or detect failure modes. ***FMEA*** is a tool used to prevent problems from occurring.

Some industry sectors have highly adapted forms of ***FMEA*** and may practice traditional ***FMEA*** in say their routine maintenance while using another technique (such as ***HAZOP***) for design and modification.

Hazard and Operability Studies (HAZOP) is a form of ***FMEA*** which has been practiced by the process industries for over 30 years and examines the implications of changes in process conditions to process stability.

Condition monitoring involves often quite sophisticated monitoring of equipment including such things as vibration monitoring, instrumental analysis of lubricating oil etc to determine the current state of the equipment, monitor the change in this condition and predict when it needs servicing/maintenance to maintain reliability.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The assessment should identify that a team leader is able to provide leadership to a team whose responsibilities include the implementation of a proactive maintenance strategy.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of leadership to a team in supporting a proactive maintenance strategy would be required.
In what context should assessment occur?	Assessment needs to occur in an organisation implementing a proactive maintenance strategy preferably through project based assessment.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other leadership related units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence from one significant change may be sufficient. For less significant changes, a range of changes will be needed to generate sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- communication techniques
- negotiation skills
- information finding and analysing/using skills
- team work

Knowledge

- understanding of the production process as it applies to the team area of responsibility
- understanding of proactive maintenance strategies

What are the specific resource requirements for this unit?

Access to an organisation implementing a proactive maintenance strategy.

MCMT622A Design a process layout

Unit Descriptor

This unit covers the knowledge and skills required to design a process layout, typically a cellular flow, for either a jobbing shop or a continuous process manufacturer.

Application of the Unit

This unit provides the skill for a technical expert to apply the principles of competitive manufacturing to process as distinct from a volume production layout. While the application of the unit may be for an initial layout, in many cases it is likely to be for the redesign of an existing layout.

The unit is written on the assumption that there is an existing manufacturing process. Where this is not the case, then additional competency in equipment/process design and selection will also be required through units from an appropriate technical qualification or Training Package.

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Identify the products and processes used in the enterprise	1.1 Obtain or develop a process map of the existing process 1.2 Identify all/main products/classes of products 1.3 Obtain forecast sales and sales pattern of products/classes 1.4 Obtain ***profiles*** of products/classes 1.5 Group the products/classes into ***compatible families***.
2. Engineer the process.	2.1 Make a preliminary selection of required equipment/ technology/process for each family 2.2 Estimate ***required resource times*** for each family 2.3 Calculate total resourcing required for each family 2.4 Estimate appropriate ***lot size*** 2.5 Determine ***viability*** of proposed families 2.6 Examine draft proposal for possible improvements in process consistent with the ***competitive manufacturing strategy*** of the enterprise
3. Design the infrastructure.	3.1 Consult on layout needs with all ***stakeholders*** 3.2 Identify ***physical infrastructure*** required by system 3.3 Identify ***information and control infrastructure*** required 3.4 Identify ***work organisation*** required 3.5 Identify workforce development and training requirements 3.6 Check the availability of required infrastructure and compatibility with requirements

4. Layout the process.	4.1 Draft proposed process flow map 4.2 Draft proposed configuration diagram 4.3 Draft proposed space plan/layout 4.4 Check availability of services/structural suitability as appropriate 4.5 Validate proposed layout with all relevant stakeholders 4.6 Layout the process/work cell 4.7 Develop implementation plan in liaison with relevant stakeholders 4.8 Review layout after implementation

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Profiles	Profiles of products may include: • components/materials needed to manufacture • equipment/technology/processes required to manufacture • volume of activity to manufacture forecast amount
Compatible families	Compatible families are products/classes requiring identical or similar manufacturing equipment, technology or processes.
Required resource times	Required resource times may include: • set up time • equipment time • person time • process time
Lot size	Lot size may include: • external lot size • internal lot size • transfer batch size • kanban size
Viability	Viability includes: • appropriate calculated processing times • adequacy of equipment utilisation • acceptable maintenance implications • ability to meet OHS requirements • ability to meet environmental requirements • compliance with any legislative and regulatory requirements • acceptable to stakeholders

Competitive manufacturing strategy	Competitive manufacturing strategies may include one or more of: • Six sigma • Lean Manufacturing • Agile Manufacturing • Just in Time • Supply chain management • Value Chain Management • Total Quality • Pro Active maintenance • Elimination of waste • Balanced Scorecard • etc
Stakeholders	Stakeholders include: • employees • customers • equipment suppliers and contractors (especially if new equipment required) • Depending on the process and location stakeholders may also include: • regulatory authorities • local community representatives • utilities (water, power etc)
Physical infrastructure	Physical infrastructure may include: • containers • material handling equipment • utilities supply (steam, air, gas, electricity, water)
Information and control infrastructure	Information and control infrastructure may include: • quality assurance • SPC/six sigma • planning systems/software • data collection and control systems/software
Work organisation	Work organisation includes: • number of personnel • skills mix of workforce

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

The assessment should confirm the ability to develop or improve a process layout in a jobbing or process manufacturing enterprise

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of process layout or layouts undertaken should be available.
In what context should assessment occur?	Assessment will need to occur in an organisation developing or improving its process layout. Assessment could also be undertaken by project work or simulation provided adequate opportunity to test the practicality of the developed layouts exist.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.
What evidence is required for demonstration of consistent performance?	Generally one significant process layout project should generate sufficient evidence

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- verbal and written communication
- calculations

Knowledge

- processing requirements of products and jobs
- capabilities of equipment
- abilities and skills of workforce
- business requirements from layout

What are the specific resource requirements for this unit?

Access to an organisation developing or redesigning its process layout.

MCMT623A Develop a levelled pull system of manufacturing

Unit Descriptor

This unit covers the knowledge and skills required to develop and level a demand pull system of manufacturing.

Application of the Unit

This unit covers the production planning skills needed in a manufacturing enterprise to develop and level a demand pull system which meets the business needs of the enterprise. This may apply to the initial development of a pull system, or the continuous improvement of an existing system.

Depending on the enterprise the following units may also be relevant:

- MCMT622A Design a process layout
- MCMS601A Analyse and map a value chain
- MCMT280A Undertake root cause analysis
- MCMT621A Develop a Just in Time (JIT) system

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse production systems.	1.1 Acquire an 'as is' value map of the process for all major ***products***
	1.2 Separate repeated products from specials
	1.3 Consult with production, maintenance, supervisory and management workforce on current production system and processes
	1.4 Identify process steps causing problems
	1.5 Analyse ***inventories*** within process and determine causes of high inventories
	1.6 Determine costs of problems and inventories
	1.7 Develop improved flow sequence and future value map
2. Establish sequence.	2.1 Identify equipment and processes which can be sequenced by co-location
	2.2 Identify equipment which is not suitable for co-location
	2.3 Identify ***pacemaker*** process
	2.4 Establish/review location of equipment for desired sequencing
3. Initiate or develop flow system.	3.1 Determine rate and variability of demand for product
	3.2 Compare capability of flow sequence to demand rate and variability
	3.3 Set flow rate to level demand at pacemaker and handle variability
	3.4 Identify trigger for pacemaker process
	3.5 Establish kanban system for other process parts

4. Balance the work	4.1 Determine target time per product 4.2 Standardise work processes and operations and establish procedures to monitor variation 4.3 Adjust product/batch production to ***balance*** work 4.4 Arrange for implementation of system 4.5 Monitor operation of system and take appropriate action

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Product	Product includes individual products and product groups/ families.
Inventories	Inventories within process may include: • cycle stock which reflects the replenishment quantity and frequency • buffer stock to meet demand variability and forecast errors • safety stock required to guard against quality and delivery failures upstream
Pacemaker	Pacemaker processes is that process which sets the pace for the flow of manufacturing work through the enterprise. Pacemaker processes may include but are not limited to: • process steps which are significantly longer than other production stages • critical technical or quality steps in the production process
Balance work	Balance work means balancing: • time of production • effort required by workforce and equipment • work organisation • job design • quality considerations • waste and other cost considerations between stations/equipment/processes to achieve levelled pull within allowable time per product. Balance work consideration also means: • undertaking adequate consultation with stakeholders • meeting OHS and environmental requirements • any other regulatory and legislative requirements

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

Assessment should confirm the ability to develop or further develop a balanced, levelled pull system of manufacturing.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of undertaking the development or redevelopment of a pull system developmentshould be available.
In what context should assessment occur?	Assessment will need to occur in an organisation using a balanced pull system of manufacturing. Assessment should occur over a time period appropriate to determine the successful operation of the developed pull system. Assessment can be by a combination of project, portfolio and direct observation of the developed system.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	Depending on the enterprise the following units may also be relevant and could be assessed with this unit: • MCMT622ADesign a process layout • MCMS601A Analyse and map a value chain • MCMT280A Undertake root cause analysis • MCMT621A Develop a Just in Time (JIT) system
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Generally one significant pull development project or a number of continuous improvements should generate sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting of process steps
- calculations

Knowledge

- processing requirements of products
- capabilities of equipment
- Capabilities and skills of the workforce
- production planning

What are the specific resource requirements for this unit?

Access to an organisation using/intending to use a balanced pull system of manufacturing.

MCMT632A Analyse cost implications of maintenance strategy

Unit Descriptor

This unit covers the knowledge and skills needed to analyse the cost implications of different maintenance strategies and to adjust adopt the strategy to minimise or eliminate unnecessary costs.

Application of the Unit

In a typical scenario, an organisation is selecting or reviewing its proactive maintenance strategy. While technical factors are significant in the choice of maintenance strategy and tools, cost factors will also impact on the selection of a maintenance strategy. This unit covers the cost analysis of maintenance strategies and complements the technical analysis covered in *MCMT681A Develop a proactive maintenance strategy.* The technical analysis may be performed by the same or a different person to the person undertaking the cost analysis.

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse cost components of maintenance	1.1 Determine cost of failure of plant/equipment 1.2 Determine cost of a planned shut down, maintain, start up activity 1.3 Determine cost of maintenance activity for a planned activity 1.4 Determine cost of maintenance activity for an unplanned activity 1.5 Determine costs of condition monitoring 1.6 Identify cost implications for maintenance strategy
2. Estimate life cycle costs of plant/ equipment	2.1 Determine initial capital cost 2.2 Estimate servicing, maintenance and repair costs 2.3 Estimate production and other costs associated with service, maintenance and repair 2.4 Determine depreciation and other applicable allowances 2.5 Estimate ancillary costs such as training, commissioning, productivity loss 2.6 Estimate technological life and costs of changing to current technology/costs of retaining obsolete equipment 2.7 Estimate annualised costs in present value terms. 2.8 Identify life cycle cost implications for strategy.
3. Liaise with proactive maintenance strategy developer	3.1 Identify cost implications for different strategies 3.2 Negotiate a strategy which minimises total costs 3.3 Monitor the implementation of the strategy to ensure the costs are minimised 3.4 Make required adjustments

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Maintenance strategies and techniques may include:

- Total Productive Maintenance (TPM)
- Reliability Centred Maintenance (RCM)
- Root Cause Analysis (RCA)
- Mean Time Between Failures (MBTF)
- Failure Mode and Effects Analysis (FMEA)
- Condition monitoring

Total Preventative Maintenance/Total Productive Maintenance (TPM) is an application of total quality management to maintenance with the intention of increasing reliability, getting it right first time and increasing ***OEE.***

Reliability Centred Maintenance (RCM) moves maintenance from reactive, or even planned/programmed towards a focus on ***uptime*** and ***OEE***

RCA There are many possible causes of any problem. Eliminating some will have no impact, others will ameliorate the problem. However elimination of the ***root cause*** will eliminate the problem. There should only be one ***root cause*** for any problem and so the analysis should continue until this one cause is found. Elimination of the ***root cause*** permanently eliminates the problem.

Uptime refers to the overall availability of the plant - it is the inverse of downtime - or the unavailability of the plant. Ideal uptime is 100%.

Overall equipment efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is:

OEE = availability x performance x quality rate

where:

- availability takes into account losses due to breakdown, set up and adjustments
- performance takes into account losses due to minor stoppages, reduced speed and idling
- quality rate takes into account t losses due to rejects, reworks and start up waste.

Mean time between failure (MBTF) is one key measure of the effectiveness of a maintenance procedure, and is an indicator as to whether ***root causes*** are being found and resolved. If ***MBTF*** is reducing, then it is an indicator that the maintenance regime is failing.

Failure Mode and Effects Analysis (FMEA) is a systematic approach that identifies potential failure modes in a system, product, or manufacturing / assembly operation caused by either design or manufacturing / assembly process deficiencies. It also identifies critical or significant design or process characteristics that require special controls to prevent or detect failure modes. ***FMEA*** is a tool used to prevent problems from occurring.

Some industry sectors have highly adapted forms of ***FMEA*** and may practice traditional ***FMEA*** in say their routine maintenance while using another technique (such as ***HAZOP***) for design and modification.

Hazard and Operability Studies (HAZOP) is a form of ***FMEA*** which has been practiced by the process industries for over 30 years and examines the implications of changes in process conditions to process stability.

Condition monitoring involves often quite sophisticated monitoring of equipment including such things as vibration monitoring, instrumental analysis of lubricating oil etc to determine the current state of the equipment, monitor the change in this condition and predict when it needs servicing/maintenance to maintain reliability.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will analyse and determine cost components for maintenance strategies. The strategies implemented will be cost effective.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of analysing all cost components and their impact of maintenance strategies.
In what context should assessment occur?	Assessment will need to occur in a workplace.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence from a single optimisation may be adequate, although generally analyses of a few products with different cost structures or customer benefit structures would be required.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- calculation
- analysis
- problem solving

Knowledge

- cost components of maintenance
- interrelationship of cost components and maintenance activities

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies. No other specific resources are required.

MCMT641A Implement a continuous improvement system

Unit Descriptor

This unit covers the knowledge and skills required to introduce and institutionalise continuous improvement (kaizen) to the organisation.

Application of the Unit

This unit covers the introduction of continuous improvement as a manufacturing strategy across an enterprise. Continuous improvement strategies are sometimes also known as kaizen in different manufacturing systems. The continuous improvement (kaizen) strategy is usually undertaken through special improvement "events" that cover the identification of improvement opportunities and the undertaking of the improvement in a single exercise.

Depending on starting point for the continuous improvement program in the enterprise other relevant units may need to be selected including:

- MCMT640A Manage 5S system in a manufacturing environment
- MCMC611A Manage people relationships
- PMASUP390A Use structured problem solving tools
- MCMT280A Undertake root cause analysis

Unit Sector CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for continuous improvement (kaizen) event	1.1 Select process/area for kaizen event 1.2 Select kaizen team for event 1.3 Develop ***scope*** and direction for event 1.4 Validate scope with stakeholders 1.5 Determine ***whether to proceed*** with kaizen event 1.6 Negotiate problem issues with undertaking identified improvement, or choose a different process or area for improvement activity 1.7 Make infra structure and support arrangements for improvement event.

2. Undertake kaizen event	2.1 Arrange for initial training in continuous improvement (kaizen) and related skills for employees involved in improvement event 2.2 Facilitate the development of operating protocols for the team 2.3 Build a ***description of the target work process*** 2.4 Clarify points of disagreement/uncertainty through consultation and where required by reference to ***procedures*** or other relevant ***authority*** 2.5 Analyse the process to quantify ***waste*** volumes and sources 2.6 Consult individual operators in process or area asking for improvement ideas 2.7 ***Solve performanceissues*** 2.8 Negotiate any differences between problems and proposed solutions and initial objectives of improvement event 2.9 Develop plan(s) and obtain agreements to implement improvements 2.10 Implement improvements 2.11 Measure changes and calculate benefits 2.12 Complete all relevant documentation 2.13 Communicate achievements to stakeholders
3. Institutionalise continuous improvement	3.1 Arrange for additional continuous improvement (kaizen) events using different team members 3.2 Arrange for ongoing continuous improvement (kaizen) events with previous kaizen team members 3.3 Build a culture for ongoing continuous improvement (kaizen)

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Scope	Scope of event may include: • description of the business • the target work process • what the key stakeholders seek from the kaizen event • a mission for the event • a set of goals • a statement of the do's and don'ts for the kaizen team

Whether to proceed	The decision to proceed (or otherwise) will be based on: • the focus of the kaizen event makes sense • the business case for doing the event is reasonable • the degree of support from management and employees • the setting and resources available to the event are adequate • the timing of the event will not interfere with business • specifics about the work process such as its overall operating cost and factor costs (e.g., labour, machine, raw materials) are available
Description of the target work process	The description of the work target process may include: • an overview that captures the purpose of the work process • essentials about the process (e.g., inputs, outputs, departments with which it coordinates); • a work process map that shows the sequence of operations that execute it
Procedures	Procedures includes all work instructions, standard operating procedures, formulas/ recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, ' procedures' also includes good operating practice as may be defined by industry codes of practice (eg Good Manufacturing Practice (GMP), Responsible Care) and government regulations. Procedures also include required procedures under legislation or regulation. awards and enterprise agreements.
Authority	The authority will vary according to the problem encountered and may include: • internal or external technical specialist • designated manager • equipment supplier • regulatory authority • safety specialist • reference manuals • etc.

Waste.	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.
Solve performance issues	Solving performance issues includes: • generating improvement ideas (brainstorming/ask expert) • selecting most appropriate improvement ideas to proceed with • conducting experiments where required to test idea • making final selection of improvement ideas

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

Assessment should cover the ability to implement a continuous improvement (kaizen) strategy across a manufacturing enterprise as distinct from simply participating in kaizen events

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of developing and supervising the introduction of a continuous improvement strategy (kaizen) should be available.
In what context should assessment occur?	Assessment will need to occur in an organisation implementing a continuous improvement strategy (kaizen). Assessment should cover a sufficient period to observe the success of the continuous improvement strategy. Assessment may be by project or portfolio assessment.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

- Depending on starting point for the continuous improvement program in the enterprise other relevant units that could be assessed in conjunction with this unit include:

- MCMT640A Manage 5S system in a manufacturing environment
- MCMC611A Manage people relationships
- PMASUP390A Use structured problem solving tools
- MCMT280A Undertake root cause analysis

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Generally one significant kaizen event or a number of routine events, plus ongoing kaizen would be needed to generate sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting

Knowledge

- continuous improvement (kaizen) philosophy and process

What are the specific resource requirements for this unit?

Access to an organisation using or introducing kaizen.

MCMT652A Design an experiment

Unit Descriptor

This unit covers the knowledge and skills associated with the design of experiments (DoE). DoE is generally undertaken as part of black belt six sigma' but may also be undertaken independently.

Prerequisite Unit(s)

MCMT452A Apply statistics to processes in manufacturing

Application of the Unit

In a typical scenario, a technical expert will design and implement experiments aimed at making breakthrough improvements in the process. They will work with other members of the process team in doing this.

Where this unit forms part of a suite on six sigma then the following will also be relevant:

- MCMT650A Determine and improve process capability
- MCMT653A Apply six sigma to process control and improvement
- MCMC410A Lead change in a manufacturing environment and/or
- MCMC611A Manage people relationships
- PMASUP390A Use structured problem solving tools
- MCMS601A Analyse and map a value chain
- MCMT451A Mistake proof a production process
- MCMT481A Undertake proactive maintenance analyses

This unit has a prerequisite of:

- MCMT452A Apply statistics to processes in manufacturing

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Choose an improvement project	1.1 Review a process/value stream map 1.2 Identify areas in need of improvement 1.3 Select a process/value stream area for analysis and improvement 1.4 Determine the ***objective of the experiment*** in consultation with relevant stakeholders.
2. Design the experiment.	2.1 Select appropriate ***factorial design***. 2.2 Estimate ***signal to noise ratio*** 2.3 Determine required number of runs and factorial fraction 2.4 Determine ***resolution*** 2.5 Design a ***sequential series of experiments*** 2.6 Calculate resource requirement for this design 2.7 Determine whether this resource requirements is practical in consultation with relevant stakeholders 2.8 Modify experiment if required to match available resources. 2.9 Determine/develop ***required metrics***

3. Conduct the experiment.	3.1 Conduct first run of experiment 3.2 Replicate in random order for required number of runs 3.3 Block out known sources of variation 3.4 Conduct other experiences in series 3.5 Record data/have data recorded
4. Analyse and confirm the experimental results.	4.1 Identify aliases/confounding of variables/results 4.2 Analyse data using ***statistics pack*** or similar 4.3 Interpret analysed data in line with objective(s) 4.4 Identify confidence level of analysed data 4.5 Design experiment to confirm correlations identified 4.6 Conduct confirming experiment 4.7 Analyse data from confirming experiment 4.8 Confirm results (or conduct further experiments)

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

Objective of the experiment	Purpose may include: • screen factors to find the critical few • optimise a few critical factors • solve process problem(s) • reduce waste • increase reliability.
Factorial design	Factorial design may include: • 2/3 level Factorial, • Taguchi L8, • 2/4-1 Half Fraction, • Plackett-Burman 8-run • Full factorial.
Signal to noise ratio	Signal to noise ratio may be estimated from: • previous DoE experience • previous process capability studies • statistical process control data • estimated from other sources

Resolution

Resolution is typically:

- Resolution III DOE: A design where main factor effects are confounded with two factor and higher order interactions.
- Resolution IV DOE: A design where main effects are confounded with three factor and higher order interactions and all two factor interactions are confounded with two factor interactions and higher order interactions.
- Resolution V DOE: A design where main effects are confounded with four factor and higher order interactions and two factor interactions are confounded with three factor interactions and higher order interactions.

Sequential series of experiments

A typical series of experiments consists of:

- a screening design (fractional factorial) to identify the significant factors,
- a full factorial or response surface design to fully characterize or model the effects,
- confirmation runs to verify results

Required metrics

Required metrics may include:

- quantitative measures normally associated with the process
- other quantitative measures relevant to the experiment
- ranking systems for normally qualitative measures such as defectives.

Statistics pack

Typical statistics packs include:

- minitab
- JMP
- spreadsheets such as Excel particularly with specific add ons such as Sigma XL, Analyse It or other add ons

Many statistical packages are suitable. It is desirable that they include residual analysis capability.

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

Assessment should confirm that the person can undertake DoE projects in a work situation.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of DoEundertaken should be available through portfolio or project based assessment
In what context should assessment occur?	Assessment will need to occur in an organisation implementing DoE or through project based assessment.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other units dealing with six sigma type work and/or change management. These are: • MCMT650A Determine and improve process capability • MCMT653A Apply six sigma to process control and improvement • MCMC410A Lead change in a manufacturing environment and/or • MCMC611A Manage people relationships • PMASUP390A Use structured problem solving tools • MCMS601A Analyse and map a value chain • MCMT451A Mistake proof a production process • MCMT481A Undertake proactive maintenance analyses • The prerequisite unit *MCMT452A Apply statistics to processes in manufacturing* should where possible be assessed concurrently with this unit

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Generally one significant DoE project should generate sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting
- calculations
- use of statistics packs

Knowledge

- Charting such as Pareto Charts, Main Effects Plots, Scatter Plots, Interaction Plots, Contour Plots, Response Surface Plots
- Statistical principles and analysis such as ANOM, Prediction Equations, ANOVA/ One-way ANOVA, Desirability Function, Hit a Target, Advanced Graphical Data Analysis, Multi-Vari Planning, Variation Trees and Funneling, Hypothesis Testing, Central Limit Theorem, Statistical Analysis Roadmap, Analysis for Means and t-test, Correlation and Regression
- Factorial analysis principles and methods such as Multi-Variate Analysis, Taguchi S/N Ratios, 2/3 level Factorial, Taguchi L8, 2/4-1 Half Fraction, Plackett-Burman 8-run, Full factorial
- Acceptance criteria/confidence levels

What are the specific resource requirements for this unit?

Access to an organisation using design of experiment or access to an organisation where DoE could be conducted.

MCMT653A Apply six sigma to process control and improvement

Unit Descriptor

This unit covers the knowledge and skills required to apply six sigma in the workplace for the purposes of process control and process improvement.

Prerequisite Unit(s)

MCMT452A Apply statistics to processes in manufacturing

Application of the Unit

This unit covers the skills and knowledge needed by a technical expert in applying the principles and practices of the six sigma approach to competitive manufacturing. in order to minimise defects and make improvements to the manufacturing process. The expert will work with other members of the manufacturing team in applying the six sigma process.

Depending on the situation of the enterprise and the complexity of their manufacturing process the following units may also be required in implementing six sigma at an enterprise.

- MCMT650A Determine and improve process capability
- MCMT652A Design an experiment
- MCMC410A Lead change in a manufacturing environment and/or
- MCMC611A Manage people relationships
- PMASUP390A Use structured problem solving tools
- MCMS601A Analyse and map a value chain
- MCMT451A Mistake proof a production process
- MCMT481A Undertake proactive maintenance analyses

This unit has a prerequisite of:

- MCMT452A Apply statistics to processes in manufacturing

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Review process data.	1.1 Review statistical process control (SPC), process capability and other relevant data for area of responsibility/study 1.2 Identify shifts in process performance and processes requiring improvement 1.3 Quantify the shifts in performance which have occurred or which are desired 1.4 Determine cost of shift in performance and cost of intervention 1.5 Identify improvement priorities and degree of intervention
2. Apply DMAIC process to the priority area(s).	2.1 ***Define*** improvement project. 2.2 Determine ***metrics*** and acquire initial data 2.3 ***Analyse*** data and determine possible causes of performance shifts/process improvements 2.4 Develop and trial ***improvement*** solutions 2.5 ***Control and standardise*** the improvement

3. Establish/review control strategies	3.1 Determine ***sampling schedule*** 3.2 Analyse data to determine process capability 3.3 Develop ***process control strategy*** 3.4 Confirm strategy with all stakeholders 3.5 Identify skills required to implement and monitor process control strategy 3.6 Arrange where required training for employees in skills and techniques needed for process control strategy
4. Review and confirm improvement.	4.1 Calculate and document benefits 4.2 Ensure procedures and other relevant documentation is updated for improved procedure 4.3 Review process data after an appropriate period and confirm the improvement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

The following variables may be present with training and assessment depending on the work situation, needs of the trainee, accessibility of the item, and local industry and regional contexts. Bold italicised text from the performance criteria is detailed here.

DMAIC

DMAIC is a structured improvement process involving the following stages:

- define
- measure
- analyse
- improve
- control and standardise

Define

Definition of the project to include:

- completed, verified and validated as is process map
- SIPOC diagram (describing the Suppliers, Inputs, Process, Outputs, and Customers)
- discrepancies to current 'as is' process map
- formation and briefing of project team
- defining business case for project
- problem statement
- goal statement
- project scope

Metrics

Metrics may include:

- identification of key measures/attributes
- sampling schedule for project

Analyse	Analyse may include: • statistical analysis of data • root cause analysis • use of various other problem solving/analysis tools
Improvement	Improvement may include: • generation and testing of improvements • selection of appropriate improvements
Control and standardise	Control and standardise may include: • documenting • transferring ownership of improved process
Sampling schedule	Sampling schedule may include: • sampling frequency • type of sample/sample method • sample location/type • type of test/data to be collected
Process control strategy	Process control strategy may include: • degree of intervention/rules for resets • SPC tools to be used

EVIDENCE GUIDE

The evidence guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements

Assessment should confirm that the person being assessed is competent to apply six sigma in a work situation. including the development of a process control strategy and setting of metrics.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of six sigma strategies applied at a workplace should be available
In what context should assessment occur?	Assessment will need to occur in an organisation implementing six sigma.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

The following units if not already held should be assessed concurrently with this unit:

- MCMT452 Apply statistics to processes in manufacturing
- MEM15.1A Perform basic statistical quality control

Depending on the situation of the enterprise and the complexity of their manufacturing process the following units could also be assessed concurrently with this unit:

- MCMT650A Determine and improve process capability
- MCMT652A Design an experiment
- MCMC410A Lead change in a manufacturing environment and/or
- MCMC611A Manage people relationships
- PMASUP390A Use structured problem solving tools
- MCMS601A Analyse and map a value chain
- MCMT451A Mistake proof a production process
- MCMT481A Undertake proactive maintenance analyses

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Generally one significant six sigma project or a number of smaller improvement projects would be required to generate sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- documenting
- calculations
- use of statistics

Knowledge

- Charting such as Pareto Charts, fish bone diagrams
- Statistical principles and analysis such as confidence limits
- Acceptance criteria/confidence levels
- DMAIC - Define, Measure, Analyse, Improve and Control methods
- Process mapping
- Types of data (eg discrete/continuous/attributes) and their use in six sigma.

What are the specific resource requirements for this unit?

Access to an organisation using or intending to use six sigma.

MCMT682A Adapt a proactive maintenance strategy to the process manufacturing sector

Unit Descriptor

This unit covers the knowledge and skills needed to develop and proactive maintenance strategy for continuous manufacturing processes which may also be major hazard facilities or similar.

Prerequisite Unit(s)

MCMT681A Develop a proactive maintenance strategy

Application of the Unit

In a typical scenario, an organisation engaged in ***competitive manufacturing*** using continuous manufacturing technology also adopts proactive maintenance strategies. Continuous manufacturers such as the chemical, hydrocarbons and oil refining sectors are often also major hazard facilities and this will change the priority of some of the choices which need to be made.

The unit covers the selection of appropriate strategies, techniques and tools and the adapting of them to the organisations needs. It also covers the application of the strategies to new areas and the improvement of operation in existing areas. This would typically be done in a team environment and in consultation with all key stakeholders.

This unit has a prerequisite of MCMT681A Develop a proactive maintenance strategy.

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Interpret proactive maintenance strategy	1.1 Analyse proactive maintenance strategy 1.2 Identify areas which may conflict with hazard or operations requirements
2. Interpret hazard information.	2.1 Analyse ***HAZOP*** (or similar) data for maintenance implications 2.2 Analyse ***Safety Case*** (or similar) data for maintenance implications 2.3 Analyse data arising from incident reports (and similar) for maintenance implications 2.4 Compile hazard control implications for proactive maintenance strategy
3. Identify shutdown cycle requirements.	3.1 Determine when the next shutdown is due and the expected time between shutdowns 3.2 Identify plant items/maintenance activities which can only be completed during a shutdown 3.3 Identify critical conditions which must not be breached in order to maintain plant reliability until shutdown 3.4 Compile shutdown cycle requirements for proactive maintenance strategy

4. Identify maintenance requirements of ancillary equipment	4.1 Identify proactive maintenance requirements of ancillary equipment 4.2 Identify maintenance which can only be done when the plant is shut down 4.3 Compile ancillary equipment requirements for proactive maintenance strategy
5. Adapt proactive maintenance strategy	5.1 Compare identified requirements to the proactive maintenance strategy 5.2 Negotiate a proactive maintenance strategy which meets these requirements 5.3 Monitor the implementation of the strategy to ensure the identified requirements are met 5.4 Make required adjustments and arrange for strategy review

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems control and data acquisition software (SCADA), enterprise resource planning systems (ERP), Manufacturing resource planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- just in time, kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

HAZOP

HAZOP (hazard and operability studies) is a technique of analysing process plant to determine hazard and operability issues.

Safety Case	Safety Case is a formal requirement of major hazard facilities in order to procure an operating licence.
Shutdown	Shutdown is the term applied to the regulatory shut down of the plant for safety inspections. This is also the only time major maintenance can be done.
Ancillary equipment	Ancillary equipment includes other plant such as boilers, utilities plants, waste treatment and hazard control equipment includes equipment such as fire ring mains, fire monitors, steam curtains, gas (or other loss of containment) monitors, blast protection and flare stacks.

Strategies and techniques may include:

- Total Productive Maintenance (TPM)
- Reliability Centred Maintenance (RCM)
- Root Cause Analysis (RCA)
- Mean Time Between Failures (MBTF)
- Failure Mode and Effects Analysis (FMEA)
- Condition monitoring

Total Preventative Maintenance/Total Productive Maintenance (TPM) is an application of total quality management to maintenance with the intention of increasing reliability, getting it right first time and increasing ***OEE.***

Reliability Centred Maintenance (RCM) moves maintenance from reactive, or even planned/programmed towards a focus on ***uptime*** and ***OEE.***

RCA There are many possible causes of any problem. Eliminating some will have no impact, others will ameliorate the problem. However elimination of the ***root cause*** will eliminate the problem. There should only be one ***root cause*** for any problem and so the analysis should continue until this one cause is found. Elimination of the ***root cause*** permanently eliminates the problem.

Uptime refers to the overall availability of the plant - it is the inverse of downtime - or the unavailability of the plant. Ideal uptime is 100%.

Overall equipment efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is where:

- availability takes into account losses due to breakdown, set up and adjustments
- performance takes into account losses due to minor stoppages, reduced speed and idling
- quality rate takes into account t losses due to rejects, reworks and start up waste

Mean time between failure (MBTF) is one key measure of the effectiveness of a maintenance procedure, and is an indicator as to whether ***root causes*** are being found and resolved. If ***MBTF*** is reducing, then it is an indicator that the maintenance regime is failing.

Failure Mode and Effects Analysis (FMEA) is a systematic approach that identifies potential failure modes in a system, product, or manufacturing / assembly operation caused by either design or manufacturing / assembly process deficiencies. It also identifies critical or significant design or process characteristics that require special controls to prevent or detect failure modes. ***FMEA*** is a tool used to prevent problems from occurring. Some industry sectors have highly adapted forms of ***FMEA*** and may practice traditional ***FMEA*** in say their routine maintenance while using another technique

(such as ***HAZOP***) for design and modification.

Hazard and Operability Studies (HAZOP) is a form of ***FMEA*** which has been practiced by the process industries for over 30 years and examines the implications of changes in process conditions to process stability.

Condition monitoring involves often quite sophisticated monitoring of equipment including such things as vibration monitoring, instrumental analysis of lubricating oil etc to determine the current state of the equipment, monitor the change in this condition and predict when it needs servicing/maintenance to maintain reliability.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to select appropriate strategies, techniques and tools and adapt them to the organisations needs. They will also be able to apply the strategies to new areas and improve their operation in existing areas.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of a functioning proactive maintenance strategy is required.
In what context should assessment occur?	Assessment will need to occur in an organisation using, or about to use, a proactive maintenance strategy or a case study or project.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with other relevant maintenance units and technical units related to the techniques and tools. This unit is related to *MCMT280A Undertake root cause analysis*, *MCMT281A Contribute to the application of a proactive maintenance strategy* and *MCMT481A Undertake proactive maintenance analyses* which cover different aspects/levels of this area.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

If evidence is provided from the initial introduction of a proactive maintenance strategy or a significant maintenance strategy, then one development and implementation may provide sufficient evidence. Where evidence is from the ongoing improvements of an existing strategy, then it will be needed from a range of activities to provide sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- communication
- team work
- analysis
- problem solving
- mathematics
- planning
- reading and interpreting engineering specifications/drawings
- computer use
- prioritising
- recording data

Knowledge

- characteristics and strengths of different types of strategies, techniques and tools such as TPM, RCM, MTBF, FMEA, condition monitoring, RCA etc
- holistic costs of different strategies combining cost of maintenance with costs of lost production, sales etc as relevant to the organisation
- business goals sufficient to match the strategy to the business needs
- strategic thinking and its application to proactive maintenance
- principles of process equipment and how to improve its reliability
- resources required and how to obtain them

What are the specific resource requirements for this unit?

Access to an organisation using, or about to use, proactive maintenance strategies.

MCMT683A Adapt a proactive maintenance strategy for a seasonal or cyclical manufacturing operation

Unit Descriptor

This unit covers the knowledge and skills needed to develop a standard proactive maintenance strategy for a seasonal or cyclical manufacturing processes or similar.

Prerequisite Unit(s)

MCMT681A Develop a proactive maintenance strategy

Application of the Unit

In a typical scenario, an organisation engaged in ***competitive manufacturing*** operates a seasonal/cyclical plant and also adopts proactive maintenance strategies. The seasonal/cyclical nature of some manufacturers for example many food processing enterprises, cotton ginning and sugar refiners may change the normal priority of some of the choices which need to be made in implementing a proactive maintenance strategy .

The unit covers the selection of appropriate proactive maintenance strategies, techniques and tools and the adapting of them to the needs of an organisation engaged in strongly seasonal manufacturing or processing. It also covers the application of the strategies to new areas and the improvement of operation in existing areas. This would typically be done in a team environment and in consultation with all key stakeholders.

This unit has a prerequisite of:

MCMT681ADevelop a proactive maintenancestrategy

Unit Sector

CMI Tools

ELEMENT	PERFORMANCE CRITERIA
1. Interpret proactive maintenance strategy	1.1 Analyse proactive maintenance strategy 1.2 Identify areas which may conflict with cyclical requirements
2. Identify cyclical requirements of the process	2.1 Establish when the season finishes and the expected cycle duration 2.2 Identify plant items and maintenance activities which production imperatives dictate can only be completed after season end 2.3 Identify ***critical conditions*** which must be met in order to maintain plant reliability until season end 2.4 Compile cycle requirements for proactive maintenance strategy
3. Identify maintenance requirements of ancillary equipment	3.1 Identify proactive maintenance requirements of ancillary equipment 3.2 Identify maintenance which can only be done at season end 3.3 Compile ancillary equipment requirements for proactive maintenance strategy

4. Identify maintenance requirements during season	4.1 Identify critical maintenance activities which must be done during season 4.2 Negotiate conflicts with cyclical manufacturing or processing requirements 4.3 Compile proactive maintenance strategy requirements during season
5. Adapt proactive maintenance strategy	5.1 Compare identified requirements to the proactive maintenance strategy 5.2 Negotiate a proactive maintenance strategy which meets these requirements 5.3 Monitor the implementation of the strategy to ensure the identified requirements are met 5.4 Make required adjustments and arrange review schedule

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems control and data acquisition software (SCADA), enterprise resource planning systems (ERP), Manufacturing resource planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- just in time, kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

Critical conditions	Critical conditions are those factors which must be undertaken or determined in order to maintain plant reliability during processing season. These may include: • maximum load factors • lubrication schedules • correct operating temperatures • cleaning and waste removal schedules • equipment inspection and test schedules • development of standard operating procedures and training of operators • etc.
Ancillary equipment	Ancillary equipment includes other plant such as boilers, utilities plants, waste treatment and hazard control equipment includes equipment such as fire ring mains, fire monitors, steam curtains, gas (or other loss of containment) monitors, blast protection and flare stacks.

Strategies and techniques may include:

- Total Productive Maintenance (TPM)
- Reliability Centred Maintenance (RCM)
- Root Cause Analysis (RCA)
- Mean Time Between Failures (MBTF)
- Failure Mode and Effects **Analysis (FMEA)**
- Condition monitoring

Total Preventative Maintenance/Total Productive Maintenance (TPM) is an application of total quality management to maintenance with the intention of increasing reliability, getting it right first time and increasing ***OEE.***

Reliability Centred Maintenance (RCM) moves maintenance from reactive, or even planned/programmed towards a focus on ***uptime*** and ***OEE.***

RCA There are many possible causes of any problem. Eliminating some will have no impact, others will ameliorate the problem. However elimination of the ***root cause*** will eliminate the problem. There should only be one ***root cause*** for any problem and so the analysis should continue until this one cause is found. Elimination of the ***root cause*** permanently eliminates the problem.

Uptime refers to the overall availability of the plant - it is the inverse of downtime - or the unavailability of the plant. Ideal uptime is 100%.

Overall equipment efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is where:

- availability takes into account losses due to breakdown, set up and adjustments
- performance takes into account losses due to minor stoppages, reduced speed and idling
- quality rate takes into account t losses due to rejects, reworks and start up waste

Mean time between failure (MBTF) is one key measure of the effectiveness of a maintenance procedure, and is an indicator as to whether ***root causes*** are being found and resolved. If ***MBTF*** is reducing, then it is an indicator that the maintenance regime is failing.

Failure Mode and Effects Analysis (FMEA) is a systematic approach that identifies potential failure modes in a system, product, or manufacturing / assembly operation caused by either design or manufacturing / assembly process deficiencies. It also identifies critical or significant design or process characteristics that require special controls to prevent or detect failure modes. ***FMEA*** is a tool used to prevent problems from occurring.

Some industry sectors have highly adapted forms of ***FMEA*** and may practice traditional ***FMEA*** in say their routine

maintenance while using another technique (such as ***HAZOP***) for design and modification.

Hazard and Operability Studies (HAZOP) is a form of ***FMEA*** which has been practiced by the process industries for over 30 years and examines the implications of changes in process conditions to process stability.

Condition monitoring involves often quite sophisticated monitoring of equipment including such things as vibration monitoring, instrumental analysis of lubricating oil etc to determine the current state of the equipment, monitor the change in this condition and predict when it needs servicing/maintenance to maintain reliability.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to select appropriate strategies, techniques and tools and adapt them to the organisations needs. They will also be able to apply the strategies to new areas and improve their operation in existing areas.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of a functioning proactive maintenance strategy is required.
In what context should assessment occur?	Assessment will need to occur in an organisation using, or about to use, a proactive maintenance strategy or a case study or project.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with other relevant maintenance units and technical units related to the techniques and tools. This unit is related to *MCMT280A Undertake root cause analysis*, *MCMT281A Contribute to the application of a proactive maintenance strategy* and *MCMT481A Undertake proactive maintenance analyses* which cover different aspects/levels of this area.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

If evidence is provided from the initial introduction of a proactive maintenance strategy or a significant maintenance strategy, then one development and implementation may provide sufficient evidence. Where evidence is from the ongoing improvements of an existing strategy, then it will be needed from a range of activities to provide sufficient evidence.

What skills and knowledge is needed to achieve the performance criteria?

Skills

- communication
- team work
- analysis
- problem solving
- mathematics
- planning
- reading and interpreting engineering specifications/drawings
- computer use
- prioritising
- recording data

Knowledge

- characteristics and strengths of different types of strategies, techniques and tools such as TPM, RCM, MTBF, FMEA, condition monitoring, RCA etc
- holistic costs of different strategies combining cost of maintenance with costs of lost production, sales etc as relevant to the organisation
- business goals sufficient to match the strategy to the business needs
- strategic thinking and its application to proactive maintenance
- principles of process equipment and how to improve its reliability
- resources required and how to obtain them

What are the specific resource requirements for this unit?

Access to an organisation using, or about to use, proactive maintenance strategies.

MCMC210A Manage the impact of change on own work

Unit Descriptor

This unit covers the skills needed by an employee in a competitive manufacturing organisation which requires the employee to participate in and manage the impact of the implementation of competitive manufacturing initiatives on their own work life.

Application of the Unit

In a typical scenario, an employee in a competitive manufacturing organisation is required to positively participate in ongoing and continuous change in order for them to be implemented successfully. The employee will be expected to deal with these changes as part of a team and to give feedback from their own perspective.

Unit Sector

MCM Change/interpersonal

ELEMENT	PERFORMANCE CRITERIA
1. Examine the impact of change on own work practices	1.1 Examine changes to work flow 1.2 Examine changes to equipment/process/physical environment 1.3 Examine changes to work relationship with team members and other teams 1.4 Examine changes to data collection needs 1.5 Examine changed work for impacts on health, safety and environment 1.6 Examine changes to quality requirements 1.7 Identify any additional individual skill needs 1.8 Identify other areas requiring assistance
2. Implement change	2.1 Review changes which may have adverse impact with team leader 2.2 Adopt changes to individual work practice 2.3 Seek assistance in gathering/processing data as required 2.4 Implement the data collection/processing and take actions on resulting information in accordance with ***procedures*** 2.5 Seek assistance/training to meet needs caused by change
3. Implement continuous improvement	3.1 Critically examine all changes 3.2 Identify impacts of changes both up and down the immediate ***value chain*** 3.3 Identify areas for improvement 3.4 Make recommendations for improvement in accordance with procedures

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- just in time, kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems.

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

Procedures

Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form.

For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

Continuous improvement

Continuous improvement (also called kaizen) - the philosophy of continual improvement, that every process can and should be continually evaluated and improved in terms of time required, resources used, resultant quality, and other aspects relevant to the process.

Value chain	Competitive manufacturing organisations encompass the entire production system, beginning with the customer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The employee would respond readily to each initiative, making its implementation easier and recommending improvements.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of commitment to a range of initiatives should be available.
In what context should assessment occur?	Assessment will need to occur in a workplace following competitive manufacturing.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with any other relevant unit which relates to making a change in the workplace.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

If evidence is provided from an initial move to competitive manufacturing, then sufficient evidence may come from this initial adjustment. Where evidence is provided from a series of improvements, then it will need to be gathered from a range of initiatives to provide sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- analysis
- communication
- problem solving
- reading and interpreting
- teamwork.

Knowledge

- current process and principles of operation
- sources of data on the process/plant and possible applications to information
- methods of determining own skill needs and developing skills required
- health, safety and environment (HSE) principles as relevant to own job
- basic continuous improvement principles.

What are the specific resource requirements for this unit?

Access to an organisation using competitive manufacturing.

MCMC410A Lead change in a manufacturing environment

Unit Descriptor

This unit covers the knowledge and skills needed by people who are given the responsibility of leading change processes in a manufacturing organisation. The change may be occurring in manufacturing or in the support functions of maintenance, office, warehousing etc.

Application of the Unit

In a typical scenario, change from continuous improvement is a constant in a ***competitive manufacturing*** organisation. Change can however be more significant, for example, when the move to competitive manufacturing improvement processes are made, or at other times when significant changes such as the introduction of new products, processes or equipment are made. In these circumstances one or more individuals may have a particular role of leading the change and facilitating its implementation.

This unit assumes that consultation between management and workers and other relevant personnel has already occurred and the nature and extent of the change has been agreed. This unit does not cover the negotiation of change in a formal industrial relations sense but does cover the skill needed to identify real or potential change implementation issues including those that may need to be referred to formal consultation and/or dispute settlement procedures.

Unit Sector

MCM Change/interpersonal

ELEMENT	PERFORMANCE CRITERIA
1. Define nature and impact of change	1.1 Identify enterprise aims and objectives of the change 1.2 Identify opportunities for implementation of change within team and production environment 1.3 Determine impacts of change within team and production environment 1.4 Develop a description of the change, including its potential benefits and impacts on own work and work of team members
2. Identify Key Performance Indicators(KPIs)	2.1 Undertake liaison with managers, engineers and other staff responsible for designing and/or implementing change 2.2 Identify Key Performance Indicators (KPIs) for own and team's area of responsibility 2.3 Communicate Key Performance Indicators (KPIs) to all relevant stakeholders 2.4 Check that data collection and processing are appropriate for Key Performance Indicators (KPIs) 2.5 Raise and resolve issues related to Key Performance Indicators (KPIs) with relevant personnel

3. Liaise with key stakeholders	3.1 Identify key stakeholders impacted by the change 3.2 Communicate with key stakeholders within scope of authority 3.3 Identify and address ***issues and concerns*** of each stakeholder if within scope of authority 3.4 Develop and/or locate information required to address key concerns 3.5 Refer issues and concerns outside of scope of authority to appropriate personnel
4. Develop a strategy to help work teams implement change	4.1 Develop a ***work plan*** including timetable, key performance indicators, training needs, occupational health and safety (OHS) implications, contingency plans, and responsibilities with team members and senior managers, engineers and other staff responsible for designing and/or implementing change 4.2 Make information required to support change available to team members 4.3 Communicate/circulate draft work plan to team members, supervisors, technical experts and other appropriate personnel for comment 4.4 Assess suggested changes and incorporated into work plan where appropriate
5. Implement change	5.1 Obtain authorisation to commence change implementation in accordance with enterprise procedures 5.2 Implement change in accordance with work plan and enterprise OHS and consultation procedures
6. Monitor implementation of change	6.1 Maintain open communication channels with all stakeholders during implementation 6.2 Monitor Key Performance Indicators (KPIs) during implementation 6.3 Encourage and facilitate improvement suggestions of team members 6.4 Identify areas requiring improvement in change implementation 6.5 Make improvements to implementation according to enterprise procedures

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing	Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to: • lean manufacturing • agile manufacturing • preventative and predictive maintenance approaches • monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA)software, Enterprise Resource Planning (ERP)systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc. • statistical process control systems including six sigma and three sigma • Just in Time (JIT), kanban and other pull related manufacturing control systems • supply, value, and demand chain monitoring and analysis • other continuous improvement systems. Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.
Team	Team may include work teams from all sections of the organisation including production, maintenance, technical, administration/finance, sales/marketing.
Change	The philosophy of continual improvement is that every process can and should be continually evaluated and improved in terms of time required, resources used, resultant quality, and other aspects relevant to the process. Superimposed on this is the concept of breakthrough change when a large change/improvement is made which can shift the direction or operation of the organisation. Once such breakthrough change is the introduction of competitive manufacturing.
Issues and concerns	Issues and concerns may be communicated formally and informally and can include individual and group concerns as well as those expressed by and through industrial processes.

Work plan	A work plan can be written or informal but must include consideration of timetable, key performance indicators, training needs, OHS implications, contingency plans and responsibilities. The work plan must be capable of being coherently communicated to others.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The competent person would be able to facilitate the implementation of change by effective communication with all relevant people and by facilitating improvements to the change.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of changes facilitated would be required.
In what context should assessment occur?	Assessment needs to occur in an organisation implementing a significant change either to, or in a competitive manufacturing environment or by a project.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other team leader units dealing with change/improvement in the organisation.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence from one significant change may be sufficient. For less significant changes, a range of changes will be needed to generate sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication techniques
- negotiation skills
- information finding and analysing/using skills
- teamwork.

Knowledge

- sufficient understanding of the process to contextualise the communication and understand the data requirements to produce the Key Performance Indicators (KPIs)
- project management
- motivational techniques.

What are the specific resource requirements for this unit?

Access to an organisation implementing a significant change to or in competitive manufacturing.

MCMC610A Manage relationships with non-customer external organisations

Unit Descriptor

This unit is focused on the skills needed to identify and manage relationships with non-customer external organisations such as community groups, other businesses, training providers, research organisations and government departments.

Application of the Unit

In a typical scenario, the person (who may be a section leader, production manager or similar) will be expected to deal with a range of external organisations. Some of these will be relationships initiated by the manager's organisation, others will not. Regardless they need to be managed to the maximum benefit of the organisation and the organisation's customers.

Unit Sector

MCM Change/interpersonal

ELEMENT	PERFORMANCE CRITERIA
1. Identify mutual interest	1.1 Clarify the ***reason contact*** was/is to be made 1.2 Identify expectations of initiating organisation 1.3 Discuss expectations, ability to meet those expectations and areas of mutual interest
2. Determine contribution of relationship	2.1 Identify any value contributions from relationship 2.2 Identify ***waste*** arising from relationship 2.3 Classify waste as necessary or unnecessary
3. Manage the relationship. in order to enhance the enterprise reputation, efficiency and profitability	3.1 Measure performance of relationship against expectations 3.2 Develop systems to enhance mutual benefit and value contributions from relationship 3.3 Develop systems to minimise and control ***necessarywaste*** without causing harm 3.4 Eliminate ***unnecessarywaste*** where possible without causing harm 3.5 Manage or terminate the relationship is a manner which enhances the organisation

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Reason contact	Contacts may be made for the purpose of research, innovation, mutual cooperation, strategic alliances, computer (or other) technology, emergency response etc.

Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items. Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.
Necessary waste	Necessary waste is any activity or cost which does not contribute directly to customer benefit/feature in the product, and which **cannot** be avoided (for example regulatory compliance and fixed costs). Necessary waste cannot be eliminated but should be managed.
Unnecessary waste	Unnecessary waste is any activity or cost which does not contribute directly to customer benefit/features in the product and **can** be avoided. Unnecessary waste should be eliminated as quickly as practical.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will deal with a range of non-customer external organisations. The relationships will be managed to be of benefit.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of relationships with external, non-customer organisations and their management.
In what context should assessment occur?	Assessment will occur in an organisation following competitive manufacturing or by a suitable case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	Nil

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

There should be evidence from a number of relationships managed over an extended period.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- negotiation
- planning.

Knowledge

- strategic requirements of own organisation
- strategic benefits to the organisation from liaisons with external organisations
- possible external organisations which may offer benefits
- benefits which can be offered to the external organisations
- customer benefits/features from products.

What are the specific resource requirements for this unit?

Access to an organisation using competitive manufacturing.

MCMC611A Manage people relationships

Unit Descriptor

This unit covers the knowledge and skills needed to manage the human relationship aspects of implementing and operating competitive manufacturing systems.

Application of the Unit

In a typical scenario, a person (who may be a manager, technical specialist or other person) is required to work with people, encourage them to accept change and also to increase the quality, quantity and reliability of output. Much of this is due to good relations with the employees and relevant people.

Unit Sector

MCM Change/interpersonal

ELEMENT	PERFORMANCE CRITERIA
1. Develop an open environment	1.1 Establish and maintain regular dialogue between all levels and all relevant sections of the organisation 1.2 Encourage a flow of communications in both directions 1.3 Identify ***key personnel*** for communications 1.4 Develop and maintain a ***formal mechanism*** for the flow of issues, concerns and suggestions in both directions 1.5 Develop and maintain regular and frequent verbal communication with all key stakeholders
2. Identify significant issues	2.1 In liaison with relevant team members/ ***stakeholders***, identify current and potential issues 2.2 Assist team members/stakeholders to formulate issues 2.3 Identify and define boundary and ' non-negotiable' issues for all team members/stakeholders 2.4 Negotiate with relevant team members/stakeholders over actual and potential issues
3. Proactively resolve issues	3.1 Liaise with team members/stakeholders to develop agreed, and where possible win-win, solutions 3.2 Negotiate acceptable solutions as required in accordance with company practices/procedures 3.3 Obtain any required official authorisations 3.4 Consult with relevant stakeholders to develop implementation plan 3.5 Implement solution
4. Monitor ongoing situation	4.1 Determine relevant Key Performance Indicators (KPIs) for plan 4.2 Check that implementation is proceeding to plan 4.3 Check for unforeseen consequences 4.4 Take appropriate action to resolve any arising issues

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing	***Competitive manufacturing*** is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to: • lean manufacturing • agile manufacturing • preventative and predictive maintenance approaches • monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc. • statistical process control systems including six sigma and three sigma • Just in Time (JIT), kanban and other pull related manufacturing control systems • supply, value, and demand chain monitoring and analysis • other continuous improvement systems. Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.
Key personnel	Key personnel for communication include formally identified managers, supervisors and workforce delegates as well as key opinion shapers (such as employees with specialist technical knowledge) on the issue being communicated.
Formal mechanisms	Formal mechanisms for communication will vary according to the enterprise but may include notice boards, employee circulars, consultative committees, staff associations, union representatives, team leaders etc.
Stakeholders	Stakeholders include team members, personnel officers, industrial officers, union delegates, production management, human relations management, financial management, engineering/technical personnel.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to develop a relationship with the team members which will make a positive contribution to the organisation.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of managing people relationships and dealing with issues.
In what context should assessment occur?	Assessment will need to occur in a competitive manufacturing organisation and where the individual is responsible for managing people relationships or by case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.
What evidence is required for demonstration of consistent performance?	Evidence should be available from an extended period of time and may be historic if the person has been in this role for some time.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- negotiating
- communication
- teamwork
- problem solving.

Knowledge

- knowledge of industrial relations structures
- relevant awards and agreements
- types of workforce structures and reward systems.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies is required. No other specific resources are required.

MCMC612A Manage workplace learning

Unit Descriptor

This unit covers the knowledge and skills required to manage the learning and skill development for a manufacturing workforce.

Application of the Unit

Management of the identification of skills needed by a work force to undertake the required work including arranging for any required learning processes. The unit does not cover trainer and assessor skills.

Unit Sector

MCM Change/interpersonal

ELEMENT	PERFORMANCE CRITERIA
1. Identify current skill requirements for the work team	1.1 Ensure records/data base of skill mix currently required by the work team are maintained in accordance with ***procedures*** 1.2 Re-assess and monitor the skills required by the team as enterprise requirements change 1.3 Consult with relevant stakeholders to predict any new/different skill requirements arising from changes to products, processes, equipment or work organisation
2. Determine current skill mix of work team	2.1 Ensure current records/data base of skill profile of individuals within the team are maintained 2.2 Consult with relevant stakeholders and monitor the application of these skills in the workplace to ensure they remain current and valid 2.3 Review the actual skill mix of the team compared to the required skill mix of the team
3. Make arrangements for skill development	3.1 Consult with team and identify any mismatch of skills possessed and used and skills required 3.2 Identify any new skills required due to anticipated changes 3.3 Consult with relevant stakeholders to determine the best way to refresh existing skills/develop new skills 3.4 Develop individual skill development program 3.5 Ensure skill development programs are implemented in accordance with procedures
4. Forecast possible future skill needs	4.1 Examine strategic directions of organisation 4.2 Discuss possible future directions with relevant stakeholders 4.3 Determine possible long term future skill requirements in consultation with relevant stakeholders 4.4 Develop plan to ensure skills are developed in advance of when they are required

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations. Procedures may also include industrial relations requirements and any classification changes that result from the acquisition of higher level skills.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will ensure that at all times the team has all the skills required to complete their work, but not necessarily any more skills.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of the work team always having the required skills for the job.
In what context should assessment occur?	Assessment will need to occur in a competitive manufacturing organisation or by case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available from an extended period of time and may be historic if the person has been in this role for some time.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- planning
- assessing
- analysing
- negotiation.

Knowledge

- knowledge of skill analysis methods or how to access skill analysis from relevant experts
- knowledge of skill development methods, or how to access skill development programs from relevant experts
- relevant formal qualifications/skill standards available to the team members, and their relevance to the job and the organisation.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies is required. No other specific resources are required.

MCMS200A Apply competitive manufacturing practices

Unit Descriptor

This unit covers the skills needed to implement basic improvement practices within a competitive manufacturing organisation. The unit focuses on bringing together the basic concepts and the holistic application of these basic concepts and processes to manufacturing. It would typically be carried out working as part of a team.

Application of the Unit

In a typical scenario, an organisation has embarked on the competitive manufacturing path. This requires certain critical skills and principles to be practised in order for competitive manufacturing to succeed. These skills are to be used within the scope of the person's job and authority.

Unit Sector

MCM Systems

ELEMENT	PERFORMANCE CRITERIA
1. Focus on the basic competitive manufacturing concepts	1.1 Identify ***customers*** and their needs/requirements 1.2 Identify ***suppliers*** 1.3 Identify value contributions along the chain 1.4 Recommend methods of increasing own contribution to the value chain
2. Improve the product/process value	2.1 Identify customer features/benefits in the product 2.2 Identify items which contribute to those features/benefits 2.3 Identify things which do not contribute to customer benefits/features 2.4 Recommend methods of increasing features/benefits
3. Use competitive manufacturing tools	3.1 Select appropriatetools for the job/process 3.2 Apply the tool to the job/process 3.3 Monitor the job/process and make adjustments to improve it in accordance with ***procedures*** 3.4 Identify own skill requirements and seek skill development if required

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing	Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to: • lean manufacturing • agile manufacturing • preventative and predictive maintenance approaches • monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA)software, Enterprise Resource Planning (ERP)systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc. • statistical process control systems including six sigma and three sigma • just in time, kanban and other pull related manufacturing control systems • supply, value, and demand chain monitoring and analysis • other continuous improvement systems. Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.
Customer	Customer may be interpreted to be an internal customer, but typically the benefits to the final customer should be used as the basis for the identification of waste. The operator does not need to interface directly with the external customer, but should be provided with sufficient information to enable them to identify customer benefits and features. Supplier may be interpreted to be an internal supplier, but typically the external supplier and their abilities should be known. The operator does not need to interface directly with the external supplier, but should be provided with sufficient information to enable them to identify supplier abilities.
Tools	Tools are used in this unit to mean the tools of competitive manufacturing such as 5S, 6 s , continuous improvement, cause effect diagrams, etc.

Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will work effectively in a competitive manufacturing environment, making continual positive contributions to the improvement of the business within the scope of their job.

What critical aspects of evidence are required to demonstrate competency in this unit?	There should be evidence of the person's contribution to the value chain and willing application of competitive manufacturing to their job.
In what context should assessment occur?	Assessment should occur in an organisation implementing competitive manufacturing.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit is related to all other units at this level in that it is the general implementation of competitive manufacturing. It could be assessed concurrently with any unit dealing with the *tools* of competitive manufacturing. This unit is related to: • *MCMS400A Implement a competitive manufacturing system* which covers the intermediate skill levels in CMI.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the Elements, Performance Criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

This should be a routine part of the operator's job and there should be evidence that these skills are practised routinely.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- analysis
- communication
- planning
- teamwork
- problem solving.

Knowledge

- the customers and the benefits they derive from the products
- the suppliers and their capabilities
- product waste
- relevant tools for their job and how to apply them
- factors impacting on the product, process and waste, particularly those wholly or partially under their control (and how to control them).

What are the specific resource requirements for this unit?

Access is required to an organisation implementing competitive manufacturing.

MCMS201A Sustain process improvements

Unit Descriptor

This unit covers the skills needed to prevent implemented process improvements slipping back to former practices or digression to less efficient practices.

Application of the Unit

The unit covers the skills needed to ensure that process improvements are sustained and opportunities taken to suggest further improvements.

Improvement initiatives can be made by any of a number of methods and by teams or individuals. The unit assumes that desired levels of performance or quality are known to employees.

This unit applies to an environment where continuous improvement in a manufacturing enterprise is being undertaken. The identification of the improvement may occur independently of the application of this unit. The unit can be applied to all areas of a manufacturing enterprise including production, maintenance, logistics and office functions.

Unit Sector

MCM Systems

ELEMENT	PERFORMANCE CRITERIA
1. Implement corrective actions	1.1 Identify impact of process improvements on systems in own work area 1.2 Examine process improvements 1.3 Clarify changes to process improvements as required 1.4 Identify any additional, personal skill gaps and seek skill development 1.5 Adopt improved process
2. Check changes	2.1 Identify claimed ***improvements*** 2.2 Identify methods of observing claimed improvements 2.3 Check if claimed improvements are occurring and report problems in accordance with procedures
3. Check for further improvements	3.1 Look for areas of possible further improvement 3.2 Take action to make improvements in accordance with procedures

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Performance	Performance may be thought of as the rate of output of the plant compared to the rate required to meet demand. Performance might also be thought of in terms of takt where takt time is the allowable time to produce one product at the rate customers are demanding it. This is NOT the same as cycle time, which is the normal time to complete an operation on a product (which should be less than or equal to takt time).
Procedures	All work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
Improvements	Improvement procedures in some enterprises is also known by baka-yoke which is a manufacturing technique of preventing mistakes by designing the manufacturing process, equipment and tools so that an operation literally cannot be performed incorrectly. An attempt to perform incorrectly, as well as being prevented, is usually met with a warning signal of some sort; the term poka-yoke is sometimes referred to as a system where only a warning is provided.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to demonstrate their willing adoption of new equipment, processes, procedures and practices and their expertise at implementing them and making critical reviews of their performance in line with their level of competence and authority.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of having sustained improvements in their own job and of assessing these improvements for their real impact.

In what context should assessment occur?

Assessment will need to occur in a workplace where improvements are occurring which impact on the operator's job and they are required to implement changes which sustain these improvements.

The unit may also be assessed on a project basis in a simulated environment.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed concurrently with appropriate units on continuous improvement/kaizen.

This unit relates to improvements in a person's own area of responsibility. *MCMS401A Ensure process improvements are sustained* is an intermediate skill level unit in the CMI.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available from multiple small changes, or from a large change which has had multiple facets implemented over a period of some months.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- technical competence to perform job
- problem solving
- teamwork
- communication.

Knowledge

- existing procedures
- modified procedures.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies or appropriate simulated environment is required. No other specific resources are required.

MCMS400A Implement a competitive manufacturing system

Unit Descriptor

This unit covers the knowledge and skills needed to implement competitive manufacturing practices. Generally, five areas drive competitive manufacturing: cost, quality, delivery, safety/environment, and morale. In a competitive manufacturing company systems will need to be implemented which drive continuous improvement in all these areas, without one area competing unduly with another.

Application of the Unit

In a typical scenario, team performance is continually reviewed against the five key areas and in liaison with other relevant people, and with the support of technical support staff, improvements in these five key areas are developed and implemented. Whereas other units may emphasise the competence to use one or more ***tools***, this unit emphasises the ability to advance on all five key areas over a moderate time period.

Unit Sector

MCM Systems

ELEMENT	PERFORMANCE CRITERIA
1. Optimise the manufacturing system	1.1 Apply competitive manufacturing practices to maximise health, safety and environmentperformance 1.2 Apply competitive manufacturing practices to maximise quality consistency 1.3 Apply competitive manufacturing practices to maximise performance by team members 1.4 Apply competitive manufacturing practices to maximise ***customer*** benefit/cost ratio 1.5 Apply competitive manufacturing practices to reduce lead time to delivery within the scope of the team's authority and responsibility 1.6 Negotiate with relevant stakeholders to resolve conflicts which arise 1.7 Select improvements which will deliver the greatest overall benefit for the resources required/available without reducing current performance on individual factors
2. Implement improvements	2.1 Implement the chosen improvement/s 2.2 Check the selected improvements improve the ***system*** as a whole and do not result in unintended consequences 2.3 Monitor implementation and make adjustments as required.

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing	Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to: • lean manufacturing • agile manufacturing • preventative and predictive maintenance approaches • monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA)software, Enterprise Resource Planning (ERP)systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc. • statistical process control systems including six sigma and three sigma • Just in Time (JIT), kanban and other pull related manufacturing control systems • supply, value, and demand chain monitoring and analysis • other continuous improvement systems. Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.
Tools	Tools is used in this unit to mean the tools of competitive manufacturing such as 5S, 6 sigma, continuous improvement, cause effect diagrams, etc.

Customer	Competitive manufacturing organisations encompass the entire production system, beginning with the ***customer***, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the ***value chain*** (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning. ***Customer*** may be interpreted to be an internal customer, but typically the benefits to the final customer should be used as the basis for the identification of waste. The operator does not need to interface directly with the external customer, but should be provided with sufficient information to enable them to identify customer benefits and features. ***Supplier*** may be interpreted to be an internal supplier, but typically the external supplier and their abilities should be known. The operator does not need to interface directly with the external supplier, but should be provided with sufficient information to enable them to identify supplier abilities.
System	A competitive manufacturing system is that holistic combination of the process, plant and equipment, procedures and practices including the skills and work organisation of the workforce which make up the productive organisation.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person should be able to continuously make improvements to all key aspects of their team/process and any change made should be of benefit to the system as a whole.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of the implementation of the competitive manufacturing system and the improvements made to product, process and team.
In what context should assessment occur?	Assessment needs to occur in an organisation implementing competitive manufacturing or using a suitable project.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed concurrently with a unit on continuous improvement and or units on the use of competitive manufacturing tools.

This unit is related to:

- *MCMS200A Apply competitive manufacturing practices* which covers the lower skill level aspects of this competency.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence will generally come from the routine implementation of competitive manufacturing and the routine continuous improvements which flow from this. As such evidence from a range of improvements is necessary.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- interpersonal relationships
- prioritising
- mathematics
- statistics
- analysing
- conducting root cause analysis
- problem solving.

Knowledge

- the customers and the benefits they derive from the products
- cost components and their relationship to customer benefits/features
- the suppliers and their capabilities
- product waste
- factors causing variability in a product and how to control them
- relevant tools for their job and how to apply them
- factors impacting on the product, process and waste, particularly those wholly or partially under their control (and how to control them)
- good health safety and environment (HSE) practice and factors impacting on HSE performance
- morale and how to improve it
- optimisation techniques appropriate to the organisation and the job
- application of quality standards and processes.

What are the specific resource requirements for this unit?

Access to an organisation implementing competitive manufacturing.

MCMS401A Ensure process improvements are sustained

Unit Descriptor

This unit covers the knowledge and skills needed to ensure that the gains which have been made by using improved methods, processes and equipment are sustained as the new base line/standard to the team's area of work and so prevent regression to former practices, or digression to less efficient practices.

Application of the Unit

This unit applies to an environment where continuous improvement in a manufacturing enterprise is being undertaken.

The team leader or other responsible person then facilitates and implements methods of ensuring that these improvements are sustained.

Improvement initiatives can be made by any of any number of methods and by teams or individuals. The unit assumes that desired levels of performance or quality are known.

The unit covers ensuring that team members implement the modified processes to ensure the improvements are sustained and opportunities taken to suggest further improvements.

Unit Sector

MCM Systems

ELEMENT	PERFORMANCE CRITERIA
1. Ensure corrective actions are implemented.	1.1 Liaise with relevant people associated with the anticipated corrective action 1.2 Ensure the supply of resources (equipment, modifications, consumables, people) 1.3 Check occupational health and safety (OHS) impacts of corrective action and take action in accordance with procedures if required 1.4 Ensure workforce has relevant skill level 1.5 Negotiate solutions with relevant people to allow implementation 1.6 Supervise implementation of corrective action 1.7 Monitor implementation of corrective action 1.8 Make required adjustments
2. Verify systems support improvement	2.1 Ensure ***procedures*** reflect improvements 2.2 Ensure training and assessment systems reflect improvements 2.3 Liaise with relevant people to ensure their support of the new modified system/s
3. Audit the change	3.1 Determine an appropriate audit period/cycle 3.2 Agree relevant measures/indicators for the improvement 3.3 ***Measure performance*** at agreed times using agreed measures 3.4 Investigate the cause/s of under performance 3.5 Take appropriate corrective action to improve performance 3.6 Reaudit the improvement on an agreed basis

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Systems	Systems is used to mean any/all of the equipment, process, procedures and work practices that are used to produce the product. A term often used in this context is: • Kaizen - the philosophy of continual improvement, that every process can and should be continually evaluated and improved in terms of time required, resources used, resultant quality, and other aspects relevant to the process.
Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
Improvement	Improvement procedures in some enterprises are also known by baka-yoke which is a manufacturing technique of preventing mistakes by designing the manufacturing process, equipment and tools so that an operation literally cannot be performed incorrectly. An attempt to perform incorrectly, as well as being prevented, is usually met with a warning signal of some sort. The term poka-yoke is sometimes referred to as a system where only a warning is provided. Improvements may be sustained by use of technology so that it is impossible to do the job any other way. However, improvements may also be sustained by changes to process or procedures or other changes to the manufacturing system which, if followed, will sustain the change and this unit may be applied to all these situations.
Measuring performance	Measuring performance is not used literally and may mean the personal taking of measurements, or it may mean arranging for measurements to be taken/made by appropriate personnel. The interpretation of the measurements however is to be undertaken personally.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to point to improvements which have been made where they have been active in designing and implementing systems for sustaining the improvement.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of having sustained improvements in the workplace and of reviewing these improvements for their real impact.
In what context should assessment occur?	Assessment will need to occur in a workplace where improvements are occurring, or where specific improvement projects are undertaken for the purpose of providing evidence of competence (among other aims). The unit may also be assessed on a project basis in a simulated environment.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units on continuous improvement. This unit relates to a team leader ensuring that their team sustains improvements. *MCMS201A Sustain process improvements* is a lower level unit for a person's own area of responsibility.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available from multiple small changes, or from a large change which has had multiple facets implemented over a period of some months.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication/negotiation skills
- teamwork
- basic mathematics
- planning
- problem solving
- analysing.

Knowledge

- existing procedures
- modified procedures
- overall process of manufacturing relative to improvements being made
- appropriate measures of performance
- business performance goals sufficient to determine best measures of improved performance.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies, or where improvement projects can be conducted and relevant records is required. No other specific resources are required.

MCMS600A Develop a competitive manufacturing system

Unit Descriptor

This unit covers the knowledge and skills required to develop a new competitive manufacturing system or make improvements to an existing system.

Application of the Unit

In a typical scenario, the person (who may be a manager, technical specialist or similar) in a competitive manufacturing organisation, or an organisation wishing to embark on the competitive manufacturing path, needs to be able to analyse the needs of the organisation and lead them through a change process and down the competitive manufacturing path.

This would typically be done in a team, or at least in close liaison with all relevant stakeholders.

Unit Sector

MCM Systems

ELEMENT	PERFORMANCE CRITERIA
1. Determine appropriate analytical techniques	1.1 Liaise with key stakeholders to determine objectives of manufacturing ***strategy***
	1.2 Examine current manufacturing situation to determine major areas requiring improvement
	1.3 Compare possible strategies ***, techniques*** and ***tools*** against organisation needs
	1.4 Select possible strategies, techniques and tools
	1.5 Consult with key stakeholders to confirm selected strategies, techniques and tools
2. Develop competitive manufacturing strategies	2.1 Estimate benefit/cost ratio for major stakeholders and the ***value chain*** overall
	2.2 Select preferred manufacturing strategy
	2.3 Examine and adapt strategy to organisation needs and priorities
	2.4 Examine and adapt techniques and tools required to implement strategy
	2.5 Negotiate with key stakeholders to develop an implementation plan
	2.6 Identify key information and performance indicators required
3. Implement strategy	3.1 Identify data collection required
	3.2 Identify methods of collecting and processing required data
	3.3 Identify hardware and other resources required
	3.4 Identify skill needs required
	3.5 Ensure all resources/training are available and completed
	3.6 Implement strategy

4. Monitor implementation of strategy	4.1 Compare information/performance indicators with desired levels 4.2 Liaise with key stakeholders regarding strategy issues 4.3 Identify areas requiring adjustment 4.4 Make required adjustments

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- Just in Time (JIT), kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems.

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

Strategy

There are many approaches used to embarking on competitive manufacturing. Successful organisations select an appropriate array of techniques and tools and formulate a strategy for their implementation.

Techniques and tools

There are many techniques and tools used to implement a competitive manufacturing strategy such as 5S, six sigma, root cause analysis etc.

Value chain	Competitive manufacturing organisations encompass the entire production system, beginning with the ***customer***, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.
System	A competitive manufacturing system is that holistic combination of the process, plant and equipment, procedures and practices including the skills and work organisation of the workforce which make up the productive organisation.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to conceptualise scenarios, determine which ones are of sufficient benefit to proceed with, and take their team with them.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of scenarios developed and implemented (and/or rejected for valid reasons) which have had a positive impact on the entire value chain should be available.
In what context should assessment occur?	Assessment needs to occur in an organisation following competitive manufacturing.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other relevant units to do with change in the competitive manufacturing environment. This unit is related to: • *MCMC210A Manage the impact of change on own work* which covers individual impact aspects in CMI.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Generally evidence will come from a range of scenarios and the improvements which flow.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- teamwork
- analysis
- problem solving
- mathematics
- planning
- computer use
- prioritising
- recording data.

Knowledge

- overview of competitive manufacturing principles and the decision rules for selecting the appropriate tools to use and place to start
- methods of estimating costs/benefits
- acceptable benefit/cost ratios
- continuous improvement principles
- principles of motivation and leadership
- systems thinking
- characteristics and strengths of different types of strategies, techniques and tools such as 5S, JIT, 6 sigma, lean manufacturing, agile manufacturing etc
- business goals sufficient to match the strategy to the business needs
- strategic thinking
- principles of process equipment and how to improve its reliability
- resources required and how to obtain them.

What are the specific resource requirements for this unit?

Access to an organisation using competitive manufacturing.

MCMS601A Analyse and map a value chain

Unit Descriptor

This unit covers the skills needed to analyse and map a value chain including the clear identification of a manufacturing enterprise's place in and contribution to the value chain. The unit will cover the identification of enterprises in a value chain including their relationships and the activities undertaken by value chain enterprises. The identification skills include identification at the virtual or information level, the technical or process level and at the physical or logistic level.

The unit includes the analysis of value adding and non-value adding activities and the information needs for successful value chain mapping including information technology (IT) needs.

This unit covers the analysis of the supply chain, the demand chain as well as the overall value chain.

Application of the Unit

In a typical scenario, the person (who may be a production/plant manager, purchasing/technical officer or similar) needs to analyse a value chain,asupply chain or a demand chain in order to understand the interactions between all members and determine the value added/potential value added by each member. This is the basis for the design of ***Just in Time (JIT)*** and for the determination of ***waste***.Value chain analysis is not just a one off activity but rather an ongoing activity of reanalysis as the value chain changes as its members progress towards truly competitive manufacturing.

This unit has the prerequisite of:

- *MCMT631A Undertake value analysis of product costs in terms of customer requirements*.

Unit Sector

MCM Systems

ELEMENT	PERFORMANCE CRITERIA
1. Map the value stream	1.1 Select a product/product group for analysis 1.2 Identify ultimate customer/s 1.3 Identify ultimate supplier/s 1.4 Identify all organisations between ultimate supplier and ultimate customer 1.5 Identify all steps in own organisation
2. Define customer need	2.1 Determine the features/benefits obtained by customers from product/s 2.2 Determine methods of measuring the contribution to each features/benefits 2.3 Identify possible data sources for required measures 2.4 Implement measurement of contribution to features/benefits
3. Assess the value added at each step	3.1 Identify value contributed by each external organisation 3.2 Determine value added by each internal step 3.3 Determine method of measuring value added

4. Reduce waste	4.1 Compare value added to customer benefit/feature 4.2 Identify activities which do not add to customer benefit/features 4.3 Liaise with external value chain members to determine methods to reduce overall waste 4.4 Take required actions to reduce waste

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Value chain	Competitive manufacturing organisations encompass the entire production system, beginning with the ***customer***, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.
Value added	Value added is measured against its contribution to the customer benefits/features and may be in the form of: • technical benefits/features • location benefits/features • aesthetic benefits/features • information benefits/features.
Just in time (JIT)	Just in time (JIT) is a production scheduling concept that calls for any item needed at a production operation - whether raw material, finished item, or anything in between, to be produced and available precisely when needed, neither a moment earlier nor a moment later.

Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items. Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will have a current value map and will be continuously updating the analysis of the value chain to drive further improvement both in their own organisation and also others in the value chain.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of a current analysis of the value chain should be available, along with the waste reductions which flow from it.
In what context should assessment occur?	Assessment needs to occur in an organisation pursuing competitive manufacturing, or by use of a project or case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other units related to development and improvements of systems for competitive manufacturing.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Where evidence is provided from an initial value chain analysis, then this may provide sufficient evidence. Where evidence is from an ongoing updating of an analysis then evidence is required from a range of analyses/products.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- analysis
- problem solving
- communication
- calculations
- negotiation.

Knowledge

- purpose of value chain analysis
- methods of value chain analysis
- types of waste and methods of reducing it
- process used to make product
- processes employed by other members of the value chain sufficient to have meaningful dialog with them.

What are the specific resource requirements for this unit?

Access to an organisation following competitive manufacturing.

MCMS602A Manage a value chain

Unit Descriptor

This unit covers the knowledge and skills needed to manage a value chain, a supply chain or a demand chain including the close liaison with suppliers and customers and even the managing of the supply/demand chain of smaller suppliers/customers (if they wish it).

This unit covers the managing of the supply chain, the demand chain as well as the overall value chain and may be applied to the managing of the chain internally/externally within an organisation.

Prerequisite Unit(s)

MCMS601A Analyse and map a value chain
MCMT631A Undertake value analysis of product costs in terms of customer requirements

Application of the Unit

In a typical scenario, the person (who may be a manager, technical specialist or similar) needs to manage the value/supply/demand chain on an ongoing basis to achieve the best overall contribution of valued added to their product in terms of customer benefit/features.

This unit has the prerequisites of:

- MCMS601A Analyse and map a value chain
- *MCMT631A Undertake value analysis of product costs in terms of customer requirements*.

Unit Sector

MCM Systems

ELEMENT	PERFORMANCE CRITERIA
1. Evaluate the value chain	1.1 Identify all members in the value chain for product/s in area of responsibility 1.2 Identify ***value added*** by each member of the chain 1.3 Identify acute and chronic issues which impact on the value chain 1.4 Develop priority list of items for improvement
2. Liaise regularly with chain members	2.1 Establish and maintain regular liaison with all chain members 2.2 Identify current and forecast issues with each member 2.3 Work with members to help them address their issues 2.4 Build trust and confidence in the relationship 2.5 Develop a priority list of items for improvement 2.6 Negotiate with all chain members to ensure improvements benefit chain members and improve the benefits/features perceived by the ultimate customer
3. Monitor the value added at each step	3.1 Identify changes in value added by each chain member 3.2 Identify areas where changes to value added are required 3.3 Develop a priority list of items for improvement 3.4 Work with chain member to bring about improvements to value added
4. Continue to reduce waste	4.1 Identify ***waste*** in value chain 4.2 Work with chain members to continually reduce waste

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Value chain	Competitive manufacturing organisations encompass the entire supply system, beginning product design, raw material mining and processing and all tiers of the value chain. Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.
Value added	Value added is measured against its contribution to the customer benefits/features and may be in the form of: • technical benefits/features • location benefits/features • aesthetic benefits/features • information benefits/features.
Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items. Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be continuously monitoring the value chain to drive further improvement both in their own organisation and also others in the value chain.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of ongoing improvements in the value chain should be available, along with the waste reductions which flow from it.
In what context should assessment occur?	Assessment needs to occur in an organisation pursuing competitive manufacturing or by a suitable project or case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other units related to development and improvements of systems for competitive manufacturing.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.
What evidence is required for demonstration of consistent performance?	Evidence should be from an ongoing monitoring and improvement of the supply chain.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- liaison
- negotiation
- communication
- planning
- basic value analysis.

Knowledge

- purpose of value chain analysis
- methods of value chain analysis
- types of waste and methods of reducing it
- process used to make product
- processes employed by other members of the value chain sufficient to have meaningful dialog with them
- methods of value analysis.

What are the specific resource requirements for this unit?

Access to an organisation following competitive manufacturing.

MCMS603A Develop manufacturing related business plans

Unit Descriptor

This unit covers the knowledge and skills needed to develop business plans in a competitive manufacturing environment.

Application of the Unit

In a typical scenario, the person (who may be a production/plant manager, purchasing/technical officer or similar) is required to develop a section business plan to meet the requirements of the overall strategic plan of the organisation. The plan includes the impact on the value chain and other critical competitive manufacturing factors. Due competitive pressures in manufacturing, this may be a reasonably frequent activity and can occur at any time over the business cycle. The plan may be in response to a specific change, or it may be a plan for the next period.

Unit Sector

MCM Systems

ELEMENT	PERFORMANCE CRITERIA
1. Determine purpose of plan	1.1 Confirm reason for developing plan and expected outcomes from plan 1.2 Confirm purpose of plan with all relevant stakeholders 1.3 Check expected outcomes from plan with overall strategic plan for organisation 1.4 Identify any potential areas for conflict between proposed plan and strategic directions 1.5 Negotiate with relevant stakeholders to resolve issues
2. Develop objectives and strategies	2.1 Draft ***objectives*** for business plan 2.2 Draft strategies to achieve these objectives 2.3 Determine implications for value chain 2.4 Determine capital or workplace layout/organisation implications for ***objectives and strategies***
3. Develop plans to meet objectives and strategies	3.1 Negotiate with ***relevant stakeholders*** over implications for objectives and strategies 3.2 In liaison with relevant stakeholders, develop plans to meet objectives 3.3 Determine relevant Key Performance Indicators (KPIs) for plan 3.4 Check Key Performance Indicators (KPIs) are appropriate for purpose of plan 3.5 Check plan will deliver planned purpose 3.6 Map plan to changed value chain 3.7 Adjust plan to optimise value chain 3.8 Validate plan with relevant stakeholders

4. Monitor the implementation of the plan	4.1 Release plan for implementation 4.2 Check the key progress points against the key stages of the plan 4.3 Note any discrepancies 4.4 Take appropriate action to ensure correct implementation of plan

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- Just in Time (JIT), kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems.

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

Plan

Plan may include any sort of business plan and may emphasise any of the areas for sub-plans over the others.

Objectives

Objectives may include:

- quality
- occupational health and safety (OHS)
- environment
- competitive manufacturing practices
- human, physical, financial and environmental/resource.

Objectives and strategies	Objectives and strategies may include: • human and industrial relations • material/component and resources • sustainable environmental practices • sales and marketing • financial.
Relevant stakeholders	Relevant stakeholders may include: • other team members • other workers • management • technical specialists • other members of the value chain.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to develop a plan which successfully delivers the plans objectives.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of having developed a plan which meets its objectives.
In what context should assessment occur?	Assessment will need to occur in a competitive manufacturing organisation and where the individual is undertaking business planning or by project or case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence from one significant plan should be sufficient, or alternatively from several smaller business plans.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- planning
- communication
- negotiating
- prioritising
- numeracy/calculation
- problem solving
- organising information.

Knowledge

- knowledge of organisation strategic directions
- planning methods and types of plans
- contingency planning and other risk mitigating planning tools
- the organisation's value chain
- analysis of value chain
- competitive manufacturing practices
- application of quality principles
- human resources and Industrial Relations
- OHS.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies is required. No other specific resources are required.

MCMT220A Apply quick changeover procedures

Unit Descriptor

This unit covers the knowledge and skills needed to do quick changeovers.

Application of the Unit

In a typical scenario, an organisation is pursuing quick changeover as one of its competitive manufacturing tools. This unit covers the carrying out of these quick changeovers and also recommending improvements within the scope and authority of the person's job.

Particular technical skills may also be required in some manufacturing sectors and for some jobs. These will be contained in the relevant industry Training Package.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for changeover	1.1 Determine when changeover will be required 1.2 Obtain all required tools/parts/materials for changeover 1.3 Organise process, and tools/parts/materials ready for changeover 1.4 Liaise with relevant people for quick changeover
2. Make quick changeover	2.1 Plan changeover according to quick changeover principles 2.2 Complete changeover according to ***procedures*** 2.3 Check output meets specification 2.4 Debrief with all relevant stakeholders 2.5 Note any steps which cause a problem 2.6 Recommend changes to problematic steps
3. Improve occupational health and safety (OHS)	3.1 Identify hazards in all steps/actions 3.2 Determine risks from each hazard 3.3 Identify actions which may be performed in a more ergonomic manner 3.4 Recommend changes to improve OHS

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Changeover

Changeover may refer to an exchange of dies/tools (traditional), or a change between batches, or between campaigns. It may be any quantum equipment/process change to produce a different product.

Changeover is sometimes referred to as ***SMED*** which is a more extreme form where SMED is an abbreviation for Single Minute Exchange of Die; literally, changing a die on a forming or stamping machine in a minute or less; broadly, the ability to perform any ***setup activity*** in a minute or less of machine or process downtime; the key to doing this is frequently the capability to convert ***internal setup time*** to ***external setup time***; variations on SMED include:

- Single-digit setup: performing a setup activity in a single-digit number of minutes, i.e. fewer than ten.
- OTED: One Touch Exchange of Die; literally, changing a die with one physical motion such as pushing a button; broadly, an extremely simple procedure for performing a setup activity.

Setup time - work required to change over a machine or process from one item or operation to the next item or operation ; can be divided into two types:

- ***internal setup*** work that can be done only when the machine or process is not actively engaged in production; OR
- ***external setup*** work that can be done concurrently with the machine or process performing production duties.

While the term die is the traditional term, competitive manufacturers who require changeover, but where dies are not used or are less significant, have applied this to a range of other changeovers.

This unit may not be applicable to a totally continuous operation producing only the one product, or simultaneous range of products. This is not applicable to a maintenance/ PVI shutdown as experienced by the continuous process manufacturers. However, where there is continuous manufacturing on a campaign basis, it may be applied to the changeover between campaigns or similar changeovers.

Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will effectively and routinely carry out quick changeovers, in liaison with other relevant personnel, and will make recommendations for improving the changeover.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of routine positive participation in quick changeover.
In what context should assessment occur?	Assessment will need to occur in an organisation using quick changeover or a suitable simulation, for example, in a workshop.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with relevant technical process units. This unit is related to: • *MCMT620A Develop quick changeover procedures* which covers the manager/design area for quick changeover.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available of routinely participating in quick changeovers.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- ability to determine/predict when a changeover will occur
- communication
- teamwork
- appropriate tools/process skills for setup.

Knowledge

- principles of quick changeover
- relevant procedures
- purposes/requirements of changeover
- methods of recommending changes
- quality requirements for products
- minimisation of changeover scrap.

What are the specific resource requirements for this unit?

Access to an organisation using quick changeovers.

MCMT221A Apply Just in Time (JIT) procedures

Unit Descriptor

This unit covers the knowledge and skills needed to work in a JIT system.

Application of the Unit

In a typical scenario, a person working in an organisation following JIT will need to follow ***procedures*** which are specific to JIT such as the controlled flow of material (e.g. the use of ***kanban,*** and elimination of waste etc). This will involve the operator in the application of the ***pull system*** to their job and the authorisation of product/material flows, in accordance with procedures and their level of authority

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Respond to indicator of demand	1.1 Identify pull of product through work role 1.2 Recognise indicator of ***flow authorisation*** 1.3 Identify production required
2. Make products to demand	2.1 Make product as required by ***ticket*** 2.2 Identify any factors likely to prevent demand being satisfied 2.3 Take action in accordance with procedures
3. Update demand information as required	3.1 Record information on ticket to procedures as required 3.2 Facilitate operation of flow authorisation as part of work
4. Recommend improvements	4.1 Examine the operation of the JIT system as it relates to own work 4.2 Identify areas for improvement 4.3 Recommend improvements

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Just in time (JIT)	Just in time (JIT) is a production scheduling concept that calls for any item needed at a production operation - whether raw material, finished item, or anything in between, to be produced and available precisely when needed, neither a moment earlier nor a moment later.
Flow authorisation	A system which authorises the worker to make a product without reference to another authority.

Indicator of demand	May be kanban bin, ticket or similar, or may be some other indicator of demand pull.In some plants, this may also include authorisation using SCADA software.
Ticket	Ticket may be a kanban or some other record, paper or electronic which constitutes the whole or part of the flow authorising system. Where kanban bins are used, there may be no other record.
Kanban	Kanban - a card or sheet used to authorize production or movement of an item. When fully implemented, kanban operates according to the following rules: • all production and movement of parts and material take place only as required by a downstream operation, i.e. all manufacturing and procurement are ultimately driven by the requirements of final assembly or the equivalent • the specific tool which authorizes production or movement is called a kanban. The word literally means card or sign, but it can legitimately refer to a container or other authorizing device. Kanban have various formats and content as appropriate for their usage (e.g. kanban for a vendor is different than a kanban for an internal machining operation). Kanban is typically applied to batch type operation and the production is measured in units produced. In continuous manufacturing organisations, production is measured in terms of production rate (e.g. kg/h, tonne/day) and rate is increased/decreased according to the flow authorisation which may be a kanban (e.g. ticket, order from a supplier) or may be a SCADA signal from a remote facility (e.g. customer tank) saying that resupply is required or similar.
SCADA	System Control and Data Acquisition (SCADA) is a general term applied to a number of systems which automatically collect critical process data, perform required mathematical manipulations on it and then make control decisions and/or give required information personnel for action.
Pull system	A pull system is a manufacturing planning system based on making on demand as opposed to a push system based on making for stock using a sales forecast.

Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, ' procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will work in a JIT system, using it to authorise their own work, facilitating its operation and recommending improvements.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of the routine and smooth integration of JIT into their daily work
In what context should assessment occur?	Assessment will need to occur in an organisation using JIT.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit should be assessed concurrently with relevant technical units dealing with the manufacture of product, or other units where JIT is relevant. This unit is related to: • *MCMT421A Facilitate a Just in Time (JIT) system*, and • *MCMT621A Develop a Just in Time (JIT) system* which cover the intermediate and highest skill levels in CMI respectively.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

This competency should be a routine part of the job and there should be evidence of it being consistently and routinely applied.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- reading
- recording
- communication
- planning.

Knowledge

- relevant flow authorisations, kanban for the job
- JIT methods relevant to job
- procedures for recommending improvements
- technical competence to do the job.

What are the specific resource requirements for this unit?

Access to an organisation using JIT.

MCMT230A Apply cost factors to work practices

Unit Descriptor

This unit covers the knowledge and skills needed for an individual to identify cost components and to be able to determine in general terms the cost impacts of alternative actions.

Application of the Unit

In a typical scenario, a person is required to contribute to and be involved in the assessment of cost factors in their work. This may be done individually or in a team environment.

The person is able to assess the relative costs of the alternatives and use this as one of the key factors in making decisions. Decisions are made within the scope of the employee's authority and according to procedures. Typical decisions include those that contribute to the efficient organisation of own work and the improvement of production time and cycle times.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Identify in own work area major cost components of product or process	1.1 Identify ***cost components*** in the product or ***process*** in own work area 1.2 Recognise the impact of current or alternative actions on costs
2. Identify constraints to cost efficiency	2.1 Identify required production/process rate and major costs 2.2 Identify costs factors under the control of the individual or team 2.3 Relate identified costs factors to impact on ***overall cost*** of production/process 2.4 Identify cost factors that are a constraint to cost efficiency in own work area
3. Apply cost efficient work practices	3.1 Express the implications of possible actions/changes to improve cost efficiency in simple financial terms 3.2 Identify non-financial implications of proposed changes in discussion with relevant people 3.3 Select actions which minimise overall costs 3.4 Monitor actions to ensure cost efficiency in own work area is maintained

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Cost components	Cost components include fixed and variable costs such as power/energy, materials, plant and equipment, production or process time including impact on salary and wages, office expenses such as telephone and government taxes and charges.
Process	Process may include a production, maintenance, logistics or office process in a manufacturing environment.
Overall cost	Overall cost may include the assessment of negative and positive financial implications. It also includes negative long term issues, such as occupational health and safety (OHS), environmental and regulatory issues.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will as part of their routine decision making aim to minimise costs. There should be evidence of their doing so.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of being able to identify costs factors relevant to an individual's job. Evidence of having made appropriate decisions to minimise overall costs.
In what context should assessment occur?	Assessment will need to occur in a workplace or by use of a work based case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units on continuous improvement.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available over a period of time or from more than one process or product.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- basic numeracy.

Knowledge

- cost components of products made
- costs concepts such as expense and income
- major cost contributors to product (e.g. energy)
- the difference between internally and externally controlled costs
- difference between overhead, labour and consumables.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies. No other specific resources are required.

MCMT231A Interpret product costs in terms of customer requirements

Unit Descriptor

This unit covers the knowledge and skills needed for a person to be able to identify the major cost components of their product/s, the basic relationship of these to customer benefits and use this to help minimise waste (defined as anything not delivering a customer benefit). It has a different focus to MCMT230A Apply cost factors to work practices which focuses on costs in isolation whereas this unit regards all costs not directly leading to customer benefit as waste. It may apply to all employees.

Application of the Unit

In a typical scenario, an employee uses their understanding of the customer's requirements of the product or process being undertaken as the basis for investigating processes to identify waste sources and then take actions relevant to their level of competency and authority to reduce this waste. It requires and understanding of both the cost factors in the products they make and also the benefits which the customer derives from the product.

This competency may be performed individually or in a team based environment.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Identify cost components deriving from customer benefits and other costs	1.1 Identify ***customer features/benefits*** in product or process being undertaken 1.2 Identify cost components which deliver customer features/benefits and those which don't
2. Compare required performance of product or process steps with actual performance	2.1 Identify ***performance*** required to meet customer needs 2.2 Identify actual performance 2.3 Compare cost components of products or process with current ***customer related targets*** 2.4 Separate costs components into those that contribute to customer features/benefits and those that do not contribute 2.5 Determine ***non-contributing cost components*** which are under control of the individual or team
3. Minimise waste	3.1 Recommend changes to eliminate or reduce waste 3.2 Adopt changes which minimises waste 3.3 Monitor effect of changes to ensure gains are made against customer features/benefits

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Customer features/benefits	Customer features/benefits are those characteristics of the product or service which add value to the customer, this value may be assessed in financial or features terms. The customer may be internal or external.
Performance	Performance may be thought of as the rate of output of the plant compared to the rate required to meet demand. Performance might also be thought of in terms of takt where takt time is the allowable time to produce one product at the rate and quality customers are demanding it. This is NOT the same as cycle time, which is the normal time to complete an operation on a product (which should be less than or equal to takt time).
Customer related targets	Customer related targets are the internally set financial and operational targets that contribute to meeting customer features/benefits.
Non-contributing cost components	Some costs incurred make a direct contribution to customer features/benefits. These costs continue to need to be incurred (although they may be minimised) in order to gain the customer feature/benefit. Other costs do not contribute to customer features/benefits (non-contributing cost components) and either must be maintained such as regulatory compliance and occupational health and safety (OHS) costs while other costs are not required and do not contribute to customer features and so should be eliminated if possible. This is also defined in terms of ***waste*** - see below.

Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items. Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

An employee will as part of their everyday routine aim to minimise waste and establish a focus in their work on meeting targets that contribute to customer features/benefits.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of being able to identify cost factors in employees work in terms of customer features/benefits and having made appropriate recommendations to reduce waste. Evidence of implementing changes which reduce waste.
In what context should assessment occur?	Assessment will need to occur in a workplace or through a project in a simulated work environment.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units on continuous improvement.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available from several episodes of analysis and implementation of recommendations to reduce waste and improve customer features/benefits.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- numeracy
- communication and literacy.

Knowledge

- ability to access company information about:
- customer features/benefits
- cost components of products made
- costs concepts such as expense and income
- major cost contributors to product (e.g. energy)
- the difference between internally and externally controlled costs
- difference between overhead, labour and consumables.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies. No other specific resources are required.

MCMT240A Apply 5S procedures in a manufacturing environment

Unit Descriptor

This unit covers the knowledge and skills needed for an employee to apply 5S procedures (a structured approach to housekeeping) to their own job and work area.

Application of the Unit

In a typical scenario, an organisation has decided to embark on a competitive manufacturing strategy and as part of this has adopted the philosophy of 5S as one of the tools to move down this path. The employee needs to apply 5S to their job and work area and maintain the housekeeping and other standards set by 5S.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Sort needed from unneeded	1.1 Identify all ***items*** in the work area 1.2 Distinguish between essential and non-essential items 1.3 Place any non-essential item in a appropriate place, not in the work area 1.4 Regularly check that only essential items are in the work area
2. Set the workplace in order	2.1 Identify the best location for each essential item 2.2 Place each essential item in its assigned location 2.3 After use immediately return each essential item to its assigned location 2.4 Regularly check that each essential item is in its assigned location
3. Shine the work area	3.1 Keep the work area clean and tidy at all times 3.2 Conduct regular housekeeping activities during shift 3.3 Ensure the work area is neat, clean and tidy at both beginning and end of shift
4. Standardise activities	4.1 Follow ***procedures*** 4.2 Follow checklists for activities where available 4.3 Keep the work area to specified standard
5. Sustain the 5S system	5.1 Clean up after completion of job and before commencing next job or end of shift 5.2 Identify situations where compliance to standards is unlikely and take actions specified in procedures 5.3 Inspect work area regularly for compliance to specified standard 5.4 Recommend improvements to lift the level of compliance in the workplace

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

5S	5S is a system of work organisation originally developed in Japan based around: A close translation of the five stages in the housekeeping approach is: • Sort • Set in order • Shine • Standardise • Sustain
Sort	Sort involves keeping only what is absolutely necessary for the production process on the production floor. As a first step, clear the work area of all non-essential equipment and materials. Remove anything either not required to produce the product or adjust the machine during the process. This helps to get rid of a 'just in case' mentality.
Items in work area	Items in work area include tools, jigs/fixtures, materials/ components, plant and equipment, manuals, personal items (such as bags, lunch boxes, posters), safety equipment and personal protective equipment, and any other item which happens to be in the work area.
Set in order	After removing unnecessary materials, the remaining materials must be those that are required immediately for either the machine or the job at hand. All of these materials/change/parts etc must have an assigned location on the production floor. Locations should be clearly marked and labelled to show what belongs where.
Shine	The work area should be kept clean at all times. Cleaning must be carried out to a regular daily schedule against allowed time and, on most occasions, at the end of a job.
Standardise	Once 5S is established, standardising activities help maintain the order and the housekeeping standards. Standardising may use procedures and checklists developed from a procedure.

Sustain	Sustain means making sure that daily activities are completed every day regardless of circumstance. A job should always be cleaned up once finished regardless of the urgency of the next job. Informal inspections should be done often, at least weekly. Formal inspections of each area should be carried out at least monthly. Specific actions should be followed up. This will generate continuous improvement.
Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the operation of the plant. They may be written, verbal, computer based or in some other form. For the purposes of CMI, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

There should be evidence that the employee is routinely applying 5S principles in their routine work and that they are aware of why 5S is important.

What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of routine practice of 5S as part of their job.
In what context should assessment occur?	This unit needs to be assessed in a workplace practising, or beginning to implement, 5S.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with a unit on continuous improvement, or in conjunction with a technical unit related to the process. This unit differs from *MCMT440A Lead 5S in a manufacturing environment* which applies to those who also need to help others apply 5S.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

There needs to be evidence that this is a consistent part of their routine work life, and as such, evidence is needed over an extended period.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- planning
- organising
- prioritising
- reading and interpretation
- recording
- problem solving.

Knowledge

- meaning and application of 5S to their job
- principles of efficient workplace organisation
- purposes of 5S
- procedures relevant to job
- methods of making/recommending improvements.

What are the specific resource requirements for this unit?

Access to a plant implementing/practising 5S. No other specific resources re required.

MCMT250A Monitor process capability

Unit Descriptor

This unit covers the knowledge and skills required for gathering of data and the interpretation of simple information to determine the compliance of the process and the taking of action as defined by the procedures where the information reveals the process is out of control parameters.

Application of the Unit

In a typical scenario an organisation has adopted either ***six sigma*** or statistical process control/ ***three sigma*** as a means of determining and improving the capability of their process. The team member is involved in this in collecting specified data and performing specified manipulations to the data (typically by plotting on a chart or by entering into a specified computer program). The information is typically presented to the team member in terms of graphs/charts which they are expected to interpret at a basic level and then take action in accordance with procedures to restore the process to being under control parameters.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Collect and process data	1.1 Take specified measurements/readings as required 1.2 Enter data onto log/into computer or other record 1.3 Manipulate and/or chart data as required by ***procedures***
2. Identify variations that are not random and take action	2.1 Examine chart and/or reliability information 2.2 Distinguish between ***random variations*** and those with an identifiable cause 2.3 Take action specified in ***procedures*** when a variation with an ***identifiable cause*** occurs
3. Assist in process improvement	3.1 Collect data for process capability improvement trials as directed 3.2 Make recommendations for improvement as required 3.3 Implement revised capability monitoring ***procedures*** as required

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Six sigma	Six sigma is a process improvement methodology based on statistical process control with six sigma limits which equates to 3.4 defects per million opportunities for each product or service transaction. Six sigma is also often used as a general term covering a competitive manufacturing approach. Six sigma training typically covers several units of competency in this Training Package.
Three sigma	Three sigma includes statistical process control with three sigma limits which equates to 3 defects per thousand opportunities for each product or service transaction.
Procedures	Procedures includes all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, ' procedures' also includes good operating practice as may be defined by industry codes of practice (eg Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
Random variation	Random variation is the term used in statistical control to refer to those variations for which no cause can be found.
Identifiable cause	Also referred to as an 'assignable cause' or a 'special cause' are those variations for which a cause can be found and so the cause of the variation eliminated.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person performing this unit would be expected to collect the correct data at the required frequency, perform the required manipulations on the data and then recognise assignable causes and take the required action (which may just be reporting).

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence should be available of data collected and processed. There may also be evidence of assignable causes recognised and action taken. There should not be evidence of assignable causes ignored.
In what context should assessment occur?	Assessment will need to occur in a workplace implementing either 3 sigma or 6 sigma.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with a continuous improvement or a quality unit. This unit is related to: • *MCMT450A Undertake process capability improvements*, and • *MCMT650A Determine and improve process capability* which apply to the intermediate and highest skill levels in CMI respectively. It may also be appropriate to relate this unit to *MEM15.1AA Perform basic statistical quality control* and possibly also *MEM15.8BA Perform advanced statistical quality control* where the person is required to perform statistical manipulations (i.e. where these are not done automatically for the person e.g. by a computer system).

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence of the routine collection and processing of data should be available from the workplace. Consistent interpretation of information should also be available from the workplace, although this may need to be supplemented with synthetic data as above. The interpretation of multiple assignable causes is more important that the consistent interpretation of one type of assignable cause.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- problem solving
- statistical control
- planning
- communication.

Knowledge

- data collection methods
- data processing techniques required
- basic variability and normal distribution
- recognition of identifiable causes in accordance with procedures
- causes of different types of identifiable causes as defined by procedures
- actions to be taken for the different causes.

What are the specific resource requirements for this unit?

Access to a work place utilising either 6 sigma or 3 sigma is required. Where it is necessary to use synthetic information for assessment purposes, then a bank of such information should be created.

MCMT251A Apply quality standards

Unit Descriptor

This unit is based on LMTQAGN01A Apply quality standards.

This unit covers the skills and knowledge required to apply quality standards to work operations in a manufacturing enterprise.

Application of the Unit

In a typical scenario, an employee is expected to take responsibility for the quality of their own work, and to take actions specified in the procedures and within the scope of their job and authority to ensure that quality standards are met.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Assess own work	1.1 Continuously check completed work against workplace standards relevant to the operation being undertaken 1.2 Demonstrate an understanding of how the work activities and completed work relate to the next production process or processes and to the final products concerned 1.3 Identify and isolate faulty pieces/components or final products/batches 1.4 Record and/or report the faults and any identified causes to the supervisor concerned where required in accordance with workplace ***procedures***
2. Assess quality of received component parts/materials	2.1 Continuously check received materials, component parts or final products against workplace standards and specifications for conformance 2.2 Demonstrate an understanding of how the received materials or component parts relate to the current operation and how they contribute to the final quality of the product 2.3 Identify and isolate faulty material or component parts related to the operator's work 2.4 Record and/or report the faults and any identified causes to the supervisor concerned where required, in accordance with workplace procedures 2.5 Identify causes of any identified faults and take corrective action specified in the workplace procedures
3. Measure parts/ materials	3.1 ***Measure*** materials, component parts or products, as required, using the appropriate measuring instruments in accordance with workplace procedures
4. Record information on production indicator	4.1 Record basic information on the quality and other ***indicators of production performance*** in accordance with workplace procedures

5. Investigate causes of quality deviations	5.1 ***Investigate and report*** causes of deviations from specified quality standards for materials, component parts or final products, as required, using the appropriate measuring techniques in accordance with workplace procedures 5.2 Recommend suitable preventative action based on workplace quality standards and the identified causes of deviations from specified quality standards of materials, component parts or final products

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Work site environment	Work may be conducted in a large scale production or small business situation.
Quality parameters	Quality parameters may include: • finish • size • durability • product variations • materials • alignment • colour • damage and imperfections.
Quality checks	Quality checks may include: • visual inspection • physical measurements • chemical tests • checks against patterns, templates and guides.
Measure	Measure includes those measurements which may be taken by the employee in the work place/at their work station.
Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the operation of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (eg Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

Indicators of production performance	Indicators of production performance include things like number of items/production rate, delays and causes of delays (where known) and other information as specified in the procedures.
Data entry/recording	Data entry/recording may include: • keyboard • written (including ticks or signs) • verbal.
Sources of information/ documents	Sources of information/documents may include: • quality and Australian standards and procedures • work instructions, patterns, designs and recipes • organisation work procedures • manufacturer's instructions for materials and equipment • organisational or external personnel • customer/s requirements.
Investigate and report	Investigate and report in this unit is used to mean following set procedures defined for such investigations.
Workplace context	Work organisation procedures and practices relating to the manufacture and quality outcomes for products. Conditions of service, legislation and industrial agreements including: • workplace agreements and awards • Federal or State/Territory legislation • standard work practice.
Reporting/communication	Reporting/communication may include verbal and written communication in accordance with organisational policies and procedures. Communication may be oral, written or visual and can include simple data.
Being responsible for the maintenance of own work quality	Being responsible for the maintenance of own work quality may include being required to contribute to the quality improvement of team or section output, where necessary, in accordance with workplace procedures. Safety, environmental, housekeeping and quality are as specified by materials/machine/equipment manufacturers, regulatory authorities and the enterprise.

Applicable regulations and legislation	Applicable regulations and legislation may include: • occupational health and safety (OHS) legislation relevant to workplace activities • workers' compensation legislation.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

Competence should be demonstrated in the appropriate work context dependent on the level of responsibility being exercised.

Work is assessed in accordance with enterprise quality standards, relevant statutory requirements, organisation insurance requirements, OHS legislation, manual handling procedures and relevant health regulations.

What critical aspects of evidence are required to demonstrate competency in this unit?	Assessment must confirm appropriate knowledge and skills to: • interpret, relevant work instructions, standards and specifications appropriate to the assessee's work • check and measure the relevant quality parameters • interpret the results of quality checks in terms of specifications, patterns and work standards • take required action where standards of materials, component parts, final product or work processes are found to be unacceptable • maintain accurate records.
In what context should assessment occur?	Assessment may occur on the job or in an appropriately simulated environment.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed in conjunction with the other relevant units. In some contexts it may be necessary to use specific measuring equipment to check the quality and this may required competence in using that equipment. Where that is the case, it is appropriate to assess this unit in conjunction with that other relevant unit.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Applies underpinning knowledge and skills when:

- interpreting work instructions, specifications, standards and patterns appropriate to the assessee's work
- describing consequences
- completing tasks
- identifying improvements within defined procedures
- applying safety precautions relevant to the task
- assessing operational capability of specified equipment used and work processes.

Shows evidence of application of relevant workplace procedures including:

- quality procedures
- hazard policies and procedures including codes of practice relevant to their job within defined procedures
- job procedures and work instructions
- waste, pollution and recycling management processes within defined procedures
- action taken promptly, accidents and incidents reported in accordance with statutory requirements and enterprise procedures
- recognises and adapts appropriately to cultural differences in the workplace, including modes of behaviour and interactions among staff and others in accordance with workplace procedures
- work completed systematically with attention to detail without damage to goods, equipment or personnel.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- interpret work instructions, specifications, standards and patterns appropriate to the assessee's work
- carry out relevant visual inspections of materials, component parts and final products
- carry out relevant physical/chemical measurements or tests
- maintain accurate work records in accordance with procedures
- carry out work in accordance with OHS policies and procedures
- meet work specifications
- communicate effectively within defined workplace procedures
- interpret and apply defined procedures.

Knowledge

- relevant quality standards, policies and procedures
- relevant production processes, materials and products
- basic characteristics of materials used in the relevant production processes
- safety and environmental aspects of relevant production processes
- relevant measurement techniques and quality checking procedures
- workplace procedures
- reporting procedures.

What are the specific resource requirements for this unit?

Access to real or appropriately simulated production situations including areas, materials, equipment, and information on work specifications/patterns, relevant safety procedures and regulations, quality standards, organisation procedures and customer requirements.

MCMT260A Use planning software systems in manufacturing

Unit Descriptor

This unit covers the knowledge and skills needed to access planning software (often known as ERP, MRP, MRPII, and often by its brand name such as SAP etc) to make routine business decisions required of the person as a regular part of their job.

Application of the Unit

In a typical scenario, an organisation has introduced a planning software system which the employees now must interface with. At its simplest level this is just an information system. However when fully implemented the ***planning software*** system can be used as a tool for decision making.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Use interface	1.1 Use keyboards, track ball/mouse and monitor and/or other peripherals to access system 1.2 Navigate through the system and the screens 1.3 Acknowledge messages 1.4 Input and output information in the required format
2. Access information	2.1 Obtain relevant data and information from the system 2.2 Identify the status of items in the ***value chain*** 2.3 Access historical data and information 2.4 Interpret information and prioritise actions
3. Take appropriate actions in accordance with procedures	3.1 Take actions in response to information 3.2 Follow up as appropriate to ensure anticipated results have occurred 3.3 Record adjustments and variations according to procedures

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Planning software	Planning software is a general term applied to a number of software systems which integrate a range of business information such as finance, logistics maintenance and production. It is frequently referred to by names such as ERP, SAP, MRP/MRPII.

Value chain	Competitive manufacturing organisations encompass the entire production system, beginning with the customer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the ***value chain*** (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.
Procedures	Procedures includes all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The employee will routinely use the relevant parts of the planning software system for their job.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of routine use of planning software as part of their job is required.
In what context should assessment occur?	Assessment needs to occur in a workplace using a planning software system or a simulation system.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit should be assessed concurrently with relevant technical units for the process. This unit covers the lower skill levels of using planning software. *MCMT460A Use planning software systems in manufacturing* and *MCMT660A Develop the application of enterprise systems in manufacturing* cover the intermediate and highest skill levels in the CMI respectively.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence of routine use over an extended period should be available. Planning software systems will typically log all interactions with it. Interrogation of the planning software system will therefore provide evidence of the operator's use of it. Actions taken may also be accessible from the planning software system itself, or may need other evidence available from the process.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- keyboarding/mousing
- communication
- teamwork
- problem solving.

Knowledge

- technical knowledge and skills needed to operate process
- hierarchy of planning software system and operation
- information available from and business activities exercised by/through the planning software system.

What are the specific resource requirements for this unit?

Access to an organisation using a planning software system.

MCMT261A Use SCADA systems in manufacturing

Unit Descriptor

This unit covers the knowledge and skills needed by an employee to interact with a System Control and Data Acquisition (SCADA) system as part of their job.

Application of the Unit

In a typical scenario, an organisation has introduced a SCADA system which employees now must interface with. The employee will need to access this system as part of their routine and take actions based on the information they get from the SCADA system in accordance with procedures.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Use operator interface	1.1 Use keyboards, track ball, monitor and/or stand alone controllers to access/interrogate system 1.2 Find all relevant screens and information 1.3 Acknowledge messages 1.4 Input and output information
2. Use information	2.1 Obtain data and information from the SCADA as required including process, ***supply*** and ***product*** chain data 2.2 Interpret data and information as required by own job 2.3 Find and use relevant historical data and information 2.4 Determine and prioritise required actions
3. Make required changes in accordance with procedures	3.1 Adjust production/process in response to SCADA information 3.2 Record adjustments and variations to specifications/ schedules and report to appropriate personnel

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

System Control and Data Acquisition (SCADA)	System Control and Data Acquisition (SCADA) is a general term applied to a number of systems which automatically collect critical process data, perform required mathematical manipulations on it and then make control decisions and/or give required information to personnel for action. In the continuous manufacturing sector, the SCADA system is sometimes integrated into other sophisticated computer control systems such as Distributed Control System (DCS) and indeed these systems do merge in advanced systems. These organisations may simply refer to their SCADA as the DCS or other similar term (such as the proprietary name of the computer system). SCADA systems may provide information from outside of the process, such as stock/material levels in a customer'/ s plant and/or available supply, supply rates and pricing from a supplier plant. This information may all be accessed by the SCADA system and the employee using it in order to make production rate and other control decisions (either automatically or human assisted) about their own process.
Supply and product chains	The supply chain is all suppliers in the chain from the initial raw material up to the current step in the manufacturing process. The product chain is all steps after the current step up to the final customer. Competitive manufacturing organisations encompass the entire production system, beginning with the customer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.

Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, ' procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The employee will routinely use the relevant parts of the SCADA system for their job.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of routine use of SCADA as part of their job is required.
In what context should assessment occur?	Assessment needs to occur in a workplace using a SCADA system or using a SCADA simulation program.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit should be assessed concurrently with relevant technical units for the process. This unit covers the lowest skill level aspects of SCADA. *MCMT461A Facilitate SCADA systems in manufacturing team or work area* and *MCMT660A Develop the application of enterprise systems in manufacturing* cover the intermediate and highest skill levels of SCADA in CMI respectively.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence of routine use over an extended period should be available. SCADA systems will typically log all interactions with it. Interrogation of the SCADA system will therefore provide evidence of the operator's use of it. Actions taken may also be accessible from the SCADA system itself, or may need other evidence available from the process.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- keyboarding/mousing
- communication
- teamwork
- problem solving.

Knowledge

- technical knowledge and skills needed to operate process
- hierarchy of SCADA system and operation
- information available from and controls exercised by/through the SCADA system.

What are the specific resource requirements for this unit?

Access to an organisation using a SCADA system.

MCMT270A Use sustainable energy practices

Unit Descriptor

This unit covers the skills needed to use and make improvements in sustainable energy practices in production, maintenance and logistics.

Application of the Unit

In a typical scenario, a team member will be aware of energyuse. Some of this energy use isnecessary but typically a large part of energy use is ***unnecessary waste*** and so should be eliminated. The team member will observe energy use and ensure it is according to the organisation's plans and will also engage in continuous improvement for energy use.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Identify energy use	1.1 Identify energy consuming processes in relation to own work 1.2 Recognise the type/source of ***energy*** consumed
2. Follow energy conservation plans	2.1 Check energy use in accordance with conservation plans 2.2 Identify any uses which do not comply with conservation plans 2.3 Take action in accordance with procedures to bring energy use back in line with conservation plans
3. Improve energy use	3.1 Note any waste of energy use 3.2 Recommend improvements to energy use

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Waste

Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include:

- excess production and early production
- delays
- movement and transport
- poor process design
- inventory
- inefficient performance of a process
- making defective items.

Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.

Energy	Energy is used to mean all sources of energy used by the process be it electricity, gas or mobile transport fuel. The uses of the energy will also be potentially wide and include heating and cooling, lighting, moving materials (including pumps and conveyors), modifying materials (including cutting, forming, weaving, knitting, reacting, moulding, extruding, mixing), generating pressure/vacuum or providing motive power for equipment and transport.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The team member will be able to identify the energy use of any/all parts of the process and recommend better ways of using it.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of conformance to energy usage plans and suggestions for improvement should be available.
In what context should assessment occur?	Assessment needs to be conducted in an organisation where energy is a significant cost component or by use of a project, simulation or case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit is related to: • *MCMT271A Use sustainable environmental practices* which covers general environmental practices, and • *MCMT670A Develop and manage sustainable energy practices* which covers higher level aspects.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available from the daily routine of the job to show that there is consistent performance.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- analysis
- basic mathematics
- communication
- problem solving.

Knowledge

- types and sources of energy relevant to the process
- basic principles of energy efficiency
- process needs for energy.

What are the specific resource requirements for this unit?

Access to an organisation seeking to improve its energy usage.

MCMT271A Use sustainable environmental practices

Unit Descriptor

This unit covers the knowledge and skills needed to use and make improvements in sustainable environmental practices in production, maintenance and logistics.

Application of the Unit

In a typical scenario, a team member will be aware of ***environmental resource*** use. Some of this is ***necessary*** but typically a large part of environmental resource use may be ***unnecessary waste*** and so should be eliminated or at least minimised. The team member will observe resource use and ensure it is according to the organisations plans and will also engage in continuous improvements for resource use.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Identify resource use	1.1 Identify resources used by processes in area of responsibility 1.2 ***Recognise*** the type/source of resource used
2. Comply with environmental obligations	2.1 Follow procedures to ensure there is no breach of environmental regulations/licence conditions 2.2 Identify situations related to job which may lead to a breach of regulations/licence conditions
3. Follow resource conservation plans	3.1 Identify resource conservation plan/section of plan relevant to area of responsibility 3.2 Check resource use is in accordance with plan 3.3 Sort/recycle waste according to procedures 3.4 Note any uses which do not comply with plan 3.5 Take appropriate action specified in plan to bring resource use back in line with plans
4. Improve resource use	4.1 Identify waste of resource use 4.2 Recommend improvements to resource use

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items. Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.
Necessary waste	Necessary waste is any activity or cost which does not contribute directly to customer benefit/feature in the product, and which **cannot** be avoided (for example regulatory compliance and fixed costs). Necessary waste cannot be eliminated but should be managed.
Unnecessary waste	Unnecessary waste is any activity or cost which does not contribute directly to customer benefit/features in the product and **can** be avoided. Unnecessary waste should be eliminated as quickly as practical.
Resource	Resource is used to mean resources used by the process be it raw materials, components, process water, cooling water, cleaning water and so on.
Recognise	Recognition of type of resource is at an appropriate level for the person and the area and includes things like recognising steam/electric heating, cooling water/refrigerated cooling, raw materials waste materials etc.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The competent team member will be able to identify the resource use of any/all part/s of the process and recommend better ways of using it.

What critical aspects of evidence are required to demonstrate competency in this unit?

Evidence of conformance to resource usage plans and suggestions for improvement should be available.

In what context should assessment occur?

Assessment needs to be conducted in an organisation where resource is a significant cost component or by project, simulation or case study.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit is related to:

- *MCMT270A Use sustainable energy practices* which covers energy specifically, and
- *MCMT671A Develop and manage sustainable environmental practices* which covers the higher skill levels.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available from the daily routine of the job to show that there is consistent performance.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- analysis
- basic mathematics
- communication
- problem solving.

Knowledge

- the '3 Rs' - reduce, reuse, recycle
- regulatory/licencing requirements relevant to the process/plant
- types and sources of resource
- basic principles of resource efficiency
- process needs for resource.

What are the specific resource requirements for this unit?

Access to an organisation seeking to improve its resource usage.

MCMT281A Contribute to the application of a proactive maintenance strategy

Unit Descriptor

This unit covers the knowledge and skills required to make a positive contribution to proactive maintenance strategies which include things like plant uptime and Overall Equipment Efficiency (OEE).

Application of the Unit

In a typical scenario, an organisation is following a predictive, preventative or reliability centred maintenance strategy and this requires commitment from all employees. The employee should 'own' their equipment/plant and take an active part in the implementation of the strategy within the scope of their authority.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Maintain equipment/ plant	1.1 Keep equipment/plant within area of responsibility clean 1.2 Ensure equipment/plant is serviced and adjusted as required in accordance with ***procedures*** andown level of responsibility
2. Monitor operation of equipment/plant	2.1 Regularly check key conditions of the equipment/plant as defined in the procedures 2.2 Regularly check equipment/plant Overall Equipment Efficiency (OEE) 2.3 Note any deviation from conditions specified in procedures 2.4 Identify any previous occurrences of this deviation
3. Identify deviations and patterns	3.1 Identify any previous occurrences of a deviation 3.2 Identify any related deviations which have occurred 3.3 Identify any unusual occurrence which may be related to a deviation
4. Take action appropriate to competency and authority on deviation	4.1 Liaise with relevant people regarding the deviation and the solution 4.2 Implement solution/assist with the implementation of the solution as appropriate

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Uptime	Uptime refers to the overall availability of the plant - it is the inverse of downtime - or the unavailability of the plant. Ideal uptime is 100%.

Overall Equipment Efficiency (OEE)	Overall Equipment Efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is: where: • availability takes into account losses due to breakdown, set up and adjustments • performance takes into account losses due to minor stoppages, reduced speed and idling • quality rate takes into account t losses due to rejects, reworks and start up waste.
Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The employee should own' their plant/equipment and take a lead role in ensuring that it is always operating in peak condition and with high and increasing OEE.

What critical aspects of evidence are required to demonstrate competency in this unit?	There should be evidence of deviations recognised and appropriate solutions implemented.
In what context should assessment occur?	Assessment needs to occur in an organisation using a predictive maintenance strategy.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed concurrently with other units dealing with maintenance.

This unit is related to:

- *MCMT280A Undertake root cause analysis* which is one of the analysis tools, and also to
- *MCMT481A Undertake proactive maintenance analyses,* and
- *MCMT681A Develop a proactive maintenance strategy* which cover the intermediate and high skill levels respectively.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be required from a range of activities indicating that the maintenance and monitoring elements are a routine part of the job and that the identification of patterns and taking action has occurred in a range of situations.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- mathematical literacy
- analysis
- problem solving
- communication.

Knowledge

- normal behaviour of the equipment/plant
- indicators of abnormal performance
- principles of operation sufficient to recognise problems and propose solutions
- appropriate cleaning and adjusting for the equipment/plant/area as required by procedures.

What are the specific resource requirements for this unit?

Access to a plant using a proactive maintenance strategy.

MCMT421A Facilitate a Just in Time (JIT) system

Unit Descriptor

This unit covers knowledge and skills required to facilitate the implementation/operation of a Just in Time (JIT)/kanban system in the organisation.

Application of the Unit

In a typical scenario, the person will need to monitor the operation of the JIT system and facilitate its working. This will involve liaison with stakeholders as well as examining the data generated. They will need to be alert to potential problems and areas for improvement.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Monitor the operation of the JIT system	1.1 Track value of ***key measures*** 1.2 Recognise indicators of poor performance 1.3 Take appropriate ***quick fix*** action
2. Liaise with relevant stakeholders	2.1 Regularly communicate with team members regarding the operation of the JIT system 2.2 Review JIT performance indicators with team members 2.3 Communicate with relevant personnel up and down the ***value chain*** regarding the operation of the JIT system 2.4 Identify issues with stakeholders and take appropriate quick fix action
3. Improve the JIT system	3.1 Identify areas requiring improvement in the JIT system 3.2 Review value of key measures 3.3 Recognise skill gaps in team members and other stakeholders 3.4 Determine any other issues in team members, other stakeholders and JIT system leading to poor performance indicators 3.5 Develop appropriate improvement solutions 3.6 Liaise with relevant people regarding these solutions 3.7 Implement/assist with the implementation of the solutions

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Just in time (JIT)	Just in time (JIT) is a production scheduling concept that calls for any item needed at a production operation - whether raw material, finished item, or anything in between, to be produced and available precisely when needed, neither a moment earlier nor a moment later.

Kanban	Kanban is a card or sheet used to authorise production or movement of an item; when fully implemented, kanban (the plural is the same as the singular) operates according to the following rules: • all production and movement of parts and material take place only as required by a downstream operation, i.e. all manufacturing and procurement are ultimately driven by the requirements of final assembly or the equivalent • the specific tool which authorizes production or movement is called a kanban. The word literally means card or sign, but it can legitimately refer to a container or other authorizing device. Kanban have various formats and content as appropriate for their usage (e.g. a kanban for a vendor is different than a kanban for an internal machining operation). Kanban is typically applied to batch type operation and the production is measured in units produced. In continuous manufacturing organisations, production is measured in terms of production rate (e.g. kg/h, tonne/day) and rate is increased/decreased according to the flow authorisation which may be a kanban (e.g. ticket, order from a supplier) or may be a SCADA signal from a remote facility (e.g. customer tank) saying that resupply is required or similar.
SCADA	System Control and Data Acquisition (SCADA) is a general term applied to a number of systems which automatically collect critical process data, perform required mathematical manipulations on it and then make control decisions and/or give required information personnel for action.
Key measures	Key measures may include inventory levels, lead time, IFOTIS delivery, productivity/production rate, other measures of pull through the value chain, quality. IFOTIS refers to delivery of product In Full, On Time and In Specification.
Quick fix	Quick fix is action taken to immediately and cheaply control a problem, prevent it getting worse and/or ameliorate its impact, but which does not necessarily solve it long term.
Pull system	Pull is a system of making to demand rather than for stock or to a forecast.

Value chain	Competitive manufacturing organisations encompass the entire production system, beginning with the customer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning **.**

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will at all times know the state of the JIT system in their area and will take actions to ensure its smooth operation on a day to day basis as well as recommend/undertake actions to improve it long term.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence should be available of the person's facilitation of the operation of the JIT system and their making of recommendations for/making improvements
In what context should assessment occur?	This unit will need to be assessed in an organisation operating JIT.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit is related to: • *MCMT221A Apply Just in Time (JIT) procedures*, and • *MCMT621A Develop a Just in Time (JIT) system* which cover the lower and higher skill levels in CMI respectively.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be gathered from an extended period showing routine support for the JIT system and regular improvements made/suggested.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- reading
- recording
- communicating
- planning
- analysing
- problem solving
- negotiating.

Knowledge

- JIT principles relevant to jobs
- procedures for making/recommending improvements
- reasons for delays/storages/inventories in that section of the value chain under their control and methods of reducing/eliminating them
- skill gap analysis and methods of filling skill gaps
- principles of the manufacturing process relevant to the section/team
- production data generated by the process and its application to JIT.

What are the specific resource requirements for this unit?

Access to an organisation using JIT.

MCMT430A Improve cost factors in work practices

Unit Descriptor

This unit covers the knowledge and skills needed to evaluate the product or process outcomes of a team in terms of their cost components and to be able to determine in general terms the cost impacts of alternative actions.

Application of the Unit

In a typical scenario, a person is able to assess the relative costs of alternatives and use this as one of the key factors in decision making. Typical decisions include the efficient organisation of work within a team and the improvement of throughput and cycle times.

Decisions are made within the scope of the team's authority and according to procedures

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse cost components of team's function	1.1 Identify ***cost components*** in the product or ***process*** 1.2 Identify costs factors under control of the team 1.3 Identify causes of variability in costs 1.4 Analyse impact of costs on production or process activities undertaken by team
2. Improve cost efficiency of team processes	2.1 Identify methods of improving productivity and/or reducing costs within team's area of responsibility 2.2 Determine cost/ ***benefit*** ratio of alternative methods improving productivity and/or reducing costs 2.3 Consult with all relevant stakeholders regarding possible changes 2.4 Recommend changes which will increase productivity and reduce cost and variability 2.5 Implement recommended changes in consultation with relevant stakeholders

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Cost components	Cost components may include fixed and variable costs such as power/energy, materials, plant and equipment, salary and wages, office expenses such as telephone, and government taxes and charges.
Process	Process may include a production, maintenance, logistics or office process in a manufacturing environment.

Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
Benefits	Benefits should include positive benefits as well as negative benefits such as quality, safety, reliability and similar issues which may be impacted by a cost saving.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will as part of their routine decision making aim to maximise the cost efficiency of their work team within their scope of authority. There should be evidence of their doing so.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of routinely analysing cost factors relevant to their team's operation and implementing improvements to the team's cost efficiency.
In what context should assessment occur?	Assessment will need to occur in a workplace or by use of a work based case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units on continuous improvement.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available over a period of time or from more than one process or product.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- basic numeracy.

Knowledge

- cost components of products made
- costs concepts such as expense, income and cost benefit
- major cost contributors to product (e.g. energy)
- the difference between internally and externally controlled costs
- difference between overhead, labour and consumables.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies. No other specific resources are required.

MCMT432A Analyse manual handling processes

Unit Descriptor

This unit covers the knowledge and skills to analyse manual handling in terms of its efficiency and safety.

Application of the Unit

In a typical scenario a team leader or team member examines the manual handling component of a job and improves it in terms of safety, effort required and efficiency. This may be conducted for a job performed by others in the team, or it may be for the person's own job.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Assess manual handling risks	1.1 Identify ***manual handling hazards*** in work area 1.2 Assess risks arising from those hazards
2. Analyse physical effort requirements of job	2.1 Determine basic manual handling requirements of job 2.2 Analyse requirements in terms of components such as lift, move, place, hold 2.3 Analyse items to be handled in terms such as weight, size, shape or other hazards
3. Determine time/effort components of physical effort	3.1 Break required movement pattern down into movement components 3.2 Determine time and effort requirements for movements 3.3 Develop alternative movement patterns 3.4 Determine time and effort requirements for alternative movements 3.5 Determine handling aids required to assist movement 3.6 Determine preferred movement pattern/s
4. Analyse the ergonomics of physical effort	4.1 Analyse the ergonomics of the preferred movement pattern 4.2 Develop substitute movements for any movement which is not ergonomically sound 4.3 Determine handling aids required to improve ergonomics of required movements
5. Optimise application of physical effort	5.1 Select movement patterns which are ergonomically sound and time and effort efficient 5.2 Train all relevant people to use these methods 5.3 Ensure ***procedures*** and practices reflect the optimum methods

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
Manual handling hazards	Manual handling hazards include all requirements as defined by the relevant occupational health and safety (OHS) acts and regulations, industry standards and best practice.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to examine a job for its physical components and then determine a better way of doing it. As a side benefit they will become more aware of poor manual handling practice and raise an alert to it.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence should be available of the analysis and improvements of the physical/manual handling aspects of jobs in the workplace.
In what context should assessment occur?	Assessment should use evidence from the analysis of real jobs or an appropriate simulation.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	There are no related units. Concurrent assessment may be undertaken with appropriate units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Where evidence is from continuous improvement activities, then a range of such improvements needs to be considered to provide sufficient evidence. Where evidence is coming from one, complex improvement activity then it may provide sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- analysis
- teamwork
- basic mathematics
- problem solving.

Knowledge

- relevant OHS acts and regulations as applied to manual handling
- principles of efficient movement
- principles of efficient job and work method design
- principles of work analysis
- principles of ergonomics/safe movement.

What are the specific resource requirements for this unit?

Access to a workplace which will allow the improvement of physical actions.

MCMT440A Lead 5S in a manufacturing environment

Unit Descriptor

This unit covers the competencies needed to facilitate and improve the 5S housekeeping environment.

Application of the Unit

In a typical scenario, an organisation is implementing or practising a 5S approach to housekeeping. While 5S places much of the responsibility on team members, team leaders needs to support, encourage and facilitate effective 5S in the workplace.

The manufacturing environment for 5S may include the warehouse, tool shops, office etc.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Facilitate the set up of 5S	1.1 Assist team members to determine what are necessary and unnecessary items in the work area 1.2 Assist team members to determine optimum assigned location for all necessary items 1.3 Liaise with relevant production and occupational health and safety (OHS) personnel in determining optimum locations 1.4 Assist team members to determine optimum location for unnecessary items 1.5 Assist team members to determine 5S schedule 1.6 Ensure ***procedures*** reflect 5S practices 1.7 Assist team members to achieve the required level of skill
2. Monitor 5S	2.1 Check work area for 5Simplementation as part of normal routine 2.2 Identify non-conformances 2.3 Negotiate solutions to non-conformances
3. Improve the 5S	3.1 Work with team members to find areas for improvement 3.2 Assist team members to develop improvement solutions 3.3 Facilitate the availability of resources required for the improvement solution 3.4 Facilitate the implementation of the improvement solution

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
5S	5S is a system of work organisation originally developed in Japan based around: A close translation of the five stages in the housekeeping approach is: • Sort • Set in order • Shine • Standardise • Sustain

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

There should be evidence of successful application of 5S in the person's work group and their positive interaction with it.

What critical aspects of evidence are required to demonstrate competency in this unit?	There should be evidence of the person's assisting team members to implement 5S and/or to implement improvements to 5S. There should be evidence of continuous improvement.
In what context should assessment occur?	Assessment needs to occur in a workplace practising or implementing 5S.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed concurrently with other units relating to the team leader's interactions with their team.

This unit differs from *MCMT240A Apply 5S procedures in a manufacturing environment* which covers the application of 5S to the person's own work.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

5S needs to be a routine, natural part of everyone's job. As such there should be evidence of consistent application of 5S over an extended period.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- planning
- organising
- prioritising
- reading and interpretation
- recording
- problem solving
- teamwork.

Knowledge

- meaning and application of 5S to their job
- principles of efficient workplace organisation
- purposes of 5S
- procedures relevant to job
- identification of skill gaps
- methods of addressing skill gaps
- ways of encouraging team members to find and suggest areas for improvement
- methods of making/recommending improvements
- methods of accessing required resources
- OHS.

What are the specific resource requirements for this unit?

Access to a workplace implementing or practising 5S. No other specific resources are required.

MCMT450A Undertake process capability improvements

Unit Descriptor

This unit covers the knowledge and skills required by a team leader/technical expert to analyse data from the process, develop improvements to eliminate variation due to assignable causes and then implement actions.

Application of the Unit

In a typical scenario, a person reviews a range of process capability data and information, makes some changes/arranges for changes to be made to ***procedures***, equipment or process and then recalculates the process capability. Process capability may have been determined using either a ***sixsigma (6?)*** or ***three sigma (3?)*** process.

This unit has the prerequisite of:

- *MCMT542Apply statistics to processes in manufacturing*.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Obtain required data	1.1 Identify process for study 1.2 Obtain/organise to obtain required data/information
2. Analyse information	2.1 Analyse past data and determine assignable causes 2.2 Develop possible improvements to eliminate assignable causes
3. Improve process capability	3.1 Liaise with relevant people to implement improvements 3.2 Obtain required authorities to implement improvements 3.3 Obtain/organise to obtain required data for improved process 3.4 Recalculate process capability 3.5 Implement revised data collection/processing and new capability information

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Six sigma (6?)	Six sigma is a statistical tool for recording defects and determining capability. Six sigma limits equate to 3.4 defects per million opportunities for each product or service transaction. Six sigma is also used as a general term covering a competitive manufacturing approach. Six sigma training typically covers several units of competency in this Training Package.

Three sigma (3?)	Traditional statistical process control uses three sigma limits which equates to 3 defects per thousand opportunities for each product or service transaction.
Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person should be able to analyse a process and recalculate process capability/trial limits after changes have been made.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence should be available of the analysis of process information and the recalculation of process capability/trial limits. The improvements made may be as a result of continuous improvement with the process capability being recalculated periodically, or the improvement may be as a result of an improvement project with the process capability recalculated as part of that project.
In what context should assessment occur?	Assessment may occur in an organisation which uses process capability to monitor its process and as a tool for improving its process or may occur using a specific project/projects to improve process capability.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed concurrently with a continuous improvement unit.

This unit is related to:

- *MCMT250A Monitor process capability*, and
- *MCMT650A Determine and improve process capability*

which apply to the lower and higher skill levels in CMI respectively.

It may also be appropriate to relate this unit to *MEM15.8BA Perform advanced statistical quality control* where the person is required to perform statistical manipulations (i.e. where these are not done automatically for the operator e.g. by a computer system).

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

This should normally be a routine part of the team leader's job. Where improvements result from a continuous improvement/kaizen process, then a few rounds of improvement and capability recalculation should be required as evidence of competence. Where the improvements results from an improvement project, and this is a complex project and includes the recalculation and implementation of the revised process capability, then one project may be provide sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- mathematical
- statistical methods
- communication
- negotiation
- planning
- analysis
- problem solving
- teamwork
- computer operation.

Knowledge

- data collection methods
- data processing techniques required
- variability and normal distribution
- three sigma or six sigma processes as relevant
- random and non-random results - recognition of assignable causes
- causes of different types of non-random results
- causes of random variation
- process understanding sufficient to translate the data into variations in the process and determine methods of controlling them.

What are the specific resource requirements for this unit?

Access to an organisation using process capability to control and improve its process.

MCMT451A Mistake proof a production process

Unit Descriptor

This unit covers the knowledge and skills needed to make changes which prevent errors and/or backsliding to a pre-improvement level of practice. In the CMI environment, this unit would typically be done by a team leader, technical expert of similar person.

Application of the Unit

In a typical scenario a person needs to analyse the process that a team is responsible for and determine methods of ***mistake proofing*** it (i.e. ensuring it only produces product within an, acceptable range). After improvement activities have been undertaken these improvements need to be sustained.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse process	1.1 Identify sources of variability/non-conformance in the process 1.2 Identify critical control points in process 1.3 Analyse causes of variability/non-conformance
2. Develop preventative techniques/systems	2.1 Liaise with team members and other people to develop mistake proof method of performing operation 2.2 Test and validate mistake proofing
3. Implement permanent fix	3.1 Liaise with relevant people to have systems/procedures changed to implement solution 3.2 Liaise with relevant people to implement the solution 3.3 Liaise with relevant people to ensure the workforce has an appropriate skills set 3.4 Follow through to ensure implementation occurs
4. Monitor implementation	4.1 Critically observe the implementation 4.2 Compare the results of the implementation against the expected outcomes 4.3 Modify solution to improve outcomes 4.4 Ensure procedures reflect change 4.5 Ensure training/assessment reflects change 4.6 Audit change at agreed period/cycle 4.7 Take action on any observed deviation
5. Seek improvements	5.1 Observe changes 5.2 Analyse process again if required to ensure improvements are sustained

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Mistake proofing	Sometimes known as baka-yoke/poka-yoke, a manufacturing technique of preventing mistakes by designing the manufacturing process, equipment, tools and components/subassemblies etc so that an operation literally cannot be performed incorrectly. An attempt to perform incorrectly, as well as being prevented, is usually met with a warning signal of some sort.
Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the operation of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to analyse their process and implement systems to ensure the process is mistake proof and the operators, work in a predictable way with little or no chance of mistake.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of actions taken to mistake proof the process should be available.
In what context should assessment occur?	Assessment needs to occur in a workplace implementing competitive manufacturing or by using a suitable project.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be used as a stand alone unit or it may be assessed concurrently with any of: • MCMT250A Monitor process capability • MCMT450A Undertake process capability improvements • *MCMT650A Determine and improve process capability*.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Where evidence is from the application of *baka-yoke* to continuous improvement, then there should be evidence that it is practiced routinely and from a number of standardisation activities. Where the evidence is from an initial standardisation of a process, or a single, large and complex standardisation/change process the may provide sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication ability to discuss items with both operators and technical support personnel
- problem solving
- analysis
- team work
- design conceptualisation.

Knowledge

- understanding of their process
- factors in the process which may cause variability
- methods of controlling the variability in the process
- mistake proofing methods relevant to the process/product.

What are the specific resource requirements for this unit?

Access to an organisation using a competitive manufacturing approach.

MCMT460A Facilitate the use of planning software systems in manufacturing

Unit Descriptor

This unit covers the knowledge and skills required by a team leader or technical expert to use and facilitate the use of planning software systems (known by various names such as ERP, SAP and MRP). This unit also covers the interactions of the person with a planning software system as they both use it for their own work and support their team members use it.

Application of the Unit

In a typical scenario, an organisation will be using planning software. The person will access the planning software system for their own work, but will also need to provide support and organise skill development programs for their team members. The planning software system will be a routine part of their work life.

This unit has the prerequisite of:

- MCMT260A Use planning software systems in manufacturing.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Communicate using the planning software system	1.1 Send and receive information using planning software 1.2 Send and receive messages using planning software
2. Make decisions using planning software	2.1 Interrogate the planning software system to find required current, historical or predicted information 2.2 Take actions appropriate to the information in accordance with procedures
3. Monitor the use of planning software	3.1 Routinely monitor planning software information and use along the ***value chain*** 3.2 Review performance and use of planning software with team
4. Support team use planning software	4.1 Regularly communicate with team, both using planning software and face to face 4.2 Identify improvements required 4.3 Take appropriate actions to implement improvements

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Planning software	Planning software is a general term applied to a number of software systems which integrate a range of business information such as finance, logistics maintenance and production. It is frequently referred to by names such as ERP, SAP or MRP/MRPII. In some cases it can be integrated with engineering applications such as Systems Control and Data Acquisition (SCADA) systems. In such cases *MCMT261A Use SCADA systems in manufacturing* may also be required. Competitive manufacturing organisations encompass the entire production system, beginning with the customer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.
Value chain	Competitive manufacturing organisations encompass the entire production system, beginning with the customer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning **.**

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will need to be able to demonstrate an ability to understand and apply planning software to a work location or area and send, receive and interpret process and production data for that area. They should also be able to assist others in the use of the planning software system. Software editing is not required for this unit but the ability to recognise and suggest application improvements is required.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of competent use of planning software and also of assisting their team to use it effectively and efficiently.
In what context should assessment occur?	Assessment will need to occur on an organisation using planning software or simulation software.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with other relevant units. This unit covers the intermediate skill levels in CMI for planning software. *MCMT260A Use planning software systems in manufacturing* and *MCMT660A Develop the application of enterprise systems in manufacturing* cover the lowest and highest skill levels respectively. *MCMT260A Use planning software systems in manufacturing* is specified as a prerequisite, and should be applied to the person's own job.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence of routine use over an extended period should be available. Planning software systems will typically log all interactions with it. Interrogation of the planning software system will therefore provide evidence of the operator's use of it. Actions taken may also be accessible from the planning software system itself, or may need other evidence available from the process.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- keyboarding/mousing
- communication
- teamwork
- problem solving.

Knowledge

- hierarchy of planning software system and operation
- information available from/through the planning software system
- facilities and information offered by planning software
- support/training/skill development mechanisms available for access by team members.

What are the specific resource requirements for this unit?

Access to an organisation using planning software.

MCMT461A Facilitate SCADA systems in a manufacturing team or work area

Unit Descriptor

This unit covers the knowledge and skills required by a person who is required to use System Control and Data Acquisition (SCADA), or other similar systems, and support the team in their use of SCADA.

Prerequisite Unit(s) MCMT261A Use SCADA systems in manufacturing

Application of the Unit In a typical scenario, an organisation will be using SCADA. The person will access the SCADA system for their own work, but will also need to provide support and organise skill development programs for their team members.

This competency is also relevant to maintenance personnel using a SCADA system to coordinate maintenance activities.

Unit Sector MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Communicate using the SCADA system	1.1 Send and receive information using SCADA 1.2 Send and receive messages using SCADA
2. Make decisions using SCADA	2.1 Interrogate the SCADA system to find required current, historical or predicted information 2.2 Take actions appropriate to the information
3. Monitor the use of SCADA	3.1 Routinely monitor SCADA information and use along the ***value chain*** 3.2 Identify poor uses of SCADA system within team and system inadequacies 3.3 Identify team members who require additional support 3.4 Take appropriate action to provide required support 3.5 Take appropriate action to improve SCADA system and its use
4. Support team use SCADA	4.1 Regularly communicate with team, both using SCADA based communication and face to face 4.2 Identify system improvements required 4.3 Identify skill improvement needs 4.4 Take appropriate actions to have the identified improvements implemented

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

SCADA	System Control and Data Acquisition (SCADA) is a general term applied to a number of systems which automatically collect critical process data, perform required mathematical manipulations on it and then make control decisions and/or give required information personnel for action. In the continuous manufacturing sector, the SCADA system is sometimes integrated into other sophisticated computer control systems such as Distributed Control System (DCS) and indeed these systems do merge in advanced systems. These organisations may simply refer to their SCADA as the DCS or other similar term (such as the proprietary name of the computer system).
Value chain	Competitive manufacturing organisations encompass the entire production system, beginning with the customer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will not only be a competent user of SCADA but will also support their team using it.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of competent use of SCADA and also of assisting the team to use it effectively and efficiently.
In what context should assessment occur?	Assessment will need to occur on an organisation using SCADA or by use of SCADA simulation.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed concurrently with other relevant units.

This unit covers the intermediate skill level of SCADA. *MCMT261A Use SCADA systems in manufacturing,* and *MCMT660A Develop the application of enterprise systems in manufacturing* cover the lower and higher skill levels in CMI respectively.

MCMT261A Use SCADA systems in manufacturing is specified as a prerequisite, and should be applied to the person's own job.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence of routine use over an extended period should be available. SCADA systems will typically log all interactions with it. Interrogation of the SCADA system will therefore provide evidence of the operator's use of it. Actions taken may also be accessible from the SCADA system itself, or may need other evidence available from the process.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- keyboarding/mousing
- communication
- teamwork
- problem solving.

Knowledge

- hierarchy of SCADA system and operation
- information available from and controls exercised by/through the SCADA system
- facilities and information offered by SCADA
- support/training/skill development mechanisms available for access by team member.

What are the specific resource requirements for this unit?

Access to an organisation using SCADA.

MCMT481A Undertake proactive maintenance analyses

Unit Descriptor

This unit covers the skills needed for the most common forms of analyses associated with predictive maintenance strategies.

Application of the Unit

In a typical scenario, a technical expert (usually an engineer, technician or tradesperson) will be required to undertake analyses for the purpose of predictive/preventative/reliability centred maintenance as part of a ***competitive manufacturing*** strategy.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Liaise with operator	1.1 Establish a relationship with the operator/s of equipment/plant 1.2 Ensure the operator has the required skills and resources to keep the equipment/plant clean 1.3 Ensure the operator is able to effectively monitor the operation of the equipment/plant 1.4 Regularly communicate with operator about the ***Overall Equipment Efficiency (OEE)*** of their equipment/plant
2. Analyse history	2.1 Analyse ***Mean Time Between Failures*** (***MTBF***) (or similar statistical history analysis)from maintenance records 2.2 Analyse performance data of the equipment/plant 2.3 Identify causes of changes to historic trends/status 2.4 Determine methods of ensuring causes of improvements are locked in and deterioration resolved
3. Undertake Failure Mode Effects Analysis (FMEA) (or similar)	3.1 Undertake analysis 3.2 Record results of analysis 3.3 Investigate methods of eliminating possibility of failure and/or minimising the impact of the failure 3.4 Liaise with operator, team leader and other key personnel regarding possible solutions 3.5 Select most appropriate solution 3.6 Implement selected solutions
4. Undertake condition monitoring analysis	4.1 Obtain data for condition monitoring analysis 4.2 Interpret condition monitoring data 4.3 Predict required maintenance type and timing from condition monitoring data 4.4 Liaise with operator, team leader and other key personnel regarding implications of condition monitoring report

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing	Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to: • lean manufacturing • agile manufacturing • preventative and predictive maintenance approaches • monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc. • statistical process control systems including six sigma and three sigma • Just in Time (JIT), kanban and other pull related manufacturing control systems • supply, value, and demand chain monitoring and analysis • other continuous improvement systems. Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.
Overall Equipment Efficiency (OEE	Overall Equipment Efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is: where: • availability takes into account losses due to breakdown, set up and adjustments • performance takes into account losses due to minor stoppages, reduced speed and idling • quality rate takes into account t losses due to rejects, reworks and start up waste.

Mean Time Between Failure (MTBF)	Mean Time Between Failure (MTBF) is one key measure of the effectiveness of a maintenance procedure, and is an indicator as to whether root causes are being found and resolved. If MTBF is reducing, then it is an indicator that the maintenance regime is failing. There are many possible causes of any problem. Eliminating some will have no impact, others will ameliorate the problem. However, elimination of the root cause will eliminate the problem. There should only be one root cause for any problem and so the analysis should continue until this one cause is found. Elimination of the root cause permanently eliminates the problem.
Failure Mode and Effects Analysis (FMEA)	Failure Mode and Effects Analysis (FMEA) is a systematic approach that identifies potential failure modes in a system, product, or manufacturing/assembly operation caused by either design or manufacturing/assembly process deficiencies. It also identifies critical or significant design or process characteristics that require special controls to prevent or detect failure modes. FMEA is a tool used to prevent problems from occurring. Some industry sectors have highly adapted forms of FMEA and may practice traditional FMEA in say their routine maintenance while using another technique (such as ***HAZOP***) for design and modification. ***Hazard and Operability Studies (HAZOP)*** is a form of FMEA which has been practiced by the process industries for over 30 years and examines the implications of changes in process conditions to process stability.
Condition monitoring	In this unit condition monitoring is used to describe the process of analysing the implications of condition monitoring data for proactive maintenance whether it be obtained from non destructive testing reports, visual assessment by experts, diagnostic reports obtained from SCADA or other enterprise or equipment software and product or process quality analyses. It does not require the actual undertaking of the NDT or condition monitoring assessment or test. If this is required appropriate units from other Training Packages will be required.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to undertake a range of predictive maintenance analyses as well as support operations staff, and implement an advanced maintenance strategy.

What critical aspects of evidence are required to demonstrate competency in this unit?

Evidence should be available as to the analyses undertaken and the support provided.

In what context should assessment occur?

Assessment needs to occur in an organisation using predictive maintenance strategies or a simulation in a workshop or by case study.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed concurrently with other relevant maintenance units.

This unit is related to:

- MCMT280A Undertake root cause analysis
- *MCMT281A Contribute to the application of a proactive maintenance strategy*, and
- *MCMT681A Develop a proactive maintenance strategy* which cover different aspects/levels of this area.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Generally evidence will be required from a range of predictive maintenance analyses in order to have sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- teamwork
- analysis
- problem solving
- mathematics
- planning
- reading and interpreting engineering specifications/drawings
- computer use
- prioritising
- recording data.

Knowledge

- cleaning needs, techniques and principles
- methods of assessing skill gaps and filling them
- techniques for determining MTBF or similar
- techniques for undertaking FMEA or similar
- underpinning principles of competitive manufacturing strategies being implemented and how to adapt them to maintenance
- root cause analysis
- condition monitoring.

What are the specific resource requirements for this unit?

Access to an organisation using predictive maintenance procedures.

MCMT482A Assist in implementing a proactive maintenance strategy

Unit Descriptor

This unit covers the knowledge and skills required by a maintenance person to assist in the implementation of a proactive maintenance strategy in a manufacturing environment. This unit includes the interaction between maintenance worker and operator as appropriate.

Application of the Unit

In a typical scenario, an organisation has adopted/is implementing ***Total Preventative Maintenance/Total Productive Maintenance (TPM), Reliability Centred Maintenance (RCM)*** or ***similar strategies***. As part of this the maintenance personnel are expected to assist in the implementation by determining appropriate maintenance related schedules and also by providing maintenance related assistance to non-maintenance personnel, such as assisting production personnel to fulfil their role in the TPM/RCM strategy.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Develop components of reliability strategy for a work/plant area	1.1 Determine manufacturer's recommended ***inspection***, ***servicing*** and related schedules for relevant plant 1.2 Consult with relevant people with regard to appropriate inspections, services and schedules 1.3 Discuss any conflicts with relevant people and seek resolution of conflicts 1.4 Develop schedules in liaison with relevant people 1.5 Identify inspections and servicing which may be done by operations personnel in liaison with relevant stakeholders
2. Assess current practice for maintenance implications	2.1 Evaluate ***procedures*** for plant/equipment reliability implications 2.2 Discuss current practices with relevant people to determine any plant/equipment reliability implications 2.3 Recommend changes to improve plant/equipment reliability in accordance with procedures
3. Assist in implementing the reliability strategy	3.1 Arrange for schedules to be incorporated in relevant work plans 3.2 Identify training needs in discussion with relevant personnel 3.3 Assist personnel to develop required skills for inspections/servicing within scope of authority 3.4 Collect data/information as required by own work plan 3.5 Compare data/information with performance indicators 3.6 Recommend improvements to reliability strategy in accordance with procedures

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Total Preventative Maintenance/Total Productive Maintenance (TPM)	Total Preventative Maintenance/Total Productive Maintenance (TPM) is an application of total quality management to maintenance with the intention of increasing reliability, getting it right first time and increasing ***Overall Equipment Efficiency (OEE)***.
Reliability Centred Maintenance (RCM)	Reliability Centred Maintenance (RCM) moves maintenance from reactive, or even planned/programmed, towards a focus on ***uptime*** and OEE.
Similar strategies	***Mean Time Between Failure (MTBF)*** is one key measure of the effectiveness of a maintenance procedure, and is an indicator as to whether ***root causes*** are being found and resolved. If MTBF is reducing, then it is an indicator that the maintenance regime is failing. ***Failure Mode and Effects Analysis (FMEA)*** is a systematic approach that identifies potential failure modes in a system, product, or manufacturing/assembly operation caused by either design or manufacturing/assembly process deficiencies. It also identifies critical or significant design or process characteristics that require special controls to prevent or detect failure modes. FMEA is a tool used to prevent problems from occurring. Some industry sectors have highly adapted forms of FMEA and may practice traditional FMEA in say their routine maintenance while using another technique (such as ***HAZOP***) for design and modification. ***Hazard and Operability Studies (HAZOP)*** is a form of FMEA which has been practiced by the process industries for over 30 years and examines the implications of changes in process conditions to process stability. ***Condition monitoring*** involves often quite sophisticated monitoring of equipment including such things as vibration monitoring, instrumental analysis of lubricating oil etc to determine the current state of the equipment, monitor the change in this condition and predict when it needs servicing/maintenance to maintain reliability.

Overall Equipment Efficiency (OEE)	Overall Equipment Efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is: where: • availability takes into account losses due to breakdown, set up and adjustments • performance takes into account losses due to minor stoppages, reduced speed and idling • quality rate takes into account the losses due to rejects, reworks and start up waste.
Uptime	Uptime refers to the overall availability of the plant - it is the inverse of downtime - or the unavailability of the plant. Ideal uptime is 100%.
Inspection	Inspection may include: • reading dials, gauges, meters • observations including those using sight, hearing, smell, feel • observations of product quality/faults/rejects.
Servicing	Servicing may include: • cleaning • lubricating • topping up • adjusting.
Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

There should be evidence that the maintenance person is routinely applying proactive maintenance strategies in their routine work and that they are aware of why they are important. In a TPM environment, the operator needs to move to taking ownership of their equipment/plant and maintenance personnel have a role to play in helping this happen and in developing the competence of operating personnel to do so.

What critical aspects of evidence are required to demonstrate competency in this unit?

Evidence of schedules developed and implemented and improvements recommended.

In what context should assessment occur?

This unit needs to be assessed in a workplace practising, or beginning to implement proactive maintenance.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed in conjunction with a technical unit related to maintenance.

This unit is related to:

- *MCMT481A Undertake proactive maintenance analyses* which covers the analysis skills associated with proactive maintenance.

These units are complimentary and in some organisations it may be appropriate for the one person to hold both competencies.

This unit is related to:

- *MCMT681A Develop a proactive maintenance strategy* which is the highest level unit dealing with proactive maintenance in CMI.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

There needs to be evidence that schedules related to proactive maintenance have been developed either in an initial implementation of a proactive maintenance strategy, or have been developed as part of continuous improvement to the proactive maintenance strategy.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- planning
- organising
- prioritising
- reading and interpretation
- recording
- problem solving.

Knowledge

- requirements of the proactive maintenance strategy being implemented
- principles of operation of the equipment/plant
- likely abilities of operations personnel with regard to inspections and servicing
- procedures relevant to job
- methods of making/recommending improvements.

What are the specific resource requirements for this unit?

Access to a plant implementing/practising proactive maintenance. No other specific resources are required.

MCMT620A Develop quick changeover procedures

Unit Descriptor

This unit covers the knowledge and skills needed to develop/improve changeovers.

Application of the Unit

In a typical scenario, an organisation has adopted/is adopting a ***quick changeover*** approach to its changeovers to equipment required for production. This unit applies to the structured development and/or improvement of changeover ***procedures***. To do this they will ***critically analyse*** the existing changeovers and by applying quick changeover principles, develop improved changeover procedures.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse changeover	1.1 Critically observe changeover process 1.2 Identify steps in changeover 1.3 Identify start situation and required finish situation for changeover
2. Apply quick changeover principles	2.1 Identify changes to the start situation and required finish situation which are possible 2.2 Identify internal and external changeover activities 2.3 Identify activities which could be ***improved/eliminated*** 2.4 Eliminate/reduce adjustments required after changeover 2.5 Develop improved changeover process and recommendations for implementation procedure 2.6 Liaise with relevant people to validate recommendations
3. Design in good occupational health and safety (OHS)	3.1 Analyse hazards and risks from all steps in changeover 3.2 Apply ergonomic principles and hierarchy of control to each hazard 3.3 Minimise hazards during changeover ensuring final risk profile is ***acceptable***
4. Implement improved changeover	4.1 Acquire any required resources and approvals 4.2 Organise trials of improved changeover 4.3 Monitor trial 4.4 Make adjustments to changeover process 4.5 Implement improved changeover process

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Changeover	Changeover may refer to an exchange of dies/tools (traditional), or a change between batches, or between campaigns. It may be any quantum equipment/process change to produce a different product. It may sometimes be referred to as ***SMED*** which is an abbreviation for Single Minute Exchange of Die; literally, changing a die on a forming or stamping machine in a minute or less; or broadly the ability to perform any ***setup activity*** in a minute or less of machine or process downtime. The key to doing this is frequently the capability to convert ***internal setup time*** to ***external setup time***; variations on SMED include: Single-digit setup: performing a setup activity in a single-digit number of minutes, i.e. fewer than ten. OTED: One touch exchange of die; literally, changing a die with one physical motion such as pushing a button; broadly, an extremely simple procedure for performing a setup activity. ***Setup time*** - work required to change over a machine or process from one item or operation to the next item or operation; can be divided into two types: • ***internal setup*** work that can be done only when the machine or process is not actively engaged in production, or • ***external setup*** work that can be done concurrently with the machine or process performing production duties. While the term die is the traditional term, competitive manufacturers who require changeovers using other equipment are also covered by this unit. This unit may not be applicable to a totally continuous operation producing only the one product, or simultaneous range of products. This is not applicable to a maintenance/PVI shutdown as experienced by the continuous process manufacturers. However, where there is continuous manufacturing on a campaign basis, it may be applied to the development of changeover procedures between campaigns or similar changeovers.
Critically analyse	Critical analysis of the existing changeover involves a detailed examination to observe all actions and delays and the times taken.

Principles	The principles of quick changeover include the principles of efficient movement as well as an understanding of jigs, fixtures, locating devices and mechanical aids which will reduce human effort and time required.
Improved/eliminated	Activities which should be improved/eliminated include not only those which take time or are unreliable in terms of outcome, but also those which are difficult to do or have adverse OHS implications (e.g. repetitive strain injury, back injury, finger injuries).
Acceptable	An acceptable risk profile is one which at the minimum meets regulatory and organisation requirements and does not increase the current risk profile.
Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to critically examine existing changeover procedures and develop and implement improved procedures which will steadily move the organisation to greater uptime/lower changeover caused downtime.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of changeover procedures modified and improved in accordance with the above criteria should be available.
In what context should assessment occur?	Assessment will need to occur in an organisation following quick changeover or by a suitable project.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed concurrently with other improvement units.

This unit is related to:

- *MCMT220A Apply quick changeover procedures* which covers the doing quick changeovers.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Where evidence is from a continuous improvement to changeover then a range of improvements will be required to generate sufficient evidence. Where evidence is from the initial introduction of quick changeovers or a complex improvement, then the single project may generate sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- ability to break changeover down into key steps
- communication
- teamwork
- negotiation.

Knowledge

- principles of quick changeover
- safe movement and other relevant OHS principles
- relevant procedures
- purposes/requirements of changeover
- sourcing of resources
- trialling procedures
- ability to differentiate between habitual practice and necessary activity.

What are the specific resource requirements for this unit?

Access to an organisation using quick changeover.

MCMT621A Develop a Just in Time (JIT) system

Unit Descriptor

This unit covers the skills needed to plan and implement a Just in Time (JIT) production system in manufacturing. It covers both the initial JIT implementation and also the ongoing improvement and implementation of the improved system.

Application of the Unit

In a typical scenario, an organisation decides to adopt JIT and so needs to plan and develop their JIT system. This unit covers the skills needed to both plan the implementation of JIT and also consult with employees, suppliers and customers regarding the change. This may require identification of training and other employee support as well as identifying possible logistical support.

It includes ***kanban*** based JIT systems but uses JIT principles so that it is applicable to process manufacturing and other sectors and systems that are not suitable for a kanban type JIT implementation.

This unit has the prerequisite of:

- *MCMC410A Lead change in a manufacturing environment*.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Design the JIT system/system improvements	1.1 Identify ***value chain*** members 1.2 Consult with internal and external value chain members 1.3 Identify current storage/inventory in value chain 1.4 Determine ***flow authorisation indicators*** 1.5 Determine minimum and maximum production rate capability 1.6 Determine production lead time for products subject to JIT 1.7 Determine number of ***cards/bins*** and number of units per card/bin 1.8 Draft workable procedures to implement JIT
2. Implement the JIT system/improvements	2.1 Consult with key internal stakeholders to develop solutions to JIT issues 2.2 Ensure all stakeholders have required JIT related skills and related issues have been resolved 2.3 Liaise with key external members of the value chain to develop solutions to JIT issues 2.4 Develop implementation plan for JIT 2.5 Determine ***key measures*** of JIT
3. Monitor the JIT system	3.1 Monitor key measures of JIT 3.2 Regularly liaise with key stakeholders seeking areas for improvement 3.3 Identify areas in need of improvement

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Just in time	Just in time (JIT) is a production scheduling concept that calls for any item needed at a production operation, whether raw material, finished item, or anything in between, to be produced and available precisely when needed, neither a moment earlier nor a moment later.
Kanban	Kanban - a card or sheet used to authorise production or movement of an item; when fully implemented, kanban (the plural is the same as the singular) operates according to the following rules: • all production and movement of parts and material take place only as required by a downstream operation, i.e. all manufacturing and procurement are ultimately driven by the requirements of final assembly or the equivalent • the specific tool which authorises production or movement is called a kanban. The word literally means card or sign, but it can legitimately refer to a container or other authorizing device. Kanban have various formats and content as appropriate for their usage (e.g. a kanban for a vendor is different than a kanban for an internal machining operation). Kanban is typically applied to batch type operation and the production is measured in units produced. In continuous manufacturing organisations, production is measured in terms of production rate (e.g. kg/h, tonne/day) and rate is increased/decreased according to the flow authorisation which may be a kanban (e.g. ticket, order from a supplier) or may be a ***SCADA*** signal from a remote facility (e.g. customer tank) saying that resupply is required or similar.
SCADA	System Control and Data Acquisition (SCADA) is a general term applied to a number of systems which automatically collect critical process data, perform required mathematical manipulations on it and then make control decisions and/or give required information personnel for action.

Value chain	Competitive manufacturing organisations encompass the entire production system, beginning with thecustomer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.
Flow authorisation indicator	Flow authorisation indicator may be kanban bin, ticket or similar, or may be some other indicator of demand pull.
Pull system	Pull system - a manufacturing planning system which makes to demand, rather than for stock or to a forecast.
Cards/bins	The indicators used for production authorisation and may be physical cards or bins or some other suitable indicator.
Procedures	Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, ' procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
Key measures	Key measures may include inventory levels, lead time, IFOTIS delivery, productivity/production rate, other measures of pull through the value chain, quality. IFOTIS refers to delivery of product In Full, On Time and In Specification.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to plan the initial introduction of JIT to an organisation or a process, or plan improvements to an existing JIT system.

What critical aspects of evidence are required to demonstrate competency in this unit?

Evidence of the design, implementation and monitoring of a JIT system and the effective operation of the JIT system are required.

In what context should assessment occur?

Assessment needs to occur in an organisation using JIT or by use of a suitable project or case study.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit could be assessed concurrently with:

- *MCMS601A Analyse and map a value chain*, and/or
- *MCMT650A Determine and improve process capability*.

This unit is related to:

- *MCMT221A Apply Just in Time(JIT) procedures*, and
- *MCMT421A Facilitate a Just in Time (JIT) system* which cover the lowest and intermediate skill levels in CMI respectively.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Where evidence is gathered from the initial introduction of JIT to an organisation or a process, then this single project may generate sufficient evidence. Where evidence is gathered from continuous improvements to an existing JIT system, then it will be required from a range of improvements to generate sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- reading
- recording
- communicating
- planning
- analysing
- problem solving
- negotiating.

Knowledge

- needs of value chain members
- principles of JIT
- reasons for delays/storages/inventories in the value chain and methods of reducing/eliminating them
- methods of identifying skill gaps and methods of filling skill gaps
- key business objectives associated with implementing JIT
- principles of the manufacturing process relevant to the section/team
- production data generated by the process and its application to JIT.

What are the specific resource requirements for this unit?

Access to an organisation using JIT.

MCMT630A Optimise cost of product

Unit Descriptor

This unit covers the knowledge and skills needed to take a global view of the costs of a product and determines methods of reducing costs overall.

Application of the Unit

In a typical scenario, a product is selected and analysed by its cost components to determine the best method of lowering the cost overall. This unit differs from *MCMT631A Undertake value analysis of product costs in terms of customer requirements* in that it looks at all costs and takes a holistic approach to the cost of the product.

This unit has the prerequisite of:

- *MCMT631A Undertake value analysis of product costs in terms of customer requirements*.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse total cost components of product	1.1 Identify all cost components of product 1.2 Allocate cost components to major categories such as overhead, depreciation, energy, consumables and labour 1.3 Distinguish between costs which directly deliver customer features/benefits and ***waste***
2. Optimise costs	2.1 Analyse causes of costs which lead to customer features/benefit 2.2 Determine methods of increasing the customer benefit/cost ratio 2.3 Analyse causes of waste costs 2.4 Determine methods of reducing/eliminating waste costs 2.5 Analyse interactions between cost components 2.6 Check that one method of reducing costs does not cause an increase in another cost/reduction in consumer benefit 2.7 Check that cost reduction plans do not reduce required levels of regulatory compliance or occupational health and safety (OHS)
3. Implement cost optimisation	3.1 Develop cost optimisation plans 3.2 Negotiate with relevant people to agree on implementation plans 3.3 Take actions to implement the cost optimisation 3.4 Monitor the implementation of the cost optimisation 3.5 Make adjustments to the plan as required

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items. Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will select a product to analyse and determine cost components. Costs will be identified as waste or otherwise as an aid to determining their treatment. The cost reduction plans will optimise the cost of the product overall in terms of benefit delivered.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of analysing all cost components and their interactions as well as distinguishing between waste and necessary costs.
In what context should assessment occur?	Assessment will need to occur in a workplace.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with appropriate units on continuous improvement/kaizen.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence from a single optimisation may be adequate, although generally analyses of a few products with different cost structures or customer benefit structures would be required.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- calculation
- analysis
- problem solving.

Knowledge

- cost components of product
- major costs which are controllable (and how to control them)
- types of waste
- interrelationship of cost components and costs and benefits.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies. No other specific resources are required.

MCMT631A Undertake value analysis of product costs in terms of customer requirements

Unit Descriptor

This unit covers the knowledge and skills required by an employee who is required to analyse products and processes to determine the factors that most impact on meeting customer requirements. The analysis is in terms of cost factors and include options for improving cost efficiency. The unit also includes implementing identified changes that increase cost efficiency. The unit may be applied individually or in a team environment.

In this unit an employee uses an analysis of the benefits/features which a customer perceives to be in a product/products as a basis for determining waste and so reducing waste.

Application of the Unit

In a typical scenario, an employee will choose a product, analyse the features/benefits obtained by customers from this product and the cost components relating to those benefits. From this waste will be determined and actions taken to reduce waste.

This unit has the prerequisite of:

- *MCMT230A Apply cost factors to work practices*.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse customer benefits and determine waste	1.1 Determine features/benefits perceived by customer in product 1.2 Analyse cost components and determine those which deliver customer features/benefits and those which don't 1.3 Analyse waste cost components 1.4 Determine alternative ways of reducing waste costs 1.5 Select actions which maximise customer benefits and minimise costs
2. Analyse production performance variance	2.1 Analyse required performance to meet customer ***pull*** 2.2 Determine actual ***cycle time***/s and variability of cycle time 2.3 Analyse cause of waste in throughput 2.4 Analyse costs and determine methods of reducing costs/waste 2.5 Take actions required to achieve cost/waste reduction/s

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items. Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.
Performance	Performance may be thought of as the rate of output of the plant compared to the rate required to meet demand.
Cycle time	Cycle time is the normal time to complete an operation on a product.
Pull	Pull is the concept of producing to demand, rather than for stock or some forecast.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The employee will select a product/range of products to analyse and determine waste in terms of any cost which does not contribute directly to an identified customer benefit/feature and then proceed to determine and implement methods of reducing this waste.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of having taken appropriate action to analyse customer benefits and then reduce waste.

In what context should assessment occur?

Assessment will need to occur in a workplace.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed concurrently with appropriate units on continuous improvement/kaizen.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence should be available from a number of minor changes or from a single large change which had multiple facets and which was implemented over a period of months.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- calculation
- communication
- problem solving
- analysis
- numeracy
- literacy.

Knowledge

- customer benefits from products
- performance and cycle times for products made
- major costs which are controllable (and how to control them)
- types of waste (muda)
- methods of reducing waste (muda)
- methods of reducing cycle time
- desirability of improving performance and methods of reducing cycle time.

What are the specific resource requirements for this unit?

Access to a workplace implementing competitive manufacturing strategies. No other specific resources are required.

MCMT640A Manage 5S system in a manufacturing environment

Unit Descriptor

This unit covers knowledge and skills needed for the overall management of the 5S system in a manufacturing organisation.

Application of the Unit

In a typical scenario, an organisation has decided to pursue ***competitive manufacturing*** and to adopt 5S as one of the tools. This unit covers the skills needed for ensuring the smooth operation and continuous improvement of the 5S system in plant or enterprise. This may be for an initial introduction of, or for the ongoing implementation and continuous improvement resulting from, 5S.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Organise an appropriate environment for 5S	1.1 Arrange for team leaders to develop/maintain skills required for 5S 1.2 Ensure team leaders are developing/maintaining skills required in their team members 1.3 Ensure ***procedures*** and work practices reflect 5S needs and regulatory requirements 1.4 Practise 5S in own work 1.5 Eliminate ***roadblocks*** to 5S
2. Audit 5S implementation	2.1 Undertake spot checks of compliance 2.2 Review workplace for indicators of compliance/non-compliance 2.3 Encourage operators to routinely suggest areas for improvement 2.4 Discuss 5S routinely with team leaders to seek ideas for improvement and encourage identification of non-conformance
3. Improve 5S	3.1 Negotiate solutions to non-conformances 3.2 Implement agreed solutions 3.3 Work with team leaders to develop opportunities for improvements 3.4 Provide necessary resources for improvements 3.5 Ensure procedures and practices change to reflect improvements

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- Just in Time (JIT), kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems.

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

Procedures

Procedures include all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form.

For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

Roadblocks

Includes all factors which are inhibiting the smooth implementation of 5S.

5S	5S is a system of work organisation originally developed in Japan based around: A close translation of the five stages in the housekeeping approach is: • Sort • Set in order • Shine • Standardise • Sustain.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

There should be evidence of successful application of 5S in the person's area of responsibility and their positive interaction with it.

What critical aspects of evidence are required to demonstrate competency in this unit?	There should be evidence of the person assisting team leaders to implement 5S and/or to implement improvements to 5S. There should be evidence of continuous improvement.
In what context should assessment occur?	Assessment needs to occur in a workplace practising or implementing 5S.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other units relating to the person's interactions with their team This unit differs from *MCMT440ALead 5S in a manufacturing environment* which covers the intermediate skill levels in CMI.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

5S needs to be a routine, natural part of everyone's job. As such there should be evidence of consistent application of 5S over an extended period.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- planning
- organising
- prioritising
- reading and interpretation
- recording
- problem solving
- teamwork
- negotiation.

Knowledge

- meaning and application of 5S to their job
- principles of efficient workplace organisation
- purposes of 5S
- procedures relevant to jobs
- relevant regulatory requirements
- identification of skill gaps
- methods of addressing skill gaps
- ways of encouraging team leaders and operators to find and suggest areas for improvement
- methods of making/recommending improvements
- methods of accessing required resources
- non-conformance, what they are, assessment of severity and action to be taken.

What are the specific resource requirements for this unit?

Access to a workplace implementing or practising 5S. No other specific resources are required.

MCMT650A Determine and improve process capability

Unit Descriptor

This unit covers the knowledge and skills needed to determine the actual (as distinct from design) capability of a process and then to analyse that process to remove assignable causes and reduce random causes. This would typically be done by a manager or technical expert support person either working in a team, or in close liaison with key stakeholders. Process capability is typically calculated using standard deviations.

Application of the Unit

In a typical scenario a person (who may be a production manager, plant/process engineer, technical specialist or similar) will be responsible for developing plans to improve process capability and following agreement the implementation of the plans to improve process capability. The organisation may use either a ***6 sigma*** or ***3 sigma*** process.

This unit has the prerequisite of:

- *MCMT452 Apply statistics to processes in manufacturing*.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Obtain data for process capability study	1.1 Identify the process requiring capability analysis 1.2 Obtain process capability data
2. Analyse data	2.1 Identify assignable causes of variation in liaison with relevant personnel 2.2 Develop solutions to eliminate variation due to assignable causes in liaison with relevant people 2.3 Analyse random variations for possible causes in liaison with relevant people 2.4 Confirm cause/s of random variation 2.5 Develop solutions to reduce random variations in liaison with relevant people
3. Take action to improve process capability	3.1 Develop plans to implement solutions 3.2 Liaise with relevant people to implement solutions 3.3 Gain necessary approvals as required 3.4 Monitor implementation and make adjustments as required 3.5 Determine new/revised process capability 3.6 Implement revised process capability regime

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Six sigma	Six sigma is a statistical tool for recording defects and determining capability which equates to only 3.4 defects per million opportunities for each product or service transaction. Six sigma is also used as a general term covering a competitive manufacturing approach. Six sigma training typically covers several units of competency in this Training Package.
Three sigma	Traditional statistical process control uses three sigma limits which equates to 3 defects per thousand opportunities for each product or service transaction.
Procedures	Procedures includes all work instructions, standard operating procedures, formulas/recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (e.g. Good Manufacturing Practice (GMP), Responsible Care) and government regulations.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person should be able to implement and review a process capability system and make improvements to the process using process capability as a tool.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence should be available of the conducting of process capability studies, the improvement to process capability as a result of these studies and the implementation of a revised process capability regime.
In what context should assessment occur?	Assessment needs to occur in an organisation using process capability as a tool for process monitoring and improvement. It may also be assessed using a suitable project.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit is related to:

- *MCMT250A Monitor process capability*, and
- *MCMT450A Undertake process capability improvements*

which cover the lowest and intermediate skill levels in CMI respectively.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

One complex project, or several simpler projects will be needed to gain sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- mathematical
- statistical methods
- communication
- negotiation
- planning
- analysis
- problem solving
- teamwork
- computer operation.

Knowledge

- data collection methods
- data processing techniques required
- variability and normal distribution
- three sigma or six sigma processes as relevant
- random and non-random results - recognition of assignable causes
- causes of different types of non-random results
- causes of random variation
- process understanding sufficient to translate the data into variations in the process and determine methods of controlling them.

What are the specific resource requirements for this unit?

Access to an organisation using process capability.

MCMT660A Develop the application of enterprise systems in manufacturing

Unit Descriptor

This unit covers the knowledge and skills needed to continuously modify and improve or develop new enterprise wide systems such as SCADA, ERP, MRPII and similar. Typically the development of such a system will be in liaison with an appropriate technical expert who may be an internal expert or an external consultant.

Application of the Unit

This unit covers the development and implementation of new systems or modifications/changes to the current system. While the person might generate the ideas for change themselves and also undertake a significant part of the final implementation, they would be working closely with an appropriate technical expert (such as the software system supplier) who may actually make the modifications.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Monitor information and control needs of organisation	1.1 Check the use of current information 1.2 Check the operation of current control systems 1.3 Communicate regularly with key information users regarding improved/changed information/control needs 1.4 Identify short comings in information/control provision 1.5 Take appropriate action on information/control needs to meet organisational needs
2. Check the current system against organisation needs	2.1 Check the routine use of the system 2.2 Communicate regularly with key stakeholders about current system use and application 2.3 Identify problems/issues 2.4 Take appropriate action on problems/issues
3. Determine developments needed in a new or significantly modified system	3.1 Identify needs requiring a new system or development of modifications to the current system 3.2 Draft scope, specifications and outcomes required 3.3 Liaise with key stakeholders and relevant technical experts to refine scope, specifications and outcomes needed in new or modified system 3.4 Agree final scope, specifications and outcomes
4. Develop system	4.1 Develop project plan 4.2 Ensure ongoing consultation with all relevant stakeholders 4.3 Manage development project 4.4 Manage trialling of modified system 4.5 Ensure modified system meets organisational requirements

5. Implement modified system	5.1 Liaise with all affected personnel 5.2 Develop and agree an implementation strategy 5.3 Ensure all personnel have required skills 5.4 Implement modified system 5.5 Monitor implementation and modify as required

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

SCADA	System Control and Data Acquisition (SCADA) is a general term applied to a number of systems which automatically collect critical process data, perform required mathematical manipulations on it and then make control decisions and/or give required information personnel for action. In the continuous manufacturing sector, the SCADA system is sometimes integrated into other sophisticated computer control systems such as Distributed Control System (DCS) and indeed these systems do merge in advanced systems. These organisations may simply refer to their SCADA as the DCS or other similar term (such as the proprietary name of the computer system).
Resource planning	Planning software is a general term applied to a number of software systems which integrate a range of business information such as finance, logistics maintenance and production. It is frequently referred to by names such as ERP, SAP, MRP/MRPII.
Value chain	Competitive manufacturing organisations encompass the entire production system, beginning with the customer, and includes the product sales outlet, the final assembler, product design, raw material mining and processing and all tiers of the value chain (sometimes called the supply chain). Any truly 'competitive' system is highly dependent on the demands of its customers and the reliability of its suppliers. No implementation of competitive manufacturing can reach its full potential without including the entire 'enterprise' in its planning.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to modify an existing system to accommodate changed needs of the organisation, or make improvements to an existing system to better do what it is already doing. They could also work with relevant experts to implement a new system to an organisation, process or part of a process.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of development and implementation of a relevant system should be available.
In what context should assessment occur?	Assessment would need to occur in an organisation using or introducing SCADA,resource planning or similar systems or a suitable simulation.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with units of project management, product design or process improvement/optimisation.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.
What evidence is required for demonstration of consistent performance?	Where evidence is provide from small developments, a range of development activities should be considered to provide sufficient evidence. Where evidence is from one complex development project, this may provide sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- keyboarding/mousing
- communication
- teamwork
- problem solving
- negotiation
- prioritising
- planning
- analysing
- organisation.

Knowledge

- capability of resource planning/SCADA systems as appropriate
- information and control needs of organisation/process
- project management
- support/training/skill development mechanisms available for access by personnel.

What are the specific resource requirements for this unit?

Access to an organisation operating systems and undertaking developments to its system.

MCMT661A Determine and establish information collection requirements and processes

Unit Descriptor

This unit covers the knowledge and skills required to determine what information is needed to support decision making in a competitive manufacturing environment and then to set about establishing required information collection systems. This would usually be done as part of a team and would require consultation with all key stakeholders.

Application of the Unit

This unit covers the determination of data needs and collection methods for a manufacturing organisation or specific plant or process. This will typically be done in liaison with a wide range of people, each of whom will have their own specific information requirements. There will need to be balanced and interpreted into a workable set of data to be collected.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse decision to be made	1.1 Identify person/s to be included in the analysis process 1.2 Determine the consequences of the decision in liaison with relevant people 1.3 Determine the variables which can be controlled 1.4 Determine the variables which cannot be controlled 1.5 Determine the consequences of a change in these variables in liaison with affected person/s
2. Define the factors which cause the variables to change	2.1 Identify factors which are able to be controlled 2.2 Identify factors which are not able to be controlled 2.3 Identify means of measuring these factors, or indicators for the values of these factors 2.4 Compile a list of measurements/indicators required.
3. Develop data collection protocols	3.1 Determine methods of making measurements 3.2 Determine methods of quantifying indicators 3.3 Determine the benefit/cost of automated (or other) collection of this data
4. Develop systems to produce required information	4.1 Identify user of information and their needs and abilities 4.2 Determine data processing needs to produce required information 4.3 Determine information distribution channels 4.4 Determine skill development need for recipients of information 4.5 Implement systems to produce information 4.6 Monitor implementation and make adjustments as required

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- Just in Time (JIT), kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems.

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

Decision

This unit potentially applies to all organisations that are pursuing competitive manufacturing.

A decision can be a change, improvement, new/altered process or system which requires data in order to monitor it or where data is required to make a decision regarding the selection of alternatives.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to determine information and so data requirements for any activity, and in liaison with others, implement the collection of the data and distribution of the information.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence should be available of the identification of the required data and the implementation of the data collection and processing and information distribution.
In what context should assessment occur?	Assessment will need to occur in an organisation which makes conscious decisions about its information needs.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	There are no related units. Concurrent assessment may be undertaken with appropriate units.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.
What evidence is required for demonstration of consistent performance?	Where evidence is provided from ongoing changes to the information requirements, then a range of changes will be needed to provide sufficient evidence. Where evidence is provided from a complex information requirements project, then a single project may provide sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- analysis
- problem solving
- negotiation
- mathematics.

Knowledge

- business needs of the organisation/section
- information needs of individuals within the organisation
- possible data available/potentially available to the organisation
- relationship between data available and information required
- methods of converting data into useful information.

What are the specific resource requirements for this unit?

Access to an organisation which makes conscious decisions about its information needs.

MCMT670A Develop and manage sustainable energy practices

Unit Descriptor

This unit covers the skills needed to identify opportunities for and make improvements in sustainable energy practices in production, maintenance and logistics. Areas covered include efficient use of raw materials, management of waste, electricity conservation, heat conservation and management, water management, environment protection and environment obligations of enterprises.

Application of the Unit

This is the highest level sustainable energy unit in the CMI. In a typical scenario, there is a need to reduce ***waste*** in the ***value chain***. Part of this is the cost of energyto the process. Some of this is ***necessarywaste*** but typically a large part of energy use in ***unnecessary waste*** and so should be totally eliminated. In order to make these savings, there is a need to analyse energy use and cost in all its forms and then develop and implement plans for the more efficient use of energy.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse energy use	1.1 Identify all energy consuming processes 1.2 Determine quantity and nature of energy consumed 1.3 Analyse energy consumed and generated in different parts of the process 1.4 Determine source of energy consumed in process
2. Develop energy conservation plans	2.1 Determine the efficiency of use of energy by all energy consuming processes 2.2 Determine causes of low efficiency of use 2.3 Develop plans for increasing the efficiency of energy use 2.4 Determine benefit/cost of plans
3. Develop energy trading plans	3.1 Compare energy generating activities with energy consuming activities 3.2 Determine feasibility of energy consuming activities using energy generated by other activities 3.3 Develop plans for energy trading 3.4 Determine benefit/cost of plans
4. Investigate alternative sources of energy	4.1 Develop a specification for energy required 4.2 Identify a range of sources for that energy 4.3 Determine benefit/cost for alternative energy sources
5. Develop plans for more efficient energy use	5.1 Compare benefit/costs for different alternatives developed 5.2 Rank proposals based on benefit/cost compare to limited resources 5.3 Check proposals meet regulatory requirements 5.4 Recommend proposals for improving energy efficiency

6. Implement selected plans	6.1 Liaise with relevant people to implement energy efficiency plans 6.2 Follow through to ensure implementation occurs 6.3 Monitor implementation and make adjustments as required 6.4 Check new energy usage to ensure improvements have occurred

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items. Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.
Necessary waste	Necessary waste is any activity or cost which does not contribute directly to customer benefit/feature in the product, and which **cannot** be avoided (e.g. regulatory compliance and fixed costs). Necessary waste cannot be eliminated but should be managed.
Unnecessary waste	Unnecessary waste is any activity or cost which does not contribute directly to customer benefit/features in the product and **can** be avoided. Unnecessary waste should be eliminated as quickly as practical.

Energy	Energy is used to mean all sources of energy used by the process be it electricity, gas or mobile transport fuel. The uses of the energy will also be potentially wide and include heating and cooling, moving materials (including pumps and conveyors), modifying materials (including cutting, forming, weaving, knitting, reacting, moulding, extruding, mixing), generating pressure/vacuum or providing motive power for equipment and transport.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to analyse the energy use of any/all part/s of the process and determine if there are more efficient/cheaper ways of achieving the same result.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of analyses of energy consumed and improvements made should be available.
In what context should assessment occur?	Assessment needs to be conducted in an organisation where energy is a significant cost component or by project, simulation or case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit is related to: • *MCMT270A Use sustainable energy practices* which covers the individual application level, and • *MCMT671A Develop and manage sustainable environmental practices* which covers general environmental practices.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

If evidence is from a major project to improve energy efficiency, then it may provide sufficient evidence. If evidence is from a number of minor improvements to energy then a range of such improvements will be needed to provide sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- analysis
- mathematics
- communication
- problem solving
- data gathering.

Knowledge

- types and sources of energy
- methods of analysing energy efficiency for different types of energy
- methods of converting energy values from one form to another
- alternative sources of energy
- principles of energy efficiency
- relevant regulatory/legislative requirements
- energy trading schemes and procedures
- process needs for energy.

What are the specific resource requirements for this unit?

Access to an organisation seeking to improve its energy usage.

MCMT671A Develop and manage sustainable environmental practices

Unit Descriptor

This unit covers the knowledge and skills needed to identify opportunities for and make improvements in sustainable environmental practices in production, maintenance and logistics. Areas covered include efficient use of raw materials, management of waste, electricity conservation, heat conservation and management, water management, environment protection and environment obligations of enterprises.

Application of the Unit

This is the highest level sustainable environmental practices unit in the CMI. In a typical scenario, there is a need to reduce ***waste*** in the ***value chain***. Part of this is the cost of ***environmental resources*** to the process. Some of this is ***necessarywaste*** but a large part of environmental resource use may be ***unnecessary waste*** and so should be totally eliminated. In order to make these savings, there is a need to analyse environmental resource use and cost in all its forms and then develop and implement plans for the more efficient use of energy.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Analyse resource use	1.1 Identify all resource consuming processes 1.2 Determine quantity and nature of resource consumed 1.3 Analyse resource flow through different parts of the process
2. Develop resource conservation plans	2.1 Determine the efficiency of use/conversion of resources 2.2 Determine causes of low efficiency of use 2.3 Develop plans for increasing the efficiency of resource use 2.4 Check resource use plans comply with regulations/licencing requirements 2.5 Determine benefit/cost of plans
3. Investigate alternative sources of resource	3.1 Determine the function of the resource used 3.2 Develop a specification for function 3.3 Identify a range of sources for meeting that function 3.4 Determine benefit/cost for alternative resource sources
4. Develop plans for more efficient resource use	4.1 Compare benefit/costs for different alternatives developed 4.2 Rank proposals based on benefit/cost compare to limited resources 4.3 Check proposals meet regulatory requirements 4.4 Recommend proposals for improving resource efficiency
5. Implement selected plans	5.1 Liaise with relevant people to implement resource efficiency plans 5.2 Follow through to ensure implementation occurs 5.3 Monitor implementation and make adjustments as required 5.4 Check new resource usage to ensure improvements have occurred

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Resources	Resources includes all raw materials and components as well as cooling water, process water, cleaning water, fuels, lubricants and other materials used in/required by the process.
Waste	Waste (also known as muda in the Toyota Production System and its derivatives) is any activity which does not contribute to customer benefit/features in the product. Within manufacturing, categories of waste include: • excess production and early production • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items. Waste for this unit may include activities which do not yield any benefit to the organisation or any benefit to the organisations customers.
Necessary waste	Necessary waste is any activity or cost which does not contribute directly to customer benefit/feature in the product, and which **cannot** be avoided (e.g. regulatory compliance and fixed costs). Necessary waste cannot be eliminated but should be managed.
Unnecessary waste	Unnecessary waste is any activity or cost which does not contribute directly to customer benefit/features in the product and **can** be avoided. Unnecessary waste should be eliminated as quickly as practical.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to analyse the resource use of any/all part/s of the process and determine if there are more efficient/cheaper ways of achieving the same result.

What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence of analyses of resources used and improvements made should be available.
In what context should assessment occur?	Assessment needs to be conducted in an organisation where resource use is a significant cost component.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit is related to: • *MCMT271A Use sustainable environmental practices* which covers the individual application level, and • *MCMT670A Develop and manage sustainable energy practices* which covers energy specific aspects.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.
What evidence is required for demonstration of consistent performance?	If evidence is from a major project to improve resource efficiency, then it may provide sufficient evidence. If evidence is from a number of minor improvements to resource use then a range of such improvements will be needed to provide sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- analysis
- mathematics
- communication
- problem solving
- data gathering.

Knowledge

- the '3Rs' - reduce, reuse, recycle
- regulatory/licencing requirements
- types and sources of resources
- methods of analysing resource efficiency for different resources
- alternative resources/alternative ways of achieving the same function
- principles of resource efficiency
- relevant regulatory/legislative requirements
- process needs for resources.

What are the specific resource requirements for this unit?

Access to an organisation seeking to improve its resource usage.

MCMT675A Facilitate the development of a new product

Unit Descriptor

This competency covers the knowledge and skills required to develop a new/evolutionary product within an existing range of products and encompasses design for manufacture and the facilitation of its initial production.

This unit is based on PMBTECH601A Develop a new product.

Application of the Unit

This competency applies to people who develop new products to meet a specified end use. This will involve working closely with a range of management and operations personnel and requires balancing the business and technical sides of the new product and would typically be done as part of a cross functional team. This unit of competency applies to the technical expert. Critical aspects for success include:

- ensuring the technical performance meets the customer's needs
- making sure the market needs of cost, timeliness and quality are appropriately balanced
- designing a product and process which can be efficiently made by the company
- liaising with the required people to ensure tooling design and manufacture and equipment modification is correct
- optimising the process for the new product at the completion of the development phase.

This competency is typically performed by high level staff, working as part of a product design, development and implementation team and taking a lead technical role.

This unit of competency assumes the knowledge component included in the following unit of competency. Evidence must be available that the specified knowledge has been acquired and is able to be applied:

- *MCMT452 Apply statistics to processes in manufacturing*.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Confirm design brief of new product in consultation with relevant people	1.1 Communicate with customer and other key stakeholders and agree on technical specification, aesthetic requirements, timelines, cost and other market requirements 1.2 Determine regulatory/industry code/intellectual property requirements for product 1.3 Identify possible ***tooling/process/equipment*** needs 1.4 Develop design brief, including relevant drawings, to meet needs 1.5 Obtain 'sign off' on total design brief from all relevant persons

2. Determine material requirements for product	2.1 Select appropriate materials/combination of materials/ components in liaison with key stakeholders 2.2 Determine material/component testing and evaluation regime required to meet product end use requirements, including ***regulatory***/industry code requirements 2.3 Arrange for, testing and evaluation of trial materials/ components 2.4 Guide material trial process and interpret material trial results 2.5 Determine final materials/components specifications and details of value chain
3. Determine process requirements for product	3.1 Select appropriate process to make product in liaison with key stakeholders and based on ***relevant factors*** 3.2 Determine any special process/equipment requirements for this product 3.3 Communicate with production personnel to determine their concerns and/or training or other needs 3.4 Adjust the design as required to satisfy customer and production needs
4. Ensure process needs for new product have been met	4.1 Liaise with equipment design/procurement personnel 4.2 Interpret hardware specifications and ensure they are appropriate for the job required 4.3 Liaise with process personnel to ensure appropriate draft procedures for new product have been developed 4.4 Validate product cost and design meets objectives
5. Trial new product through the process	5.1 Design trialing procedure to deliver required information 5.2 Liaise with relevant stakeholders 5.3 Ensure health safety and environment (HSE) requirements are stringently observed 5.4 Coordinate the trialing of the new product 5.5 Interpret product trial results and guide product trial process 5.6 Tune process to optimise production of new product
6. Determine process capability	6.1 Plot appropriate statistical process control charts 6.2 Determine confidence limits 6.3 Compare confidence limits with product specification
7. Coordinate product trials	7.1 Determine product testing and evaluation regime required to meet end use requirements, including regulatory/industry code requirements 7.2 Arrange for testing and evaluation of trial product/prototype 7.3 Interpret product trial results and guide product trial process 7.4 Determine final product specification in liaison with key stakeholders 7.5 Make required changes to materials, process and equipment

8. Implement standard procedures for new product	8.1 Monitor initial production and, in liaison with appropriate team members, adjust process, conditions and materials to ensure the product and process outcomes conform to requirements 8.2 Ensure process specifications are updated and reflect the optimised operation developed 8.3 Ensure standard operating procedures are correct for the new product 8.4 Ensure equipment and other hardware records are updated to reflect additions/changes 8.5 Ensure project records are complete and all required reports have been completed and submitted 8.6 Archive records according to company procedure

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Tools and equipment

This unit of competency includes tools and equipment such as:

- understanding of use of all standard processing equipment
- relevant personal protective equipment.

Typical regulatory requirements

Typical regulatory requirements include:

- occupational health and safety (OHS)
- environmental regulations
- structural codes
- product/industry specific requirements.

Typical problems

Typical problems include:

- defining product end use requirements in terms meaningful to the product design and manufacture
- matching suitable materials and processes to the product needs and company expertise and facilities
- matching (and improving) process capability to product tolerances.

Relevant factors	Relevant factors may include: • type of material • dimensional precision of product • length of run/number of products • required aesthetics • size and complexity of product • available capital funding • process equipment available • HSE.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

There should be evidence of successfully designed products.

What critical aspects of evidence are required to demonstrate competency in this unit?	The critical aspect for this unit of competency is the ability to apply a thorough understanding of materials and components, their grades and properties and the effects of processing to a new situation and use this understanding to predict likely solutions to the new product design specification challenge. This understanding of material/component and process interactions should also be able to be applied in interpreting data and making adjustments to materials/components and process to achieve the desired outcomes.
Language, literacy and numeracy requirements:	This unit requires high levels of numeracy and literacy with the ability to write and interpret technical specifications and reports. Advanced numeracy allowing the calculation and interpretation of statistics, product formulae and process conditions is also required.

In what context should assessment occur?

Competence in this unit may be assessed:

- by observation of an actual product development project where the assessee takes a lead technical role
- by use of a suitable product development project where arrangements are made to also assess the implementation aspects.

The development must be of a product which is new to the organisation and not just a modification of an existing product. It is possible that a major redesign of an existing product may encompass all the aspects of a new product design to an appropriate breadth and depth. Where the only available product design projects are the major redesign of an existing project, normally several such projects will be required to match the breadth and depth of skills which can be demonstrated by the development of a totally new product.

In all cases it is expected that practical assessment will be supported by targeted questioning to assess the underpinning knowledge and theoretical assessment will be supported by appropriate practical/simulation or similar assessment.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed with other relevant units.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

Evidence from one major product design or a number of product improvements should be available.

What skills and knowledge are needed to achieve the performance criteria?

Knowledge and understanding of the materials, equipment and process sufficient to choose an appropriate combination of materials and process to achieve the end use function of the product.

Knowledge of the enterprise's procedures and relevant regulatory requirements along with the ability to implement them within appropriate time constraints and work standards.

Competence includes the ability for the practical completion of the job to:

- select and justify the selection of:
- type of material/material specification
- appropriate process for a range of product/market applications
- material and product testing procedures
- apply theoretical principles to predict:
- properties of product based on materials selected
- effects of processes and processing on the final properties of the product
- mathematically determine:
- product cost estimates
- interpret and make recommendations based on:
- field test results
- market analysis data
- trailing data.

What are the specific resource requirements for this unit?

Resources required include suitable access to an operating plant or equipment that allows for appropriate and realistic simulation. A bank of questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

MCMT681A Develop a proactive maintenance strategy

Unit Descriptor

This unit covers the knowledge and skills needed to develop and implement a predictive maintenance strategy for a manufacturing enterprise. The unit recognises that there are a number of predictive or proactive maintenance strategies such as TPM, RCM.

Application of the Unit

In a typical scenario, an organisation engaged in ***competitive manufacturing*** also adopts proactive maintenance strategies. The initial development and implementation will need to be managed as will subsequent changes to the strategy.

The unit covers the selection of appropriate strategies, techniques and tools and adopting them to the organisations needs. It also covers the application of the strategies to new areas and the improvement of operation in existing areas. This would typically be done in a team environment and in consultation with all key stakeholders.

Unit Sector

MCM Tools

ELEMENT	PERFORMANCE CRITERIA
1. Determine appropriate analytical techniques	1.1 Liaise with key stakeholders to determine objectives of maintenance strategy 1.2 Examine current maintenance situation to determine major areas requiring improvement 1.3 Compare possible ***strategies, techniques*** and ***tools*** against organisation needs 1.4 Select possible strategies, techniques and tools 1.5 Confirm selected strategies, techniques and tools with key stakeholders
2. Develop reliability strategies	2.1 Select preferred maintenance strategy 2.2 Examine and adapt strategy to organisation needs and priorities 2.3 Examine and adapt techniques and tools required to implement strategy 2.4 Liaise with key stakeholders to develop an implementation plan 2.5 Identify key information and performance indicators required
3. Implement strategy	3.1 Identify data collection required 3.2 Identify hardware and other resources required 3.3 Identify skill needs required in consultation with key stakeholders 3.4 Ensure all resources/training are available 3.5 Implement strategy

4. Monitor implementation of strategy	4.1 Compare information/performance indicators with desired levels 4.2 Liaise with key stakeholders regarding strategy issues 4.3 Identify areas requiring adjustment 4.4 Make required adjustments

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Competitive manufacturing

Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:

- lean manufacturing
- agile manufacturing
- preventative and predictive maintenance approaches
- monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc.
- statistical process control systems including six sigma and three sigma
- Just in Time (JIT), kanban and other pull related manufacturing control systems
- supply, value, and demand chain monitoring and analysis
- other continuous improvement systems.

Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.

Strategies and techniques

Total Preventative Maintenance/Total Productive Maintenance (TPM) is an application of total quality management to maintenance with the intention of increasing reliability, getting it right first time and increasing Overall Equipment Efficiency (OEE).

Reliability Centred Maintenance (RCM) moves maintenance from reactive, or even planned/programmed towards a focus on uptime and OEE

Root Cause Analysis (RCA). There are many possible causes of any problem. Eliminating some will have no impact, others will ameliorate the problem. However, elimination of the root cause will eliminate the problem. There should only be one root cause for any problem and so the analysis should continue until this one cause is found. Elimination of the root cause permanently eliminates the problem.

Uptime refers to the overall availability of the plant - it is the inverse of downtime - or the unavailability of the plant. Ideal uptime is 100%.

Overall Equipment Efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is:

OEE = availability x performance x quality rate

where:

- availability takes into account losses due to breakdown, set up and adjustments
- performance takes into account losses due to minor stoppages, reduced speed and idling
- quality rate takes into account t losses due to rejects, reworks and start up waste.

Mean Time Between Failure (MBTF) is one key measure of the effectiveness of a maintenance procedure, and is an indicator as to whether root causes are being found and resolved. If MBTF is reducing, then it is an indicator that the maintenance regime is failing.

Failure Mode and Effects Analysis (FMEA) is a systematic approach that identifies potential failure modes in a system, product, or manufacturing/assembly operation caused by either design or manufacturing/assembly process deficiencies. It also identifies critical or significant design or process characteristics that require special controls to prevent or detect failure modes. FMEA is a tool used to prevent problems from occurring.

Some industry sectors have highly adapted forms of FMEA and may practice traditional FMEA in say their routine maintenance while using another technique (such as HAZOP) for design and modification.

Hazard and Operability Studies (HAZOP) is a form of FMEA

which has been practiced by the process industries for over 30 years and examines the implications of changes in process conditions to process stability.

Condition monitoring involves often quite sophisticated monitoring of equipment including such things as vibration monitoring, instrumental analysis of lubricating oil etc to determine the current state of the equipment, monitor the change in this condition and predict when it needs servicing/maintenance to maintain reliability.

Tools

Tools selected will vary with the selected strategy and techniques. Tools should be compatible with the strategy and techniques chosen.

This unit does not cover the use of selected tools.

Tools may include root cause analysis, condition monitoring, maintenance/breakdown history, manufacturer's recommendations etc.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Overview of assessment requirements

The person will be able to select appropriate strategies, techniques and tools and adapt them to the organisations needs. They will also be able to apply the strategies to new areas and improve their operation in existing areas.

What critical aspects of evidence are required to demonstrate competency in this unit?

Evidence of a functioning predictive maintenance strategy is required.

In what context should assessment occur?

Assessment will need to occur in an organisation using, or about to use, a predictive maintenance strategy or a case study or project.

Are there any other units which could or should be assessed with this unit or which relate directly to this unit?

This unit may be assessed concurrently with other relevant maintenance units and technical units related to the techniques and tools.

This unit is related to:

- MCMT280A Undertake root cause analysis
- *MCMT281A Contribute to the application of a proactive maintenance strategy*, and
- *MCMT481A Undertake proactive maintenance analyses* which cover different aspects/levels of this area.

What method of assessment should apply?

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.

What evidence is required for demonstration of consistent performance?

If evidence is provided from the initial introduction of a predictive maintenance strategy or a significant maintenance strategy, then one development and implementation may provide sufficient evidence. Where evidence is from the ongoing improvements of an existing strategy, then it will be needed from a range of activities to provide sufficient evidence.

What skills and knowledge are needed to achieve the performance criteria?

Skills

- communication
- teamwork
- analysis
- problem solving
- mathematics
- planning
- reading and interpreting engineering specifications/drawings
- computer use
- prioritising
- recording data.

Knowledge

- characteristics and strengths of different types of strategies, techniques and tools such as TPM, RCM, MTBF, FMEA, condition monitoring, RCA etc
- holistic costs of different strategies combining cost of maintenance with costs of lost production, sales etc as relevant to the organisation
- business goals sufficient to match the strategy to the business needs
- strategic thinking and its application to proactive maintenance
- principles of process equipment and how to improve its reliability
- resources required and how to obtain them.

What are the specific resource requirements for this unit?

Access to an organisation using, or about to use, predictive maintenance strategies.

MCMP296A Make a small furniture item from timber

Unit Descriptor

This competency standard covers the skills required to make a small timber furniture item in accordance with the requirements of an established design and in a simulated or trial manufacturing environment where there is a high degree of direct supervision. The work may or may not involve electrical machinery.

The elements of this unit should always be assessed in conjunction with other units that relate to the requirements of a specified work or job function.

Training and assessment against this competency unit must incorporate all relevant OHS and related legislative requirements.

Application of the Unit

This unit applies to a learning and assessment environment where access to normal production operations is not available . A typical environment will be for application in a VET in Schools delivery environment or other simulated or trial manufacturing environment where a high degree of supervision exists.

The unit has applications in qualifications for the broad manufacturing of timber furniture products where the project is based upon the construction of a simple timber item such as:, jewellery boxes, CD racks, timber stools and stationery trays and picture frames.

The unit should be applied to a specific 'project'/ or task which has a defined beginning, middle and end, occurs over an extended period of time, and is reflective of furniture manufacturing industry and/or organisation.

When delivered/assessed as part of a qualification the unit should be customised to ensure its relevance to a real or simulated work activity and related workplaces and must be delivered and assessed over a period of time.

Unit Sector

No Sector Assigned

ELEMENT	PERFORMANCE CRITERIA
1. Identify job requirements	1.1 Specifications for ***small furniture item*** are identified from ***work instructions*****.** 1.2 Design is interpreted to determine tool, equipment and materials and space requirements. 1.3 Cutting, joining and finishing requirements are identified 1.4 ***OH&S requirements*** are considered

2. Prepare for work	2.1 ***Suitable work area*** is selected for the task. 2.2 Work area is prepared according to OH&S and ergonomic requirements. 2.3 ***Appropriate tools, equipment*** and ***materials*** are selected in accordance with the specifications for work. 2.4 Equipment and machinery are cleaned, checked, and adjusted in accordance with workplace procedure. 2.5 ***Potential hazards*** are identified from observation of the tools, equipment, materials and workplace and either rectified or reported to supervisor 2.6 ***Records*** are kept in accordance with workplace requirements.
3. Produce work	3.1 Timber is cut according to ***specifications*** and OH&S requirements. 3.2 Edges and surfaces are ***prepared*** according to specifications and OH&S requirements. 3.3 Timber pieces are ***joined*** according to item specifications and OH&S requirements . 3.4 Work is checked against specifications at the identified checkpoints 3.5 Non-conformity with the required specifications including quality standards is ***rectified*** . 3.6 Work is ***finished*** according to specifications, including quality standards and OH&S requirements .
4. Complete work	4.1 Completed work is checked against specifications 4.2 Unused materials are returned to storage and waste and scrap are dealt with following workplace procedures. 4.3 Work area is cleaned, tools and equipment are returned to storage. 4.4 ***Documentation*** is completed following workplace procedures.

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

What can a small furniture item include?

A *small furniture item* from timber can include:

- Small decorative box, with or without a lid
- Wooden photo album
- Simple stool/ chair
- Shelving
- CD rack
- Chopping board
- Simple table.

What are the work instructions?

Work instructions may include:

- Job sheets
- Patterns
- Plans
- Drawings and sketches
- Verbal or illustrated directions from supervisor
- Number and type of objects to be produced
- Quality requirements.
- OH&S requirements
- Environmental requirements

What can OH&S requirements include?

OH&S requirements may include:

- Equipment safety instructions
- Hazardous and dangerous goods codes
- Local safe operating procedures
- Specific workplace rules regarding personal protective wear and equipment.

What can a suitable work area include?

A suitable work area may include:

- Workbench
- Desk or table
- Workshop
- Shed
- Floor suitable for layout and assembly

What can appropriate tools, equipment and materials include?

Appropriate tools will vary according to the project, but may include:

- Manual saw
- Jigsaw
- Hacksaw
- Clamp
- Hammer
- Mallet
- Screw driver
- Punch
- Pliers and pincers
- File
- Miter cutter
- 90 degree angle
- Staple gun
- Paintbrush
- Rags
- Measuring tapes/ rulers
- Spirit level
- Bevel
- Chisel

Appropriate equipment could include:

- Electric saw
- Electric sander
- Electric screw driver
- Power drills
- Panel laners
- Horizontal borers
- Vertical drill presses
- Pedestal grinders
- Pencils and marking devices
- Blades
- Lathes

Appropriate materials could include:

- Timber
- Manufactured boards
- Adhesives
- Screws
- Nails
- Bolts
- Glue
- Hinges and metal fasteners
- Steel
- Plastics
- Sandpapers
- Primers
- Paints and stains.

What potential hazards include?

Potential hazards may include:

- Broken or faulty equipment
- Unnoticed sharp objects
- Poor lighting
- Inadequate ventilation
- Inadequate attention to the activities of others
- Electrical shortages and power overload
- Disorganised or cluttered workspace (poor housekeeping)
- Poor attention when dealing with tools and equipment.
- Environmental chemicals, heat, dust, noise, gas and oil.

What could records include?

Records could include:

- Plant and maintenance records
- Job cards
- Check sheets
- Reporting requirements
- Documenting equipment and/or material defects
- Workplace procedures relating to the use of tools and equipment.
- equipment booking forms and records
- attendance records.

What could specifications include?

Specifications could include:

- Measurements and dimensions
- Shape
- Joining methods
- Surface finish, for example paint, varnish etc.
- Quality standard
- Materials to be used

What is involved in making sure edges and surfaces are prepared?

Preparing edges and surfaces could include:

- Filing
- Sanding
- Beveling.

What is involved in making sure timber pieces are joined?

Joining timber pieces could include attaching pieces together with:

- Nails
- Screws
- Glue
- Staples.

What is involved in making sure non-conformities are rectified?

Rectifying non-conformities could involve:

- Disassembly of the furniture item
- Reshaping /resizing or re-cutting component materials
- Reassembly.

What is involved in making sure work is finished?

Finishing work can include:

- Sanding
- Priming
- Painting
- Sealing
- Staining
- Decorating.

What documentation could be relevant?

Documentation could include:

- Completing necessary paperwork
- Communicating with supervisor that you have completed the task
- Photographing the finisher piece

Filing necessary paperwork.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this competency.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Knowledge and application of relevant sections of:
- occupational, health and safety legislation; statutory legislation;
- enterprise/site safety procedures;
- enterprise/site emergency procedures
- Preparation and planning of work
- Perform normal operator maintenance of work area to enable work to be conducted safely and efficiently
- Relevant standards and procedures
- interpret work instructions and locate and apply relevant information.
- apply safe handling requirements for equipment, products and materials, including use of personal protective equipment.
- follow work instructions, operating procedures and inspection practices to:
- minimise the risk of injury to self or others
- prevent damage to goods, equipment or products
- achieve required production output and product quality.
- adapt or vary furnishing product designs.
- construct, assemble and finish at least one basic furnishing product from the list in the range statement.
- work effectively with others.
- modify activities to cater for variations in workplace contexts and environment.

Context of assessment

Assessment may occur on the job or in a workplace simulated facility with relevant equipment, materials, work instructions and deadlines.

Specific resources required for assessment

- Access to plans, hand and/or power tools, equipment, materials, woodworking machinery and a work area.
- Access is required to opportunities and appropriate resources to either:
- carry out a range of suitably simulated practical and knowledge assessments that demonstrate the skills and knowledge to work safely (usually as part of a holistic assessment involving other competency units), and/or
- participate in actual workplace activities that demonstrate the skills and knowledge to work safely

What skills and knowledge are required to achieve the assessment criteria

Skills

Skills required to apply this competency standard in the workplace include:

- communicate and work effectively and safely with others
- complete a basic furniture construction project to specifications,
- comply with OH&S requirements,
- correct and safe use of hand tools and power equipment
- comply with safety instructions and any OH&S legislation /regulations /codes of practice applicable to workplace operations
- collect, organise and understand information related to basic plans
- plan and organise activities
- use mathematical ideas and techniques for measuring and calculation of areas and estimated materials requirements.
- ability to follow instructions and specifications and and ask for help where needed

Knowledge

- workplace procedures and work instructions
- quality requirements
- furniture construction terminology
- tool, equipment and material types and uses
- plans, drawings and specifications
- safety precautions with hazardous materials and equipment
- organisational or workplace structure
- evaluation and review procedures
- creative thinking techniques

MCMP297A Make an object from cloth using an existing pattern

Unit Descriptor

This unit of competency has been primarily developed for use in a simulated or trial manufacturing environment where there is a high degree of direct supervision.

It covers the skills required to make an object from cloth (such as basic decorative items or clothing) following the requirements of an identified pattern. It may or may not require machinery.

The elements of this unit should always be assessed in conjunction with other units that relate to the requirements of a specified work or job function

Training and assessment against this competency unit must incorporate all relevant OHS and related legislative requirements.

Application of the Unit

This unit applies to a learning and assessment environment where access to normal production operations is not available . A typical environment will be for application in a VET in Schools delivery environment or other simulated or trial manufacturing environment where a high degree of supervision exists.

The unit applies to the construction of a cloth item that does not require complex sewing or finishing or the development of a pattern. Typical items include tablecloths, hats, towels, cushions, BBQ covers, place mats, cloth bags, scarves, wall hangings, external awnings, and cloth pencil or tool cases.

The unit should be regarded as an integrating unit which has application in Certificate I and II qualifications that act as general introductory qualifications to manufacturing industry. It should be applied to a specific 'project' or task which has a defined beginning, middle and end, occurs over an extended period of time, and is reflective of clothing manufacturing industry and/or organisation.

When delivered and assessed as part of a qualification the unit should be customised to ensure its relevance to a real or simulated work activity and related workplaces and must be delivered and assessed over a period of time.

Unit Sector

No Sector Assigned

ELEMENT	PERFORMANCE CRITERIA
1. Identify job requirements	1.1 Job requirements for making the ***object from cloth*** are identified from ***work instructions***
	1.2 Instructions for designing and sequencing of work are considered
	1.3 Particular measurements or adjustments are interpreted and mapped out
	1.4 ***OH&S requirements*** are considered, planned for and observed

2. Prepare for work	2.1 ***Suitable work area*** is selected for the task 2.2 Appropriate ***tools, equipment and materials*** are selected 2.3 ***Potential hazards*** are identified from observation of the tools, equipment, materials 2.4 Required tools and materials are laid out in sequence according to job requirements and work instructions 2.5 Equipment, if required, is checked and adjusted in accordance with workplace procedure
3. Create work	3.1 Fabric is measured, cut and laid out according to specifications 3.2 Fabric is secured or sewed according to quality requirements 3.3 Work is checked against patterns and work sheets at the identified checkpoints 3.4 Non-conformity with the required pattern or quality standard is rectified.
4. Complete work	4.1 Completed work is checked against required quality standards 4.2 Documentation is completed following workplace ***reporting procedures*** 4.3 Work area is cleaned, tools and equipment are returned to storage 4.4 Unused materials are returned to storage and waste and scrap are dealt with following workplace procedures

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

What does an object from cloth include?	An object from cloth is a cloth item that does not require sewing of complex shapes or finishing or the development of a pattern and may include: basic cushions • soft tableware such as placemats or serviettes • basic clothing such as a scarf, simple cloth hat not requiring blocking or a circle skirt, • a basic carry bag • handkerchief • tea towel • wall hanging • pencil case

What are the work instructions?

Work instructions may include:

- job sheets including number and type of objects to be produced
- patterns for making an object from cloth
- plans
- drawings and sketches
- operating instructions for equipment including safety procedures
- designer instructions
- quality requirements
- verbal directions from a supervisor or instructor

What do OH&S requirements include?

OH&S requirements may include:

- legislation
- regulations,
- material handling instructions including hazardous and dangerous goods codes
- local safe operating procedures
- specific workplace rules and regulations regarding personal protective wear and equipment

What is a suitable work area?

A suitable work area may include:

- a bench top or desk
- a sewing or layout table
- a sewing table with a sewing machine

What are tools, equipment and materials?

Tools and equipment may include:

- measuring equipment such as tapes and rulers
- calculating equipment such as calculators and computers
- general cutting and sewing tools including scissors, drills, sewing machines, hemming machines, glue guns
- personal protection equipment

Materials may include:

- plain and patterned fabric
- velvet
- threads
- wadding
- foam
- tape
- fasteners including buttons and hooks

What are potential hazards?

Potential hazards may include broken or faulty equipment, damaged needles, a lack of lighting, untidy working conditions, wet or slippery floors, improperly secured sewing machines, damaged or frayed electrical cables and connections,

What are reporting procedures?

Workplace reporting procedures may include:

- completing necessary paperwork
- communicating with a supervisor or key person that you are completed with the task
- reporting, accidents, injuries and faulty equipment or materials

filing necessary paperwork

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- identify appropriate materials for use in making cloth items, and any special sewing or handling requirements for those materials.
- apply safe operating and handling practices for equipment, products and materials.
- interpret work order and locate and apply relevant information.
- use patterns select and use tools and equipment appropriate to the task.
- follow work instructions, operating procedures and inspection practices to:
- prevent damage to goods, equipment or products
- maintain required production output and product quality
- minimise the risk of injury to self or others.
- work effectively with others.
- modify activities to cater for variations in workplace contexts and environment.
- report process or materials faults, damaged products or equipment.

Assessment must confirm appropriate knowledge and skills to:

- follow workplace procedures for hazard identification and risk control
- use relevant personal protective clothing and equipment
- communicate effectively with others as required when following safety procedures
- Performance is demonstrated consistently over a period of time and in a suitable range of contexts
- Consistently applies required knowledge and skills when completing workplace hazard prevention tasks and following relevant procedures:
- Consistently shows evidence of application of relevant workplace procedures, policies, instructions and regulations, including:
- OHS regulations and hazard prevention policies and procedures
- relevant manufacturer's guidelines relating to the operation and use of equipment
- Action is taken promptly to report and/or rectify any safety incidents in accordance with workplace procedures
- Recognises and adapts appropriately to cultural differences in the workplace, including modes of behaviour and interactions among staff and others
- Work is completed systematically with required attention to detail without damage to goods, equipment or personnel

Context of assessment

- Assessment may occur on the job or in a workplace simulated facility with relevant equipment, materials, and work instructions and specifications.
- Assessment of this unit must be carried out or managed by a registered training organisation:
- Assessment of knowledge must be conducted through appropriate written/oral examinations
- Appropriate practical assessment must occur:
- in suitable simulations of a work environment organised by the registered training organisation, and/or
- in an appropriate workplace

Specific resources required for assessment

Access is required to opportunities and appropriate resources to either:

- carry out a range of suitably simulated practical and knowledge assessments that demonstrate the skills and knowledge to work safely (usually as part of a holistic assessment involving other competency units), and/or
- participate in actual workplace activities that demonstrate the skills and knowledge to work safely

What skills and knowledge are required to achieve the assessment criteria

Knowledge

- workplace procedures and work instructions
- organisational structure
- evaluation and review procedures;
- creative thinking techniques.

Skills

- collect, organize and understand information related to basic plans and safety procedures
- coordinate work
- plan and organise activities
- work with others
- the ability to ask for limitations and ask for help where needed; and

use mathematical ideas and techniques to correctly complete measurements and calculate areas and estimated materials requirement

MCMP298A Make an object from metal

Unit Descriptor

This competency standard covers the skills required to make an object from metal in accordance with the requirements of an established design and in a simulated or trial manufacturing environment where there is a high degree of direct supervision. .

The elements of this unit should always be assessed in conjunction with other units that relate to the requirements of a specified work or job function.

Application of the Unit

This unit applies to a learning and assessment environment where access to normal production operations is not available. A typical environment will be for application in a VET in Schools delivery environment or other simulated or trial manufacturing environment where a high degree of supervision exists.

This unit applies to the manufacture of a simple metal object such as: small decorative box, with or without a lid; desk pencil holder; metallic photo album; cabinet; shelving; CD rack; metallic picture frame etc.

Training and assessment against this competency unit must incorporate all relevant OHS and related legislative requirements.

The unit should be regarded as an integrating unit which has application in Certificate I and II qualifications that act as general introductory qualifications to manufacturing industry. It should be applied to a specific 'project' or task which has a defined beginning, middle and end, occurs over an extended period of time, and is reflective of the particular sector of the Manufacturing industry and/or organisation.

Unit Sector

No Sector Assigned

ELEMENT	PERFORMANCE CRITERIA
1. Identify job requirements	1.1 Specifications for ***metal*** item are identified from ***work instructions***
	1.2 Design is interpreted to determine process, tool, equipment and materials requirements
	1.3 ***OH&S requirements*** are considered and observed throughout the ***workplace***

2. Prepare for work	2.1 ***Suitable work area*** is selected for the task 2.2 Work area is prepared according to OH&S and ergonomic requirements 2.3 ***Appropriate tools, equipment*** and ***materials*** are selected in accordance with the specifications determined for the work 2.4 Equipment and machinery is cleaned, checked, and prepared for operation in accordance with OH&S requirements and workplace procedure 2.5 ***Potential hazards*** associated with the use of tools, equipment, materials and the workplace are identified and steps taken to eliminate them in accordance with OH&S legislative requirements and established workplace procedures. 2.6 Where required ***, records*** are kept in accordance with workplace requirements
3. Produce work	3.1 Dimensions are transferred from job specifications and/or drawings or sketches and material is marked out to conform to ***specifications*** and templates are ***formed*** using appropriate machinery or tools 3.2 Edges and surfaces are ***prepared*** according to specifications. 3.3 Components are ***joined*** according to project requirements 3.4 Work is checked for conformance with specifications. 3.5 Non-conformity with specifications or quality standard is ***rectified*** 3.6 Work is ***finished*** according to specifications and quality standards
4. Complete work	4.1 Completed work is checked against required quality standards 4.2 Unused materials are returned to storage and waste and scrap are dealt with following workplace procedures 4.3 Work area is cleaned, tools and equipment are returned to storage 4.4 Where required, documentation and records are completed and maintained following workplace procedures

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

What can metal include?

*Metal***may include:**

- Mild steel
- Galvanised steel
- Stainless steel
- Aluminium
- Brass

What can object from metal include?

An*object from metal***can include:**

- A small decorative box, with or without a lid
- Desk pencil holder
- Metallic photo album
- Cabinet
- Shelving
- CD rack
- Metallic picture frame.

What are the work instructions?

Work instructions may include:

- Job sheets
- Patterns
- Plans
- Drawings and sketches
- Verbal or illustrated directions from supervisor
- Number and type of objects to be produced
- Quality requirements.
- OH&S requirements
- Environmental requirements

What can OH&S requirements include?

OH&S requirements may include:

- Legislative requirements
- Hazardous and dangerous goods codes
- Safe operating procedures
- Specific workplace rules regarding personal protective wear and equipment such as disposable overalls, dust mask, eye and ear protection and gloves.

Workplace

Workplace for this unit means a manufacturing environment specifically established for learning introductory manufacturing skills. It may be:

- a school classroom or workshop equipped to teach manufacturing principles and practices
- RTO premises equipped to teach manufacturing principles and practices
- an enterprise environment where above average supervision exists and training is occurring. The normal production imperatives have been modified to take into account the training being delivered.

What can a suitable work area include?

A *suitable work area* may include:

- Workbench
- Desk or table
- Workshop
- Shed
- Durable space

What can appropriate tools, equipment and materials include?

Appropriate tools will vary according to the project, but may include:

- Measuring tapes or rulers
- Hammers
- Mallets
- Squares
- Bevels
- Chisels
- Files
- Planes
- Hand saws
- Cordless drills/ screwdrivers
- Fixing and joining devices
- Jigs
- Clamping devices
- Pincers

Appropriate equipment could include:

- Power saws
- Power drills
- Band saws
- Vertical drill presses
- Protective eye ware
- Protective gloves
- Dust masks
- Overalls or protective clothing

Appropriate materials could include:

- Metal
- Adhesives
- Screws
- Nuts
- Bolts
- Hinges and metal fasteners
- Pencils and markers
- Paints.

What potential hazards include?

Potential hazards may include:

- Broken or faulty equipment
- Unnoticed sharp objects
- Poor lighting
- Inadequate ventilation
- Inadequate attention to the activities of others
- Electrical shortages and power overload
- Disorganised or cluttered workspace (poor housekeeping)
- Poor attention when dealing with tools and equipment.
- Environmental chemicals, heat, dust, noise, gas and oil.

What could records include?

Records could include:

- Plant and maintenance records
- Job cards
- Check sheets
- Reporting requirements
- Documenting equipment and/or material defects
- Workplace procedures relating to the use of tools and equipment.

What could specifications include and what does it mean for materials to be formed?

- ***Specifications*** could include:
- measurements and dimensions
- forming methods could include cutting, bending, rolling, beading.

What is involved in making sure edges and surfaces are prepared?

Preparing edges and surfaces could include:

- Filing
- Sanding
- Cleaning
- Grinding
- Polishing

What is involved in making sure metal pieces are joined?

Joining metal pieces could include attaching pieces together with:

- Screws, rivets, nuts and bolts
- Hinging
- Soldering

What is involved in making sure non-conformities are rectified?

Rectifying non-conformities could involve:

- Deconstructing the assembled pieces
- Reshaping /resizing or re-cutting elements
- Reassembling elements.

What is involved in making sure work is finished?

Finishing work can include:

- Filing
- Polishing
- Grinding

Painting and decorating.

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Knowledge and application of relevant sections of:
- occupational, health and safety legislation; statutory legislation;
- enterprise/site safety procedures;
- enterprise/site emergency procedures
- Preparation and planning of work
- Lay out, marking off/out and developing techniques and procedures
- Fabrication techniques
- Shaping techniques
- Cutting techniques
- Perform normal operator maintenance of work area to enable work to be conducted safely and efficiently
- Relevant standards and procedures
- Completion of work procedures

Context of assessment

Assessment may occur on the job or in a workplace simulated facility with relevant equipment, materials, work instructions and deadlines.

Specific resources required for assessment

- Access to plans, hand and/or power tools, equipment, materials and a work area.
- Access is required to opportunities and appropriate resources to either:
- carry out a range of suitably simulated practical and knowledge assessments that demonstrate the skills and knowledge to work safely (usually as part of a holistic assessment involving other competency units; and/or
- participate in actual workplace activities that demonstrate the skills and knowledge to work safely

What skills and knowledge are needed to achieve the performance criteria?

Skills

- Apply occupational health and safety standards
- Observe relevant statutory requirements and codes of practice
- Use, update and where appropriate produce sketches and basic drawings
- Select materials and resources
- Use and apply basic quality standards
- Apply quality procedures
- Communicate effectively
- Communicate ideas and information to obtain confirmation of work requirements and specifications, coordination with other workers and the reporting of work outcomes and problems.
- Collect, organise and understand information related to work orders, basic plans and safety procedures.
- Plan and organise activities, including preparation for work and obtaining equipment and materials.
- Work with others and in a team to optimise efficient workflow and productivity.
- Apply pre-checking and quality techniques to anticipate construction problems, avoid reworking and avoid wastage.
- Use of routine workplace tools, equipment, materials and measuring devices.

Depending on the object to be made required skills may also include:

- Use cutting and heating equipment
- Use of mechanical cutting equipment
- Use of workshop plant and equipment
- Use of hand and portable power tools

Knowledge

- The interpretation of a plan representing the product to be made
- The concept of workflow and its relation to manufacture of objects
- Identification of appropriate hand and power tools, materials, equipment, processes and procedures.
- Occupational health and safety standards and practices.
- Relevant statutory requirements and codes of practice
- Hand and portable power tools and their application
- Mechanical cutting techniques
- Paints, sealants and glues
- Jigs and templates
- Workshop plant and equipment
- Manufacture and assembly techniques
- Common materials used in the manufacture of metal objects
- Mathematical techniques

Communication principles

MCMP299A Make an object from plastic

Unit Descriptor

This competency standard covers the skills required to make a component from plastic in accordance with the requirements of an established design and in a simulated or trial manufacturing environment where there is a high degree of supervision. The work may or may not involve plastics processing machinery.

The elements of this unit should always be assessed in conjunction with other units that relate to the requirements of a specified work or job function.

Training and assessment against this competency unit must incorporate all relevant OHS and related legislative requirements.

Application of the Unit

This unit applies to a learning and assessment environment where access to normal production operations is not available . A typical environment will be for application in a VET in Schools delivery environment or other simulated or trial manufacturing environment where a high degree of supervision exists.

The unit has applications in qualifications for the broad manufacturing of plastic products where the project scope can be based upon the construction of a simple plastic item such as:, tool trays and picture frame or could extend to include the production of consumer products or moulded components.

The unit should be applied to a specific 'project'/ or task which has a defined beginning, middle and end, occurs over an extended period of time, and is reflective of the plastics manufacturing industry and/or organisation.

When delivered/assessed as part of a qualification the unit should be customised to ensure its relevance to a real or simulated work activity and related workplaces and must be delivered and assessed over a period of time.

Unit Sector

No Sector Assigned

ELEMENT	PERFORMANCE CRITERIA
1. Identify job requirements	1.1 Specifications for ***plastic product*** are identified from ***work instructions.***
	1.2 Customer requirements are recognised and identified in the product specification
	1.3 Assembly and finishing requirements are identified
	1.4 Health, safety and environmental hazards are identified and hazard control measures are implemented.
	1.5 Materials, housekeeping and waste management needs are considered

2. Prepare for work	2.1 ***Equipmen*** t requirements are checked and equipment adjusted to appropriate process settings 2.2 ***Materials*** requirements are checked and adjusted as required 2.3 ***Records*** are kept according to company requirements 2.4 Pre-start checks are completed as required
3. Operate equipment to produce component	3.1 Equipment is started up following workplace and hazard control procedures 3.2 Process is monitored to ensure quality 3.3 Product quality is monitored as required 3.4 Quality and other problems are identified and rectified
4. Complete work	4.1 Product is assembled according to specifications as required 4.2 Completed work is checked against specifications and customer requirements 4.3 Unused materials are returned to storage and waste and scrap are dealt with following workplace procedures. 4.4 Work area is cleaned; tools and equipment are returned to storage. 4.5 ***Documentation*** is completed following workplace procedures.

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

What can a plastic product include?	A plastic product can include: • Small container • Picture frame • Toys • Tool box • Automotive plastic products • Household items • Electrical goods • Playground equipment • Small boat • Any other product made from polymers

What processes can be used to make a plastic product?

A plastic product can be made from:

- injection moulding
- blow moulding
- thermo forming
- composite
- extrusion
- fabrication
- rotational moulding
- other plastic processing methods

What are the work instructions?

Work instructions may include:

- Job sheets
- Patterns
- Plans
- Drawings and sketches
- Verbal or illustrated directions from supervisor
- Number and type of objects to be produced
- Quality requirements.
- OHS&E requirements

What can OHS& E requirements include?

OHS&E requirements may include:

- Equipment safety instructions
- Hazardous and dangerous goods codes
- Local safe operating procedures
- Specific workplace rules regarding personal protective wear and equipment.
- Environmental controls
- Risk assessment
- Emergency procedures

What can a suitable work area include?

A suitable work area may include:

- On- site host company maintenance or tooling workshop
- Simulated workshop in RTO
- On-site production facilities

What can appropriate tools, equipment and materials include?

Appropriate tools will vary according to the project, but may include:

- Manual saw
- Jigsaw
- Hacksaw
- Clamp
- Hammer
- Mallet
- Screw driver
- Punch
- Pliers and pincers
- File
- Miter cutter
- 90 degree angle
- Staple gun
- Paintbrush
- Rags
- Measuring tapes/ rulers
- Spirit level
- Bevel
- Chisel
- Rollers/scissors

Appropriate equipment could include:

- Electric saw
- Electric sander
- Electric screw driver
- Power drills
- Vertical drill presses
- Pedestal grinders
- Plastics processing equipment
- Plastics welders such as hot air guns, ultrasonic
- Injection moulders/blow moulders/rotational moulding equipment/thermoforming equipment

Appropriate materials could include:

- Plastics raw material
- Extruded plastic sheeting (e.g. Perspex, acrylic, polycarbonate)
- Adhesives
- Screws
- Bolts
- Glue
- Hinges and metal fasteners
- Sandpapers
- Primers
- Paints

What could potential hazards include?

Potential hazards may include:

- Broken or faulty equipment
- Unnoticed sharp objects
- Poor lighting
- Inadequate ventilation
- Inadequate attention to the activities of others
- Electrical shortages and power overload
- Disorganised or cluttered workspace (poor housekeeping)
- Poor attention when dealing with tools and equipment.
- Environmental chemicals, heat, dust, noise, gas and oil
- Hot equipment and materials
- Cuts
- Back strain

What could records include?

Records could include:

- Plant and maintenance records
- Set up, date, batch and materials
- Check sheets
- Reporting requirements
- Documenting equipment and/or material defects
- Workplace procedures relating to the use of tools and equipment.
- Equipment booking forms and records
- Attendance records
- Quality reports
- Production reports
- Log sheets

What could specifications include?

Specifications could include:

- Measurements and dimensions
- Shape
- Joining methods
- Quality standard
- Materials to be used
- Appearance
- Colour/finish

What is involved in making sure plastic pieces are joined?

Plastic pieces can be joined together by:

- Glue
- Ultrasonic/hot air welding
- Clips
- Metal fasteners (e.g. screws, bolts, rivets.).

What is involved in making sure non-conformities are rectified?	Rectifying non-conformities could involve: • Disassembly of the furniture item • Reshaping /resizing or re-cutting component materials • Reassembly • Refinishing • Adjusting process conditions.
What is involved in making sure work is finished?	Finishing work can include: • Sanding • Priming • Painting • Decorating. • Assembly • Polishing • Trimming

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required skills and knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	• Knowledge and application of relevant sections of: • occupational, health and safety legislation; statutory legislation; • enterprise/site safety procedures; • enterprise/site emergency procedures • environmental requirements • Preparation and planning of work • Perform normal operator maintenance of work area to enable work to be conducted safely and efficiently • Relevant standards and procedures • Interpretation of work instructions and locate and apply relevant information. • Application of safe handling requirements for equipment, products and materials, including use of personal protective equipment. • Following work instructions, operating procedures and inspection practices to: • minimise the risk of injury to self or others • prevent damage to goods, equipment or products • achieve required production output and product quality. • Ability to adapt or vary plastic component designs. • Ability to construct, assemble and finish at least one basic plastic component from the list in the range statement. • Ability to work effectively with others. • Ability to modify activities to cater for variations in workplace contexts and environment.

Context of assessment

Assessment may occur on the job or in a workplace simulated facility with relevant equipment, materials, work instructions and deadlines.

Specific resources required for assessment

- Access to plans, equipment, materials,
- Access is required to opportunities and appropriate resources to either:
- Carry out a range of suitably simulated practical and knowledge assessments that demonstrate the skills and knowledge to work safely (
- as part of a holistic assessment involving other competency units), and/or
- Participate in actual workplace activities that demonstrate the skills and knowledge to work safely

What skills and knowledge are needed to achieve the performance criteria?

Knowledge

- workplace procedures and work instructions
- quality requirements
- plastics industry terminology
- tool, equipment and material types and uses
- plans, drawings and specifications
- safety precautions with hazardous materials and equipment
- organisational or workplace structure
- evaluation and review procedures
- creative thinking techniques

Skills

- communicate and work effectively and safely with others
- complete a basic plastic product manufacturing project to specifications
- comply with OHS&E requirements,
- correct and safe use of hand tools and power equipment
- comply with safety instructions and any OH&S legislation /regulations /codes of practice applicable to workplace operations
- collect, organise and understand information related to basic plans
- plan and organise activities
- use mathematical ideas and techniques for measuring and calculation of areas and estimated materials requirements.
- follow instructions and specifications and ask for help where needed

AUM4003A Interpret customer requirements - complex

Unit Descriptor

This unit identifies the competence required to be able, in conjunction with professional and other staff, to interpret customer requirements and apply them to the design, development and production of motor vehicles.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Identify market.	1.1 The potential market for a product is identified in consultation with marketing and engineering staff using information from surveys, published information and feedback from customers, dealers and sales staff in accordance with company procedures. 1.2 The market for a product is defined in terms of the potential customer base, market segmentation, geographic location, price range, product features and extent of current and future likely competition. 1.3 Information on the potential market for a product is documented in accordance with company procedures.
2. Gather information on customers' needs.	2.1 Using the potential market information, surveys of customers and dealers are conducted and analysed in accordance with company requirements to establish customer needs and preferences. 2.2 Information is gathered from customers and other contacts on customer reactions to competitors' products in the same market including perceived strengths, weaknesses, special features and complaints.
3. Evaluate customer information.	3.1 All collected information on customers' needs is evaluated in terms of design and production and quality assurance implications in conjunction with relevant design, marketing and engineering staff in accordance with company requirements.
4. Document customer information.	4.1 The outcomes of the evaluation of customer needs is documented in accordance with company requirements. 4.2 Information on customer needs is stored and distributed to marketing and design sections in accordance with company requirements.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	3
Collecting analysing and organising information	3
Planning and organising activities	3
Working with others and in teams	3
Using mathematical ideas and techniques	3
Solving problems	3
Using technology	3

RANGE STATEMENT

Establishing and interpreting customer needs for products or sub-assemblies involving a range of complex components and assembly processes

Examples of the application of this competency unit may include the following:

Demonstrate understanding of specialised knowledge with depth in some areas

Analyse, diagnose, design and execute judgements across a broad range of technical or management functions

Demonstrate a command of wide ranging, highly specialised technical, creative or conceptual skills

Generate ideas through the analysis of information and concepts at an abstract level

Demonstrate accountability for personal outputs within broad parameters

Demonstrate accountability for group outcomes within broad parameters.

Note:The application of this competency standard must comply with the appropriate AQF level descriptor criteria.

Sources of information/documents may include:

- Manufacturer specifications
- Enterprise operating procedures
- Product manufacturer specifications
- Customer requirements
- Industry/Workplace Codes of Practice

OH&S practices must abide by:

- State/industry OH&S legislation
- Award provisions

Resources may include:

- Type of products and sub-assemblies (as per company requirements)
- Documentation and reporting systems (as per company requirements)

Methods include:

- Identifying markets, gathering information on customer needs, evaluating customer information and documenting customer information.

Methods should be applied under normal operating conditions.

EVIDENCE GUIDE

Context:

- Competency must be assessed in a safe working environment.
- Assessment must be undertaken in accordance with endorsed industry assessment guidelines.
- The knowledge and practical component may be assessed in an on- or off-the-job environment.
- Assessment may take place within the work place or appropriate simulated environment.
- The trainee should be able to carry out the task to be assessed in a safe and correct manner without supervision on more than one occasion prior to assessment.

Critical aspects:

It is essential that competence is fully observed and there is the ability to transfer the competency to changing circumstances and to respond to unusual situations in the critical aspects of:

- Degree of complexity
- Safe working practices
- Documentation
- Technical specifications
- Planning

Underpinning knowledge:

- Identifying markets
- Gathering information on customer needs
- Evaluating customer information
- Documenting customer information

Practical assessments:

- Perform work under the required level of supervision
- Use and maintain all required materials, tools and parts
- Diagnose and solve problems involved in the work
- Interpret customer requirements
- Achieve specified quality standards
- Apply knowledge of OH&S requirements
- Apply knowledge of required quality improvement techniques
- Apply knowledge of relevant company procedures
- Apply knowledge of emergency procedures
- Apply knowledge of reporting and documentation requirements
- Communicate effectively with team members, management and user departments

FDFOPTSD2A Work in a socially diverse environment

Unit Descriptor

This is an Optional unit. It covers the skills and knowledge required to work in a socially diverse environment, including the development and application of cultural awareness required to interact effectively with people from diverse backgrounds.

This unit is based on the tourism and hospitality unit THHCOR2A Work in a socially diverse environment and the transport and distribution unit TDTG701A Work in a socially diverse environment.

Unit Sector Optional

ELEMENT	PERFORMANCE CRITERIA
1. Communicate with people from diverse backgrounds	1.1 People from all cultural groups are valued and treated with respect and sensitivity 1.2 Verbal and non verbal communication takes account of cultural differences 1.3 Where language barriers exist, efforts are made to communicate through use of gestures or simple words in the other persons' language 1.4 Assistance from colleagues, specialist resources or outside organisations is obtained when required
2. Respond to cross-cultural misunderstandings	2.1 Issues which may cause conflict or misunderstanding in the workplace are identified 2.2 Difficulties are addressed with the appropriate people in the workplace 2.3 When difficulties or misunderstandings occur, possible cultural differences are considered 2.4 Efforts are made to resolve the misunderstanding, taking account of cultural considerations 2.5 Issues and problems that cannot be resolved are referred as required for follow up

RANGE STATEMENT

The range statement indicates the context for demonstrating competence. This statement is a guide and, unless otherwise indicated, items may or may not apply as required by the work context.

Range description

- Work is carried out according to company policies and procedures, regulatory and licensing requirements, legislative requirements and industrial awards and agreements
- Legislative requirements are typically reflected in procedures and specifications. Legislation includes anti-discrimination and equal opportunity
- Work involves the application of communication principles and problem solving techniques to facilitate work in a socially diverse environment
- People from diverse backgrounds may include any person involved in or related to the work process. This may include work colleagues, managers and external personnel
- Cultural difference may include but is not limited to:
  - race
  - special needs
  - disabilities
  - gender
  - marital status
  - sexual preference
  - age
- Examples of cultural differences may include but are not limited to:
  - language spoken and related communication style
  - levels of formality/informality
  - personal grooming
  - family obligations
  - recognised holidays
  - customs
  - work ethic
  - product preferences
- Outside organisations may include but are not limited to:
  - interpretative services
  - diplomatic services
  - local cultural organisations
  - appropriate government agencies
  - educational institutions

EVIDENCE GUIDE

The assessment process must address all of the following items of evidence.

Ability to:

- Identify and recognise cultural differences in the workplace
- Apply understanding of cultural difference to communicate effectively to achieve work requirements. This includes selecting appropriate communication style to suit audience
- Identify and respond to cross-cultural misunderstandings

Knowledge of:

- Principles of Equal Employment Opportunity (EEO) and anti-discrimination legislation as they apply to company and employee rights and responsibilities in the workplace
- Recognition of the different cultural groups in the workplace
- Understanding of the basis of cultural difference including behaviour or practices that can cause offence, and related strategies for interacting in ways that are culturally sensitive
- Communication strategies and styles appropriate to diverse audiences related to the workplace

Relationship with other standards

Pre-requisite units

There are no pre-requisite units for this competency standard.

Co-assessment of related units

This unit should be assessed together with core units and other units of competence relevant to the function or work role.

Resources required for assessment

Assessment must occur in a real or simulated workplace where the assessee has access to:

- Advice on legal rights and responsibilities relating to anti-discrimination and equal employment opportunity
- Related company policies and procedures
- Opportunities to interact with others using typical workplace communication processes

Assessment requirements

For information on how to assess this competency standard and who can assess, refer to the Assessment Guidelines for this Training Package.

LMTPDTX04A Contribute to the development of products or processes

Unit Descriptor

This unit encompasses the range of skills and knowledge required to contribute to developing products or processes within the enterprise.

Unit Sector Product Development

ELEMENT	PERFORMANCE CRITERIA
1. Interpret provisional specifications	1.1 Provisional specifications are identified and interpreted, in consultation with others, where required
2. Participate in feasibility studies	2.1 Assistance is provided in studies to assess feasibility of design/development through sampling, trial run production, consideration of machine capabilities, availability of resources, required quality and cost
3. Assist in developing/engineering product	3.1 Product or process specifications are interpreted and/or preliminary specifications are developed from feasibility study 3.2 Specifications are used to develop or engineer the product 3.3 Raw materials are checked or selected and machines or skill availability determined against requirements
4. Conduct trials	4.1 Requirements for trial are confirmed and clarified, where necessary, to establish procedures/parameters 4.2 Organisation and liaison with production area occurs, where required 4.3 Trials are assessed in accordance with the established procedures
5. Analyse, interpret and report results	5.1 Results of the trials are analysed to determine performance and acceptability for production 5.2 Analysis is interpreted to determine performance and acceptability for production 5.3 Reports are prepared in accordance with enterprise procedures

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	3
Collecting analysing and organising information	3
Planning and organising activities	3
Working with others and in teams	3
Using mathematical ideas and techniques	3
Solving problems	3
Using technology	3

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the Performance Criteria, is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs if the candidate, accessibility of the item, and local industry and regional contexts.

General context	• Work involves activities contributing to development of products or processes within the enterprise • Judgement may be required in planning and selecting appropriate processes or procedures for self and others • Work is assessed in accordance with statutory requirements, organisation insurance requirements, OH&S legislation, manual handling procedures and relevant health regulations

Worksite environment may include	• Work may be conducted in a large, medium or small sized production situation
	• The competencies can refer to enterprise and client initiated ideas or requests
	• Competencies may involve:
	  • applications associated with original creation
	  • adaptation of designs or interpretation of sketches within contexts related to single or multiple production runs
	• The work responsibilities will vary in scope according to:
	  • size of the workplace
	  • range of designs
	  • specialisation in the workplace
	  • workplace quality standards
	• Activities may include:
	  • work allocation
	  • reviewing/evaluating processes and products
	  • liaising with relevant personnel, client and/or other functional areas
	• Applications can include the use of manual and/or computer aided systems
	• The competencies are applied under broad guidance
	• Knowledge and skills are applied in a self-directed way to tasks, roles and/or functions
	• The competencies are used independently within routine and non-routine situations

Sources of information/documents may include	• Work specifications • Product specifications • Design brief • Marketing strategies • Organisation work procedures • Organisational or external personnel • Quality and Australian standards and procedures • Customer/s requirements

Workplace context may include	• Work organisation procedures and practices relating to the development of products and processes
	• Conditions of service, legislation and industrial agreements including:
	  • workplace agreements and awards
	  • Federal or State/Territory legislation
	• Standard work practices
	• Reporting actions include verbal and written communication in accordance with organisational policies and procedures
	• Communication may be oral, written or visual and can include simple data
	• Being responsible for the maintenance of own work quality and being required to contribute to the quality improvement of team or section output, where necessary
	• Safety, environmental, housekeeping and quality are as specified by machine/equipment manufacturers, regulatory authorities and the enterprise

Applicable regulations and legislation may include	• Occupational health and safety legislation relevant to workplace activities • Workers' compensation legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.

Critical aspects of evidence to be considered	• Assessment must confirm appropriate knowledge and skills to:
	  • conduct feasibility studies
	  • interpret/develop specifications
	  • use specifications appropriately
	  • organise/conduct trials
	  • assess results against specifications
	  • communicate effectively with design team, customers, etc.
	  • apply workplace health and safety policies in work operations
	  • prepare reports/presentations

Interdependent assessment of units	• This unit does not need to be assessed in conjunction with other units

Required knowledge and skills

- Underpinning knowledge of:
  - products and processes development procedures
  - relevant authorisation processes
  - recording and reporting processes as they apply in the enterprise
  - safety and environmental aspects of relevant enterprise activities
  - workplace procedures and reporting processes
  - relevant OH&S legislation, regulatory requirements
  - copyright obligations and codes of practice
- Underpinning skills to:
  - carry out sampling
  - establish availability of machines and/or required skills
  - check/select raw materials
  - select, interpret and apply procedures or processes
  - determine/recommend options
  - communicate effectively with individuals, work groups and supervisors
  - prepare and present reports and information in appropriate formats

Resource implications

- Access to real or appropriately simulated product development situations involving the development of products and procedures
- This includes real or simulated work areas, materials, equipment, and information on work specifications and production processes, relevant safety procedures and regulations, quality standards, organisation procedures and customer requirements

Consistency in performance

- Applies underpinning knowledge and skills when:
  - planning and organising work
  - interpreting plans and/or customer's requirements
  - completing tasks
  - identifying improvements
  - applying safety precautions relevant to the task
- Shows evidence of application of relevant workplace procedures including:
  - hazard policies and procedures including codes of practice
  - job procedures and work instructions
  - quality procedures (where existing)
  - waste, pollution and recycling management processes
- Action taken promptly, accidents and incidents reported in accordance with statutory requirements and enterprise procedures
- Recognises and adapts appropriately to cultural differences in the workplace, including modes of behaviour and interactions among staff and others
- Work completed systematically with attention to detail without damage to goods, equipment or personnel

Context for assessment

- Assessment may occur on the job or in an appropriately simulated environment

LMTPRGN05A Participate in product engineering

Unit Descriptor

This unit covers the skills and knowledge required to participate in product engineering in a TCF enterprise.

Unit Sector Production

ELEMENT	PERFORMANCE CRITERIA
1. Identify and confirm specifications	1.1 Sample material or product is examined to confirm structure 1.2 Detail of structure or composition is documented, where required, to assist in production planning
2. Identify options for production	2.1 Evaluation of material or product structure is conducted to identify options for production 2.2 Options are assessed to determine most effective/efficient method of production, ensuring highest quality and yield from raw materials, and ease of production 2.3 Options and recommendations are documented in accordance with enterprise procedures
3. Identify potential machine or production changes	3.1 Existing resources, machines, production techniques and scheduling arrangements are examined in relation to the production requirements 3.2 Any potential requirements for change are identified and documented in accordance with enterprise procedures
4. Prepare cost estimates	4.1 Material requirements and economic batch sizes are identified 4.2 Labour hours, times and other statistics required are identified and estimates made 4.3 Available machine hours are determined and estimates made, where required 4.4 Overall costs are estimated and documented in accordance with enterprise procedures
5. Maintain records	5.1 Production planning records are maintained and reports prepared, where necessary, in accordance with enterprise procedures

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	3
Collecting analysing and organising information	3
Planning and organising activities	3
Working with others and in teams	3
Using mathematical ideas and techniques	3
Solving problems	3
Using technology	3

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the Performance Criteria, is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs if the candidate, accessibility of the item, and local industry and regional contexts.

General context	• Work involves participation in product engineering in a TCF enterprise • Judgement may be required in planning and selecting appropriate processes or procedures for self and others • Work is assessed in accordance with statutory requirements, organisation insurance requirements, OH&S legislation, manual handling procedures and relevant health regulations

Worksite environment may include

- Work may be conducted in a large scale production or small business situation in a TCF sector
- Work conducted in a variety of environments, i.e. operational workplace activities, restricted space, hazardous, controlled or exposed conditions
- The competencies apply to the range of activities associated with participation in product engineering as they relate to the enterprise
- TCF production areas may include:
  - textile production
  - clothing production
  - footwear production
  - early stage wool processing
  - cotton ginning
  - hide/skin/leather production
  - headwear production and millinery
  - canvas and sails production
  - laundry operations
  - dry cleaning operations
- Product engineering may occur in relation to repetitive production runs, short runs and quick changes
- Product engineering can relate to:
  - fabrics
  - fibres
  - yarns
  - design varieties
  - weaves
  - dyes
  - finishes, etc.
- Organisation systems may include:
  - JIT
  - VAM
  - quick response
  - quality circles,
  - team processes
  - benchmarking
- Written bill of labour, order of work or plant sample may be used for cost estimating
- Calculations may be assessed by manual or computerised systems
- The competencies are applied under broad guidance
- Knowledge and skills are applied in a self-directed way to tasks, roles and/or functions
- The competencies are used independently within routine and non-routine situations

Sources of information/ documents may include	• Production orders • Machine/equipment manufacturers' specifications and instructions • Organisation work orders • Production and planning policies and other documentation • Organisational or external personnel • Work scheduling documentation • Job procedures • Work instructions

Workplace context may include	• Work organisation procedures and practices relating to product engineering in a TCF enterprise
	• Conditions of service, legislation and industrial agreements including:
	  • workplace agreements and awards
	  • Federal or State/Territory legislation
	• Standard work practice includes providing an effective contribution to planning production
	• Extent of production planning will be dependent on production requirements and workplace arrangements within the enterprise
	• Reporting actions include verbal and written communication in accordance with organisational policies and procedures
	• Communication may be oral, written or visual and can include simple data
	• Being responsible for the maintenance of own work quality and being required to contribute to the quality improvement of team or section output, where necessary
	• Safety, environmental, housekeeping and quality are as specified by machine/equipment manufacturers, regulatory authorities and the enterprise

Applicable regulations and legislation may include	• Occupational health and safety legislation relevant to workplace activities • Workers' compensation legislation • Environment protection legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.

Critical aspects of evidence to be considered

- Assessment must confirm appropriate knowledge and skills to:
  - confirm specifications
  - assess options for method of production
  - establish potential machine/production changes
  - estimate costs
  - apply workplace health and safety policies in production operations
  - maintain accurate records

Interdependent assessment of units

- This unit does not need to be assessed in conjunction with other units and can be assessed independently

Required knowledge and skills

- Underpinning knowledge of:
  - machines and their capabilities
  - quality assurance processes; production processes and software
  - products produced by the enterprise and material/fabric structure (techniques)
  - work and workplace organisation systems
  - safety and environmental aspects of relevant enterprise activities
  - workplace procedures and reporting processes
- Underpinning skills to:
  - determine structure/composition of material or product
  - make calculations, interpret and use data from various sources
  - communicate effectively within the workplace
  - select, interpret and apply procedures or processes
  - prepare and present reports and information in appropriate formats

Resource implications

- Access to real or appropriately simulated product engineering situations in a TCF context
- This includes real or simulated work areas, materials, equipment, and information on work specifications, relevant safety procedures and regulations, quality standards, organisation procedures and customer requirements

Consistency in performance

- Applies underpinning knowledge and skills when:
  - planning and selecting appropriate processes or procedures
  - identifying contingencies
  - completing tasks
  - identifying and implementing improvements
  - ensuring safety standards are followed
- Shows evidence of application of relevant workplace procedures including:
  - hazard policies and procedures including codes of practice
  - issue resolution procedures
  - job procedures and work instructions
  - quality procedures (where existing)
  - security procedures
  - waste, pollution and recycling management processes
- Action taken promptly, accidents and incidents reported in accordance with statutory requirements and enterprise procedures
- Recognises and adapts appropriately to cultural differences in the workplace, including modes of behaviour and interactions among staff and others
- Work completed systematically with attention to detail without damage to goods, equipment or personnel

Context for assessment

- Assessment may occur on the job or in an appropriately simulated environment

MEM12024A Perform computations

Unit Descriptor

This unit covers estimating approximate answers to arithmetical problems, carrying out basic calculations involving percentages and proportions, and determining simple ratios and averages. The unit includes producing and interpreting simple charts and graphs.

Realted units:

Band: A

Unit weight: 3

Application of the Unit

This unit applies in manufacturing, engineering or related environments. It includes the application of the four rules of algebraic expressions, extracting information from drawings, diagrams, graphs and charts and producing simple charts and graphs.

Data may be derived from readings taken or may be computer generated. Applications can include computations associated with pressure, volume, temperature, heat, speed, power, elasticity, density, mass, force etc.

Calculations may be performed using pen and paper or on a calculator.

Unit Sector

Measurement

ELEMENT	PERFORMANCE CRITERIA
1. Determine work requirement	1.1 Required outcomes are established from job instructions. 1.2 Data is obtained from *relevant sources* and interpreted correctly. 1.3 Required calculation method is determined to suit the *application* , including selection of relevant *arithmetic operations* and/or formulae. 1.4 Expected results are estimated, including rounding off, as appropriate.
2. Perform calculations	2.1 Calculation method is applied correctly. 2.2 Correct answer is obtained. 2.3 Answer is checked against estimation.
3. Produce charts and graphs from given information	3.1 Data is transposed accurately to produce charts or graphs. 3.2 Charts or graphs accurately reflect data on which they are based.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

Relevant sources	Charts, graphs, diagrams, measurement data, reference manuals and specifications
Application	Applications can include computations associated with pressure, volume, temperature, heat, speed, power, elasticity, density, mass, force etc.
Arithmetic operations	Application of subtraction, addition, multiplication and division Manipulation of decimals, fractions and mixed numbers and whole numbers Determining of percentages Performing of algebraic expressions Calculation of proportions and ratios
Charts and graphs	Simple histograms, control charts, pie charts etc.

EVIDENCE GUIDE

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to perform computations.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with performing computations or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- performing calculations involving whole numbers using all four basic rules
- performing calculations involving length, perimeter, area and volume
- checking calculated answers for accuracy
- rounding off estimated answers
- expressing information presented in fractional or decimal format as a percentage
- selecting appropriate formulae for the given application
- substituting the correct values for each term in the relevant formulae
- using appropriate mathematical operations
- performing calculations involving ratios or proportions
- determining required information from appropriate charts or graphs
- producing simple charts or graphs from given information or observations made
- selecting appropriate scales and using them in the production of charts and graphs
- marking appropriate limits clearly on the graph or chart
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
- planning and sequencing operations
- checking and clarifying task related information
- checking for conformance to specifications
- undertaking numerical operations, geometry and calculations/formulae within the scope of this unit

Required knowledge

Look for evidence that confirms knowledge of:

- formula applicable to the determination of perimeter, area and volume of simple geometric shapes
- techniques for estimating approximate answers
- reasons for using dimensions with the same units when calculating length, perimeter, area and volume
- concepts of perimeter, area and volume
- procedures for rounding off figures when estimating approximate answers
- mixed numbers, decimals, fractions and whole numbers
- concept of percentage
- procedures to be followed in converting a decimal to a percentage
- procedures for carrying out calculations involving fractions and using each of the four basic rules
- procedures to be followed on converting a fraction to a percentage
- sources of appropriate formulae
- reasons for ensuring that the units of each term are consistent with the formulae selected
- procedures for converting given units to those required for use in formulae
- concepts of ratio and proportion
- given ratios and proportions can be expressed in terms of whole numbers, fractions and decimal fractions
- scales applicable to the axes of the graphs or charts
- three types of charts and/or graphs used in the individual's field of work
- where appropriate, upper and lower limits of acceptability applicable to data entered on a graph or chart
- where appropriate, the trends indicated by the slope or gradient of a graph
- where appropriate, the action to be taken when given trends occur or set limits are approached on graphs or charts
- procedures for drawing 'lines of best fit'
- the trends indicated by the graphs or charts drawn
- hazards and control measures associated with performing computations, including housekeeping
- safe work practices and procedures

MEM15001B Perform basic statistical quality control

Unit Descriptor

This unit covers taking samples and applying a statistical process to monitor production.

Realted units:

When the production and interpretation of charts and graphs not dependent on knowledge and understanding of the implications for quality are required, Unit 12.24 (Perform computations) should be accessed.

Band: A

Unit weight: 2

Application of the Unit

This unit applies to the collation and interpretation of statistical data in the context of statistical quality control, for example, tally, run or control charts. Uncontrolled variations are reported to appropriate authority.

Unit Sector

Quality

ELEMENT	PERFORMANCE CRITERIA
1. Take samples	1.1 Difference between population and sample is understood and various *sampling schemes* are applied in accordance with standard operating procedures.
2. Apply statistical process to monitor production	2.1 Concept of variation in terms of average and spread is understood. Data is used to *produce relevant statistical information.* 2.2 Data is interpreted accurately and information is presented to appropriate authority according to standard operating procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

Sampling schemes	Agreed customer plans, Acceptable Quality Level (AQL) and Average Outgoing Quality Level (AOQL) plans, Shainin, Six Sigma etc.
Relevant statistical information	Average, range and process control data and the plotting of charts such as line graphs, run charts, tally charts, histograms, control charts, random and assignable causes etc.

EVIDENCE GUIDE

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to perform basic statistical quality control.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with performing basic statistical quality control or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- reading, interpreting and following information on written job instructions, standard operating procedures, charts, lists, drawings and other applicable reference documents
- applying statistical process control procedures in accordance with instructions to a given production process
- obtaining data from samples including average, range and random or assignable causes
- producing tally, run or control charts from sampling data
- reporting information from sampling data
- checking and clarifying task-related information
- completing proformas and standard workplace forms

Required knowledge

Look for evidence that confirms knowledge of:

- the difference between population and sample, and the concept of variation in terms of average and range, random and assignable causes
- numerical operations and statistical calculations/formulae within the scope of this unit
- statistical process control procedures, which may include Six Sigma etc. and the sampling procedures to be followed
- the types of charts that can be produced to assist monitoring of products including run charts, tally charts, histograms, control charts
- procedures for reporting sample data information
- use and application of personal protective equipment
- safe work practices and procedures

MEM16006A Organise and communicate information

Unit Descriptor

This unit covers accessing, organising and communicating information related to processes or tasks.

Realted units:

For access and recording of data requiring system knowledge and judgement, see Unit 16.8 (Interact with computing technology).

Band: A

Unit weight: 2

Application of the Unit

This unit applies in manufacturing, engineering or related environments.

It may include information related to production, maintenance or associated processes. Information may be drawn from a variety of sources.

This unit includes the ability to communicate using common workplace terminology.

Unit Sector

Communication

ELEMENT	PERFORMANCE CRITERIA
1. Access information and/or records	1.1 Information requirements of tasks are determined and relevant information is accessed from a *range of sources* . 1.2 *Workplace terminology* is correctly recognised.
2. Organise and analyse information	2.1 Information is interpreted and organised in accordance with enterprise and work requirements. 2.2 Information is *analysed* according to enterprise and work requirements.
3. Communicate organised information using established workplace methods	3.1 Information is communicated using *established workplace methods* .

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

Range of sources	Job instructions, specifications, standard operating procedures, charts, lists, documents, computer data, drawings, sketches, tables, technical manuals and/or charts and other applicable reference material
Workplace terminology	Terminology - referring to equipment, processes, workplace areas, staff and procedures - specific to the processes and equipment used in the workplace
Analyse	Analysis for this unit involves simple determinations of relevance and implication for the employee'/ s immediate work requirements
Established workplace methods	Proforma reports Data entry e.g. bar coding and simple keyboard operations Verbal Drawings

EVIDENCE GUIDE

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to organise, analyse and communicate information.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with organising, analysing and communicating information or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- accessing relevant information from a range of sources
- recording, where appropriate, the accessed information
- recognising and using workplace terms
- reading, interpreting and following information in workplace documentation
- checking and clarifying information
- organising, categorising and sequencing information

Required knowledge

Look for evidence that confirms knowledge of:

- types of information
- available sources of information
- information analysis techniques
- methods of categorising and organising information
- methods of recording and communicating information

MEM16008A Interact with computing technology

Unit Descriptor

This unit covers accessing, inputting and storing information used in manufacturing, engineering or related environments, using computing technology.

Band: A

Unit weight: 2

Application of the Unit

This unit applies in manufacturing, engineering or related environments. It involves identifying the type and source of information required, and using the technology to access, input and store information. The equipment may include computers and a range of other equipment based on computing technology.

Unit Sector

Communication

ELEMENT	PERFORMANCE CRITERIA
1. Determine job requirements	1.1 Nature and scope of task requirement are identified. 1.2 Information/data required to be accessed, input or stored is identified. 1.3 Source of information/data is identified.
2. Access information/data	2.1 Access procedures are followed. 2.2 *Technology* is navigated to find the required information/data. 2.3 Relevant software *application* menus, functions and commands are used to locate required information/data. 2.4 Information/data is retrieved using organisational procedures. 2.5 Information/data is checked for relevance to job requirements.
3. Input information/data	3.1 Relevant software menus, functions and commands are used to manipulate information/data. 3.2 Information/data is entered, changed, or removed as required.
4. Store information/data	4.1 Data/files are saved following standard procedures prior to exiting the application. 4.2 *Data output* is produced as required. 4.3 Procedures for shutting down/logging off/exiting computing technology are followed.
5. Access assistance as required	5.1 Appropriate personnel are identified and consulted as required. 5.2 Manuals, online help and other reference materials are identified and used as required.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

Access procedures	Logging on and security procedures, virus checks, start-up routines, application start-up
Technology	Hand held data recording devices, screen based equipment, personal computers, bar coders
Applications	Word processing spreadsheets and databases Customised engineering and manufacturing applications Material Resource Planning (MRP) Warehousing inventory applications Predictive reliability and maintenance applications Production data management applications
Data output	Report, email, chart, graph, printout, data transfer, labels

EVIDENCE GUIDE

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to interact with computing technology to achieve workplace outcomes.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with interacting with computing technology or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning should not require language, literacy and numeracy skills beyond those required in this unit. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- ability to enter or retrieve data using appropriate software applications
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
- planning and sequencing operations
- checking and clarifying task-related information
- using numerical operations within the scope of this unit

Required knowledge

Look for evidence that confirms knowledge of:

- functions and capabilities of various types of computing technology used in the workplace
- functions of software applications
- hazards and control measures associated with using computing technology, including housekeeping
- safe work practices and procedures

MEM30001A Use computer aided drafting systems to produce basic engineering drawings

Unit Descriptor

This unit covers producing basic engineering drawings using a CAD system, under the direction of a supervisor.

Related units:

If basic engineering drawings are required, then Unit 30.2 (Produce basic engineering graphics) should be selected. If detailed engineering drawings are required, then Unit 30.3 (Produce detailed engineering drawings) should be selected.

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Prerequisite Unit(s)

MEM16006A Organise and communicate information
MEM16008A Interact with computing technology

Application of the Unit

This unit applies to the production of drawings according to defined parameters and predetermined specifications that include materials, tolerances, codes and other specifications. All work is conducted under supervision.

Standard CAD software would be used including inbuilt file management, macros and reports.

Drawings include plans, diagrams, charts, circuits, systems or schematics.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Prepare the CAD environment	1.1 All relevant manuals, instructions and operating procedures for the CAD software are obtained in accordance with workplace procedures. 1.2 The CAD package is booted up in accordance with workplace procedures. 1.3 Screen display areas and *basic parameters* are set in accordance with instructions.
2. Produce a basic drawing	2.1 *Basic CAD drawings* are created and guidance is sought as required. 2.2 Drawings are prepared in accordance with AS 1100 or equivalent or in accordance with standard operating procedures. 2.3 As required, CAD drawings are reviewed with supervisor and/or other designated staff in accordance with company procedures.
3. Modify existing CAD drawings	3.1 Existing CAD drawings are located and modified by adding, deleting or changing drawing elements within that drawing.

4. Produce output	4.1 Drawing files are saved in the appropriate format in accordance with standard operating procedures. 4.2 Drawing files are printed out using plotter or *equivalent devices* .
5. Perform exit and shut-down procedures	5.1 Programs and computer are shut down in accordance with workplace procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Basic parameters	Include layer or level, line type, line width, colour and text format etc.
Basic CAD drawings	Include the following characteristics: lines, arcs, circles, polygons, ellipses, hatching or filling of areas, text, dimensions and tangents
Equivalent devices	May include ink jet printers or the like

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to use computer aided drafting systems to produce basic engineering drawings. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with producing basic engineering drawings using computer aided drafting systems, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Consistency of performance	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- reading and interpreting engineering specifications
- organising information
- using computer and peripherals
- using CAD program
- preparing simple drawings in plane orthogonal, isometric projection or equivalent

Required knowledge

Look for evidence that confirms knowledge of :

- CAD program capabilities and processes

MEM30002A Produce basic engineering graphics

Unit Descriptor

This unit covers producing drawings or similar graphical representations where the critical dimensions and associated tolerances and design specifications are predetermined.

Related Units:

If CAD skills are required, then Unit 30.1 (Use computer aided drafting systems to produce basic engineering drawings) and its prerequisites should be selected

If additional CAD skills are required, then Unit 30.4 (Use CAD to create and display 3D models) should also be selected. If fully detailed drawings are required, then Unit 30.3 (Produce detailed engineering drawings) should be selected.

Prerequisite Unit(s)

MEM16006A Organise and communicate information
MEM16008A Interact with computing technology

Application of the Unit

This unit applies to any of the full range of engineering disciplines. All work is carried out under supervision.

Manual drafting or CAD drawing equipment may be used.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Identify drawing requirements	1.1 All relevant job requirements and design *specifications* are obtained in accordance with workplace procedures. 1.2 Drawing requirements and specifications are identified and interpreted.
2. Prepare assembly, layout and general drawings in accordance with instructions	2.1 *Drawings* are prepared in plane orthogonal, isometric projection or equivalent including sections to Australian Standard 1100, as required. 2.2 Problems are resolved in *consultation* with a supervisor.
3. Draw sections through simple engineering components as required for clarity	3.1 Sections are drawn through an engineering component incorporating correct use of cutting plane(s) symbols and conventions.
4. Select physical dimensions from manufacturer handbooks	4.1 Where required, components and/or materials are selected from supplier/manufacturer catalogues using predetermined design specifications.
5. Prepare engineering parts list	5.1 An *engineering parts list* is produced in accordance with workplace procedures.
6. Issue or file completed drawing/parts list	6.1 Approved drawings and/or parts lists are stored, catalogued and *issued* in accordance with standard operating procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Specifications	May be obtained form design information, customer, ideas, concepts/expectations/requirements, sketches, preliminary layouts
Drawings	Include plans, diagrams, charts
Consultation	May include reference to appropriate personnel including technical supervisors, manufacturers, suppliers, contractors, customers
Engineering parts list	May include part name, description of part, material specification or part number, quantities and other details as required
Issued drawings	Hard copy, photographic, slide or transparency form including presentation as a single drawing and/or with other drawings, support documentation as a package

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to produce basic engineering graphics. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with producing basic engineering graphics, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Consistency of performance	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- correctly using and maintaining equipment including CAD
- manual drafting, filing and printing
- reading and interpreting specifications
- communicating
- visualising components
- preparing a drawing in plane orthogonal, isometric projection or equivalent

Required knowledge

Look for evidence that confirms knowledge of:

- drafting media including cartridge paper, tracing paper, drafting film, plan printing paper
- layout conventions
- effective use of blank space, location of notes and symbols
- sectioning
- draw sections through an engineering component incorporating correct use of cutting plane(s) symbols and conventions.
- overview of graphical techniques
- assembly drawings, explosion drawings
- schematics/line drawings, graphs, pictorials

MEM30003A Produce detailed engineering drawings

Unit Descriptor

This unit covers producing detailed drawings of engineering components complete with surface texture details and dimensions.

Related unitsNone

BandNone

Unit weightNone

NotesThere are no notes for this unit.

Prerequisite Unit(s)

MEM16006A Organise and communicate information
MEM16008A Interact with computing technology
MEM30001A Use computer aided drafting systems to produce basic engineering drawings
MEM30002A Produce basic engineering graphics

Application of the Unit

This unit applies to all engineering and manufacturing environments.

Work is carried out under supervision.

Drawings may be produced with or without the use of computer aided design (CAD) systems.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Determine drawing requirements	1.1 Drawing requirements are checked and interpreted from work order or similar. 1.2 Required information is sourced from workshop manuals, customer specifications, product suppliers, designers or similar. 1.3 Scope of drawing including layout, additional required information and resources is planned.
2. Produce detail drawings in third angle projection, including auxiliary views, sections and assemblies	2.1 Drawing details including assembly and components are completed as per AS 100 or similar. 2.2 Dimensions of various components are determined and inserted where required. 2.3 Appropriate symbols for limits and fits, surface texture and *geometric tolerances* are included. 2.4 *Simple componentsor layouts* are drawn in third angle projection. 2.5 An auxiliary view is drawn of a component, given two views. 2.6 Correct convention for *parts* is shown.
3. Issue and/or file drawing	3.1 Drawing is issued and/or filed according to workplace procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Geometric tolerances	Simple geometry tolerancing (no datum references, flatness, roundness etc.) Geometry tolerance with datum reference (e.g. parallel squareness)
Simple components or layouts	May include fabricated components, machined components, cast and forged components, structural details, electrical electronic components, fluid power components
Parts	Mechanical components such as fasteners, bearings, seals, gears, keys, splines etc. Electrical components such as cables, connectors, terminations etc. Fluid power components such as actuators, valves, hoses, connectors, relays etc.

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to produce detailed engineering drawings. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, i.e. the candidate is not in productive work, an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with producing detailed engineering drawings, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Consistency of performance	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- drawing
- documenting
- applying principles of geometric tolerances
- identifying functional surfaces and datums on assembly drawings
- producing detail drawings of machine components and dimension from datums

Required knowledge

Look for evidence that confirms knowledge of:

- projection
- auxiliary views, special attention
- detail drawing methods
- standard engineering drawing symbols, references and terminology
- projection lines
- arrangements
- general tolerancing
- limits and fits
- shaft and hole basis
- extremes of fit
- surface texture
- selection of standard roughness values for given processes
- application of surface finish symbols to drawings
- selection and application of equivalent surface roughness numbers
- geometric tolerancing
- simple geometry tolerancing (no datum references, flatness, roundness etc.)
- geometry tolerance with datum reference (e.g. parallel squareness)

MEM30004A Use CAD to create and display 3D models

Unit Descriptor

This unit covers using a CAD program to produce and plot basic three dimensional view drawings.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Prerequisite Unit(s)

MEM16006A Organise and communicate information
MEM16008A Interact with computing technology
MEM30001A Use computer aided drafting systems to produce basic engineering drawings

Application of the Unit

This unit applies to the production of three dimensional models using computer aided design and drawing software and associated equipment. This will include the use of region and solid modelling techniques, section views, and pre-drawn library files. Work also includes extraction of properties and application of basic rendering techniques.

All work is conducted under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Set up a three dimensional environment	1.1 Set up a three dimensional environment on the screen to allow *multiple viewing**.***
2. Create three dimensional views	2.1 Three dimensional views are created on the screen by manipulation of drawing planes and insertion of three dimensional geometric shapes. 2.2 Any plane of the three dimensional view is drawn on. 2.3 Editing functions are used to modify *three dimensional geometric shapes* in creating three dimensional views.
3. Display three dimensional views	3.1 Wire line, surface and solid face displays are produced in isometric, perspective and orthographic projections.
4. Extract mass and area properties of a 3D model	4.1 The mass and surface area of a given solid model made from a nominated material is extracted.
5. Apply basic rendering techniques to a 3D model	5.1 A solid model is rendered to a specified set of criteria.
6. Save completed drawing file in various formats	6.1 File is saved in an appropriate format to enable retrieval and use in a CAD system. 6.2 File is saved in other formats to enable retrieval in other software applications.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Multiple viewing	Includes top views, front and side views, and a general three dimensional view
Three dimensional geometric shapes	May include arcs and lines, spheres, cones, cylinders and boxes

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to use CAD to create and display 3D models. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with using CAD to create and display 3D models or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- reading and interpreting engineering specifications
- organising information
- using computer and peripherals
- using CAD program
- saving 3D modes in various file formats
- preparing drawings in plane orthogonal, isometric projection or equivalent

Required knowledge

Look for evidence that confirms knowledge of:

- region modelling techniques.
- solid modelling techniques
- development of sectioned models
- use of cutting plane
- use of cross hatching
- use of pre-drawn library files and primitives to produce a 3D model
- use of third level software to produce 3D models
- how to extract mass and area properties
- how to extract area properties from region models
- application of basic rendering techniques to a 3D model

MEM30005A Calculate force systems within simple beam structures

Unit Descriptor

This unit covers understanding and calculating force systems within simple beam structures.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Prerequisite Unit(s) MEM30012A Apply mathematical techniques in a manufacturing engineering or related environment

Application of the Unit This unit applies to solving simple engineering problems involving forces, moments and basic stress and strain calculations, and determining nominal sizes of simple beams subject to loading

Unit Sector Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Determine the resultant and equilibrant of systems of coplanar forces	1.1 Calculate the magnitude and direction of the resultant and equilibrant of coplanar force systems. 1.2 Calculate the line of action of a resultant using the principle of Moment.
2. Determine nominal sizes for a simple horizontal beam subject to a combination of uniform and point loading	2.1 Support reactions for a simply supported horizontal beam using the equations of equilibrium and including the moment effect of a couple are calculated. 2.2 The possible types of failure that need to be considered are determined. 2.3 Shear force and bending moment diagrams are drawn. 2.4 Bending stress is determined. 2.5 Calculations are completed to determine the nominal size for the beam. 2.6 Factors of safety are applied to finalise nominal size of beam.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements

A person who demonstrates competency in this unit must be able to calculate force systems within simple beam structures. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with calculating force systems within simple structures, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- calculating and using trigonometry, transposition, algebraic formula
- drawing shear force and bending moment diagrams

Required knowledge

Look for evidence that confirms knowledge of:

- force and gravity
- the concept of force
- characteristics of force
- rectangular components of force
- graphical addition of forces
- mathematical addition of forces
- weight as force
- moment and torque
- moment of force
- addition of moments
- equilibrium of moments
- torque
- equivalent force moment systems
- statics
- equilibrium of coplanar forces
- conditions of equilibrium
- calculation of beam reactions (simply supported, point load, uniformly distributed load (UDL), self-weight)
- simple beams
- shear force and bending moment diagrams
- bending stress
- deflection by formulae
- stress and strain
- shear stress and strain
- allowable stress
- factors of safety

MEM30006A Calculate stresses in simple structures

Unit Descriptor

This unit covers determining stresses and their effect on the strength and stability of simple structures and mechanical components.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Prerequisite Unit(s)

MEM30012A Apply mathematical techniques in a manufacturing engineering or related environment

Application of the Unit

This unit applies to the calculation of stresses in centrally loaded bolted connections, fillet and butt welded connections.

All work is carried out under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Determine stresses in simple structures and mechanical components	1.1 The shear stresses in simple bolted connections are determined. 1.2 The nominal weld size or length of weld required on simple welded connections is determined to meet load requirements. 1.3 Torque distribution diagrams are drawn and used to calculate torsional shear stress and angle of twist on threaded bolts subjected to torques.
2. Verify stress levels using appropriate reference material	2.1 Appropriate *reference materials* are used to verify that stress loading is acceptable and in accordance with standard operational procedures. 2.2 Verification results are reported according to standard operational procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Simple structures	Limited to consideration of centrally loaded bolted connections, fillet and butt welded connections
Reference materials	May include design manuals, handbooks, relevant codes and regulations, databases and manufacturers' references

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to calculate stresses in simple structures as defined. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with calculating stresses in simple structures, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- interpreting drawings and graphical representations
- calculating stresses using given formulas
- construction of torque distribution diagrams
- accessing relevant codes and reference material
- interpreting results against reference materials

Required knowledge

Look for evidence that confirms knowledge of:

- stress and strain:
  - normal stress and strain
  - modules of elasticity
  - deformation
  - Poisson's Ratio
  - shear stress and strain
  - modulus of rigidity
  - yield stress, ultimate stress, proportional limit, factor of safety, allowable stress
- centrally loaded connections
- bolted connections
- shear, tensile, torque and bearing stresses
- centrally loaded welded connections
- fillet and butt welds, method of failure
- size and length of weld
- effect of hole punching
- longitudinal stress
- how to access and use relevant codes and reference material

MEM30007A Select common engineering materials

Unit Descriptor

This unit covers recognising common materials used in engineering, assisting in the selection of a material for a specific application, and performing tests to evaluate the properties of materials.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

This unit applies to technician level activities in manufacturing and engineering environments.

Work is carried out under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Identify common engineering materials by their principal properties	1.1 The principal properties of ferrous and non-ferrous metals are identified. 1.2 The principal properties of thermosetting and thermoplastic polymers are identified. 1.3 The principal properties of ceramics and composite materials are identified. 1.4 The effects of different types of bonding in materials are identified. 1.5 The effects of mechanical and thermal processes on the principal properties of materials are identified.
2. Select materials for specific applications	2.1 The engineering requirement for the specific application is determined in consultation with others. 2.2 Material is selected based on the requirement and consideration of principal properties and further processing. 2.3 Selection is confirmed according to standard operating procedures.
3. Verify selected material as fit for purpose	3.1 *Appropriate tests* for the *required properties* are identified. 3.2 Tests are conducted as required in accordance with standard operating procedures. 3.3 Test results are recorded and analysed and material choices are confirmed or modified as appropriate.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Common engineering materials	Includes ferrous metals, cast irons, carbon and alloy steels, stainless steels, coated steels, non-ferrous metals, aluminium and its alloys, copper and its alloys, nickel alloys, zinc, titanium, magnesium, refractory metals, polymers, thermosetting polymers, thermoplastic polymers, ceramics and glasses
Appropriate tests	Tests which can be undertaken by the technician within the organisation as well as those required to be undertaken by external organisations, including simple tests
Required properties	Properties to be tested include tensile strength, compression, shear characteristics, torsion, hardness, impact resistance, fatigue resistance, creep resistance, visual appearance and colour, magnetic properties, corrosion resistance

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to select common engineering materials. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with selecting common engineering materials, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning should not require language, literacy and numeracy skills beyond those required in this unit. The candidate must have access to all tools, equipment, materials and documentation required and must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Consistency of performance	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- undertaking research
- selecting/carrying out tests appropriate to the material
- communicating
- documenting
- planning and sequencing operations
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents

Required knowledge

Look for evidence that confirms knowledge of:

- classification of materials:
  - metals and non-metals
  - ferrous and non-ferrous metals
  - polymers (thermoplastics, thermosetting and elastomers)
  - ceramics
  - composite materials
- structure of materials
- physical properties of materials:
  - electrical conductivity/resistivity
  - specific gravity/density
  - thermal conductivity/expansion
  - specific heat
  - melting/boiling points
- magnetic properties
- optical properties
- mechanical properties:
  - strength - yield, tensile, compressive
  - stress/strain data
  - hardness
  - toughness (impact and slow strain)
  - elasticity
  - plasticity
  - ductility
  - malleability
  - fatigue
  - creep
- chemical properties:
  - corrosion of metals, corrosion processes, mechanisms
  - degradation of polymers
- materials testing methods - destructive testing and applications:
  - tensile
  - compressive
  - shear
  - torsion
  - hardness
  - impact
  - fatigue
  - creep
  - visual
  - corrosion testing
- engineering materials
- engineering applications of ferrous metals:
  - cast irons
  - carbon and alloy steels
  - stainless steels
- engineering applications of non-ferrous metals:
  - aluminium and its alloys
  - copper, brass and bronze
  - nickel alloys, zinc, titanium
  -

    - magnesium
    - refractory metals
- engineering applications of polymers:
    - thermosetting polymers
    - thermoplastic polymers
    - ceramics and glasses
- effects of mechanical and thermal processes on the properties of materials:
    - casting
    - forging, rolling and extrusion
    - cold forming
    - powder processes
    - heat treatment
    - joining - fasteners
    - soldering
    - brazing
    - welding
    - adhesives
    - finishing - coatings, metallic and non-metallic
- hazards and control measure associated with selecting common engineering materials, including housekeeping
- safe work practices and procedures

MEM30008A Apply basic economic and ergonomic concepts to evaluate engineering applications

Unit Descriptor

This unit covers participating in the application of the basic concepts of economic and ergonomic principles and procedures to evaluate an engineering application prior to production.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

The work is carried out under supervision, usually in a team environment.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Prepare required customer requirements from information provided	1.1 Criteria for the *engineering application* are obtained in accordance with standard operating procedures.
2. Verify that customer requirements have been met in the engineering application criteria	2.1 Criteria for the engineering application criteria are reviewed against customer requirement and deficiencies are noted. 2.2 Knowledge of *engineering parameters* is applied to evaluate the engineering application criteria. 2.3 Use of appropriate and relevant *standards and codes* is verified using standard operating procedures or reference to supervisor.
3. Verify specifications in accordance with economic principles	3.1 The relationships between quality, cost of production and function are considered and specifications are verified in accordance with policy and procedures.
4. Verify specifications in accordance with ergonomic principles	4.1 The specifications are checked and verified for health effects of human/machine interaction in accordance with given policy and procedures.
5. Seek approval of recommendations	5.1 All recommendations are referred to a supervisor for approval in accordance with policy and procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Engineering application	For this unit, engineering application includes assisting in engineering processes and applications requiring ergonomic and economic knowledge and skills including design, engineering assessments, supervision of installation and commissioning etc.
Engineering parameters	Includes consideration of safety of personnel, consequences of failure (human injury etc.), economic considerations, production cost, quality of product consideration, material reliability and choice, design safety factors, maintenance, energy consumption, source of spares/service
Standards and codes	Includes access and use of Australian standards (AS): AS 3000, AS 1250, AS 4800, AS 1100, International Standards Organisation (ISO) standards
Economic principles	Includes production quantities (mass/batch), cost of manufacture, ease of manufacture, use of standardised components, human capacity (reach, dexterity, strength, repetitiveness, human comfort), aesthetics, health effects of human/machine interaction, safety

Ergonomic principles	Includes designing, installing or checking things for effective human use, and creating environments that are suitable for human living and work. It includes work methods, equipment, facilities, and tools that influence the worker's motivation, fatigue, likelihood of sustaining an occupational injury or illness, and productivity

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to participate in the application of basic economic, ergonomic concepts to evaluate engineering designs and applications. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with applying basic economic, ergonomic concepts to engineering designs and applications, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- determining customer requirements
- determining, accessing and using relevant Australian and ISO standards

Required knowledge

Look for evidence that confirms knowledge of:

- engineering parameters:
  - safety of personnel, consequences of failure (such as human injury)
  - quality of product consideration
  - material reliability and choice
  - safety factors
  - maintenance, source of spares/service
  - energy consumption
- economic considerations:
  - costs of manufacture, effect of production quantity
  - cost of quality
  - design for manufacture
  - use of standardised components
- ergonomic considerations:
  - safety considerations
  - human capacity - reach, dexterity, strength, human comfort
  - health effects of human/machine interaction, repetitive use injuries
- aesthetics

MEM30009A Contribute to the design of basic mechanical systems

Unit Descriptor

This unit covers contributing to basic mechanical system design, and selecting the components and mechanical features required to perform simple functions.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Prerequisite Unit(s)

MEM16008A Interact with computing technology
MEM30002A Produce basic engineering graphics
MEM30003A Produce detailed engineering drawings

Application of the Unit

This unit applies to all mechanical engineering environments. Work is carried out under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Research equipment function and operational requirements	1.1 All relevant drawings, specifications, manuals and documentation are obtained in accordance with workplace procedures. 1.2 Appropriate personnel are consulted to determine requirements. 1.3 Information collected is interpreted and draft functional and operational requirements are prepared and verified with supervisor or design team.
2. Prepare a preliminary sketch/drawing/specification	2.1 Appropriate *components, assemblies and fasteners* are selected to perform the required function. 2.2 Where required, components and/or materials are selected from supplier/manufacturer catalogues. 2.3 Appropriate and relevant codes are applied to the sketch/drawing/specification in accordance with workplace procedures. 2.4 The preliminary sketch/drawing/specification is referred to a higher authority for approval in accordance with policy and procedures.
3. Issue or file completed sketch/drawing/specification list as required	3.1 Approved sketch/drawing/specification is stored and catalogued in accordance with standard operating procedures. 3.2 Approved sketch/drawing/specification is issued in accordance with standard operating procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Components, assemblies and fasteners	May include shafts, seals, bearings, fasteners, splines, cam, lifting systems, pneumatic circuits, hydraulic circuits, piping systems

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to contribute to the design of basic mechanical systems. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with contributing to the design of basic mechanical systems, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- reading and interpreting specifications and drawings

Required knowledge

Look for evidence that confirms knowledge of:

- relevant codes and standards
- basic mechanical components:
  - shafts
  - bearings
  - seals
  - fasteners, thread systems
  - splines
  - cams
- drive components:
  - electric motors
  - IC engines
  - brakes
  - clutches
  - belts and pulleys
  - chains and sprockets
  - gears
  - couplings
  - universal joints
- lifting systems:
  - lifting jacks
  - hoists
  - winch equipment
- pneumatic systems:
  - advantages and disadvantages
  - compressors
  - pneumatic components
  - typical circuits and applications
  - electrical control
- hydraulic systems:
  - advantages and disadvantages
  - power packs
  - pumps and other components
  - typical circuits and applications
  - electrical control
- pumps and piping system:
  - purpose of pumps and piping systems
  - pumps, valves, pipes and other components
  - typical piping systems

MEM30010A Set up basic hydraulic circuits

Unit Descriptor

This unit covers setting up and selecting components associated with single linear hydraulic systems.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

This unit applies to all engineering or manufacturing environments.

The unit refers to simple hydraulic circuits containing single linear actuators and motors.

Work is carried out under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Determine system requirements	1.1 Instructions regarding system requirements are obtained, understood and clarified as necessary. 1.2 Circuit drawings using standard symbols are interpreted correctly.
2. Select components for simple hydraulic circuits	2.1 Suitable fluids are selected for given hydraulic systems from specification charts and in accordance with *safety procedures* involving fluids. 2.2 Linear actuators and motors are selected to suit system requirements. 2.3 Control valves are selected to suit system requirements.
3. Verify component selection	3.1 Circuits are set up and operated on laboratory benches. 3.2 Operation is analysed and outcomes are verified against system requirements.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Simple hydraulic circuits	Limited to linear actuators, motors, control valves
Safety procedures	Selecting a suitable fire resistant fluid for a system, given its operating conditions; following required precautions when changing a system from one fluid to another

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to set up basic hydraulic circuits and verify outcomes. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, i.e. the candidate is not in productive work, an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with setting up basic hydraulic circuits, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- interpreting simple hydraulic circuit drawings
- testing operation of simple hydraulic circuits
- assessing performance
- documenting circuit specifications and test results
- applying fluid power principles

Required knowledge

Look for evidence that confirms knowledge of:

- fluid power:
  - definition of the term fluid power
  - differences between pneumatic and hydraulic systems
  - advantages and disadvantages of fluid power compared with mechanical and electric power systems
  - safety procedures when working with fluid power equipment
  - basic properties of fluids
  - selection and suitability for different applications
  - basic properties and units - mass, volume, density, specific volume, relative density, force and weight, pressure (absolute, atmospheric and gauge), temperature (celsius and kelvin), viscosity, surface tension
  - introduction to temperature and pressure effects on the basic properties and applications
  - precautions to be taken when changing type of fluid in a system
- awareness of different components including:
  - pipes (rigid and flexible)
  - valves, types and functions
  - filters and strainers for liquids
  - gauges and instruments - pressure/temperature gauges, liquid level gauges, thermometers, thermocouples, manometers, piezometers
  - pipe fittings - elbows/bends, enlargement/contractions, coupler/unions, tees
  - tanks and vessels - storage tanks, pressure vessels, header and surge tanks, weirs/dams/reservoirs
  - flow measurement instruments - venturi and orifice meters
  - pumps, motors/turbines
- linear actuators:
  - types, selection and functions
  - methods of supporting linear actuators
  - introduction to calculations related to linear actuators
  - recognition and drawing of standard symbols
  - observation and analysis of performance of linear actuators in laboratory circuits
- control valves (hydraulic and pneumatic):
  - directional controls and functions
  - check valves and functions
  - pressure controls and functions
  - flow controls and functions
  - recognition and drawing of standard symbols for control valves
  - drawing and analysis of typical circuits containing control valves
  - observation and analysis of performance of valves in basic circuits
- circuit design and analysis (single linear actuator):
  -

drawing and analysis of circuit diagrams containing basic components
- setting up and operating circuits on pneumatic and hydraulic benches in a fluid power laboratory

MEM30011A Set up basic pneumatic circuits

Unit Descriptor

This unit covers setting up and selecting components associated with single linear pneumatic systems.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

This unit applies to all engineering or manufacturing environments.

The unit refers to simple pneumatic circuits containing single linear actuators.

Work is carried out under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Determine system requirements	1.1 Instructions regarding system requirements are obtained, understood and clarified as necessary. 1.2 Circuit drawings using standard symbols are interpreted correctly.
2. Select components for simple pneumatic circuits	2.1 Suitable air system components are selected for given fluid power systems from specification charts and in accordance with *safety procedures* involving compressed air. 2.2 Linear actuators are selected to suit system requirements. 2.3 Control valves are selected to suit system requirements.
3. Verify component selection	3.1 Circuits are set up and operated on laboratory benches. 3.2 Operation is analysed and outcomes are verified against system requirements.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Safety procedures	Following required precautions when using compressed air and when shutting down air compressors and receivers

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to set up basic pneumatic circuits. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with setting up basic pneumatic circuits or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- drawing pneumatic circuits
- testing operation of pneumatic circuits
- assessing performance
- calculating circuit requirements
- documenting circuit specifications and test results
- applying fluid power principles

Required knowledge

Look for evidence that confirms knowledge of:

- fluid power:
  - definition of the term fluid power
  - differences between pneumatic and hydraulic systems
  - advantages and disadvantages of fluid power when compared to mechanical and electric power systems
  - safety procedures when working with compressed air and associated equipment
- awareness of different components including :
  - air compressors
  - receivers, interlocks
  - pipes - rigid and flexible
  - valves - types and functions
  - filters - types and functions
  - gauges and instruments - pressure and temperature gauges, liquid level gauges, thermometers, thermocouples, manometers, piezometers
  - pipe fittings - elbows/bends
  - flow measurement instruments - venturi and orifice meters
  - air motors
- linear actuators:
  - types, selection and functions
  - methods of supporting linear actuators
  - introduction to calculations related to linear actuators
  - recognition and drawing of standard symbols
  - observation and analysis of performance of linear actuators in laboratory circuits
- control valves (hydraulic and pneumatic):
  - directional controls and functions
  - check valves and functions
  - pressure controls and functions
  - flow controls and functions
  - recognition and drawing of standard symbols for control valves
  - drawing and analysis of typical circuits containing control valves
  - observation and analysis of performance of valves in basic circuits
- circuit design and analysis (single linear actuator):
  - drawing and analysis of circuit diagrams containing basic components
  - setting up and operating circuits on pneumatic and hydraulic benches in a fluid power laboratory

MEM30012A Apply mathematical techniques in a manufacturing engineering or related environment

Unit Descriptor

This unit covers applies the concepts of mathematics to appropriate and simple engineering situations within the individual's area of engineering expertise.

Related units: None

Band: None

Unit weight: 4

Notes: There are no notes for this unit.

Application of the Unit

This unit applies to technician level work that requires basic algebraic, trigonometric and statistical knowledge and skill.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Use concepts of arithmetic in the solution of engineering problems	1.1 Units of physical quantities are converted to facilitate engineering calculations. 1.2 Calculations are performed to solve problems involving rational and irrational numbers. 1.3 Scientific notation is used to represent numbers. 1.4 Calculations are checked for reasonableness using estimating and approximating techniques.
2. Solve engineering problems involving algebraic expressions with one independent variable	2.1 Algebraic expressions are manipulated using mathematical operations in their *correct order.*
3. Use two-dimensional geometry to solve practical problems	3.1 Angles expressed in degrees are correctly converted to radians and vice versa. 3.2 The perimeter, area, length and angles of a range of two-dimensional figures are correctly calculated. 3.3 The volume and surface area of *complex figures* are correctly calculated. 3.4 Points identified in terms of cartesian coordinates can be converted to polar coordinates and vice versa.
4. Use trigonometry to solve practical problems	4.1 Basic trigonometry functions are used to calculate the lengths of the sides of right-angled triangles. 4.2 Inverse trigonometry functions are used to determine angles in a right-angled triangle given the lengths of two sides. 4.3 The sine rule is used to determine the lengths of the sides of acute and obtuse angled triangles given one side and two angles. 4.4 The cosine rule is used to determine the lengths of the sides of acute and obtuse angled triangles given two sides and one angle.

5. Graph linear functions	5.1 Linear functions are solved graphically and equations of straight lines are determined from the slope and one point, or two points. 5.2 Two linear functions are solved simultaneously both algebraically and geometrically. 5.3 The length and mid point of a line segment are determined.
6. Solve quadratic equations	6.1 Quadratic equations are solved. 6.2 Simultaneous linear and quadratic equations are solved.
7. Perform basic statistical calculations	7.1 Mean, median and mode are calculated from given data. 7.2 Standard deviation is calculated and interpreted employing graphical representation.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Concepts of mathematics	Include arithmetic, algebraic expressions with one independent variable, two-dimensional geometry, trigonometry, linear functions, basic quadratic functions, basic statistical methods
Correct order	Refers to the correct procedure when expanding brackets, factorising algebraic expressions, factorising quadratic expressions, simplifying algebraic fractions, transposing formulae, solving simple one variable equations, finding the quotient and remainder given a linear division
Complex figures	May include cones, pyramids, spheres, frustums and intersections of figures singularly or in combination

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to apply mathematical skills and knowledge to simple engineering applications. Evidence from tasks and projects should/may be used to complement and demonstrate integration of competency. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with applying mathematical concepts to engineering applications, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Consistency of performance	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- using and applying mathematical formulas
- logical thinking
- problem solving
- calculating
- applying statistics
- using computer numerical methods
- drawing graphs

Required knowledge

Look for evidence that confirms knowledge of:

- transposing and evaluating formulae
- polynomials
- straight line coordinate geometry
- introduction to indices
- introduction to trigonometry
- circular functions
- trigonometry of oblique triangles
- trigonometric identities
- introduction to functions and their graphs

MEM30013A Assist in the preparation of a basic workplace layout

Unit Descriptor

This unit covers assisting in the charting and analysis of basic manufacturing operations including assisting in the preparation of workplace layouts.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

The unit covers basic principles of ergonomics, productivity improvements and quality procedures and work flow analysis.

Work is conducted under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Identify opportunities for workplace layout improvement	1.1 Basic analysis of workplace data is undertaken to determine sources of *waste.* 1.2 Future capacity requirement is obtained in accordance with policy and procedures. 1.3 Productivity improvement areas are established in accordance with organisational policy and procedures. 1.4 Appropriate productivity measures are established in conjunction with supervisors and other appropriate personnel.
2. Develop basic layout options for workplace improvement	2.1 Operation process charts, flow charts, flow process charts, and string diagrams etc. are used to develop basic layout options. 2.2 *Information on ergonomics, health and safety hazards* is considered in accordance with policy and procedures. 2.3 Improvements are developed in consultation with users and supervisors and in accordance with policy and procedures. 2.4 Simple economic appraisals for proposed improvements are developed in accordance with policy and procedures. 2.5 Layout options are referred to a higher authority for approval in accordance with policy and procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Waste	Excess production and early production, waiting, materials queuing, not moving, people not working, transporting, double handling, poor process design, inventory, stores, buffers, lot sizes, inefficient performance of a process, reaching, bending, exertion
	Making defective items, rework, rejects, unnecessary inspection
Information on ergonomics, health and safety hazards	Standard references including NOHSC guidelines, any relevant Acts and Regulations, information contained in manufacturers' manuals, standard operating procedures
	Workplace reports including:, incident reports, commissioned studies, advice from relevant leaders/supervisors/workplace committees

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to assist in the design of basic workplace layout **.** Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with assisting in the design of basic workplace layout, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Consistency of performance	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- communicating
- analysing
- documenting
- reviewing
- applying principles of ergonomics
- applying productivity principles

Required knowledge

Look for evidence that confirms knowledge of:

- basic knowledge of workplace layout principles including at a basic level the degree to which workplace layout is affected by:
  - engineering processes and systems
  - materials flow patterns
  - types of production plant and machinery
  - materials handling methods
  - unit loads
  - types of production methods
- productivity:
  - definition and measures of productivity
  - factors affecting productivity
  - productivity and quality
  - value adding
- recording techniques:
  - flow charts
  - activity relationship charts
  - outline process charts
  - flow process charts
  - multipurpose charts
  - string diagrams
  - basic principle of ergonomics
- the concept of waste and its application to productivity improvements

MEM30014A Apply basic just in time systems to the reduction of waste

Unit Descriptor

This unit covers reviewing and making continuous improvements to an existing Just in Time (JIT) production system in manufacturing.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

This unit applies to all types of manufacturing and engineering environments, most likely in a team setting. All work is carried out under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Identify potential to eliminate waste in the current system	1.1 *Value chain* members are identified. 1.2 Principles of *waste* elimination are applied to each step in the value chain. 1.3 Current storage/inventory in value chain is analysed for excesses. 1.4 Production lead time is analysed for all components, sub-assemblies and assemblies subject to *JIT* including potential for set up time reductions. 1.5 *Kanban cards* and *flow authorisation indicators* are analysed for appropriate quantity. 1.6 Workplace layout is analysed for flow and application of *housekeeping principles.* 1.7 Production process is analysed for excess rework and scrap.
2. Draft workable procedures to implement improvements to JIT system	2.1 Key internal stakeholders are liaised with to develop solutions to JIT issues. 2.2 Key external members of the value chain are liaised with to develop solutions to JIT issues. 2.3 *Key measures* for improvements are determined. 2.4 The plan is referred to a higher authority for approval in accordance with policy and procedures.
3. Implement the JIT system/improvements	3.1 The JIT system/improvements are implemented according to workplace procedures. 3.2 Key measures of JIT are monitored. 3.3 Regular liaison is conducted with key stakeholders seeking areas for improvement.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Value chain	Includes the entire production system, beginning with the customer, and includes the sales outlet, product design, processing and supply
Waste	Includes activities and results to be eliminated within manufacturing Categories of waste include excess production and early production, waiting, materials queuing, not moving, people not working, transporting, double handling, poor process design, inventory, stores, buffers, lot sizes, inefficient performance of a process, reaching, bending, exertion, making defective items, rework, rejects, unnecessary inspection
JIT	Includes a production scheduling concept that calls for any item needed at a production operation - whether raw material, finished item, or anything in between, to be produced and available precisely when needed JIT systems may also be known as part of other manufacturing systems such as lean manufacturing, agile manufacturing or similar

Kanban	Includes a card or sheet used to authorise production or movement of an item Kanban is typically applied to batch type operations and the production is measured in units produced. In continuous manufacturing organisations, production is measured in terms of production rate
Flow authorisation indicator	May include Kanban bin, ticket or similar, or may be some other indicator of demand pull
Housekeeping principles	Principles of 5S which refer to the five Japanese words *seiri, seiton, seison, seiketsu, shitsuke*. These words are shorthand expressions for principles of maintaining an effective, efficient workplace: *seiri* - eliminating everything not required for the work being performed *seiton* - efficient placement and arrangement of equipment and material *seison* - tidiness and cleanliness *seiketsu* - ongoing, standardised, continually improving *seiri, seiton, seison* *shitsuke* - discipline with leadership
Key measures	May include inventory levels, lead time, delivery, productivity/ production rate, set up time, other measures of pull through the value chain, quality, rework, scrap rates Pull system refers to a manufacturing planning system based on actual real-time needs from sales or equivalent - i.e. 'make what we sell'

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to apply basic JIT systems to the reduction of waste. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, i.e. the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with applying basic JIT systems to the reduction of waste or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning should not require language, literacy and numeracy skills beyond those required in this unit. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- analysing
- communicating
- negotiating
- reading/interpreting/following information on written job instructions, specifications, standard operating procedures and other applicable reference documents
- planning and sequencing operations

Required knowledge

Look for evidence that confirms knowledge of:

- JIT manufacturing philosophy
- push and pull systems
- Kanbans
- work cells
- set up time reduction techniques
- group technology
- ABC analysis of inventory
- principles of TQM
- principles of TPM
- hazards and control measures associated with applying basic JIT systems to the reduction of waste
- safe work practices and procedures

MEM30015A Develop recommendations for basic set up time improvements

Unit Descriptor

This unit covers participating in the development of improved set up procedures in manufacturing.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

This unit applies to all fields of manufacturing. Work is carried out under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Identify existing set up procedures	1.1 *Internal and external set up activities* are identified and recorded. 1.2 All *waiting time* is identified and recorded. 1.3 All adjustment times are identified and recorded. 1.4 Any hazards and risks from all steps in the set up are identified and recorded.
2. Analyse set up procedures to determine opportunities for improvement	2.1 Opportunities for conversion of internal set up activities to external set up are considered. 2.2 Opportunities to reduce/eliminate adjustment times, waiting times and any hazards and risks are considered.
3. Prepare recommendations for operational improvement	3.1 Liaise with relevant people to validate recommendations. 3.2 Recommended improvements are recorded.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Set up procedures	May refer to: • an exchange of dies/tools or a change between batches • any quantum equipment/process change to produce a different product
Internal and external set up activities	Internal set up activities are those that can be done only when the machine or process is not actively engaged in production External set up activities are those that can be done concurrently when the machine or process is actively engaged in production
Waiting time	Includes clean up activities, waiting for tools, waiting for materials, waiting for instructions, waiting for approvals, operator training etc.

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to develop recommendations for basic set up time improvements. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with developing recommendations for basic set up time improvements, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- communicating, including preparing reports
- analysing hazards
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures and other applicable reference documents

Required knowledge

Look for evidence that confirms knowledge of:

- principles of set up time reduction including:
  - internal and external set up activities
  - waiting time
  - adjustment times
  - set up hazards and risks
- planning and sequencing operations:
  - application of ergonomic principles and hierarchy of control in regard to hazards
  - hazards and control measures associated with developing recommendations for basic set up time improvements, including housekeeping
- safe work practices and procedures

MEM30016A Assist in the analysis of a supply chain

Unit Descriptor

This unit covers assisting in the analysis of value adding and non value adding activities within the supply chain.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

The unit applies to all fields of engineering and manufacture. The skills defined by this unit would normally be exercised under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Assist in mapping the supply stream for a nominated product/process	1.1 All organisations in the *supply stream* are identified. 1.2 All relevant steps in own organisation are identified.
2. Assist in assessing the value added at each step	2.1 Value added and contributed by each supplier organisation is identified. 2.2 Value added by each internal step is identified. 2.3 Activities which do not add value to customer benefit/features are identified. 2.4 External/internal supply chain members are liaised with to identify methods to reduce *non value adding activities* . 2.5 Information is collated and assessed. 2.6 Suggestions for improvements are recorded and submitted for approval.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Supply stream	Encompasses the entire supply system, beginning with the raw materials, processing and all tiers of the supply chain
Value added	Is measured against its contribution to the customer benefits/features and is determined in accordance with company definitions
Non value adding activities	Includes excess production and early production, delays, movement and transport, poor process design, inventory, inefficient performance of a process and making defective items

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to assist in the analysis of a supply chain. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with assisting in the analysis of a supply chain, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- communicating
- planning
- assessing
- problem solving
- analysing
- prioritising
- reading and interpreting
- recording

Required knowledge

Look for evidence that confirms knowledge of:

- purpose of supply chain analysis
- methods of supply chain analysis
- types of waste, non value adding activities and methods of reducing them
- process used to make own product
- processes employed by other members of the supply chain sufficient to have meaningful dialogue with them
- safe work practices

MEM30017A Use basic preventative maintenance techniques and tools

Unit Descriptor

This unit covers supporting the implementation of a preventative maintenance strategy for a manufacturing enterprise.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

This unit may apply to a range of predictive or proactive maintenance strategies within a manufacturing environment. The unit covers skills to enable participation across the most common preventative maintenance strategies and introduces the most common techniques and statistical tools. All work is undertaken under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Interpret enterprise maintenance strategy	1.1 Objectives and details of enterprise maintenance *strategy* are obtained in accordance with enterprise procedures. 1.2 Major *techniques and tools* for monitoring are confirmed in consultation with key stakeholders and supervisor.
2. Use preventative maintenance techniques and tools	2.1 Techniques and tools are selected and confirmed in consultation with key stakeholders and supervisor in accordance with enterprise requirements. 2.2 Key information and performance indicators required are identified in consultation with key stakeholders and supervisor. 2.3 Data collection is undertaken as required.
3. Interpret results	3.1 Actual information/performance indicators are compared with target levels set by supervisors and/or equipment manufacturers. 3.2 Required adjustments are developed in consultation with key stakeholders and supervisor.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Strategies	**May include total productive/preventive maintenance, reliability centred maintenance**
Techniques and tools	Includes root cause analysis, mean time between failures, failure modes effects analysis, condition monitoring not involving application of trade skills

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to use basic preventative maintenance techniques and tools. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, i.e. the candidate is not in productive work, an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with using basic preventative maintenance techniques and tools, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning should not require language, literacy and numeracy skills beyond those required in this unit. The candidate must have access to all tools, equipment, materials and documentation required and must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- conducting root cause analysis
- identifying mean time between failures
- basic analysis of the effects of failures
- conducting condition monitoring
- analysing
- assessing
- communicating
- problem solving
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
- planning and sequencing operations
- checking for conformance to specifications
- checking and clarifying task-related information

Required knowledge

Look for evidence that confirms knowledge of:

- characteristics and strengths of different types of strategies
- characteristics and strengths of different types of techniques and tools
- principles of process equipment and how to improve its reliability
- resources required and how to obtain them
- hazard and control measures associated with using basic preventative maintenance techniques and tools, including housekeeping
- use and application of personal protective equipment
- safe work practices and procedures

MEM30018A Undertake basic process planning

Unit Descriptor

This unit covers undertaking a basic determination of process specifications and production sequence for a manufacturing operation.

Related units:

Where interfacing between manufacturing processes is required, Unit 30.21 (Prepare a simple production schedule) should be selected.

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

This unit applies to a range of processes in manufacturing and to a stage of the overall production process. It does not apply to interfacing between processes.

The process plan is developed over a specified timeframe taking into account resources available and required. The process plan establishes detailed steps required, and milestones against which progress can be checked. The plan is developed in accordance with accepted organisation practice and procedures.

Performance of this unit would normally be conducted in a work environment where the basic process plan is reviewed by supervisors, planners or other internal review procedures before the plan is implemented.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Assist in determination of a process sequence	1.1 A basic analysis of process specifications using relevant job instructions, drawings, cost objectives, and operational procedures is undertaken. 1.2 An *operation or process sheet* is prepared based on analysis. 1.3 The process steps are clearly documented and approved in accordance with standard operating procedures. 1.4 Flow charts, based on analysis, are produced where required. 1.5 Material and parts lists are prepared, based on analysis, for the production process in accordance with standard operating procedures. 1.6 Tooling and/or equipment requirements are determined in conjunction with supervisor and other expert personnel. 1.7 All requirements are documented in accordance with standard operating procedures.
2. Prepare and submit new/revised operation sheet/flow chart/parts list as required	2.1 New/revised operation sheet/flow chart/parts list is prepared in accordance with standard operating procedures. 2.2 New/revised operation requirements are submitted in accordance with enterprise approval procedures.

3. Issue or file approved operation sheet/flow chart/parts list as required	3.1 Approved drawings and or parts lists are stored and catalogued or issued in accordance with standard operating procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Operation or process sheet	Includes operation sheets, sketches, tooling, equipment schedules and gauges etc.

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to undertake basic process planning. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with undertaking basic process planning, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- communicating
- prioritising
- planning
- drawing
- evaluating
- analysing
- documenting
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures charts, lists, drawings and other applicable reference documents.
- planning and sequencing operations
- checking and clarifying task-related information

Required knowledge

Look for evidence that confirms knowledge of:

- overview knowledge of product and process manufacturing principles including:
  - flow
  - elaborate transformation
  - value adding
  - waste
  - hazard identification and reduction
- safe work practices and procedures

MEM30019A Use resource planning software systems in manufacturing

Unit Descriptor

This unit covers accessing and using Enterprise Resource Planning (ERP), Materials Requirement or Resource Planning (MRP) software systems in conjunction with Just in Time techniques.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Prerequisite Unit(s) MEM16008A Interact with computing technology

Application of the Unit This unit applies to resource planning software systems. Work is carried out under supervision.

Unit Sector Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Use software interface	1.1 Keyboards, track ball/mouse and monitor and/or other peripherals are used to access system. 1.2 The *system* and the screens are navigated. 1.3 Messages are acknowledged. 1.4 Information is processed in the required format.
2. Access information	2.1 Relevant data and information is obtained from the system. 2.2 The status of items in the system is identified. 2.3 Historical data and information are accessed. 2.4 Information is interpreted and actions are prioritised.
3. Take appropriate actions	3.1 Actions are taken in response to *resource planning information.* 3.2 Follow-up is conducted as appropriate to ensure anticipated results have occurred. 3.3 Adjustments and variations are recorded according to procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

System	Includes ERP, MRP or similar software programs
Appropriate actions	Appropriate actions are actions in regard to production schedules, materials management, purchasing and ordering, transport and logistics that are needed as a result of information obtained from resource planning software
Resource planning information	May include information from ERP, MRP or similar systems that provide information on master production schedule, materials requirement plan, capacity requirement plan, bills of material, inventory control and statistics, order action, schedules

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to use ERP, MRP planning software systems in manufacturing. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is, the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with using ERP, MRP planning software systems in manufacturing, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- using basic computer functions
- analysing
- communicating
- undertaking production planning and control
- prioritising
- reading and interpreting
- recording

Required knowledge

Look for evidence that confirms knowledge of:

- technical knowledge and skills needed to operate process
- hierarchy of ERP, MRP or similar systems and operation
- information available from and business activities exercised by/through the ERP, MRP system
- closed loop manufacturing system basics
- business planning, demand, resources
- Master Production Scheduling (MPS)
- Materials Requirement Planning (MRP)
- Capacity Requirement Planning (CRP)
- system inputs:
  - bills of material
  - need for accuracy
  - inventory statistics
  - planning data
  - introduction to capacity management
  - production activity control
- system outputs:
  - planned orders
  - order action
  - firm/tentative
- Just in Time (JIT)
  - techniques
  - production smoothing
  - single unit flow
  - Kanban
  - set up time reduction (SMED)
  - lead time reduction
- production control methods:
  - types
  - master schedules
  - control by exception
  - computer control
  - visual control
  - combination MRP2/Kanban system
  - shop floor - day-to-day - Kanban
- scheduling:
  - techniques
  - order release
  - policies
  - centralised
  - decentralised
- inventory control:
  - raw
  - work-in-process
  - finished goods
  - lean manufacture and inventory
  - inventory costs
  - procurement
  - material control techniques
  - ABC (Pareto) Analysis
  - Economic Order Quantity (EOQ)
  -

    - Min-Max systems
    - Kanban - Just in Time
- cycle counting

MEM30020A Develop and manage a plan for a simple manufacturing related project

Unit Descriptor

This unit covers developing and managing low risk manufacturing related projects that may be small scale and managed by one person and are carried out under guidance.

Related units:

If skills in development of production schedule are required, then Unit 30.21 (Prepare a simple production schedule) should be selected.

Band: None

Unit weight: None

Notes: There are no notes for this unit.

Application of the Unit

This unit applies to technical work in all environments.

Work is carried out under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Select appropriate project management tools and develop project plan	1.1 A working knowledge of *project management tools* is used to develop a *plan* for a *simple manufacturing related project* and schedule of activities to meet project outcomes. 1.2 The plan is referred to a supervisor for approval in accordance with policy and procedures.
2. Implement planned activities	2.1 Plan is implemented according to schedule. 2.2 All affected personnel are communicated with regarding project implementation. 2.3 Supply and/or allocation of required resources including materials and equipment is organised. 2.4 Project progress is regularly reported in relation to agreed milestones to provide a measure of performance throughout the life of the plan. 2.5 Progress is discussed in consultation with other staff and contractors to ensure effective outcomes.
3. Review project plan and schedule	3.1 Project outcomes, performance standards and project objectives are monitored and analysed against specifications and the results are reported in accordance with procedures. 3.2 Variations in keeping to plan are discussed with supervisors and are resolved in accordance with enterprise policy and procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Project management tools	May include critical path method (CPM), bar and Gantt charts, work breakdown structures, Program Evaluation and Review Technique (PERT), project management software packages, recording systems - electronic and manual
Plan	May include project implementation plans, quality assurance targets, milestones, any planning that relates to time, cost or quality and requires that progress is communicated to others
Simple manufacturing related project	Projects that are small scale, low risk, managed by one person, carried out under guidance, related to manufacturing processes and products

EVIDENCE GUIDE

The Evidence Guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the Unit Descriptor, Performance Criteria, Range Statement and the Assessment Guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to develop and manage a plan for a simple manufacturing related project. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, i.e. the candidate is not in productive work, an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with developing and manage a plan for a simple manufacturing related project or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- using computing skills
- using interpersonal communication skills
- negotiating
- report writing
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures and other applicable reference documents
- planning and sequencing operations
- checking and clarifying task-related information

Required knowledge

Look for evidence that confirms knowledge of:

- understanding of applicable regulations and standards
- appropriate software
- Gantt charts
- critical path method (CPM)
- bar charts
- work breakdown structures
- program evaluation and review technique (PERT)
- basic quality assurance techniques
- knowledge of availability of resources
- safe work practices and procedures
- a basic knowledge of:
  - the project life cycle and the relationship between project phases
- planning and control procedures, resource management and risk management

MEM30021A Prepare a simple production schedule

Unit Descriptor

This unit covers preparing a simple production schedule in manufacturing.

Related units:

For skills associated with determining steps in manufacturing process see Unit 30.18 (Undertake basic process planning).

Band: None

Unit weight: None

Notes: There are no notes for this unit

Application of the Unit

This unit applies to all manufacturing and engineering workplace environments. It covers the scheduling of production that involves several interconnected manufacturing processes.

All work is carried out under supervision.

Unit Sector

No Sector Assigned

ELEMENT	PERFORMANCE CRITERIA
1. Identify production requirements	1.1 The production processes to be used are identified from instructions and specifications provided. 1.2 Customer requirements in terms of volume, delivery time and arrangements and quality are obtained from supervisor or other appropriate sources. 1.3 Customer and process requirements are analysed to determine production requirements.
2. Develop an activity plan production requirements	2.1 Production requirements are divided into activity elements. 2.2 A network diagram is constructed. 2.3 The critical path is determined. 2.4 The latest start/earliest finish and slack time are determined for activity elements to meet requirements. 2.5 Assistance and approval from supervisor is obtained.
3. Prepare the production schedule	3.1 A *production schedule* is prepared which lists: 3.1.1 customer requirements 3.1.2 time constraints 3.1.3 production requirements 3.1.4 machine availability and capability 3.1.5 inventory requirements 3.1.6 procurements 3.1.7 supply capacities 3.1.8 contingency analysis. 3.2 A simple bill of materials required is prepared to assist in control of materials. 3.3 Schedule is depicted using a Gantt chart or similar graphical display. 3.4 Schedule allows for future changes to improve performance. 3.5 Assistance and approval from supervisor is obtained.

4. File and issue the schedule	4.1 The schedule is reviewed and tested with appropriate personnel. 4.2 The schedule is referred to appropriate personnel for implementation. 4.3 All supporting documents are provided for implementation. 4.4 The schedule is filed/issued according to workplace procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Simple production schedule	Applies to the preparation of a schedule for the manufacture of a single component or single assembly function; or to operations for a single small production work unit or production cell The schedule will involve only a small number of constraints or variables

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to prepare a simple production schedule. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with preparing a simple production schedule, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Consistency of performance	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- prioritising
- communicating
- managing time
- organising
- documenting
- using project management tools
- analysing
- calculating
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
- planning and sequencing operations
- checking and clarifying task-related information

Required knowledge

Look for evidence that confirms knowledge of:

- basic knowledge of:
  - types of production
  - jobbing production
  - batch production
  - process production
  - Just in Time procedures
  - cellular manufacture
  - scheduling
  - interpreting customer requirements
  - machine capability and selection
  - Gant charts
  - contingency plans
  - introduction to project planning techniques
  - introduction to PERT/CPM diagrams
  - introduction to critical path networks
- hazards and control measures associated with preparing a simple production schedule, including housekeeping
- safe work practices and procedures

MEM30022A Undertake supervised procurement activities

Unit Descriptor

This unit covers planning and executing standard procurement activities to achieve required outcomes under the direction and guidance of an experienced procurement officer.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit

Application of the Unit

Work is carried out under supervision.

Unit Sector

No Sector Assigned

ELEMENT	PERFORMANCE CRITERIA
1. Plan procurement activities	1.1 The procurement requirements and outcomes are interpreted, understood and, where necessary, clarified. 1.2 Instructions for procedures to manage *standard contract* in accordance with legislation, policy and procedures are obtained. 1.3 Supplier is selected in accordance with workplace procedures.
2. Establish contractual arrangements	2.1 *Method of requesting and receiving offers* is in accordance with organisational policy and procedures. 2.2 *Evaluation* and selection of offer is made in consultation and in accordance with policy and procedures. 2.3 *Contractual arrangements* are approved and formalised in accordance with policy and procedures. 2.4 Notification of successful and unsuccessful suppliers occurs in accordance with organisational policy and procedures.
3. Follow up on contracts	3.1 Start-up or transition arrangements are confirmed and monitored in accordance with policy and procedures. 3.2 Communication strategies are implemented to ensure effective relationship with contractor/s is managed in accordance with policy and procedures. 3.3 Contractual obligations to contractors are met in accordance with policy and procedures. 3.4 Contractor performance is monitored to ensure contractual obligations are being met. 3.5 Approvals are obtained for any contract variations in accordance with organisational and contractual requirements. 3.6 Disputes/complaints procedures are followed and implemented in accordance with contractual requirements. 3.7 *Records* are maintained in accordance with organisational and legal requirements to provide an audit trail and for other organisational purposes.

4. Complete contractual arrangements	4.1 Goods or services received are verified as meeting outcomes required. 4.2 Contracts are finalised, cancelled or terminated in accordance with organisational and contractual requirements. 4.3 Records are maintained in accordance with organisational requirements.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

standard contract	Covers contracts where deliverables and conditions desired from the supplier have already been determined by the company and where there are pre-existing procedures for requesting and receiving offers
Method of requesting and receiving offers	May include request for quotation, request for offer, direct purchases using existing supply agreements such as standing offers, common use arrangements, oral quotations, written quotations, direct purchase from retail or wholesale outlets, electronic commerce
Evaluation	May include price comparison, timing, suitability
Contractual arrangements	May include verbal and written orders, purchase order, credit card, petty cash, memoranda of understanding/ memoranda of agreement, in-house service level agreements, contracts, common use arrangements/ standing offers

Records	May include purchase requests and orders, invoices and payment requests, statements and petty cash vouchers, offer and contract documents, evaluation process documentation, records of authorised officers' decisions, records of supplier performance

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to undertake supervised procurement activities. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Interdependent assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with undertaking supervised procurement activities, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- planning and evaluating
- using numeracy skills for developing and using a budget and contractual timeframes
- effectively consulting and negotiating with suppliers involving oral and written exchanges
- using writing skills for procurement specification in unambiguous terms
- reading contractual agreements which may include complexity of language and style
- undertaking ongoing communication with contractor which may involve explanation or clarification of written and oral information; note-taking at meetings; active listening; checking for understanding and recording
- using numeracy skills for scheduling activities, and planning activities and timeframes

Required knowledge

Look for evidence that confirms knowledge of:

- applicable Commonwealth/State/Territory government legislation
- procurement policies and practices
- method of requesting and receiving offers
- procurement approval procedures
- evaluation and selection of offer
- procedures to manage the contract in accordance with legislation, policy and procedures
- procedures for receipt and payment of goods or services

MEM30023A Prepare a simple cost estimate for a manufactured product

Unit Descriptor

This unit covers applying basic principles and concepts associated with the preparation of a cost estimate for a product.

Related units: None

Band: None

Unit None

Notes: There are no notes for this unit

Application of the Unit

This unit applies to all manufacturing and engineering workplace environments. Work is carried out under supervision.

Unit Sector

No Sector Assigned

ELEMENT	PERFORMANCE CRITERIA
1. Obtain tender/cost estimate requirements	1.1 *Tender/cost estimate brief* is obtained within established organisational framework, procedures and routines. 1.2 *Key requirements* are identified. 1.3 Assistance/approval from supervisor is obtained.
2. Prepare a simple cost estimate	2.1 Relevant costing data is identified and interpreted from the tender/cost estimate documents. 2.2 Organisational production costs are obtained. 2.3 Cost estimates are prepared according to established organisational framework, procedures and routines. 2.4 Assistance/approval from supervisor is obtained.
3. Verify cost estimate	3.1 Actual cost information is sourced from a completed tender/cost estimate project. 3.2 Actual costs are compared with estimated cost to identify deviations. 3.3 A report is prepared for supervisors to explain *deviations* according to established organisational framework, procedures and routines. 3.4 Assistance/approval from supervisor is obtained.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Simple cost estimate	Based on known production and material costs Cost can be estimated using a limited number of variables Estimate relates to a discrete product with a limited number of operations for manufacture
Tender/cost estimate brief	May include project guidelines and instructions, internal or external requirements, information from tender/contract documents, drawing specifications
Key requirements	May include timing, budget, resources, output, special conditions
Deviations	Reported as fractions or percentages, does not include standard deviations, six sigma etc.

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to prepare a simple cost estimate for a manufactured product. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Context of assessment	This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, i.e. the candidate is not in productive work, an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with preparing a simple cost estimate for a manufactured product, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- undertaking numerical operations, geometry and calculations/formulae within the scope of this unit
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures and other applicable reference documents
- undertaking simple report writing
- planning and sequencing operations
- checking and clarifying task-related information

Required knowledge

Look for evidence that confirms knowledge of:

- overview of the impact on cost estimates of:
  - product manufacture
  - demand vs. capability
  - make-or-buy
  - market-demand-price-competition
  - cost control
  - product costs
  - materials
  - resource consumption (water, power etc.)
  - labour
  - standard time/usage
  - margins, profit/loss
  - using proforma estimate sheets
  - using estimates as targets
  - impact of value adding non value adding activities
- lead times associated with:
  - raw material availability
  - equipment, tool design and commissioning
  - prototypes and trial builds
  - estimating processes
  - use of contract documents - drawings, specifications
  - consideration of general conditions and any special conditions
  - application of resources costs - hourly rates (labour, plant, material, subcontractors)
  - contingency costs
  - allowance for contract variations
- hazards and control measures associated with preparing a simple cost estimate for a manufactured product, including allowing for housekeeping, safe work practices and procedures

MEM30024A Participate in quality assurance techniques

Unit Descriptor

This unit covers participating in quality improvement programs at a basic level.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit

Prerequisite Unit(s) MEM15001B Perform basic statistical quality control

Application of the Unit This unit applies to all fields of engineering. Skills are applied to working in teams and work is carried out under supervision.

Unit Sector Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Interpret and apply quality standards and procedures	1.1 *Quality standards and procedures* are interpreted and applied to individual and teamwork in accordance with standard operating procedures.
2. Monitor and report on quality	2.1 Quality of all received, in-work and finished materials and products is monitored as required in accordance with standard operating procedures. 2.2 Designated *process improvement tools* are used either individually or in a team to identify and solve design, development and production quality problems. 2.3 Designated *analytical tools* are used to evaluate principal causes of process variation in consultation with the team or other subject experts. 2.4 Further action to improve quality is recommended, where required, using standard operating procedures.
3. Assist in implementing approved improvement strategy or strategies	3.1 Key indicators and performance measures are established and agreed in consultation with the team or other subject experts. 3.2 Process, product output is measured against key indicators in consultation with the team or other subject experts. 3.3 Steps are taken to lock in improvements in accordance with standard operating procedures.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Quality standards and procedures	Includes quality programs such as TQC, six sigma etc., quality policy, quality manuals, ISO 9000 and associated quality standards
Process improvement tools	Includes process flow charts, cause and effect diagrams, brainstorming sessions, Pareto diagrams, check sheets, run chart, scatter diagrams etc.
Analytical tools	Can include statistical analysis, critical incident analysis, root cause analysis etc.

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	A person who demonstrates competency in this unit must be able to participate in quality assurance techniques - basic. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with participating in quality assurance techniques - basic, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- undertaking problem solving
- undertaking basic arithmetic calculations
- interpreting known data
- using standard texts and references
- undertaking simple report writing
- reading and interpreting engineering specifications

Required knowledge

Look for evidence that confirms knowledge of:

- the importance of quality
- the key principles of quality improvement programs
- the influence of variation
- use and application of Australian standards/ ISO 9000 etc.
- quality policy
- quality manuals
- quality procedures
- quality definitions
- purpose of quality audits
- simple sampling techniques and possible sources of sampling error and bias
- simple statistical tools
- problem solving techniques including:
  - process flow charts, interpretation and construction of simple case
  - cause and effect diagrams, fault trees etc.
  - root cause analysis
- Pareto diagrams

MEM30025A Analyse a simple electrical system circuit

Unit Descriptor

This unit covers analysing a simple circuit by identifying the function and operation of the circuit and circuit components contained within approved manufactured products.

Related units: None

Band: None

Unit weight: None

Notes: There are no notes for this unit

Prerequisite Unit(s)

MEM12024A Perform computations

Application of the Unit

This unit applies to all manufacturing environments. It covers analysis of existing circuits against specifications only and does not extend to determining modifications to circuits.

This unit does not cover the skills involved in direct measuring of values requiring connecting or disconnecting of circuits and components covered by licensing requirements. Where such values are required they are to be obtained through the assistance of appropriately licensed personnel or through undertaking the specified training for the appropriate licence.

Work is conducted in accordance with regulatory and legislative requirements in each State and Territory

Work is carried out under supervision.

Unit Sector

Engineering technician

ELEMENT	PERFORMANCE CRITERIA
1. Establish function and purpose of selected circuit	1.1 All relevant drawings, specifications, manuals and documentation are obtained and interpreted in accordance with workplace procedures. 1.2 Circuit and component installation is observed where required to establish function and purpose. 1.3 Safety procedures to be followed are determined in conjunction with supervisors and in accordance with legislative and regulatory requirements. 1.4 Appropriate personnel are consulted with to establish job requirements.
2. Extract a circuit diagram from existing drawings and documentation	2.1 Appropriate components and assemblies are identified. 2.2 Where required, components and/or materials are identified from supplier/manufacturer catalogues. 2.3 Circuit diagram is extracted. 2.4 Drawing conventions and symbols are used in the diagram in accordance with codes and workplace procedures.
3. Analyse the circuit for electrical characteristics	3.1 Functions of the circuit and components are compared against design characteristics and operational specifications.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	-
Collecting analysing and organising information	-
Planning and organising activities	-
Working with others and in teams	-
Using mathematical ideas and techniques	-
Solving problems	-
Using technology	-

RANGE STATEMENT

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Components and assemblies

Can include:

- resistors - fixed (composition and wire wound), variable (rheostats, potentiometers and trimmers), non-linear (thermistors)
- capacitors - fixed (ceramic, plastic and electrolytic), variable, magnetic, transformers (AF, RF and power), chokes, relays, contactors, rectifiers, smoothing filters, voltage regulators and feedback

EVIDENCE GUIDE

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements

A person who demonstrates competency in this unit must be able to analyse the functions and components of a simple electrical system circuit **.** Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, i.e. the candidate is not in productive work, an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with analysing a simple electrical system circuit or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- calculating
- reading and interpreting specifications and drawings
- drawing to scale
- analysing
- planning and sequencing operations
- checking and clarifying task-related information
- checking for conformance to specifications

Required knowledge

Look for evidence that confirms knowledge of:

- safe work practices and procedures
- hazard and control measures associated with analysing the function of a simple electrical system circuit
- dangers and safety precautions:
  - electrical hazards
  - earthing and insulation

The function of the following components:

- resistors:
  - fixed (composition and wire wound)
  - variable (rheostats, potentiometers and trimmers)
  - non-linear (thermistors)
- capacitors:
  - fixed (ceramic, plastic and electrolytic)
  - variable
  - magnetic
  - transformers (AF, RF and power)
  - chokes
  - relays
  - contactors
  - rectifiers
  - smoothing filters
  - voltage regulators and feedback
- basic physics:
  - conductors
  - insulators
  - semiconductors
  - current flow
  - voltage
  - resistance
  - colour code
  - power rating
  - Ohm's Law
  - electrical units
  - power in electrical circuits
- protection methods:
  - fuses
  - circuit breaking
  - safety interlocks
  - earthing - personnel safety
- a.c. circuits:
  - series and parallel a.c. circuits
  - power in a.c. circuits
- power supplies:
  - transformers
  - rectifiers
  - smoothing filters
  - voltage regulators and feedback
  - function and operation of a simple low voltage d.c. power supply
  - function and operation of the transformer in a simple

low voltage d.c. power supply, including the significance of the turns ratio
    - function in a simple low voltage d.c. power supply of rectifiers including the significance of the diode characteristics, for both half and full wave types
    - operation of smoothing filters in a simple low voltage d.c. power supply
    - operation of simple zener diode type voltage regulators in a simple low voltage d.c. power supply
- feedback

PMASUP390A Use structured problem solving tools

Unit Descriptor

This competency covers the solving of process and other problems, beyond those associated directly with the process unit, using structured process improvement tools to identify improvements and/or solve problems. The competency is typically performed by an experienced technician, team leader or supervisor.

This unit does not cover the solving of problems undertaken as part of the technician's normal role which is covered in the relevant operation competency unit.

The plant technician would:

use a range of formal problem solving techniques

identify and clarify the nature of the problem

devise the best solution

evaluate the solution

develop an implementation plan to rectify the problem.

Generally the plant technician would be part of a team during the solving of complex or systemic problems and would be expected to perform all parts of this unit. At all times they would be liaising and cooperating with other members of the team.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Identify the problem.	1.1 Identify variances from normal operating parameters and product quality 1.2 Define the extent, cause and nature of the problem by observation and investigation 1.3 State and specify the problem clearly.
2. Determine fundamental cause of problem.	2.1 Identify possible causes based on experience and the use of problem solving tools/analytical techniques 2.2 Develop possible cause statements 2.3 Identify fundamental cause.
3. Determine corrective action.	3.1 Consider all possible options for resolution of the problem 3.2 Consider strengths and weaknesses of possible options 3.3 Determine corrective action to remove the problem and possible future causes 3.4 Develop implementation plans identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures 3.5 Develop recommendations for ongoing monitoring and testing.
4. Communicate recommendations.	4.1 Prepare report on recommendations 4.2 Present recommendations to appropriate personnel 4.3 Follow up recommendations if required.

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	2
Planning and organising activities	1
Working with others and in teams	2
Using mathematical ideas and techniques	1
Solving problems	2
Using technology	2

RANGE STATEMENT

Context

The competency unit applies to a wide range of processes and equipment. Each OPS competency unit includes a problem solving element where problems specific to that competency unit are to be resolved. This competency unit is where structured problem solving techniques are to be applied more broadly, or with greater depth/rigour than is implied by the problem solving element of the OPS units.

In large plants with multiple processes, it may apply to more than one process if those processes interact with each other. It applies to all operators across all functions.

This competency unit may include the use of analytical techniques in problem solving such as:

- brainstorming
- fishbone diagrams/cause and effect diagrams
- process logic/process requirements
- logic tree
- similarity/difference analysis
- Pareto analysis
- force field/SWOT analysis
- flow charts
- control charts, runcharts and graphs
- scattergrams.

Action plans to solve problems are prepared including:

- priority requirements
- measurable objectives
- resource requirements
- methods for reaching objectives
- timelines
- coordination and feedback requirements
- safety requirements
- risk assessment
- environmental requirements.

Typical problems include:

- non- routine process and quality problems
- equipment selection, availability and failure
- teamwork and work allocation problems
- safety and emergency situations and incidents.

All operations are performed in accordance with procedures.

HSE	All operations to which this unit applies are subject to stringent health, safety and environment requirements, which may be imposed through State or federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence.

EVIDENCE GUIDE

Assessment context and methods	Assessment for this unit of competency will be on an operating plant. The unit will be assessed in as holistic a manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency (eg, element 3). Simulation should be based on the actual plant and will include walk throughs of the relevant competency components. Simulations may also include the use of case studies/scenarios and role plays. This unit of competency requires a significant body of knowledge which will be assessed through questioning and the use of what if scenarios both on the plant (during demonstration of normal operations and walk throughs of abnormal operations) and off the plant.

Critical aspects

Evidence of satisfactory performance in this unit can be obtained by observation of performance and questioning to indicate understanding and knowledge of the elements of the competency and performance criteria.

Consistent performance should be demonstrated. In addition, look to see that:

- problems are recognised and clarified
- possible causes are identified based on experience and use of analytical techniques in solving the problem, including identifying variations and cause and effect, separating single problems from multiple problems, and the recognition of recurring problems
- fundamental cause of process or equipment faults is determined
- corrective/preventative implementation plans are developed to avoid recurrence of the problem
- implementation plan is presented to relevant personnel.

These aspects may be best assessed using a range of scenarios/case studies/what ifs as the stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations which may have been generated from the past incident history of the plant, incidents on similar plants around the world, hazard analysis activities and similar sources.

Resource implications

Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios/case studies/what ifs will be required as will a bank of questions which will be used to probe the reasoning behind the observable actions.

Other assessment advice

In all plants it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

In a major hazard facility, it may be appropriate to assess this unit concurrently with:

- PMAOHS200 Participate in workplace safety procedures.

Essential knowledge

Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognise non-standard situations.

Competence to include the ability to apply and explain, sufficient for the identification of the fundamental cause, determining the corrective action and provision of recommendations:

- relevant equipment and operational processes
- enterprise policies and procedures
- enterprise goals, targets and measures
- enterprise quality, OHS and environmental requirements
- principles of decision making strategies and techniques
- enterprise information systems and data collation
- industry codes and standards.

Prerequisites

This unit has no prerequisites.

PMLCOM300B Communicate with other people

Unit Descriptor

This unit of competency covers the ability to receive and pass on written and oral messages, provide relevant information in response to requests within timelines and demonstrate effective interpersonal skills.

This unit of competency has no prerequisites.

This unit of competency is applicable to personnel in all industry sectors covered by this Training Package.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section. This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Receive and act upon instructions	1.1 Listen attentively to instructions and respond appropriately 1.2 Clarify instructions to ensure a complete understanding of the task
2. Receive and convey messages	2.1 Receive verbal and written messages and respond appropriately 2.2 Record and convey information so that messages are understood
3. Demonstrate appropriate interpersonal skills	3.1 Follow enterprise procedures which reflect equal opportunity, anti-discrimination and non-harassment legislative requirements 3.2 Demonstrate effective interpersonal skills during everyday interactions
4. Provide appropriate information	4.1 Deal with inquiries in accordance with enterprise customer service requirements 4.2 Establish details of inquiry by questioning and summarising 4.3 Access and provide relevant information that meets own authorisation and confidentiality requirements 4.4 Redirect inquiries to relevant personnel for resolution if beyond own area of responsibility 4.5 Complete all workplace documents legibly and accurately in accordance with enterprise procedures.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Information sources and documentation could include

Enterprise procedures that deal with

- anti-discrimination, equal opportunity and anti-harassment legislative requirements
- legislative requirements (for example, Therapeutic Goods Act) and Codes of Practice (for example, good manufacturing practice (GMP) and Food Standards Code Australia, New Zealand)
- customer service, telephone protocols
- technical tasks
- information directories for staff access, (personnel, telephone), online databases, CD ROMS

Workplace documents, such as	• standard operating procedures (SOPs), laboratory methods • job (batch) cards and job descriptions • equipment manuals, service logs • induction manuals • supplier catalogues • (daily) production schedules • laboratory schedules • calibration and maintenance schedules • guide to relevant Acts and regulations (for example, Food Standards Code) • material safety data sheets (MSDSs) • non compliance reports • quality manuals • time sheets, logbooks • product specifications • text procedures • shift handover reports • pick lists • HACCP procedures • libraries
Information which uses	• common scientific and technical terminology • symbols, charts, signs, written text, tables, graphs and calculations.
Communication may include interactions with	• supervisors and managers • other laboratory and production personnel • members of the public, customers and clients.
Items of equipment may include	• telephone, two-way radio, PA system, fax, computer (email) • direct display readouts • on-line information systems.
Interpersonal communication includes	• active listening • including others • effective questioning • tolerating the view of others, attempting to reduce conflict and to negotiate suitable outcomes.

Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- communicates effectively with people at different organisational levels and from diverse cultural backgrounds
- uses available communication equipment (for example, telephone, on-line and hard copy directories, email, fax, intranet and Internet)
- listens attentively and clarifies messages and instructions to confirm their meaning
- locates relevant sources of information
- provides accurate information in an effective and timely manner
- understands colloquial, scientific and technical terminology appropriate to their expected level of knowledge and their workplace
- completes relevant workplace documents legibly and accurately
- responds to calls and messages within accepted enterprise timelines
- promotes cooperation through personal interactions.

Underpinning knowledge

Competency includes the ability to apply and explain:

- enterprise customer service standards and procedures
- standard operating procedures (SOPs) for routine technical tasks undertaken by candidate
- principles of effective interpersonal interactions
- equal opportunity, anti-discrimination, anti-harassment requirements
- communication protocols and the completion of workplace documentation
- relevant health, safety and environment requirements.

Knowledge is also required of the:

- products and services provided by the enterprise
- layout of the enterprise and laboratory
- role of laboratory services to the enterprise and customers
- organisational structure.

Specific industry

Additional knowledge requirements may apply for different industry sectors. For example:

Manufacturing, Food Processing and construction materials

- instructions to production staff when altering production mixes as a result of laboratory analysis.

Biomedical

- verification and signature requirements for the receipt and release of human specimens (such as blood transfusion products, blood alcohol samples and urine for drug testing).

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of messages and workplace documentation prepared by the candidate
- feedback from peers, customers and supervisors
- observation of the candidate's performance of a wide range of technical and administrative tasks
- questions to assess understanding of relevant workplace procedures.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLQUAL300B Contribute to the achievement of quality objectives.

Resource implications

Resources may include:

- enterprise procedures and documents
- equipment, such as telephone, fax and computer (email)

This competency in practice

Manufacturing

A technician in a petroleum refinery asked a laboratory assistant to 'go down to the cat and take a sample of the bottoms,' not realising that the assistant had only just started work with the company. The assistant looked at the technician in amazement, not knowing whether to pretend to understand, maintain self esteem, or clarify the instructions for the task. The assistant decided on the latter - to ask for clarification - and the technician repeated the instructions without using jargon. The laboratory assistant then proceeded to the catalytic cracker to take the sample as per the appropriate standard operating procedures.

Biomedical

The regular collection staff were not present when a flustered client came into the outpatient clinic with a domestic container full of straw coloured fluid. The receptionist knew what urine collection containers usually looked like and this was clearly not one. The receptionist called for help from the laboratory in the absence of collection staff. A technical officer was sent. The officer quickly realised that a recollection would be requested and because this would be inconvenient to the patient, tried to seek an explanation from them as to why the correct container was not used. The technical officer then explained as clearly and gently as possible the reasons for the recollection and why the substitute container could not be used. The officer confirmed that the patient was clear on the collection procedure and checked that the labels on the new container were correct.

Food

The front office staff of a small food processing company were responsible for many tasks and could not always ensure that they were in the office to receive customers and answer phone calls. This meant that urgent inquiries were not always immediately attended to and some customers became irate if they were unfortunate enough to have made several inquiries while the office staff were absent.

The company laboratory was adjacent to the reception area and laboratory technicians would attend to customers if they happened to see them waiting. The laboratory technicians realised that they could improve company-customer relations. They organised for a buzzer to be installed that connected the reception desk to the laboratory and the reception phone to redirect to the laboratory if it was not answered within a reasonable period of time. Since they could not always attend to the specific needs of the callers, they developed a standard format for recording messages that were passed back to the reception staff. The laboratory assistants were also trained to receive personal and phone inquires in an appropriate manner.

The company found that, even though the laboratory technicians could not always satisfy the immediate demands of customers, the customer satisfaction level was greater when customers were attended to personally than when they were connected to an answering machine or not received at all.

PMLDATA200A Record and present data

Unit Descriptor

This unit of competency covers the ability to record and store data, perform basic calculations of scientific quantities and present information in tables and graphs. The unit requires personnel to solve predictable problems using clear information or known solutions. Where alternatives exist, they are limited or apparent.

This unit of competency is based on, but is not equivalent to, the unit PMLDATA300A Process and record data in PML99.

This unit of competency has no prerequisites.

This unit of competency is applicable to production operators, field assistants and laboratory assistants in all industry sectors. Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting.

These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Record and check data	1.1 Enter data into laboratory information system or record sheets as directed 1.2 Check data to identify transcription errors or atypical entries 1.3 Rectify errors in data using enterprise procedures
2. Calculate simple scientific quantities	2.1 Calculate statistical values of given data, including mean, median, mode and standard deviation 2.2 Calculate scientific quantities using given formulae and data 2.3 Ensure calculated quantities are consistent with estimations and expectations 2.4 Report all calculated quantities with appropriate precision and units
3. Present data in tables, charts and graphs	3.1 Present data accurately in tables and charts using given formats and scales 3.2 Recognise and report obvious features and trends in data
4. Store and retrieve data	4.1 File and store data in accordance with enterprise procedures 4.2 Maintain enterprise confidentiality standards.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables (Range Statement) relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Data may be recorded on worksheets or entered into spreadsheets or databases linked to information management systems.

Data includes the results of

- observations
- tests and measurements
- surveys.

Data may be presented in the form of

- graphs
- tables
- control charts.

Data could also take the form of semi-quantitative observations and be expressed on a scale (for example, 1 to 4 or + to ++++).

Calculations may be performed with or without a calculator or computer software. For example, calculated scientific quantities could include	• percentages, fractions, decimals • conversions between SI units • areas (m 2) and volumes (mL, L, m 3) of regular shapes (for example, packaging, moulds) • average mass, mass %, density, specific gravity, moisture, relative and absolute humidity • ratios, such as, mass to mass, mass to volume and volume to volume percentages • industry specific ratios, such as g/cm 2 , kg/m 2 • concentration (for example, g/100mL, mg/L, mg/micro-L, dilution mL/L) • average count, colonies per swab surface, cell counts (live and dead/total) • process variables, such as, pressure, velocity, flow rates • % content of moisture, ash, fat, protein, alcohol, sulphur dioxide, trace metals, such as calcium or zinc • food properties, such as % concentration (dry), friability, bitterness, brix, free amino nitrogen, diastatic power, calorific content and yeast viability.
Obvious features and trends in data could include	• maximum, minimum values • spread of data • increasing/decreasing data, rate of change • outliers, data beyond control limits or normal range.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- codes, records and checks data accurately
- calculates scientific quantities relevant to their work and presents accurate results in the required format
- recognises obvious trends in data
- maintains the confidentiality of data in accordance with workplace and regulatory requirements.

Underpinning knowledge

Competency includes the ability to apply and explain:

- procedures for coding, entering, storing, retrieving and communicating data
- procedures for verifying data and rectifying mistakes
- procedures for maintaining and filing records, security of data
- relevant scientific and technical terminology, such as- precision, accuracy, units, 'out of control'.

Competency also includes the ability to perform calculations involving:

- decimals, ratios, proportions and percent
- calculation of perimeters, areas, volumes, angles
- calculation of scientific quantities, such as concentration
- unit conversion, multiples and submultiples
- use of significant figures, rounding off, estimation, approximation
- substitution of data in formulae
- preparation and interpretation of straightforward process control charts.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment. The following assessment methods are suggested:

- review of data work sheets, calculations, graphs and tables, prepared by the candidate
- review of records transcribed, maintained or stored by the candidate
- feedback from supervisors and peers
- observation of the candidate as they record data and perform calculations
- questions to assess understanding of relevant procedures and trends in data.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit may be assessed with technical units, such as:

- PMLTEST300B Perform basic tests
- PMLTEST308A Perform microscopic examination
- PMLTEST303B Prepare working solutions.

Resource implications

Resources may include:

- data sets and records
- computer and relevant software or laboratory information system
- relevant enterprise procedures.

This competency in practice

Construction materials

A laboratory assistant is given 20 soil samples and asked to test their moisture content by weighing each sample, placing them in an oven for 24 hours and then reweighing them. The assistant performs the tests in accordance with the standard method and then calculates the % water content by dividing the weight loss by the wet weight and multiplying by 100. He/she checks the results. After entering them into the Laboratory Information Management System (LIMS), they notice that they are consistently less than the previous results recorded for soils at the same site. The assistant reports the discrepancy to the supervisor who checks whether the oven was operated at the required temperature. The supervisor then discovers that the assistant has calculated the moisture content by dividing the weight loss by the wet weight instead of the dry weight. The assistant recalculates the moisture content for the 20 samples and notes that the results are now consistent with previous results.

Manufacturing

On Friday, a laboratory assistant performs the routine set of temperature, pressure and humidity measurements at 10 sites in a refinery. They enter the data on a pre-prepared data sheet that also contains the data recorded for the previous days of that week. The assistant checks the data for any significant variations to that recorded previously. They notice that for site #5, the temperature reading is 250? C which is 100? C below the expected value. The assistant repeats the measurement and gets the same result. After returning to the laboratory, the assistant enters the data into the Laboratory Information Management System (LIMS) and reports the odd result to their supervisor. The supervisor contacts the site manager and finds out that the pipeline at site #5 has been isolated as part of unscheduled maintenance in that part of the site.

PMLMAIN300B Maintain the laboratory fit for purpose

Unit Descriptor

This unit of competency covers the general cleaning of work surfaces, cleaning and storage of equipment and the monitoring of laboratory stocks under direct supervision.

This unit of competency has no prerequisites.

This unit of competency is applicable to personnel in all industry sectors covered by this Training Package.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section. This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Clean work preparation areas	1.1 Clean preparation areas using appropriate cleaning agents and enterprise procedures 1.2 Remove spillages, if they occur, using appropriate agents, personal protective equipment and enterprise procedures 1.3 Collect and segregate wastes in accordance with enterprise procedures, relevant codes and regulations
2. Clean and store equipment	2.1 Collect used equipment, inspect for faults and, where necessary, remove from service 2.2 Use appropriate agents, apparatus and techniques to clean equipment 2.3 Store clean equipment in the designated locations and manner
3. Monitor stocks of materials and equipment	3.1 Perform stock checks and maintain records of usage as directed 3.2 Store labelled stocks for safe and efficient retrieval 3.3 Inform appropriate personnel of impending stock shortages to maintain continuity of supply
4. Maintain a safe work environment	4.1 Use established safe work practices and personal protective equipment to ensure personal safety and that of other personnel 4.2 Report potential hazards and/or maintenance issues in own work area to designated personnel 4.3 Minimise the generation of wastes and environmental impacts 4.4 Dispose of wastes in accordance with enterprise procedures, relevant codes and regulations.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	2
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Personnel work in accordance with work instructions and standard operating procedures which incorporate all relevant aspects of OHS legislation and the codes, guidelines, regulations and Australian standards applying to environmental hazards and dangerous goods.

OHS legislation is state and territory based and includes general OHS Act and hazard specific regulations and Codes of Practice especially those relating to environmental hazards and dangerous goods.

Industry standards, codes and guidelines may include

- AS 2243 Safety in laboratories Parts 1-10
- AS 2982 Hand washing facilities
- AS 2243.8 Fume hoods
- AS 2252 Biological safety cabinets
- SAA HB9 Occupational personal protection, and other relevant standards for protective, clothing (for example, AS 2161, AS 2210, AS 1337 and AS 1338)
- AS 1678 Emergency procedures guide for hazardous materials
- AS 2500 Storage of goods
- AS 2503 Safety storage and handling of information cards
- AS 1940 Storage and handling of flammable and combustible liquids
- AS 3780 Storage and handling or corrosive liquids
- AS 4452 Storage and handling of toxic substances
- AS4332 Storage and handling of gases in cylinders
- AS 4187 Code of Practice for cleaning, disinfecting and sterilising reusable medical and surgical instruments and equipment and maintenance of associated environments in health care facilities
- standards for the segregation of wastes, such as AS 2243.3 and AS 2243.4
- AS/NEC/ISO 14000
- confined space legislation
- Australian Dangerous Goods Code
- Australian Code for Transport of Dangerous Goods
- guidelines for the operation of classes of laboratories
- Australian Quarantine Inspection Service guidelines for the importation of biological products
- National Code of Practice for the labelling of workplace substances (NOHSC: 2012)
- Office of the Gene Technology Regulator (OGTR) guidelines for working with genetically altered organisms.

This unit of competency forms a major part of the work of laboratory assistants. Equipment, material, procedures and facilities will vary according to the scope and classification of the laboratory.

Typical equipment could include

- animal cages
- autoclaves
- balances
- blenders, centrifuges and separating equipment
- cell counters, staining machines
- dishwashers, refrigerators, freezers, ovens, microwave ovens, incubators, water baths
- fume hoods, biohazard containers, biological safety cabinets
- gas cylinders
- glassware (burettes, pipettes); plastic ware; glass, plastic, quartz cuvettes
- hotplates, mantles, burners, muffle furnaces
- light and fluorescence microscopes
- microtomes, tissue processors
- thermometers, thermohygrographs, instrument chart recorders, hydrometers, pH meters and ion selective electrodes
- ultrasonic cleaners.

Typical materials could include

- consumable items, such as syringes, pipette tips, weigh boats
- disposable clothing and PPE
- distilled water, reagents, chemicals, disinfectants, detergents, agar media and plates
- equipment spares, such as fuses, bulbs, batteries
- oils/lubricants, fuels, industrial gases, cryogenics, such as dry ice and liquid nitrogen
- paper, stationery
- reference samples and standards.

All maintenance activities, such as cleaning, storing, prevention of contamination are carried out according to established enterprise procedures.

Cleaning requirements will vary with the scope of the laboratory and may include	• decontamination and/or disinfection • hygiene monitoring • operation of automatic cleaning apparatus, such as pipette washer, ultrasonic cleaners, dishwashers • sterilisation and disposal of wastes using boiling, high pressure air or steam, microwaves, chemicals, gas, filtration, ultraviolet radiation, autoclaving • use of specialised techniques, such as chromic acid baths, soaking in hypochlorite.
	Preparation areas include benches, sinks and fume cupboards. Agents for cleaning include decontaminants, organic solvents and cleaning solutions. Spillages include chemicals, radioactive and biologically active materials. Wastes include broken glass, sharps, micro-organisms, solvents, excess test samples, spent reagents, disposable PPE, and used containers, boxes, bags, palettes.
Stock records may include	• usage, loans, breakage • data sheets • calibration and maintenance history • handbooks, warranty documents, catalogues, manuals, MSDSs.
Communication could involve other people, such as	• laboratory, production, administration, cleaning staff • internal/external contractors • emergency personnel.
Maintenance issues could involve	• spillages, leakages, breakages, contamination • stock requirements, shortages • potential hazards, incidents and emergencies • hygiene issues • equipment malfunction • recycling and waste disposal.

Hazards may include	• electric shock • microbiological organisms and agents associated with soil, air, water, blood and blood products, human or animal tissue and fluids • aerosols from broken centrifuge tubes, pipetting • solar radiation, dust, noise • sources of ignition, flammable liquids and gases • sharps, broken glassware and hand tools • chemicals, such as acids, heavy metals, pesticides, hydrocarbons • cryogenics, such as dry ice and liquid nitrogen • fluids under pressure, such as steam, industrial gas cylinders • occupational overuse syndrome, slips, trips and falls • manual handling, working at heights and in confined spaces • crushing, entanglement, cuts associated with moving machinery or falling objects • pedestrian and vehicular traffic.
Established safe work practices may include	• ensuring access to service shut off points • recognising and observing hazard warnings and safety signs • labelling of samples, reagents, aliquoted samples and hazardous materials • use of personal protective equipment, such as hard hats, hearing protection, gloves, safety glasses, goggles, face guards, coveralls, gown, body suits, respirators and safety boots • applying containment procedures through the use of appropriate equipment, such as biohazard containers, laminar flow cabinets, Class I, II and III biohazard cabinets and Class PCII, PCIII, and PCIV physical containment facilities • use of material safety data sheets (MSDS) • handling and storage of all hazardous materials and equipment in accordance with labelling, materials safety data sheets and manufacturer's instructions • identifying and reporting operating problems or equipment malfunctions • following established manual handling procedures for tasks involving manual handling • reporting to appropriate personnel of abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/waste water, gases, smoke, vapour, fumes, odour and particulates

Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- safely cleans work preparation areas and equipment using appropriate cleaning agents, apparatus and techniques
- safely removes spillages and disposes of wastes
- minimises the exposure to hazards of self, others and the laboratory
- safely stores equipment and materials using enterprise procedures, relevant codes and guidelines
- monitors and reports stock levels and the condition of laboratory materials and equipment
- keeps accurate, up to date records
- reports potential hazards and maintenance issues using enterprise procedures.

Underpinning knowledge

Competency includes the ability to apply and explain:

- enterprise procedures for the cleaning of work preparation areas, materials and equipment
- storage requirements for specific materials and equipment
- enterprise procedures for minimisation and disposal of waste
- enterprise procedures for monitoring of laboratory stocks
- information contained in material safety data sheets (MSDSs) for materials handled regularly during the performance of maintenance tasks
- relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- observation of the candidate's techniques for cleaning and/or removal of spillages and waste disposal
- review of stock records completed by the candidate
- feedback from supervisors and peers
- questioning to assess underpinning knowledge of regulations and procedures where direct observation is difficult (such as dealing with hazards) and choice of materials and equipment.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLOHS302B Participate in laboratory/field workplace safety.

Resource implications

Resources may include:

- access to work preparation areas, stocks, materials and equipment
- cleaning, decontamination and/or disinfection agents and apparatus
- personal protection equipment
- stock order firms, labels and records/forms.

This competency in practice

Manufacturing

On receipt of a bulk container of cleaning or sanitising agent, a laboratory assistant always attached to the container a description of its method of use. The assistant also attached a list of the surfaces, apparatus, utensils and machines that could be safely treated with that chemical agent as outlined in the company's quality manual. This practice reduced the likelihood of misuse of the chemical, wastage, damage to equipment and inadequate cleaning and sanitation.

Biomedical and environmental

Laboratory assistants and technical officers routinely examine fluids for micro-organisms using a microscope. They examine fluids, such as urine, seawater, chlorinated pool water, water from catchment areas and bottled water. To maintain microscopes in working order, they thoroughly clean the stage, oculars and each objective after use and sometimes between samples. The 100X objective requires particular care since this is the oil immersion objective. The oil is slightly acidic and will slowly corrode the objective if its not cleaned thoroughly and regularly. After using the 100X objective they also take care not to drag the other objectives through the oil.

Food processing

A laboratory assistant regularly uses standard pH solutions to calibrate the laboratory's pH meters. The assistant is aware from the label that the shelf life of these solutions after opening is two months and records the opening and disposal dates on the container. The assistant is also aware that the shelf life of unopened buffer solutions is twelve months from the date of manufacture and monitors this by noting the production date on the bottle. Requests for stock replacement take into account the normal rate of use of these buffer solutions so that unopened bottles have not reached their expiry date before use.

PMLOHS301B Work safely with instruments that emit ionising radiation

Unit Descriptor

This unit of competency covers the ability to safely store, transport and operate instruments that emit ionising radiation following established safe work practices and in accordance with licensing requirements. Examples include use of process control instrumentation, such as fluid level gauges using radioactive sources, on-site non-destructive testing of weldments using X-ray and gamma ray sources and density testing of asphaltic concrete.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory or field operators working under supervision or direction of para-professionals, commonly in a construction materials testing or similar environment.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Store instruments safely and securely	1.1 Identify State or Territory requirements for storage facilities and associated document processes 1.2 Store instruments in accordance with State or Territory requirements and documented procedures 1.3 Secure instruments to prevent unauthorised access 1.4 Record instruments' movements and usage in accordance with documented procedures
2. Transport instruments safely and securely	2.1 Select vehicle suitable for the purpose 2.2 Attach regulation signage in accordance with State or Territory requirements to indicate that radioactive sources are being carried 2.3 Ensure that instruments are properly located and fixed in place 2.4 Ensure security of instruments when the vehicle is unattended
3. Use instruments safely and maintain security	3.1 Follow safe working practices to minimise own exposure to radiation 3.2 Use radiation dosimeter to monitor own exposure to radiation 3.3 Follow safe work practices to minimise exposure of others to radiation 3.4 Follow safe work practices to protect the instrument from damage 3.5 Maintain instrument security

4. Monitor radiation levels	4.1 Check operation and calibration status of radiation survey meter 4.2 Perform radiation survey following documented procedure 4.3 Report atypical conditions and/or problems to appropriate personnel
5. Maintain records	5.1 Record observations, data and results in accordance with enterprise procedures 5.2 Maintain confidentiality of enterprise information
6. Perform emergency procedures	6.1 Identify potential emergency situations 6.2 Respond to emergencies in accordance with documented procedures 6.3 Report emergency situations to appropriate personnel.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	2
Using technology	2

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements.

These procedures and requirements include or have been prepared from	• Australian and international standards, such as -
	  • AS2243 Safety in laboratories, Part 4 Ionising radiation and Part 5 Non-ionising radiation
	  • Codes of Practice prepared by
	  • Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)
	  • National Health and Medical Research Council (NHMRC)
	  • State and territory legislation dealing with health and environmental protection
	• standard operating procedures (SOPs)
	• equipment manuals
	• equipment start-up, operation and shutdown procedures
	• calibration and maintenance schedules
	• quality manuals
	• enterprise recording and reporting procedures
	• production and laboratory schedules
	• material, production and product specifications
	• licensing requirements.

Instruments and equipment used may include	• soil moisture/density gauges • borehole logging probes • fluid density/level detectors • battery chargers • radiation monitors/doimeters • motor vehicles • storage areas for nuclear sources • documentation, including user manuals, enterprise safety manuals • radiation warning signs.
Typical skills may include	• performing radiation surveys using radiation monitors • using radiation dosimeters • transporting instruments containing radioactive materials • storing instruments containing radioactive materials • using instruments containing radioactive materials • maintaining instruments containing radioactive materials.

Hazards and problems may include

- jamming of the source rod in the exposed position
- incidents during transportation
- fire
- theft of equipment containing radioactive sources
- on-site accidents
- keeping other personnel clear of instrument
- instrument breakdown.

Safe working practices include the critical elements for radiation safety

- time (reduce the exposure time)
- distance (maintain greatest distance possible at all times)
- shielding (interpose as much radiation shielding between yourself and the radiation source as possible).

Health, safety and environment

All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence.

All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- keeps other personnel clear of radiation sources
- demonstrates emergency procedures
- performs and documents radiation surveys
- places the instrument into storage
- safely transports the instrument in a motor vehicle
- safely handles and uses the instrument
- observes, interprets and reports atypical situations
- communicates problems to appropriate personnel promptly.

Underpinning knowledge

Competency includes the ability to apply and explain:

- health, safety and emergency procedures relevant to radioactive devices
- factors affecting radiation intensity
- principles of external radiation protection and practical methods of minimising radiation exposure
- methods of measuring and detecting ionising radiation
- nature of radiation, different types of radiation, their characteristics, sources and shielding methods
- physiological effects of ionising radiation
- State or Territory licensing requirements
- national Codes of Practice
- general guidelines for safe handling of radiation sources.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- analysis of work completed by the candidate over a period of time to ensure accuracy, consistency and timeliness
- observation of candidate using the instruments in a range of work contexts
- review of enterprise documentation completed by the candidate
- feedback from peers and supervisors
- use of suitable simulation and/or a range of case studies/scenarios.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLOHS302A Participate in laboratory/field workplace safety
- PMLTEST411A Perform mechanical tests
- PMLDATA400A Process and interpret data.

Resource implications

Resources may include:

- appropriate tools, instruments, equipment and materials
- enterprise procedures, test methods, equipment manuals.

This competency in practice

Construction materials

Soil moisture density gauges are used extensively for measuring the density of soils, cement treated roadbase, roller compacted concrete and asphalt. They provide a non-destructive means of monitoring compaction operations during construction, so that additional rolling can be provided before the material sets or is covered with another layer. National and State Codes of Practice regulate the use of equipment that emits ionising radiation. States and Territories also have licensing and registration requirements for people involved in owning, storing, transporting or using such equipment.

Soil moisture density gauges are used on construction sites, so they are transported to the test site in motor vehicles. They must be protected from damage and stored safely and securely while not in use. The operator must ensure that bystanders are kept clear to minimise radiation exposure. Owners of gauges are required to have documented procedures and ensure that operators are adequately trained. To ensure the safety and integrity of the gauge, radiation surveys are required at regular intervals. A handheld radiation meter is used, and the results recorded.

PMLOHS302A Participate in laboratory/field workplace safety

Unit Descriptor

This unit of competency covers the ability to apply enterprise OHS policies and procedures dealing with the identification and control of hazards, working safely at all times, emergency response and contributing to the maintenance of workplace safety. It is expected that personnel will be provided with clear directions, information, training and appropriate supervision. Responses are restricted to a first response' approach, including the notification of appropriate enterprise personnel.

This unit of competency is based on the Generic Competency A in the National Guidelines for Integrating Occupational Health and Safety into National Industry Competency Standards [NOHSC: 7025 (1998) 2nd Edition]. It is equivalent to PMLOHS300A Work safely in accordance with defined policies and procedures in PML99.

This unit of competency has no prerequisites.

This unit of competency is applicable to all workers in all industry sectors with laboratory/field operations, including induction/entry level, school-based and trainee technicians. Workers with supervisory responsibilities should be assessed against the units PMLOHS400A Maintain laboratory/field enterprise safety and/or PMLOHS601A Implement and monitor OHS and environmental management systems.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Identify, control and report OHS and environmental hazards	1.1 Routinely check immediate work area for hazards prior to commencing and during work 1.2 Address hazards within area of responsibility 1.3 Report hazards and incidents to designated personnel according to enterprise policies and procedures
2. Conduct work safely	2.1 Select, fit and use appropriate personal protective clothing and equipment 2.2 Follow enterprise procedures when carrying out work tasks 2.3 Keep all work areas clean and free from obstacles 2.4 Maintain enterprise standards of personal hygiene 2.5 Safely store, transport and dispose of hazardous materials and dangerous goods
3. Follow incident and emergency response procedures	3.1 Identify incident and emergency situations 3.2 Report and record incident and emergency situations according to enterprise procedures 3.3 Follow incident and emergency procedures as appropriate to the nature of emergency, using emergency equipment according to enterprise procedures

4. Contribute to OHS in the workplace	4.1 Raise OHS and environmental issues with designated personnel in accordance with enterprise procedures and legislated rights and obligations of employees 4.2 Participate in OHS activities within scope of responsibilities.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Personnel work in accordance with work instructions and standard operating procedures which incorporate all relevant aspects of OHS legislation and the codes, guidelines, regulations and Australian standards applying to environmental hazards and dangerous goods.

OHS legislation is state and territory based and includes general OHS Act and hazard specific regulations and Codes of Practice especially those relating to environmental hazards and dangerous goods.

Industry standards, codes and guidelines include

- AS 2243 Safety in laboratories
- AS 2982 Hand washing facilities
- AS 2243.8 Fume hoods
- AS 2252 Biological safety cabinets
- SAA HB9 Occupational personal protection, and other relevant standards for protective, clothing (for example, AS 2161, AS 2210, AS 1337 and AS 1338)
- AS 1678 Emergency procedures guide for hazardous materials
- AS 2500 Storage of goods
- AS 2503 Safety storage and handling of information cards
- AS 1940 Storage and handling of flammable and combustible liquids
- AS 3780 Storage and handling or corrosive liquids
- AS 4452 Storage and handling of toxic substances
- standards for the segregation of wastes, such as AS 2243.3 and AS 2243.4
- AS/NEC/ISO 14000
- Australian Dangerous Goods Code
- Australian Code for Transport of Dangerous Goods
- guidelines for the operation of classes of laboratories
- Australian Quarantine Inspection Service guidelines for the importation of biological products
- National Code of Practice for the labelling of workplace substances (NOHSC:2012)
- Office of the Gene Technology Regulator (OGTR) guidelines for working with genetically altered organisms.

Routine checks may include

- general housekeeping checks, such as obstructions which may cause trip hazards
- checking of safety equipment, such as eye wash stations
- checking reagents and equipment are safe to use
- checking availability of emergency equipment
- checking functionality of personal protective equipment.

A hazard is a source or situation with a potential for harm in terms of human injury or ill health, damage to property, the environment or a combination of these. Physical hazards may be considered to be sources of energy that, if not controlled may cause injury or damage.

Hazards may include

- electric shock
- microbiological organisms and agents associated with soil, air, water, blood and blood products, human or animal tissue and fluids
- solar radiation, dust, noise
- chemicals, such as acids, heavy metals, pesticides, hydrocarbons
- aerosols from broken centrifuge tubes, pipetting
- radiation, such as alpha, beta, gamma, X-ray, neutron
- sharps, broken glassware and hand tools
- flammable liquids
- cryogenics, such as dry ice and liquid nitrogen
- fluids under pressure, such as steam, hydrogen in gas liquid chromatography, acetylene in atomic absorption spectrometry
- sources of ignition
- high temperature ashing processes
- disturbance or interruption of services
- occupational overuse syndrome, slips, trips and falls
- manual handling, working at heights and in confined spaces
- crushing, entanglement, cuts associated with moving machinery or falling objects
- pedestrian and vehicular traffic
- vehicle and boat handling.

Addressing hazards may include

- hazard and incident reporting and investigation procedures
- elimination
- substitution, such as review of nature of substances or processes used
- isolation, such as-
  - use of appropriate equipment, such as biohazard containers, laminar flow cabinets, Class I, II and III biohazard cabinets
  - Class PCII, PCIII, and PCIV physical containment laboratories
- engineering
- administrative procedures, such as-
  - ensuring access to service shut off points
  - recognising and observing hazard warnings and safety signs
  - labelling of samples, reagents, aliquoted samples and hazardous materials
  - handling and storage of all hazardous materials and equipment in accordance with labelling, materials safety data sheets and manufacturer's instructions
  - identifying and reporting operating problems or equipment malfunctions
  - cleaning and decontaminating equipment and work areas regularly using recommended procedures
  - applying containment procedures
  - following established manual handling procedures for tasks involving manual handling
  - use of appropriate equipment and procedures to avoid personal contamination and contamination of others
  - following risk control measures to minimise environmental hazards
  - use of practices which minimise waste
  - reporting to appropriate personnel of abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/waste water, gases, smoke, vapour, fumes, odour and particulates
  - minimising exposure to radiation, such as lasers, electromagnetic and ultraviolet
  - use of material safety data sheets (MSDS)
  - use of signage, barriers and service isolation tags
  - use of personal protective equipment, such as hard hats, hearing protection, sunscreen lotion, gloves, safety glasses, goggles, face guards, coveralls, gown, body suits, respirators and safety boots.

Factors, such as inadequate work practices, lack of training or fatigue are not hazards but are conditions that may result in the loss of control of the hazard and cause injury or damage.

Designated personnel may include the laboratory manager, supervisor, OHS coordinator and OHS representative.

Enterprise policies and procedures may include instructions for	• all OHS specific procedures, such as for hazard and incident reporting, communication, consultation and issue resolution and risk management • controlling known hazards • minimising environmental threats • minimising and disposing of waste • responding to safety, emergency, fire and incidents • selecting/using personal protective clothing and equipment.
An incident is an event that has cause or has the potential for injury, ill-health or damage. Incidents and emergencies may include	• workplace injury and accidents - cutting, stabbing, puncturing, crushing, immersion in water, suffocation, hypothermia, burns, heat stress, animal bites, allergic reactions, assaults • biological, chemical or radioactive spills; fire; bomb threat; security threat; explosion. Emergency equipment may include first aid equipment, eye wash kit or shower and fire extinguisher.
Participating in OHS activities include	• seeking assistance to clarify obligations and procedures • clarifying work instructions that impact on safety and legal liability.
OHS and environmental issues which may need to be raised by employees with designated personnel may include	• identification of hazards not otherwise addressed • assessment of risk and decisions on measures to control risk • risk reduction measures • problems with implementation of controls • problems with recycling, by-product collection and waste disposal • investigation of injury and incidents • clarification of understanding of OHS policies and procedures.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- demonstrates the ability to recognise potential incidents and take appropriate corrective action
- can demonstrate workplace fire drill, incident, first aid and emergency evacuation procedures
- follows OHS and environmental policies and procedures for hazard identification and risk control, including the use, storage and maintenance of personal protective equipment
- follows enterprise instructions and procedures relating to storage, transport and disposal of dangerous goods
- follows instructions designed to ensure the correct labelling of samples and reagents
- uses equipment to protect health and safety
- communicates health and safety and environmental issues promptly with designated personnel.

Underpinning knowledge

Competency includes the ability to apply and explain:

- roles, rights and responsibilities of self and employer
- signage, symbols and signals relating to OHS
- hazards commonly found in own job and work area and standard risk controls
- location and purpose of personal protective equipment and emergency/hazard control equipment in the work area, including first aid facilities and personnel
- use, care and storage requirements for personal protective clothing and equipment used
- location of advice and information on OHS issues, including Material Safety Data Sheets (MSDSs)
- requirements and procedures for reporting OHS hazards and incidents, including injuries, illness and near misses
- the processes for raising a health and safety issue or concern
- safe work practices, including handling, storage and disposal of hazardous substances and requirements for labelling of hazardous substances
- work practices for use of handling equipment and any task-specific manual handling techniques as required by work role, according to enterprise procedures
- standard operating procedures for equipment used and key safety elements of the procedures.
- environmental impacts and effects of interaction with hazards in the work area
- enterprise procedures and instructions that govern personal work, incidents and emergencies
- reporting requirements for OHS issues and potentially hazardous situations.

Knowledge is also required of the:

- site layout, including emergency exits, location and use of safety alarms, emergency response system, procedures and personnel
- enterprise OHS and environmental policies and procedures.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment. The following assessment methods are suggested:

- observation of the candidate preparing for and undertaking a range of work tasks
- written and/or oral questioning to assess underpinning knowledge and likely reactions in hazardous/emergency situations
- feedback from peers and supervisors
- review of candidate's responses to case studies, scenarios and/or 'what ifs'.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with any other technical units in the context of the need to perform all work safely.

Resource implications

Resources may include:

- laboratory/field work environment, equipment and materials
- personal protective equipment
- enterprise procedures.

This competency in practice

Manufacturing

A laboratory assistant working in a laboratory was asked to produce a particular solvent-borne paint. Because of the hazardous nature of the task, the assistant referred to the material safety data sheets (MSDSs) which specified that a particular respirator and gloves be used. The assistant followed the requirements and safely prepared the batch of paint.

Food and beverage processing

One task of a laboratory assistant in a food processing company is the determination of total nitrogen in food samples by the Kjeldahl method. The assay involves digestion of the food with an aliquot of 30% hydrogen peroxide and several other reagents at more than 400?C. The assistant is familiar with the materials safety data sheets (MSDSs) for hydrogen peroxide and uses this chemical with appropriate caution and personal protective equipment. Small spills of hydrogen peroxide sometimes occur. The assistant knows to clean these up immediately by liberally diluting the spill with water, mopping it up with a cloth and washing the hydrogen peroxide from the cloth into a sink with copious amounts of water. This attention to cleanliness is essential to minimise the risk of injury because 30% hydrogen peroxide has the appearance of water. Unlike water, it is corrosive to skin and presents a serious fire or explosion hazard if it should come into contact with many of the chemicals used in the laboratory.

Biomedical

After performing and verifying cell counts of plated samples, a technical assistant proceeded to dispose of the waste. The wastes were placed in a biohazard bag. The bag was sealed with a sterilisation indicator sticker that was clearly visible, and placed in the autoclave. The assistant checked the colour of the indicator sticker to ensure that the waste was correctly processed before disposing of the bag in accordance with standard operating procedures.

PMLORG301A Plan and conduct laboratory/field work

Unit Descriptor

This unit of competency covers the ability to plan and complete tasks individually or in a team context. The tasks involve established routines and procedures using allocated resources with access to readily available guidelines and advice. Work plans may need to be modified with supervisor agreement to suit changing conditions and priorities.

This unit of competency is based on, and equivalent to, the units PMLORG300A Follow established work plan and PMLTEAM300A Work efficiently as part of a team in PML99.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory or technical assistants/officers and instrument operators working in all industry sectors covered by this Training Package.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Plan and organise daily work activities	1.1 Clarify allocated work activities and required resources if necessary 1.2 Prioritise work activities as directed 1.3 Break down work activities into small achievable components and efficient sequences 1.4 Review work plan in response to new information, urgent requests, changed situations or instructions from appropriate personnel 1.5 Update work plan and communicate changes to appropriate personnel
2. Complete allocated work	2.1 Locate relevant workplace procedures for required tasks 2.2 Undertake task(s) following prescribed and routine work related sequences 2.3 Seek assistance from relevant personnel when difficulties cannot be handled 2.4 Record completion of activities to confirm outputs in accordance with plan
3. Identify and resolve work problems	3.1 Recognise problems or opportunities for improved work performance 3.2 Apply agreed problem solving strategies to consider possible causes and solutions 3.3 Identify and access appropriate sources of help 3.4 Consider available alternatives and keep them open before agreeing on the most appropriate action.

4. Work in a team environment	4.1 Cooperate with team members to negotiate and achieve agreed outcomes, timelines and priorities 4.2 Recognise personal abilities and limitations when undertaking team tasks 4.3 Confirm personal role and responsibility within the team for particular outputs 4.4 Demonstrate sensitivity to the diversity of other team members' backgrounds and beliefs
5. Update knowledge and skills as required	5.1 Recognise own strengths and weaknesses and take advantage of skill development opportunities.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	2
Working with others and in teams	2
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

All work is performed ethically and professionally and includes	• following enterprise policy and procedures, regulations and legislation • behaving honestly and openly • respecting others and treating them with courtesy and impartiality • working diligently and responsibly • ensuring confidentiality of information, including client identification and test results • ensuring proprietary rights, intellectual property and copyright are protected • clarifying personal values and ethics and analysing how they impinge on actions in the workplace.
Workplace activities may include but are not limited to performing	• set up and pre-use checks of laboratory equipment • calibration status checks • sampling and testing following standard procedures • maintenance and cleaning tasks.
Workplace procedures may include	• standard operating procedures SOPs • job cards, batch cards, production schedules • job descriptions • methods, recipes, procedures and protocols.
Problem solving may include	• accessing relevant documentation • identifying inputs and outputs • sequencing a process • identifying and rectifying a problem step • obtaining timely help • implementing preventative strategies wherever possible.
Each team member assists the rest of the team to organise and manage its workload. The team may	• be ongoing with responsibility for particular services or functions, or project based • have a mixture of full and part-time employees and contractors, laboratory, construction and production personnel • be separated by distance and work at sites outside laboratory facilities.

The team operate within

- small, medium and large contexts
- internal and external environments
- enterprise guidelines covering access and equity principles and practices, licensing requirements, industrial awards, enterprise bargaining agreements, Codes of Practice
- agreed responsibility and accountability requirements
- appropriate goals, objectives
- given resource parameters.

The work tasks of individual team members will vary according to the size of enterprise, the scope of the laboratory and their level of responsibility.

The team may use a variety of strategies to maintain work flow

- communicating critical events on shift
- recognising shortages in reagents and problems with equipment
- communicating quality breakdowns
- recognising urgent and abnormal results to be processed
- communicating and behaving in a courteous manner
- being punctual.

Health, safety and environment

All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence.

All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

conducts work based on ethical values and principles

- clarifies tasks and recognises resource needs
- follows relevant procedures
- recognises potential disruptions or changed circumstances and modifies work plan in conjunction with relevant personnel
- compensates for a variety of working environments (indoor, outdoor and night)
- seeks assistance from relevant personnel when difficulties arise
- achieves quality outcomes within timelines
- works effectively with team members who may have diverse work styles, cultures and perspectives
- promotes cooperation and good relations in the team.

Underpinning knowledge

Competency includes the ability to apply and explain:

- enterprise procedures covering-
  - customer service
  - quality
  - OHS and environmental legislative requirements
  - technical work that the candidate routinely performs
- workplace agreements and employment conditions, such as-
  - workers compensation
  - industrial awards enterprise agreements
  - equal employment opportunity
  - anti discrimination and anti-harassment
- ethical background relevant to the nature of the work, such as-
  - use of animals for research
  - genetic modification, gene therapy, cloning, stem cells
  - in vitro fertilisation
  - forensic testing of populations
  - importance of commercial confidentiality
  - problem solving strategies
  - interpersonal communication and conflict resolution techniques
  - relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of a flowchart prepared by the candidate to show efficient sequencing of tasks
- observation of the candidate performing a range of technical tasks over sufficient time to demonstrate their handling of a variety of contingencies
- review of documents detailing completed tasks, such as completed job cards, a report or suggestions for quality improvement
- feedback from peers and team members
- feedback from supervisors
- written or oral questions to partly assess the candidate's ability to handle a range of contingencies and working in a team environment.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLOHS302A Participate in laboratory/field workplace safety
- PMLCOM300B Communicate with other people
- technical units related to the tasks undertaken.

Resource implications

Resources may include:

- enterprise procedures, equipment and materials for relevant technical tasks.

This competency in practice

Manufacturing

A plastic processing plant had to halt production because of a suspect raw material. The plant manager immediately requested the polymer testing laboratory to test and identify all batches of polypropylene additives and colouring agents. The laboratory team of three assistants and one technical officer allocated the workload amongst themselves to conduct the twelve different tests within a period of four hours to identify the 'out of specification' materials and report them to the production supervisor. All laboratory assistants had to reschedule their workplan, perform the required tests and assist each other to solve the production problem.

Biomedical

As part of a routine sequence, a technical officer is required to perform a series of tasks, including the calibration of instruments required for testing of blood samples. These tasks are to be completed within a specified timeframe to meet the output requirements of the enterprise. During the calibration of one of the instruments, the technician experiences difficulties that required expert technical assistance. The problem is referred to the appropriate person and is quickly resolved. Consequently, the officer is able to complete all necessary tasks within the prescribed timeframe and the required output is maintained.

Food processing

Each of the technical assistants working in the laboratory of a food processing company was dedicated to performing specific analyses. As a result, they often alternated between periods of inactivity and excessive workload (the latter case had the potential to compromise their health and safety and the accuracy of their food analyses). One of the contributing factors to the periods of intense activity was the need to quickly prepare standard solutions and reagents. The team discussed this problem and agreed that while it was not appropriate for each assistant to become competent to perform every analytical procedure, it was feasible for each person to be able to prepare solutions and reagents used by others. The team developed a central register in which impending shortages of these materials was noted. Each assistant referred to this register when no other work was due and prepared the materials on a 'first in, first out' basis unless a task was given a priority rating. The team found that this strategy more evenly distributed the workload over their shift, improved safety in the laboratory and reduced the risk of error.

PMLQUAL300B Contribute to the achievement of quality objectives

Unit Descriptor

`This unit of competency covers the development of a working knowledge of quality principles and their application in laboratory/field work.

This unit of competency has no prerequisites.

This unit of competency is applicable to production personnel and laboratory/field assistants working in all industry sectors covered by this Training Package.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Apply quality control procedures	1.1 Record data for quality control purposes 1.2 Recognise and report non-conformances in keeping with job role and quality procedures
2. Contribute to quality improvements	2.1 Review own work practices for opportunities to continuously improve performance 2.2 Identify and report opportunities for improvements in procedures, processes and equipment in work area
3. Maintain commitment to enterprise quality standards in own work	3.1 Maintain an objective of 'right first time' 3.2 Conduct work in accordance with sustainable energy work practices 3.3 Minimise waste and rework in accordance with enterprise guidelines 3.4 Demonstrate 'job ownership' for whole tasks through a commitment to finish and follow-up 3.5 Ensure that personal actions conform with the code of ethics relevant to the workplace
4. Assist in maintaining customer relationships	4.1 Demonstrate an understanding of the business goals, products and services of the enterprise when dealing with customers in relation to own function 4.2 Communicate appropriately with customers in keeping with knowledge and authority limitations and quality requirements
5. Update knowledge and skills as required	5.1 Recognise own strengths and limitations and take advantage of opportunities for skill development.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	2
Planning and organising activities	1
Working with others and in teams	2
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

All personnel that conduct sampling and testing have defined roles and responsibilities within the enterprise's quality system. Their roles and responsibilities are set out in quality manuals and workplace procedures.

Quality manuals and workplace procedures may be based on standards, codes and regulations, such as

- AS ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
- Food Standards Code 2002 Australia New Zealand (FSANZ) and amendments
- AQIS Export Control Orders
- NATA accreditation procedures
- AOAC standards
- ADAC regulations
- ISO 9000 series Quality management and quality assurance standards
- AS 2830 Good laboratory practice
- Therapeutic Goods Act
- Codes of Practice, such as good laboratory practice (GLP) and good manufacturing practice (GMP)
- OECD Principles of good laboratory practice
- customer specific requirements/standards.

Quality control procedures may include	• standards imposed by regulatory and licensing bodies • enterprise quality procedures • working to a customer brief and associated quality procedures • checklists to monitor job progress against agreed time, costs and quality standards • the use of hold points to evaluate conformance • the use of inspection and test plans to check compliance.
Sustainable energy principles and work practices may include	• examining work practices that use excessive electricity • switching off equipment when not in use • regularly cleaning filters • insulating rooms and buildings to reduce energy use • recycling and reusing materials wherever practicable • minimising process waste.
Reporting may involve	• verbal responses • data entry into laboratory information management system (LIMS) or enterprise databases • brief written reports using enterprise proformas.
Quality improvement opportunities that relate to the work of laboratory assistants could include	• improved methods for sampling, testing and recording data • improved hygiene and sanitation procedures • minimisation of waste and rework • improved laboratory layout and work flow.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- applies required quality control procedures during sampling, testing and the recording of data
- provides quality products and services to customers in keeping with their role
- resolves simple customer requirements
- minimises waste and rework
- contributes to improvements in productivity and quality through teamwork and commitment to personal work standards.

Underpinning knowledge

Competency includes the ability to apply and explain:

- role of internal and external audits
- quality requirements of the candidate's job role and function(s)
- continuous improvement and waste minimisation principles
- recording, reporting and document control requirements.
- relevant health, safety and environment requirements.

Knowledge is also required of the:

- products and services provided by the enterprise
- layout of the enterprise, divisions, and laboratory
- organisational structure of the enterprise
- lines of communication
- role of laboratory services to the enterprise and customers
- scheduling of tests and procedures to meet customer requirements
- enterprise procedures associated with the candidate's regular technical duties.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of quality control data collected by the candidate
- review of quality improvements suggested by the candidate
- feedback from supervisors and peers
- oral or written questions about quality concepts and enterprise procedures
- flow charts or diagrams prepared by the candidate to describe work flows and workplace layout (alternatively, the candidate could explain existing charts or diagrams).

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLCOM300B Communicate with other people
- technical units of competency dealing with sampling and testing.

Resource implications

Resources may include:

- enterprise quality manual and procedures
- standard operating procedures (SOPs).

This competency in practice

Manufacturing

Laboratory assistants must have a good working knowledge of quality control procedures and how they contribute to the achievement of enterprise quality objectives. An assistant was measuring the moisture content of coke by a standard method. The standard operating procedure (SOP) for this test stated that the limits for moisture should be between 2% and 5% by weight. The assistant obtained a result of 5.8%. The assistant had followed the standard operating procedure (SOP) correctly and performed the determination in triplicate and had confidence in the precision of the result. The assistant ' recognised and reported the non-conformance' to the laboratory supervisor. The production manager took corrective action and modified the drying process to reduce the moisture content and provide a product which met the customer's requirements.

Biomedical

A laboratory assistant working in the pathology department of a rural hospital was responsible for serum lithium estimations by flame photometry. When asked by the office staff when the lithium results would be ready, the assistant replied that the testing schedule of the laboratory meant that the test would not be done until the following week and asked why the office staff needed to know. The answer was that an outpatient clinic was being held, and the results were needed for a consultation. Although samples were often taken a week before the clinic was to be held, the assistant realised that results were not always ready for the clinic because of the testing schedule of the laboratory. The assistant reported the situation to the laboratory supervisor. The supervisor rescheduled lithium testing to match the clinic times, so that results would always be ready for the clinic consultation. This pleased the clinic staff, the patient did not waste a visit, the office staff no longer got irate phone calls and the quality of service was improved overall.

Food processing

A fruit processing company produced many tonnes of solid vegetable waste annually. This was dumped as landfill at considerable cost and the local council was concerned that the method of disposal was not sustainable. The laboratory assistants at the company were included in a quality improvement team to investigate the problem. The team concentrated on alternative production methods to minimise waste yields and additional production methods that would enable the waste to be profitably utilised. They identified four potential uses of the waste: a source of pectin, alcohol and sugar and conversion of raw fruit peel to glazed peel. A cost-benefit analysis was performed in consultation with supporting industries, including a local winery to assess the

merits of these value adding activities. The outcome was that the amount of waste produced by the company was significantly reduced with much of the waste channelled into marketable products with full cost recovery. After some initial doubts, the laboratory personnel realised that they were able to make useful contributions to the project. As a result, they became part of an ongoing investigation of waste minimisation and value adding practices.

PMLQUAL301B Apply critical control point requirements

Unit Descriptor

This unit of competency covers the ability to monitor critical, quality and regulatory control points related to a person's work responsibilities. This unit of competency also covers support for ongoing improvement of the enterprise HACCP (Hazard Analysis and Critical Control Points) plan.

This unit of competency has no prerequisites.

This unit of competency is applicable to production personnel and laboratory assistants.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Provide routine input to the HACCP plan	1.1 Obtain information about control points in the manufacturing process 1.2 Locate control points for own work area responsibilities 1.3 Perform relevant checks and inspections on materials and equipment to establish conformance to meet food safety requirements 1.4 Identify variations or common faults 1.5 Record inspection results and report to appropriate personnel
2. Contribute to the continuous improvement of the HACCP plan	2.1 Recognise non-conformance to the HACCP plan 2.2 Identify likely causes for non-conformance 2.3 Record and report non-conformances to appropriate personnel.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Control points refer to those key points in a work process that must be monitored and controlled. This includes critical, quality and regulatory control points.

Personnel who monitor control points require access to quality manuals, standards and workplace documentation, such as

- HACCP plans/documents/procedures
- product safety plan
- production/quality procedures/requirements
- State/national legislation
- standard operating procedures (SOPs)
- quality manuals
- food safety plans and/or pharmaceutical safety requirements
- good manufacturing practice (GMP).

Products/materials handled by laboratory assistants could include

- raw materials
- ingredients
- adjuncts/process aids
- consumables
- finished product
- chemicals
- food additives.

Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard.

In particular, assessors should look to see that the candidate:

- correctly monitors the critical, quality and regulatory control points for their own work area responsibilities
- prevents contamination from occurring or recurring
- records information using the enterprise reporting system
- collects and analyses data to identify variation from limits
- takes approved corrective action(s) as required
- supports continuous improvement through observation and communication.

Underpinning knowledge

Competency includes the ability to apply and explain:

- the HACCP plan, including-
- the critical control points, control limits
- consequences of non-conforming products being identified
- continuous improvement practices
- quality policy, procedures and responsibilities
- the methods used to monitor each critical, quality, regulatory control point
- equipment and instrument calibration requirement
- methods for systematically investigating and responding to problems
- control points and their potential impact on work systems
- relevant health, safety and environment requirements.

Knowledge is also required of the:

- products and services provided by the enterprise
- layout of the enterprise, divisions, and laboratory
- organisational structure of the enterprise
- lines of communication
- role of laboratory services to the enterprise and customers
- scheduling of tests and procedures to meet customer requirements
- enterprise procedures associated with the candidate's regular technical duties.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- observation of the candidate monitoring control points in the work area
- feedback from supervisors and peers
- review of corrective action suggestions by the candidate
- flow charts or diagrams prepared by the candidate, alternatively, the candidate could explain existing charts or diagrams
- candidate's response to simulated problems.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with

- PMLDATA200A Record and present data
- PMLQUAL300B Contribute to the achievement of quality objectives.

Resource implications

Resources may include:

- quality manuals and procedures
- HACCP plans and records
- recording equipment
- case studies to illustrate a range of HACCP issues.

This competency in practice

Food processing

The laboratory is responsible for the monitoring of the complex hazard analysis and critical control points in the food production process. The laboratory assistant gathers data at these points for the recording and checking of the process. All data outside the critical limits are immediately communicated to the laboratory manager and the production manager. Any approved corrective actions undertaken by the laboratory assistant are recorded in the laboratory log of system non conformance. Suggestions for improvement of the system are also recorded for discussion at the regular team meeting.

PMLQUAL401B Apply quality system and continuous improvement processes

Unit Descriptor

This unit of competency covers the exercise of good laboratory practice and effective participation in quality improvement teams. Personnel are required to ensure the quality and integrity of their own work and detect non-conformances and work with others to suggest improvements in productivity and quality.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory technicians working in all industry sectors who are most likely to contribute to quality improvements in areas or processes associated with their own job function and/or specialisation.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Satisfy quality system requirements in daily work	1.1 Access information on quality system requirements for own job function 1.2 Record and report quality control data in accordance with quality system 1.3 Follow quality control procedures to ensure products, or data, are of a defined quality as an aid to acceptance or rejection 1.4 Recognise and report non-conformances or problems 1.5 Conduct work in accordance with sustainable energy work practice 1.6 Conduct work in accordance with sustainable energy work practices 1.7 Promote sustainable energy principles and work practices to other workers
2. Analyse opportunities for corrective and/or optimisation action	2.1 Compare current work practices, procedures and process or equipment performance with requirements and/or historical data or records 2.2 Recognise variances that indicate abnormal or sub-optimal performance 2.3 Collect and/or evaluate batch and/or historical records to determine possible causes for sub-optimal performance 2.4 Use appropriate quality improvement techniques to rank the probabilities of possible causes
3. Recommend corrective and/or optimisation actions	3.1 Analyse cause(s) to predict likely impacts of change(s) and decide on the appropriate action(s) 3.2 Identify required change(s) to standards and procedures and training 3.3 Report recommendations to designated personnel

4. Participate in the implementation of recommended action(s)	4.1 Implement approved action(s) and monitor performance following change(s) to evaluate results 4.2 Implement change(s) to systems and procedures to eliminate possible causes 4.3 Document outcomes of actions and communicate them to relevant personnel
5. Participate in the development of continuous improvement strategies	5.1 Review all relevant features of work practice to identify possible contributing factors leading to sub-optimal performance 5.2 Identify options for removing or controlling the risk of sub-optimal performance 5.3 Assess the adequacy of current controls, quality methods and systems 5.4 Identify opportunities to continuously improve performance 5.5 Develop recommendations for continual improvements of work practices, methods, procedures and equipment effectiveness 5.6 Consult with appropriate personnel to refine recommendations before implementation of approved improvement strategies 5.7 Document outcomes of strategies and communicate them to relevant personnel.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	2
Collecting analysing and organising information	2
Planning and organising activities	2
Working with others and in teams	2
Using mathematical ideas and techniques	2
Solving problems	2
Using technology	2

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

This unit of competency is relevant to experienced technical officers who may work individually or as part of a team.

Quality manuals and procedures may be based on standards, such as	• ISO 9001, 9002 and 9003 series Quality management and assurance standards • ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories • NATA requirements of signatories • Good laboratory practice (GLP), good manufacturing practice (GMP), the British Standard BS 5750 and the OECD Principles of good laboratory practice • enterprise and customer product specifications • AS1199 Sampling procedures and tables for inspection by attributes • AS1399 Guide to AS1199.
Quality control procedures may include	• standards imposed by regulatory and licensing bodies • enterprise quality procedures • working to a customer brief or batch card and associated quality procedures • checklists to monitor job progress against agreed time, costs and quality standards • preparation of sampling plans • the use of hold points to evaluate conformance • the use of inspection and test plans to check compliance.
Sustainable energy principles and work practices may include	• examining work practices that use excessive electricity • switching off equipment when not in use • regularly cleaning filters • insulating rooms and buildings to reduce energy use • recycling and reusing materials wherever practicable • minimising process waste.
Communication may involve	• supervisors, managers and quality managers • administrative, laboratory and production personnel • internal/external contractors, customers and suppliers.
Reporting may involve	• verbal responses • data entry into laboratory or enterprise database • brief written reports using enterprise proformas.

Quality improvement opportunities that directly relate to the work of technical assistants and officers could include improved	• production processes • hygiene and sanitation procedures • reductions in waste and re-work • laboratory layout and work flow • safety procedures • communication with customers • methods for sampling, testing and recording data.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potential hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency	Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate: • applies all relevant procedures and regulatory requirements to ensure the quality and integrity of the products/services or data they provide • applies and promotes sustainable energy principles and work practices • detects non-conforming products or services in the work area • follows enterprise procedures for documenting and reporting information about quality • contributes effectively within a team to recognise and recommend improvements in productivity and quality • applies effective problem solving strategies • implements and monitors improved practices and procedures.

Underpinning knowledge

Competency includes the ability to apply and explain:

- specifications for laboratory products and services in the candidate's work area
- quality requirements associated with the individual's job function and/or work area
- scientific and technical knowledge underpinning the processes, procedures, equipment and instrumentation associated with the candidate's work tasks and duties
- workplace procedures associated with the candidate's regular technical duties
- methods for statistical analysis (means, median, mode, ranges, standard deviations) and statistical sampling procedures
- sustainable energy principles
- problem solving techniques, such as-
  - identifying inputs and outputs
  - sequencing a process
  - identifying and rectifying a problem step
  - root cause analysis
  - implementing preventative strategies
  - relevant health, safety and environment requirements.

The candidate should also demonstrate the ability to select and apply quality improvement tools and techniques, for example:

- run charts, control charts, histograms and scattergrams to present routine QC data
- PDCA (plan, do, check, act)
- Ishikawa fishbone diagrams, cause and effect diagrams
- logic tree
- similarity/difference analysis
- Pareto charts and analysis
- force field/SWOT analysis.

Knowledge is also required of the:

- layout of the enterprise, divisions and laboratory
- organisational structure of the enterprise
- lines of communication
- role of laboratory services to the enterprise and customers.

An appreciation of the link between the enterprise's quality systems and business goals is required as a basis for decision making and action.

Specific industry

Additional knowledge requirements may apply for different industry sectors. For example, in the biomedical sector:

- ethical requirements dealing with patient confidentiality
- regulations pertaining to trapping, tagging and handling of animals (Code 64)
- guidelines for pre-transfusion testing
- OGTR Guidelines for large scale, small scale and planned release of genetically-manipulated organisms (Office of the Gene Technology Regulator).

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of documentation completed by the candidate as part of regular quality control
- feedback from supervisors and/or customers regarding quality of products/services and/or data regularly provided by the candidate
- observation of the candidate's performance and participation in quality improvement teams over time in the workplace
- review of reports from quality improvement teams where the candidate's role is clearly outlined and verified
- verified reports of improvements suggested and implemented by the candidate individually.

Those aspects of competency dealing with improvement processes could be assessed by the use of suitable simulations and/or a pilot plant and/or a range of case studies and scenarios.

In all cases, practical assessment should be supported by questions to assess essential knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLSAMP400B, PMLTEST400 and PMLTEST500 series units.

Resource implications

Resources may include:

- enterprise quality manual and procedures
- quality control data/records
- customer complaints and rectifications
- candidate's supervisors and peers.

This competency in practice

Manufacturing

A quality improvement team at a chemical manufacturing plant was asked to propose a way of minimising the cost of disposing of chromium rich waste. Using appropriate techniques, the team narrowed the alternatives down to the option of burning the waste stream. An experienced technician agreed that this was feasible, but suggested that because the waste was petroleum high in chromium the team should consider the environmental implications. Subsequent research indicated that the permitted chromium levels in the incinerated air waste stream would not exceed 10 ppm, which was less than the air emission standards for the plant. The technician analysed samples of the air waste stream and determined that the chromium levels were below the regulatory standards. He/she then supported the team's suggestion.

Environmental

The manager of an environmental testing laboratory believed that the team of laboratory technicians relied too much on external direction. As a result, the manager requested that whenever technicians asked for assistance they should also be ready to suggest a solution to the problem if at all possible. This strategy was implemented in a non-threatening manner and was accepted by the team. In time, the manager noted that many of the suggestions for solving problems and improving work practices that came from the team were effective and reasonable. Their skill in making realistic recommendations came from their familiarity with many of the issues that needed to be considered. It became the norm that the laboratory technicians were given public credit for suggesting successful strategies that improved safety, productivity and staff morale.

Food processing industries

A company that produces apple juice uses 30-35% hydrogen peroxide (H 2O 2) to sterilise packaging. A mist of atomised H 2O 2 is sprayed into pre-formed cartons and later removed with a jet of hot sterile air. The laboratory manager was concerned that some batches of product were not sterile after standing at room temperature for several days. The cause of the failure in the sterilisation procedure was not apparent and a technical officer was asked to investigate this problem.

The technical officer examined each unit operation of juice manufacture and determined that the application of H 2O 2 was a critical sterilisation point where failure could occur. The concentration of H 2O 2 in the atomiser and in opened containers was unpredictable and several problems were found to contribute to this. H 2O 2 was left in the atomiser for up to several days between packaging runs. Containers of H 2O 2 were not always used sequentially, some being opened and then not used for a long time. The containers were stored at

room temperature after opening and some may have become contaminated with atmospheric particulates that catalyse the breakdown of H 2O 2.

The recommendations that emerged from the investigation were that:

- fresh H 2O 2 should be used at the beginning of each packaging run
- only one stock container of H 2O 2 should be open at any one time and stored chilled, with residuals discarded after 14 days
- care should be taken to exclude foreign material from the opened vessels of H 2O 2 and the atomiser.

In summary, the intolerance of the company to even low incidences of faulty product and the competency of the technical officer to investigate the processing stream resulted in increased product quality without significant cost.

PMLSAMP200A Collect routine site samples

Unit Descriptor

This unit of competency covers the ability to collect samples at field or production sites using specified equipment and standard or routine procedures.

This unit of competency has no prerequisites.

This unit of competency is applicable to production operators, field assistants and laboratory assistants in all industry sectors.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section. This competency in practice'.

Unit Sector

No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for sampling	1.1 Confirm the purpose, priority and scope of the sampling request 1.2 Liaise with relevant personnel to arrange site access and all necessary clearances/permits 1.3 Identify site hazards and review enterprise safety procedures 1.4 Confirm what samples are to be collected, from where, how and when 1.5 Assemble all specified sampling equipment, safety equipment, materials and containers 1.6 Conduct pre-use and cleanliness checks of all items to ensure they are fit for purpose 1.7 Check all items against given inventory and stow them to ensure safe transport
2. Conduct sampling	2.1 Locate sampling point(s) and services at the site 2.2 Remove security devices, such as locks and covers as required 2.3 Seek advice if the required samples cannot be collected or if procedures require modification 2.4 Select and use required sampling equipment in accordance with given procedures 2.5 Closely follow sampling procedures to obtain required samples and maintain their integrity 2.6 Record all labelling information in accordance with enterprise/legal traceability requirements 2.7 Record sample appearance, environmental conditions and any other factors that may impact on sample integrity 2.8 Replace security devices, such as locks and covers as required

3. Finalise sampling	3.1 Follow enterprise procedures for the cleaning/decontamination of equipment and vehicle as necessary 3.2 Check all equipment, materials and samples against inventory and stow for safe transport 3.3 Liaise with relevant personnel to restore normal production and/or services as necessary 3.4 Maintain integrity of samples during transportation 3.5 Deliver samples to the required collection point and complete all documentation to ensure traceability 3.6 On return, check and document serviceability of equipment before storage
4. Maintain a safe work environment	4.1 Use established work practices and personal protective equipment to ensure personal safety and that of others 4.2 Minimise environmental impacts of sampling and generation of waste 4.3 Dispose of all waste in accordance with enterprise procedures

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Samplers usually have access to information, such as	• enterprise sampling procedures for specific samples, sites and clients • maps, site plans • material safety data sheets (MSDSs) and safety procedures • enterprise recording and reporting procedures.
Site hazards may include	• solar radiation, dust and noise • wildlife, such as snakes, spiders, domestic animals • biohazards, such as micro-organisms and agents associated with soil, air, water • chemicals, such as acids and hydrocarbons • sharps, broken glassware • manual/handling of heavy sample bags and containers • crushing, entanglement, cuts associated with moving machinery and hand tools • falling objects, uneven surfaces, heights, slopes, wet surfaces, trenches, confined spaces • vehicle handling in rough terrain, boat handling in rough or flowing water
Safety procedures may include	• use of material safety data sheets (MSDSs) • use of personal protective equipment, such as hard hats, heavy protection, gloves, safety glasses, goggles, faceguards, coveralls, gown, body suits, respirators, safety boots • correct labelling of hazardous materials • handling and storing hazardous material and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations • regular cleaning and/or decontamination of equipment • machinery guards • signage, barriers, service isolation tags, traffic control, flashing lights • lockout and tagout procedures
Types of samples may include	• grab samples • disturbed or undisturbed materials • composite samples, such as time, flow proportioned, horizontal/vertical cross section • quality control samples, such as controls, background, duplicate, blanks.

Materials sampled may include	• gas or air samples • water, wastewater, stormwater, sewage, sludges • soils • construction materials • solid wastes, such as commercial, industrial, mining • raw materials, start-, middle-, end- of production run samples, final products for a wide range of manufactured items, including food and beverages • hazardous materials and/or dangerous goods
Sampling tools and equipment may include but are not limited to	• front-end loader, backhoe, excavator, drill rig • shovels, augers, bucket • sampling frames, sampling tubes, dip tubes, spears, flexible bladders, syringes • access valves • sample thief • weighted sample bottles, bottles, plastic/metal containers and disposable buckets • sterile containers, pipettes, inoculating loops, disposable spoons • pumps, stainless steel bailers
Maintenance of integrity of samples could include	• appropriate containers and lids (for example, glass, plastic, amber, opaque) • sealing of sample containers • purging of sample lines and bores • decontamination of sampling tools between collection of consecutive samples • use of appropriate preservatives (for example, sodium azide, toluene or antibiotics) • wrapping container in foil or wet newspaper • temperature control, which may involve prevention of direct contact between the sample and coolant • transfer of sterile sample into sterile container • monitoring of storage conditions • enterprise/legal traceability through appropriate sample labelling and records
Services may include	• water supply, gas, electricity • telecommunications • irrigation, stormwater, drainage systems • production plant.

Minimising environmental impacts may involve	• replacement of soils and vegetation • driving to minimise soil erosion and damage to fauna and vegetation • disposal of surplus, spent or purged materials • recycling of non-hazardous wastes • appropriate disposal of hazardous waste • cleaning of vehicles to prevent transfer of pests and contaminants.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency	Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate: • closely follows sampling procedures when collecting a variety of samples at a range of sites • collects samples safely with minimal environmental impact • maintains the integrity and security of samples • demonstrates enterprise and/or legal traceability requirements • liaises with others to access sites and conduct sampling efficiently • recognises limitations and seeks timely advice.

Underpinning knowledge

Competency includes the ability to apply and explain:

- key terminology and concepts, such as sample, contamination, traceability, integrity, chain of custody
- purpose for which the samples have been collected
- the function of key sampling equipment/materials and principles of operation
- hazards, risks and enterprise safety procedures associated with routine sampling undertaken
- enterprise procedures dealing with-
  - sampling
  - waste management, clean up and spillage
  - handling, transport and storage of dangerous goods
  - relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of sampling documentation completed by the candidate
- review of the quality of samples collected by the candidate
- observation of the candidate collecting a variety of samples
- feedback from supervisors and clients that sampling plans were followed.
- oral/written questioning about sampling and safety procedures

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLTEST200A Conduct routine site measurements.

Resource implications

Resources may include:

- variety of sample types
- sampling procedures
- a selection of sampling containers, equipment and documentation.

This competency in practice

Construction materials

A laboratory assistant takes daily tar samples from the company's retort which is used to heat tar to reduce its moisture content. The purpose of this sampling program and subsequent testing is to ensure that the water content of the hot tar is at a safe level before the tar is transferred to a road tanker and used for road construction. Serious accidents can occur during the transfer or use of tar as high water content can cause an explosion due to escape of steam. One day, the retort operator was running behind schedule and tried to convince the laboratory assistant that the water content of the tar was the same as yesterday and didn't need to be tested. The laboratory assistant was able to explain that a high water content could lead to a serious explosion and burns for the operator.

Environmental

A new field assistant was collecting samples of environmental run-off during wet weather. To successfully complete the activity, the assistant made sure that they included a sample thief, pipette, or similar to extract the sample; a container with a secure lid, and an indelible marker to write on the label. In addition, the assistant remembered to take sealable, waterproof plastic bags in which to put the containers once the samples were collected and a spare bag to protect the field notebook from rain damage.

Manufacturing

A production operator has been given the task of collecting samples of the recent batches of blended products, prior to drumming and customer delivery. In addition, the operator is required to sample the bulk raw materials stored on site, and the drummed blend ingredients, including some powdered pigments.

The operator knows that the lab needs the blend samples first and after putting on chemical gloves and safety glasses, accesses each sample point on each of the blend tanks. Because the products are under pressure in the tank manifold, it is important to guard against splashes. Some of the products are flammable hydrocarbons, so the operator ensures that static leads are connected from the tank to the sample vessel during pouring. To sample the drummed product, a sample thief is used and again, safety glasses and chemical gloves are important. The pigments present a dust hazard when being sampled, so the operator applies a protective mask over their nose and mouth, to prevent ingestion while they use a small purpose-built shovel to empty the contents into the sample container.

PMLSAMP201A Handle and transport samples or equipment

Unit Descriptor

This unit of competency covers the ability to pick up and transport samples or test/calibration equipment in accordance with enterprise procedures designed to ensure the integrity of subsequent test results. The person transporting the items is not necessarily responsible for sampling or testing. This unit does not cover the ability to handle and transport animals as might be defined under prevailing animal care and ethics legislation and practices.

This unit of competency is based on, and equivalent to, the unit PMLSAMP300A Handle and transport samples in PML99.

This unit of competency has no prerequisites.

This unit of competency is applicable to couriers and laboratory and field assistants in all industry sectors.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for pickup	1.1 Confirm pickup sequence and any licence/permit requirements with supervisor 1.2 Check that vehicle and communication devices are in working order 1.3 Check that required transport containers and materials are in the vehicle
2. Pick up and transport items	2.1 Confirm the number and nature of items to be picked up on arrival 2.2 Ensure items match paperwork 2.3 Apply enterprise requirements to the transport of samples and/or equipment 2.4 Alert laboratory personnel to any special needs that are identified on documents accompanying the items 2.5 Complete required documentation at pickup point 2.6 Stow items in the specified transport containers and under the required conditions 2.7 Maintain sample integrity at all times 2.8 Deliver items to reception point in accordance with enterprise procedures 2.9 Maintain confidentiality of information
3. Maintain transport equipment	3.1 Maintain vehicle according to enterprise requirement 3.2 Maintain state of transport containers to ensure they are fit for purpose 3.3 Requisition stocks of consumable materials as required 3.4 Replenish stocks of collecting equipment at collection centres as required

4. Maintain a safe work environment	4.1 Use established work practices and personal protective equipment to ensure personal safety and that of others 4.2 Clean up spills, if they occur, using enterprise procedures 4.3 Minimise the generation of waste 4.4 Dispose of all waste in accordance with enterprise procedures.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

This unit of competency describes the pickup and transport of samples and/or test/calibration equipment. The unit also describes skills and knowledge required of a courier who may or may not collect samples. Sample collection is covered in other units of competency.

The worker would have access to	• enterprise protocols regarding customer liaison and communication • vehicle log books • protocols for use of pagers, mobile telephones and two-way radios • material safety data sheets (MSDSs) • precautions for safe handling and handling of specific materials (for example, toxic, infective, radioactive, dangerous goods) • precautions for the transport of volatile and unstable fluids • incident/accident report forms • spillage and waste containment and disposal protocols and containment materials.
Maintenance of the integrity of samples or test/calibration equipment could involve	• use of appropriate sample containers (glass, plastic, opaque) • use of appropriate preservatives • wrapping container in foil to exclude light • temperature control, which may involve prevention of direct contact between the sample and coolant • use of appropriate equipment boxes (insulated, shockproof, waterproof) • restraint of containers to prevent movement • checking sample viability during transport while avoiding unnecessary handling
Hazards may include	• biohazards, such as micro-organisms and agents associated with soil, air, water, blood and blood products, human or animal tissue and fluids • chemicals, such as acids and hydrocarbons • sharps, broken glassware • manual handling of heavy sample bags and containers and equipment

Safety practices may include

- use of material safety data sheets (MSDSs)
- use personal protective equipment, such as gloves, safety glasses, goggles, coveralls
- use of biohazard containers
- safe road/off road driving practices
- correct labelling of hazardous materials
- handling and storing hazardous material and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations
- regular cleaning and/or decontaminating of equipment and vehicle

Where a laboratory routinely posts or couriers samples or equipment for testing, the International Air Transport Association (IATA) Dangerous Goods Regulations and Australia Post Regulations must be met.

Health, safety and environment

All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence.

All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- plans the picking up of items in conjunction with a supervisor
- prepares the vehicle for the required journey
- checks communication devices so contact is possible between the courier, reception centre, and routine pickup locations (as necessary)
- deals with individuals, customers, clients and reception staff effectively and courteously
- records details of item exchange in relevant sections of chain of custody forms (as required)
- maintains the integrity of collected samples or equipment during transport
- contains and cleans up spillage or breakages
- uses appropriate techniques and equipment to safely dispose of waste materials
- maintains confidentiality in all aspects of work
- reports problems, accidents or incidents in accordance with enterprise procedures.

Underpinning knowledge

Competency includes the ability to apply and explain:

- the relationship between effective communication with clients and customers and enterprise business
- the need for appropriate and timely transport
- control measures for minimising exposure to hazardous materials and equipment
- effect of changes in environmental conditions, vibration, shock on samples
- procedures for the containment and cleanup of spillages and breakages
- need for efficient waste containment and disposal practices
- need for maintenance of equipment used in the processes of handling and transporting samples.
- relevant health, safety and environment requirements.

Knowledge is also required of:

- enterprise procedures for responding to emergencies
- contact details for key personnel.

Specific industry

Additional knowledge requirements may apply for different industry sectors. For example, for biomedical samples:

- labile nature of biological and environmental samples
- possible infectivity of biological materials
- possible effects of exposure to radioactive materials.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment. The following assessment methods are suggested:

- review of the job sheets or journal of completed activities
- direct observation of work as a courier
- the quality of review of results traceable to the transport of samples or equipment by candidate
- oral or written questions to assess knowledge of the handling of unforseen circumstances
- simulated role plays between a courier and personnel at a reception desk or customer pickup centre.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLOHS302A Participate in laboratory/field workplace safety.

Resource implications

Resources may include:

- vehicle
- enterprise procedures for the handling and transport of samples or equipment
- communication devices
- sample containers
- containers for transporting samples and test/calibration equipment.

This competency in practice

Calibration

Calibration laboratories must take special care to ensure that they do not damage test equipment during the handling, testing or storage. Information relating to equipment requiring special handling, transport or storage conditions should be provided to those responsible for collecting and transporting the items.

A customer-orientated calibration laboratory offers a door to door calibration service to most of its clients. Once a week their driver arrives at a major facility and takes delivery of several precision measuring instruments. As always, the driver signs the acceptance note paying particular attention that all the items are recorded correctly, including listing all accessories and associated handbooks. But this time, two delicate items require unique transit cases to ensure they are stored and transported upright. Because the laboratory received prior notice, these cases were loaded into the van before setting off as well as a copy of the special transport and packaging instructions. The driver secures all the items in accordance with the accompanied written instructions to ensure their safe travel and minimise damage during transit. Upon return, the driver unloads the van and the instruments are acquitted by administration staff, inspected for damage and booked into the laboratory. The lab supervisor makes sure that their technicians are aware of the special handling requirements of the two delicate instruments.

Biotechnology

During transit, samples must be handled and maintained under conditions which will ensure that their potency and efficacy are maintained. A courier has been asked to transport vaccine samples from the airport to the enterprise for laboratory evaluation. The supervisor faxes the courier company detailed instructions regarding pickup and handling/storage conditions during transit. In this case, the samples are in insulated containers and the temperature is monitored and recorded continuously.

The courier collects the samples, puts them in the coolest part of the vehicle, ensuring that the package will not be subject to any sudden jolts, and transports them to the enterprise. After the samples arrive they are checked by the enterprise and appropriate documentation completed.

Biomedical

At 8 am the courier commences the day shift. The shift supervisor identifies the collection centres to be visited. The courier takes the mobile phone from the charger and checks their pager. In the vehicle, the courier logs in the odometer reading, makes a mental note of the fuel level, checks the cooler boxes and other equipment and carefully drives out. Today, there are pickups from four private hospitals and 12

collecting centres in a 200 sq km zone. As they approach the first hospital, there is a call from base with instructions to collect a tissue biopsy and bring it back immediately. He/she asks the base contact to tell haematology that their 10 am specimen arrival will be 40 minutes late because of this unforseen diversion. Eventually, they complete the round, having remembered to replenish specimen collecting stock at each centre visited.

Environmental

A technical assistant regularly handles and transports sensitive equipment over rough terrain in a 4WD vehicle. After reaching a field site, they are asked to transport expensive water monitoring equipment across an estuary in a small aluminium boat. The assistant notes that the equipment boxes are open to the weather and will need to be made waterproof. Because the water is choppy, the assistant adds extra packing material to cushion the most shock sensitive items. They choose to travel with the equipment rather than entrusting it to the local fisherman. Together, they carefully secure the items on the seats rather than placing them on the floor of the boat which is wet.

Environmental

A Waste Management Authority has sent one of their laboratory technicians to collect six containers that have been found by a member of the public on the verge of an industrial area service road. Given that the materials may be hazardous the technician assembles a full set of safety equipment. They also locate a laptop computer with Material Safety Data Sheet (MSDS) information, a list of phone contacts for agencies responsible for handling hazardous materials and suitable containers for storing/transporting potentially hazardous materials. Upon arrival at the site, the technician locates six containers of concentrated sulphuric acid which are clearly labelled. The technician consults the MSDS for information on appropriate handling, storage and transportation procedures and follows them closely.

PMLSAMP302A Receive and prepare samples for testing

Unit Descriptor

This unit of competency covers the ability to log samples, check sample documentation, schedule and prepare a range of samples for testing. All operations are performed in accordance with standard operating procedures (SOPs). This unit does not include testing, tissue processing or similar techniques.

This unit of competency is based on, and equivalent to, the unit PMLSAMP301A Receive and prepare a range of samples for pathology testing in PML99.

This unit of competency has no prerequisites.

This unit of competency is applicable to field and laboratory assistants in all industry sectors who receive and prepare samples as part/all of their jobs in a sample reception area.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Log samples	1.1 Record date (and time of arrival if required) of samples at enterprise 1.2 Check and match samples with request forms before they are accepted 1.3 Enter samples into the laboratory information management system (LIMS) 1.4 Apply required document tracking mechanisms 1.5 Process 'urgent' test requests according to enterprise requirements 1.6 Ensure security and traceability of all information, laboratory data and records
2. Address customer service issues	2.1 Report to referring client when samples and request forms do not comply with enterprise requirements 2.2 Refer to supervisor for instruction where ' return to source' is inappropriate or not possible 2.3 Maintain confidentiality of all client/enterprise data and information 2.4 Ensure that information provided to customers is accurate, relevant and authorised for release 2.5 Deal with customers politely and efficiently and in accordance with enterprise procedures
3. Prepare samples for testing	3.1 Perform physical separation of the samples 3.2 Prepare the required number of sub-samples 3.3 Perform chemical separation of the samples as required 3.4 Place samples in appropriate transport media, if appropriate 3.5 Monitor and control sample conditions before, during and after processing

4. Distribute samples	4.1 Group samples requiring similar testing requirements 4.2 Distribute samples to work stations maintaining sample intergrity 4.3 Distribute request forms for data entry or filing in accordance with enterprise procedures 4.4 Check that samples and relevant request forms have been received by laboratory personnel
5. Maintain a safe work area and environment	5.1 Apply safe work practices to ensure personal safety and that of other laboratory personnel 5.2 Use appropriate protective equipment to ensure personal safety when sampling, processing, transferring or disposing of samples 5.3 Report all accidents and spillages to supervisor 5.4 Clean up splashes and spillages immediately using appropriate techniques and precautions 5.5 Minimise the generation of wastes and environmental impacts 5.6 Ensure the safe disposal of hazardous materials and other laboratory wastes.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Information sources could include

- Australian and international standards, such as -
  - AS ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
  - Office of the Gene Technology Regulator (OGTR) guidelines for working with genetically altered organisms
  - enterprise operating procedures for preparing samples
  - safety manuals describing personal protective equipment requirements; control of hazardous wastes; containment and cleanup of spillages; disposal and recycling of wastes
  - procedure sheets indicating how samples and sub-samples are to be labelled, processed, distributed, flagged for urgent testing or for other non-routine requirements, including referral to external laboratories
  - procedure sheets indicating transport and storage requirements
  - procedure sheets for physical and chemical separation
  - enterprise quality manuals
- material safety data sheets (MSDSs).

Where a laboratory routinely posts or couriers samples for testing, the International Air Transport Association (IATA) Dangerous Goods Regulations and Australia Post Regulations must be met.

Samples received may include

- gas or air samples
- liquid samples, such as water, wastewater, stormwater, sludges and complex mixtures, sewage
- solid samples, such as soils, sediments, rocks/minerals, concrete, quarry or mining products
- solid wastes, such as hazardous, non-hazardous, domestic, commercial, industrial, mining, agricultural
- raw materials, start-, middle-, end- of production run samples, final products.

Hazards may include	• biohazards, such as micro-organisms and agents associated with soil, air, water, blood and blood products, human or animal tissue and fluids • dust and noise • chemicals, such as acids and hydrocarbons • aerosols • sharps, broken glassware • manual handling of heavy sample bags and containers • crushing, entanglement, cuts associated with moving machinery.
Safe work practices may include	• use of material safety data sheets (MSDSs) • use of personal protective equipment, such as hard hats, hearing protection, gloves, safety glasses, goggles, face guards, coveralls, gown, body suits, respirators, safety boots • use of biohazard containers and laminar flow cabinets • correct labelling of reagents and hazardous materials • handling, and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations • regular cleaning and/or decontamination of equipment and work areas.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- receives and logs samples in accordance with enterprise procedures
- checks samples for history and acceptable transport conditions
- applies standard precautions when dealing with hazardous materials
- applies knowledge of relationship(s) between specific sample preparation and associated tests
- promptly clarifies specific client requirements with appropriate personnel, as necessary
- performs sample preparation and sub-sampling in accordance with enterprise procedures
- labels and stores samples following enterprise procedures and maintains sample integrity, and traceability
- follows required sample disposal procedures
- maintains all equipment and workspace in accordance with enterprise procedures.

Underpinning knowledge

Competency includes the ability to apply and explain:

- enterprise procedures for the receipt, documentation, distribution and storage of samples
- potentially hazardous and unstable nature of samples
- requirement of specified sample types for specific tests
- importance of accurate and complete labelling of samples
- importance of maintaining effective customer relations
- sample storage and transport requirements.
- relevant health, safety and environment requirements.

Specific industry

Additional knowledge requirements may apply for different industry sectors. For example, in biomedical laboratories:

- potentially infective nature of all biological materials
- nature of unstable solutions, such as anticoagulated whole blood
- non-conformance of clotted samples for procedures, such as routine haematological tests.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of sample receipt and preparation records prepared by the candidate
- feedback from supervisors and peers
- direct observation of sample receipt and preparation
- questioning to assess knowledge of procedures where direct observation is difficult (such as sample receipt and preparation in the field).

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLCOM300B Communicate with other people
- PMLOHS302B Participate in laboratory/field workplace safety.

Resource implications

Resources may include:

- a selection of sample containers, tubes, request forms, sample documentation
- simulated samples when an authentic sample is unavailable or inappropriate.

This competency in practice

Environmental

A laboratory assistant at a hazardous liquid waste recycling plant is required to log in all samples, match all samples with the in-house profile of the source of the waste, label them and activate the tracking procedure. He/she then prepares a sample for a series of standard tests which are determined by the profile of the waste material (acid or alkali, organic or heavy metal, etc). Given the hazardous nature of the waste, the laboratory assistant must use appropriate safety equipment at all times and ensure the safe disposal of all hazardous material. The assistant must work efficiently as these procedures are activated upon arrival of a road tanker and when the hazardous waste has been verified and judged acceptable for treatment at the plant by the laboratory supervisor. The laboratory assistant also liaises with the truck driver, or the referring client, should the samples (and/or subsequent tests) not comply with enterprise conditions for receiving the hazardous waste.

Construction materials and mineral assay

A laboratory assistant has received a consignment of disturbed soil samples from a client for classification testing. A test request and field logs have been sent by mail. Each sample is bagged and labelled, with the label showing the name of the client, project, date and sampling location, and a field description of the material. The laboratory policy is that samples weighing more than 20 kg must be bagged so that the individual bags do not exceed this limit and labelled as bag 1 of ..., bag 2 of ..., etc. The assistant checks to ensure all component bags of such samples are present. He/she is careful to handle the samples using safe manual handling techniques. The assistant arranges the samples in order of location and reconciles them with the test request and logs. Two samples have been shown on the request but have not been received. The assistant e-mails the technician who despatched them and subsequently is advised that they were overlooked during despatch and will be forwarded as soon as possible.

The assistant compares the samples with the field descriptions and finds that they match. Samples that are not designated for testing immediately are set aside in the laboratory store. The remainder are placed in trays for drying in the 50 DegreesC oven. The tray numbers are carefully written on the respective worksheets. When the samples have dried and cooled they are split out sufficiently for sieve analysis and plasticity testing, making allowance for the maximum particle size of each sample. The assistant is careful to avoid raising dust during the process.

Biomedical

A laboratory assistant has just started a shift in specimen reception and puts on a coat and gloves before touching any samples. There is a pile of samples and forms in the sample box. In some cases, the samples and forms are enclosed in a

plastic bag. In other cases, they are seemingly unconnected. The assistant notices that one of the samples has a bloodstained label. She/he quickly examines the samples, isolates the leaking sample in a lockable plastic bag and places the related request form in the bag's separate compartment. The assistant then disposes of her/his dirty gloves. The assistant now logs all samples into the computer, placing to one side a sample and request form that is inadequately labelled. She/he makes a note to call the referring doctor as soon as possible. The assistant places the haematology samples in the colour-coded tray and calls the laboratory for their pickup. She/he then calls the doctor of the patient whose sample is inadequately labelled. She/he records the missing date of birth on the request form, and then barcode/labels tubes for the samples' testing. Within 30 minutes, she/he has cleared the first rush of samples. She/he takes the time to carefully empty the bin of wastes.

PMLSAMP400B Obtain representative samples in accordance with sampling plan

Unit Descriptor

This unit of competency covers the ability to obtain a range of samples that are representative of the source material (raw ingredients, product in process, final product) and to prepare the samples for testing. All sampling activities are to be in accordance with a defined sampling plan. This unit does not cover the subsequent testing of the samples.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory technicians in all industry sectors covered by this Training Package.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for sampling	1.1 Confirm the sampling location(s), number and type of samples, and timing and frequency of sampling from enterprise or client's sampling plan 1.2 Liaise with relevant personnel to arrange site access and (if appropriate) all necessary clearances and/or permits 1.3 Select sampling equipment and conditions to achieve representative samples and preserve sample integrity during collection, storage and transit 1.4 Check that all procedures are in accordance with client or enterprise requirements, relevant standards and codes 1.5 Identify site and sampling hazards and review enterprise safety procedures 1.6 Assemble and check all sampling equipment, materials, containers and safety equipment 1.7 Arrange suitable transport to, from and around site as required
2. Conduct sampling and log samples	2.1 Locate sampling sites and (if required) services at the site 2.2 Conduct representative sampling in accordance with sampling plan and defined procedures 2.3 Record all information and label samples in accordance with traceability requirements 2.4 Record environment or production conditions and any atypical observations made during sampling that may impact on sample representativeness or integrity 2.5 Transport all samples back to base according to standard operating procedures (SOPs) and relevant codes

3. Prepare samples for testing	3.1 Prepare sub-samples, back-up sub-samples that are representative of the source 3.2 Label all sub-samples to ensure traceability and store in accordance with SOPs 3.3 Follow defined preparation and safety procedures to limit hazard or contamination to samples, self, work area and environment 3.4 Distribute sub-samples to defined work stations maintaining sample integrity and traceability requirements
4. Address client issues	4.1 Enter approved information into laboratory information management system (LIMS) 4.2 Report all relevant aspects of the sampling and preparation phases in accordance with enterprise procedures 4.3 Ensure that information provided to client is accurate, relevant and authorised for release 4.4 Maintain security and confidentiality of all client/enterprise data and information
5. Maintain a safe work environment	5.1 Clean all equipment, containers, work area and vehicles according to enterprise procedures 5.2 Check serviceability of all equipment before storage 5.3 Use defined safe work practices and personal protective equipment to ensure personal safety and that of other laboratory personnel 5.4 Minimise the generation of wastes and environment impacts 5.5 Ensure the safe collection of all hazardous wastes for appropriate disposal.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	2
Collecting analysing and organising information	2
Planning and organising activities	2
Working with others and in teams	2
Using mathematical ideas and techniques	2
Solving problems	2
Using technology	2

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

This unit of competency may cover laboratories or processing sites and may involve

- a range of sampling plans, samples and sampling procedures, which apply to the enterprise site, plant laboratory or field sites
- enterprise products/materials, hazardous materials
- a range of sampling points and/locations
- methods and procedures which may be written to meet enterprise, client and/or regulatory/certifying body requirements.

Samplers usually have access to information, such as

- enterprise and/or client sampling schemes and sampling plans
- industry methods, such as American Association of Cereal Chemists (AACC) Preparation of samples
- enterprise and/or client procedures
- material safety data sheets (MSDSs)

Relevant Australian Standards, such as

- AS 1678 Emergency procedures guide for hazardous materials
- AS 2500 Storage of goods
- AS 2503 Safety storage and handling of information cards
- AS 1940 Storage and handling of flammable and combustible liquids
- AS 3780 Storage and handling of corrosive liquids
- AS 4452 Storage and handling of toxic substances
- Australian Dangerous Goods Code
- Australian Code for Transport of Dangerous Goods
- National Code of Practice for the labelling of workplace substances (NOHSC:2012)
- site plans, maps and specifications
- enterprise recording and reporting procedures.

Materials sampled may include

- gas or air samples
- liquid samples, such as water, groundwater, wastewater, stormwater, sludges, sewage
- solid samples, such as soil, sediments, rocks, concrete, quarry and mining material
- solid wastes
- raw materials, start-, middle-, end-of production run samples, final products, materials used in production processes, such as flocculants
- plants
- animals
- microbiological samples.

Types of samples may include	• grab samples • composite samples • quality control samples • research or one-off samples • environmental or survey samples.
Sampling tools and equipment may include but are not limited to	• shovels, augers, chain saws • sampling frames, sampling tubes, dip tubes, spears, flexible bladders, syringes • front-end loader, backhoe, excavator, drill rig • sample bottles or containers, plastic containers and disposable buckets • access valves • sample thief • auto samplers • pumps, stainless steel bailers • traps and cages • sterile containers, pipettes, inoculating loops, disposable spoons.
Maintenance of integrity of samples could include	• use of compatible container, such as glass, plastic, amber, opaque bottles • use of appropriate preservatives, such as sodium azide, toluene or antibiotics • decontamination of sampling tools between collection of consecutive samples • wrapping container in foil • purging of sample lines and boxes • handling and transport to avoid disturbance or damage • temperature control which may involve insulation of sample without direct contact with the coolant • wrapping in wet newspaper, cloth, sand or sawdust • transfer of sterile sample into sterile container • monitoring of storage conditions.
Site and sampling hazards may include	• solar radiation, dust and noise • wildlife, such as snakes, spiders, domestic animals • biohazards, such as micro-organisms and agents associated with soil, air, water, blood and blood products, human or animal tissue and fluids • chemicals, such as acids and hydrocarbons • aerosols • sharps, broken glassware • manual handling of heavy sample bags and containers • crushing, entanglement, cuts associated with moving machinery and hand tools • vehicular and pedestrian traffic.

Safety procedures may include	• use of material safety data sheets (MSDSs) • use of personal protective equipment, such as hard hats, hearing protection, gloves, safety glasses, goggles, face guards, coveralls, gown, body suits, respirators, safety boots • use of biohazard containers and laminar flow cabinets • correct labelling of reagents and hazardous materials • handling, and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations • regular cleaning and/or decontaminating equipment and work areas • machinery guards • signage, barriers, service isolation tags, traffic control, flashing lights • lockout and tagout procedures.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potential hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- collects the specified quantity of sample to enable all processing and testing to occur and backup samples to be stored
- obtains a sample that is representative of the bulk material
- preserves the integrity of samples by closely adhering to procedures
- labels samples and subsamples to satisfy enterprise/legal traceability requirements
- identifies atypical materials and samples and takes appropriate action
- maintains sampling equipment in appropriate condition
- completes sampling records using enterprise procedures
- follows safety regulations and enterprise OHS procedures during sampling, transport and storage
- follows relevant legislative requirements for the disposal of waste and the preservation of the environment.

Underpinning knowledge

Competency includes the ability to apply and explain:

- the links between correct OHS procedures and personal and environmental safety particularly at high risk sites
- the basic principles of sampling, including-
  - representative samples
  - preservation of integrity of samples
- maintaining identification of samples relative to their source, enterprise and legal traceability
- cost effectiveness of sampling
- consistency of sampling procedures
- sampling principles, including random, systematic, stratified sampling
- characteristics of product/material to be sampled and likely contaminants
- links between quality control, quality assurance and quality management systems and sampling procedures
- enterprise procedures dealing with legislative requirements for the handling, labelling and transport of hazardous goods
- enterprise and/or legal traceability requirements
- relevant health, safety and environment requirements.

Specific industry

Additional knowledge requirements may apply for different industry sectors. For example, for biomedical and environmental services:

- specific legislation on biohazards
- guidelines for infection control in the health-care setting
- OGTR Guidelines for the handling of genetically manipulated cells
- documentation procedures for the chain of custody for samples to be used as evidence or for blood transfusion.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- inspection of samples collected by the candidate
- review of sampling documentation completed by the candidate
- feedback from peers, customers and supervisors that sampling plans were followed
- questioning to assess underpinning knowledge of representative sampling procedures
- observation of the candidate taking a range of samples.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLDATA400A Process and interpret data
- PMLOHS302A Participate in laboratory/field workplace safety
- any of the PMLTEST400 and PMLTEST500 series units relevant to the sampling.

Resource implications

Resources may include:

- variety of sample types
- sampling plans
- a selection of sampling containers and sampling equipment.

This competency in practice

Manufacturing

A metallurgical laboratory technician is very familiar with preparing representative samples for a range of final products in a steel-making plant. One day, he/she is asked to sample a 50 tonne small-particle coal delivery which is believed to have a higher than acceptable sulphur content. Having never prepared representative samples for such a large quantity of material, the technician consulted their supervisor and developed an appropriate sampling plan. The technician arranged for the operator of a small front end loader to take buckets of coal from five equally spaced points around the pile. The resulting material was then combined and mixed in one heap. The technician coned and quartered the heap enough times to obtain a representative sample of about 5kg. He/she arranged for the unwanted material to be returned to the stockpile. On return to the laboratory, the technician crushed the sample and repeatedly coned and quartered the material to obtain an analytical portion.

Environmental

A field technician trained in sampling natural water systems is asked to sample a bright yellow industrial wastewater discharge into a small creek. The relevant sampling plan specifies that the samples should be collected where the waste water is well mixed near the centre of the creek and at the mid-depth point. The technician also notes that the samples must be collected where turbulence is at a maximum so that the settling of solids is minimal. On arrival at the site, the technician locates where the wastewater is entering the creek. He/she moves downstream to where the waste water and creek water is well mixed and there is little apparent loss of the yellow suspended solids. The technician dons the required PPE and uses a convenient bridge to collect a set of six samples and duplicates over a half-hour period using the equipment and procedures specified in the sampling plan. Using a field notebook, the technician records all information specified in the laboratory's chain of custody requirements and safety plan for handling potentially hazardous industrial waste.

PMLSCIG300B Operate basic handblowing equipment

Unit Descriptor

This unit of competency covers the ability to operate handblowing equipment to perform basic glasswork. Personnel may be less experienced workers working under the guidance of an experienced scientific glassblower.

This unit of competency has no prerequisites.

This unit of competency is applicable to personnel working with experienced scientific glassblowers, generally in scientific educational institutions.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for handblowing operations	1.1 Identify job, appropriate procedure, hazards and safety requirements 1.2 Use personal protective equipment and safety procedures specified for the job and materials to be used 1.3 Record description of the job to be undertaken, compare with specification and report any variations 1.4 Select and prepare tools and equipment in accordance with job requirements 1.5 Identify glass stocks and components required for the job
2. Follow sequence of operations for glasswork procedure to be performed	2.1 Prepare glass stocks and components as required for job 2.2 Check and adjust equipment and tools for the job as applicable 2.3 Start up equipment using enterprise procedures 2.4 Carry out glasswork procedure using the appropriate standard method 2.5 Monitor process and rectify routine problems 2.6 Follow equipment shutdown procedures
3. Use annealing equipment	3.1 Prepare annealing equipment for the job 3.2 Start up, operate and shut down annealing equipment using enterprise procedures 3.3 Monitor, adjust and record annealing operation 3.4 Rectify routine problems
4. Maintain a safe work environment	4.1 Follow established work practices to ensure safety of self and other workers 4.2 Minimise the generation of wastes 4.3 Ensure the safe disposal of wastes 4.4 Clean, care for and maintain work area, equipment and tools 4.5 Report any hazards or incidents according to enterprise procedures

5. Maintain records	5.1 Record data as per enterprise requirements 5.2 Maintain equipment logs as per enterprise requirements 5.3 Maintain security and confidentiality of enterprise information.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	2

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

This unit of competency describes the work typically conducted by less experienced glassblowers.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements.

These procedures and requirements include or will have been prepared from	• industry Codes of Practice • OHS and environmental legislation and standards • material safety data sheets (MSDSs) • standard operating procedures (SOPs) • equipment manuals • equipment start-up, operation and shutdown procedures • calibration and maintenance schedules • quality manuals • enterprise recording and reporting procedures • production and laboratory schedules • material, production and product specifications.

This competency includes ability to use tools and equipment, such as

- bench burner, hand torch, micro torch and ribbon burners, gas supplies and gas economisers
- dydinium glasses, polariscope
- glass working lathes
- annealing ovens
- measuring and recording equipment
- hand tools, such as carbon paddles and mandrels, range of forceps, glass tubing gauges, angle setting jigs, calipers, glass support rollers, brass shapers, carbon rods, glass knife, stainless steel gauze, vernier calipers and other measuring tools, strain viewer
- mechanical glass cutters and saws
- mechanical glass grinding equipment
- communication equipment.

Typical skills may include

- working safely with glass
- setting up and maintaining tools and equipment
- using tools and equipment to perform basic glassblowing operations
- using appropriate glass blowing hand manipulation techniques
- cutting, heating, bending, shaping, sealing and related glass working techniques
- minimising strain by using appropriate techniques
- using coefficients of expansion appropriately
- maintaining safe working pressures
- storing glass appropriately
- making and grinding components, such as stopcocks.

Typical problems include

- temperature and strain problems
- devitrification
- non-uniform thickness of seals or joints
- equipment problems
- quality problems, such as poor optics, distortion, excessive breakage, non-uniform break pattern, incorrect cross bend, excessive bow, scratches and poor glass shape
- loss of utilities.

Hazards may include

- sharps, broken glassware
- heat sources, such as burners and ovens
- fluids under pressure (acetylene, oxygen)
- glass dust
- cuts associated with glass grinders and cutters
- manual handling of heavy sample bags and containers.

Safe work practices may include	• use of personal protective equipment, such as heat resistant gloves, safety glasses, goggles, face guards, coveralls, respirators, safety boots • correct labelling of reagents and hazardous materials • handling, and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations • regular cleaning and/or decontamination of equipment and work areas.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency	Competency must be demonstrated in the ability to perform consistently at the required standard, using basic bench/hand glasswork techniques and equipment to fabricate general glass apparatus. In particular the assessor should look to see that the candidate: • can start up, set up and shut down equipment in accordance with work instructions • selects appropriate grades of glass and prepares them for use • optimises equipment operating parameters • maintains temperature and stress parameters • uses equipment to prepare items that meet specification • reports atypical results and problems to appropriate personnel according to enterprise procedures • records and communicate work results • follows correct OHS and GLP practice.

Underpinning knowledge

Competency includes the ability to apply and explain:

- composition and nature of glass types
- function and correct use of apparatus
- basic chemical and physical concepts relating to properties and behaviour of glass
- safe startup and shutdown procedures
- critical material properties and appropriate glass working parameters
- pre-heating procedures
- basic theory of re-entry angles and stress points
- setup and annealing/conditioning process
- relationship of temperature and temporary and permanent stress
- pre-annealing, annealing and post-annealing processes
- potential quality problems
- relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

It is strongly recommended that assessment is conducted through observation over time. The time frame must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- inspection of glasswork and workplace documentation completed by the candidate
- analysis of work outputs over a period of time to ensure accurate and consistent work is obtained within required timelines
- feedback from peers and supervisors
- use of suitable simulation and/or a range of case studies/scenarios.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

Although there is some overlap in the knowledge and skills in this unit with *PMLSCIG301B Repair glass apparatus using general glassblowing equipment*, competence in this unit should be demonstrated before the unit *PMLSCIG301B* is assessed.

Resource implications

Resources may include:

- access to a scientific glassblowing facility, appropriate equipment, materials and procedures
- a bank of case studies is required where these form part of the assessment method.

This competency in practice

Education

A trainee glassblower has been requested by her/his supervisor to make 100 Pasteur pipettes for a university chemistry practical class the next day. The trainee selects the appropriate glass and type and cuts 50 lengths of glass (two pipettes per length). She/he then proceeds to pull points at the designated markings in the centre of the glass tube using the bench burner. At the conclusion of this operation, the pipettes are cut to the relevant length and then flared at the other end using a specially profiled carbon hand tool. The pipettes are then annealed to eliminate stress caused by the manufacture process. After inspection through a polariscope, the pipettes are delivered to the laboratory for use.

PMLSCIG301B Repair glass apparatus using simple glassblowing equipment

Unit Descriptor

This unit of competency covers the ability to perform basic repairs to glass apparatus using simple glassblowing equipment. It includes the ability to assess the economics of salvage and to follow a procedure of disassembly/assembly of the apparatus in accordance with specifications.

This unit of competency has no prerequisites.

This unit of competency is applicable to personnel generally working in scientific educational institutions. It covers work that will sometimes be performed by less experienced workers under the guidance of an experienced scientific glassblower.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for repair operations	1.1 Identify job, appropriate procedure, hazards and safety requirements and the apparatus required 1.2 Establish correct cleaning procedure for contaminated glassware before commencing repair operations 1.3 Use personal protective equipment and safety procedures as specified for job and materials to be used 1.4 Record job description, compare with blueprint, drawing, sketch, design or similar specification and report perceived difficulties 1.5 Prepare equipment for repair in accordance with job requirements 1.6 Identify, select and prepare glass stocks and components for job
2. Repair apparatus	2.1 Check and adjust equipment and tools for job requirements 2.2 Check and adjust equipment and tools for the job 2.3 Start up equipment using enterprise procedures 2.4 Follow supplied designs and enterprise procedures to perform the repairs required 2.5 Follow equipment shutdown procedures
3. Operate annealing equipment	3.1 Prepare annealing equipment for the job 3.2 Start up, operate and shut down annealing equipment using enterprise procedures 3.3 Monitor, adjust and record annealing operation 3.4 Rectify routine problems

4. Maintain a safe work environment	4.1 Follow established safe work practices to ensure safety of self and other workers 4.2 Minimise the generation of wastes 4.3 Ensure the safe disposal of wastes 4.4 Clean, care for and maintain work area, equipment and tools 4.5 Report hazards and incidents according to enterprise procedures
5. Maintain records	5.1 Record data as per enterprise requirements 5.2 Maintain equipment logs as per enterprise requirements 5.3 Maintain security and confidentiality of enterprise information.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	2

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

This unit of competency describes the work typically conducted by less experienced scientific glassblowers.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements.

These procedures and requirements include or have been prepared from	• industry Codes of Practice • OHS and environmental legislation and standards • material safety data sheets (MSDSs) • standard operating procedures (SOPs) • equipment manuals • equipment startup, operation and shutdown procedures • calibration and maintenance schedules • quality manuals • enterprise recording and reporting procedures • production and laboratory schedules • material, production and product specifications.
This competency includes the ability to use tools, materials and equipment, such as	• burners, gas supplies and gas economisers • glass working lathes • mechanical glass cutters and saws • mechanical glass grinding equipment • annealing ovens • measuring and recording equipment • hand tools, such as carbon paddles and mandrels, range of forceps, glass tubing gauges, angle setting jigs, calipers, glass support rollers, brass shapers, carbon rods, glass knife, stainless steel gauze, vernier calipers and other measuring tools, strain viewer • various glass types, including soda-lime, borosilicate, quartz, silica and special formula glasses • glass to metal seals • communication equipment.
Hazards may include	• sharps, broken glassware • heat sources, such as burners and ovens • fluids under pressure (acetylene, oxygen) • glass dust • cuts associated with glass grinders and cutters • manual handling of heavy sample bags and containers.

Safe work practices may include	• use of personal protective equipment, such as heat resistant gloves, safety glasses, goggles, face guards, coveralls, respirators, safety boots • correct labelling of reagents and hazardous materials • handling, and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations • regular cleaning and/or decontamination of equipment and work areas.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- demonstrates a knowledge and awareness of contamination cleaning techniques to be carried out before repair operations are undertaken
- demonstrates a knowledge of the use and function of the broken apparatus
- safely applies appropriate glassblowing techniques to repair apparatus
- follows blueprints, drawings, sketches and designs relevant to repair work
- selects appropriate grades of glass and prepare for use
- determines types of contaminants present on/in apparatus and use appropriate treatment process, with particular attention to risks associated with blowing used and possibly contaminated glass
- prepares apparatus for repair
- optimises and uses glassblowing equipment
- identifies atypical or out of normal repair problems
- reports problems to either supervisor or outside service technician according to enterprise procedures
- records and communicates work results
- follows correct OHS and GLP practice.

Underpinning knowledge

Competency includes the ability to apply and explain:

- relevant glassblowing techniques
- knowledge of the risks associated with blowing used and contaminated glass
- contamination cleaning techniques to be carried out before repair operations are undertaken
- repair materials and reason for their choice
- use of appropriate tools and equipment
- basic chemical and physical concepts related to behaviour of glass under heat and stress
- basic knowledge of how apparatus to be repaired is used
- critical material properties and appropriate glassworking parameters
- pre-repair apparatus preparation procedures
- annealing procedures
- methods of minimising potential quality problems
- relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

It is strongly recommended that assessment is conducted through observation over time. The time frame must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- inspection of glasswork and workplace documentation completed by the candidate
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.
- feedback from peers and supervisors
- use of suitable simulation and/or a range of case studies/scenarios

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLSCIG300B Operate basic handblowing equipment.

Resource implications

Resources may include:

- access to a scientific glassblowing facility, appropriate equipment, materials and procedures
- a bank of case studies where these form part of the assessment method.

This competency in practice

Education

A trainee glass blower has been asked by his/her supervisor to repair several pieces of used and broken laboratory glassware as part of a cost saving exercise. Firstly, he/she determines whether the glassware will be used for general tasks or for qualitative analysis and how urgently the job is required. He/she then clarifies whether any hazardous material has been used in the equipment and applies the correct cleaning procedures. After determining the nature of the glass and the appropriate glass working parameters, he/she repairs the equipment using safe apparatus. Finally the glass blower subjects the equipment to the appropriate annealing/conditioning process and checks the final outcome with his/her supervisor. Any contaminated or used glass waste is disposed of appropriately.

PMLTEST300B Perform basic tests

Unit Descriptor

This unit of competency covers the ability to perform tests using standard methods and with access to readily available advice. Personnel are required to demonstrate close attention to the accuracy and precision of measurements and the data obtained. In general, they do not calibrate equipment and make only limited adjustments to the controls. The unit of competency does not cover interpretation or analysis of results or troubleshooting equipment problems.

This unit competency has no prerequisites.

This unit of competency is applicable to laboratory/field assistants working in all industry sectors.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Interpret test requirements	1.1 Review test request to identify samples to be tested, test method and equipment involved 1.2 Identify hazards and enterprise controls associated with the sample, preparation methods, reagents and/or equipment
2. Prepare sample	2.1 Record sample description, compare with specification, record and report discrepancies 2.2 Prepare sample in accordance with appropriate standard methods
3. Check equipment before use	3.1 Set up test equipment in accordance with test method 3.2 Perform pre-use and safety checks in accordance with enterprise procedures and manufacturer's instructions 3.3 Identify faulty or unsafe equipment and report to appropriate personnel 3.4 Check calibration status of equipment and report any out of calibration items to appropriate personnel
4. Perform tests on samples	4.1 Identify, prepare and weigh or measure sample and standards to be tested 4.2 Conduct tests in accordance with enterprise procedures 4.3 Record data in accordance with enterprise procedures 4.4 Perform calculations on data as required 4.5 Identify and report 'out of specification' or atypical results promptly to appropriate personnel 4.6 Shut down equipment in accordance with operating procedures

5. Maintain a safe work environment	5.1 Use established safe work practices and personal protective equipment to ensure personal safety and that of other laboratory personnel 5.2 Minimise the generation of wastes and environmental impacts 5.3 Ensure safe disposal of laboratory and hazardous wastes 5.4 Clean, care for and store equipment and reagents as required.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

This unit of competency describes the work conducted by supervised laboratory assistants who perform a range of basic tests and measurements.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements.

These procedures include or have been prepared from	• Australian and international standards, such as -
	  • AS ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
	  • AS/NZS 2243.2 Chemical aspects
	  • AS 2243.6 Mechanical aspects
	  • AS 2243.10 Storage of chemicals
	  • AS 2830 Good laboratory practice
	  • Codes of Practice (such as GLP and GMP)
	• material safety data sheets (MSDSs) and safety procedures
	• standard operating procedures (SOPs)
	• equipment manuals
	• equipment startup, operation and shutdown procedures
	• calibration and maintenance schedules
	• quality manuals
	• enterprise recording and reporting procedures
	• production and laboratory schedules
	• material, production and product specifications.
	• Codes of Practice.

Preparation of samples can include	• sub-sampling or splitting using procedures, such as riffling, coning and quartering, manual and mechanical splitters • diluting samples • physical treatments, such as ashing, dissolving, filtration, sieving, centrifugation and comminution • moulding, casting or cutting specimens.

Typical tests carried out by laboratory/field assistants could include	• visual/optical tests of appearance, colour, texture, identity, turbidity, refractive index (alcohol content, Baume/Brix)
	• physical tests, such as-
	  • density, specific gravity, compacted density
	  • moisture content, water activity
	  • particle size, particle shape, size distribution
	• chemical tests, such as-
	  • gravimetric
	  • colorimetric
	  • electrical conductivity (EC), pH
	  • specific ions using dipsticks and kits
	  • nutrients (for example nitrates, orthophosphates) using basic kits
	  • ashes, including sulphated ashes
	• biological/environmental tests, such as-
	  • pH, oxygen reduction potential (ORP), dissolved oxygen (DO), electrical conductivity
	  • E coli using test kits
	  • surface hygiene/presence of microbes
	• packaging tests, such as-
	  • tearing resistance, bursting strength, impact resistance
	  • permeability and/or leakage
	• mechanical tests, such as-
	  • Emerson class
	  • concrete slump

Other measurements may include	• simple ground surveys • meteorological parameters, such as wind direction/strength, rainfall, max./min. temperature, humidity, solar radiation • simple background radiation survey • production/process parameters, such as temperature, flow, pressure • gas levels in a confined space.
Common measuring equipment may include	• dimension apparatus • dissolved oxygen (DO), electrical conductivity (EC) • analogue and digital meters, charts/recorders • basic chemical and biological test kits • dipsticks and site test kits (for example, HACK) • timing devices • temperature measuring devices, such as thermometers, thermocouples.

Hazards may include	• electric shock • biohazards, such as microbiological organisms and agents associated with soil, air, water, blood and blood products, human or animal tissue and fluids • solar radiation, dust, noise • chemicals, such as sulphuric acid, fluorides, hydrocarbons • aerosols • sharps, broken glassware and hand tools • flammable liquids • dry ice and liquid nitrogen • fluids under pressure • sources of ignition • occupational overuse syndrome, slips, trips and falls • manual handling, working at heights and in confined spaces • crushing, entanglement, cuts associated with moving machinery or falling objects.
Enterprise controls to address hazards may include	• use of material safety data sheets (MSDS) • use of signage, barriers and service isolation tags • use of personal protective equipment, such as hard hats, hearing protection, sunscreen lotion, gloves, safety glasses, goggles, face guards, coveralls, gown, body suits, respirators and safety boots • use of appropriate equipment, such as biohazard containers and cabinets, laminar flow cabinets • recognising and observing hazard warnings and safety signs • labelling of samples, reagents, aliquoted samples and hazardous materials • handling and storage of all hazardous materials and equipment in accordance with labelling, materials safety data sheets and manufacturer's instructions, enterprise procedures and regulations • cleaning and decontaminating equipment and work areas regularly using recommended procedures • following established manual handling procedures for tasks involving manual handling.
Minimising environmental impacts may involve	• recycling of non-hazardous waste, such as chemicals, batteries, plastic, metals, glass • appropriate disposal of hazardous waste • correct disposal of excess sample/test material • correct storage and handling of hazardous chemicals.

Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- interprets enterprise procedure or standard methods accurately
- uses safety information (for example, MSDSs) and performs procedures safely
- checks test equipment before use
- completes all tests within required timeline without sacrificing safety, accuracy or quality
- calculates, records and presents results accurately and legibly
- maintains security, integrity and traceability of all samples, data/results and documentation
- cleans and maintains equipment.

Underpinning knowledge

Competency includes the ability to apply and explain:

- purpose of test
- principles of the standard method
- pre-use equipment checks
- relevant standards/specifications and their interpretation
- sources of uncertainty in measurement and methods for control
- enterprise and/or legal traceability requirements
- interpretation and recording of test result, including simple calculations
- procedures for recognition/reporting of unexpected or unusual results
- relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of the quality of test data/results achieved by the candidate over time
- inspection of records and workplace documentation completed by the candidate
- feedback from peers and supervisors
- observation of the candidate performing a range of basic tests
- oral or written questioning to check underpinning knowledge of test procedures.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLDATA200A Record and present data.

Resource implications

Resources may include:

- standard laboratory equipped with appropriate equipment standards and materials
- enterprise procedures and standard methods, equipment manuals
- material safety data sheets (MSDSs).

This competency in practice

Manufacturing

Standard testing methods may be viewed as ' legal' requirements that must be followed to ensure that a product manufactured in a chemical plant meets the specification by which it is sold to the customer. Technical assistants perform tests in a quality control laboratory to ensure that material meets 'legal' requirements and the material is safe and effective in use. Peroxides may be present in ether as a result of light-catalysed air oxidation. Peroxides are toxic and can give rise to mixtures which are explosive when distilled. Technical assistants test ether to ensure that the level of peroxide is within acceptable limits. The test is done by shaking ether with a solution of potassium iodide. After standing for 30 minutes in the dark the yellow colour of the aqueous phase, due to the liberation of iodine, must not be more intense than a prepared standard solution. These tests ensure the quality and safety of the ether.

Food processing

A Snack Food Company produces a range of high quality, impulse purchase snack foods. Some of these products are moisture and/or oxygen sensitive and are therefore packaged in multi-layer flexible packaging to provide optimum shelf-life. The packaging must also be able to withstand the rigours of the production and distribution process. While the packaging is purchased to meet the shelf-life and distribution specifications, the quality assurance program requires the periodic evaluation of the packaging materials against these specifications. A laboratory assistant uses standard methods to test the tearing resistance, bursting strength, impact resistance and permeability and/or leakage of the snack food packaging. Tests are also conducted on aspects of the manufacturing process that can affect shelf-life. These tests involve the measuring of the heat-seam strength and the sealing performance of the closure process. The test results are recorded by the laboratory assistant to verify the conformance of the materials to the supplier specifications and of the process to the manufacturing specifications. The assistant reports any anomalies or non-conformances to the appropriate personnel.

PMLTEST303B Prepare working solutions

Unit Descriptor

This unit of competency covers the ability to prepare working solutions and to check that existing stocks are suitable for use. This unit assumes that calculations of quantities, choice of reagent grades and required dilutions will be specified by the supervisor.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory assistants working in all industry sectors.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Safely use laboratory chemicals, glassware and equipment	1.1 Apply appropriate safety precautions for use of laboratory equipment and hazardous chemical materials 1.2 Use appropriate laboratory glassware and measuring equipment 1.3 Clean and store glassware and equipment in accordance with enterprise procedures
2. Make up working solutions	2.1 Identify the relevant standard methods for solution preparation 2.2 Assemble specified laboratory equipment 2.3 Select and prepare materials and solvent of specified purity 2.4 Measure appropriate quantities of reagents for solution preparation and record data 2.5 Prepare labels and log solution details in laboratory register 2.6 Transfer solutions to appropriately labelled containers
3. Check existing stock of solutions	3.1 Monitor shelf-life of working solutions as per laboratory procedures 3.2 Replace out-of-date or reject solutions as per laboratory procedures 3.3 Conduct routine titrimetric analyses, if appropriate, to determine if solutions are fit for purpose.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

This unit of competency describes the work conducted by supervised laboratory assistants who prepare a range of working solutions for laboratory use. Test solutions include those required to perform laboratory tests. All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements.

These procedures include or have been prepared from

- Australian and international standards, such as -
  - AS 2162.1 General - volumetric glassware
  - AS 2163 Laboratory glassware - measuring cylinders
  - AS 2165 Laboratory glassware - burettes
  - industry methods, such as American Association of Cereal Chemists (AACC) Solution methods
  - Codes of Practice, such as GLP and GMP
- material safety data sheets (MSDSs)
- National Measurement Act
- standard operating procedures (SOPs)
- equipment manuals
- equipment startup, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

The nature of test solutions will depend on the enterprise and the range of testing carried out. Typical test solutions may include	• solutions required for diagnostic/analytical and limit tests in food and chemical laboratories, such as sulphates, chlorides, heavy metals • solutions, such as stains for standard diagnostic/analytical procedures in biomedical/environmental laboratories, such as cell staining, fixation of cells and tissues, suspension of cells, titrimetric indicators • solutions required for laboratory maintenance and disinfection, such as 70% ethanol, hypochlorite.
Laboratory equipment may include	• pH meters • balances • magnetic stirrers, waterbaths and hot plates • measuring cylinders, beakers, conical flasks, volumetric flasks, pipettes, burettes • filter papers and funnels • fume cupboards.
Hazards may include	• corrosive chemicals, such as acids and alkalis • sources of heat, such as burners • sharps, broken glassware • spillages.
Safety precautions may include	• use of material safety data sheets (MSDSs) • use of personal protective equipment, such as safety glasses, gloves and coveralls • correct labelling of reagents and hazardous materials • handling and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations • regular cleaning and/or decontamination of equipment and work areas.
Monitoring quality of solutions can include	• noting turbidity to exclude absorption of moisture • noting deposits to exclude microbial contamination or chemical degradation • noting crystals to exclude evaporation • conducting titrations to check concentration • noting colour changes indicating a pH shift with solutions containing indicators • checking expiry dates on solution containers.
	Concentration terms may include- % w/w, % w/v, % v/v, ppm (mg/L), molarity.

Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, the assessor should look to see that the candidate:

- uses appropriate materials, equipment and procedures to prepare solutions
- follows appropriate OHS (and hygiene, if appropriate) procedures
- uses all equipment safely, efficiently and in accordance with enterprise procedures
- uses enterprise procedures to calculate concentrations
- identifies solutions not fit for use
- uses titrations to determine the concentration of solutions
- labels, stores and disposes of solutions appropriately
- records and present data appropriately.

Underpinning knowledge

Competency includes the ability to apply and explain:

- relevant biological, chemical, food and laboratory terminology
- basic theory of acids, bases, salts, buffers and neutralisation
- enterprise procedures for preparing solutions
- calculations required to prepare specified amounts of solutions of specified concentration
- appropriate OHS procedure for preparing, handling and disposal of solutions
- use of MSDSs
- relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- inspection of solutions prepared, labelled and stored by the candidate
- review of solution records and workplace documentation completed by the candidate
- feedback from peers, and supervisors
- observation of the candidate preparing working solutions
- oral or written questioning.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLDATA200A Record and present data
- PMLOHS302A Participate in laboratory/field workplace safety.

Resource implications

Resources may include:

- standard laboratory equipped with appropriate equipment and reagents
- standard operating procedures and testing methods
- access to appropriate containers and storage facilities.

This competency in practice

Manufacturing

When starting materials used for the manufacture of common household materials are in transit from the supplier to the manufacturer, they may degrade if subjected to conditions, such as heat, moisture, light and oxygen. Even when the supplier ships quality materials to the manufacturing plant, the materials may be substandard when they arrive. Quality control tests are designed to test starting materials to ensure they are within specification. For example, aspirin forms salicylic acid when stored under adverse conditions. Laboratory assistants prepare and monitor the quality of solutions, such as ferric chloride solution, which gives an intense violet colour when added to salicylic acid but gives no colour with aspirin. Absence of the violet colouration indicates that breakdown of the aspirin hasn't occurred.

Biomedical

A laboratory assistant made up 1 litre of buffer solution using buffer tablets and a 1 litre volumetric flask as specified in the method. To ensure the solution was suitable for use, the assistant measured the pH and found it was within acceptable range. The assistant then appropriately labelled a storage vessel and stored the buffer according to requirements. By following enterprise procedures the shelf life of the buffer was maximised.

Environmental

An environmental laboratory is contracted to determine the acidity of water samples taken from local lakes and streams. A laboratory assistant is required to make up small batches of 0.01M sodium hydroxide and to determine its concentration by titrating it against a standard solution of potassium acid phthalate using phenolphthalein indicator. This procedure is carried out monthly to ensure that the concentration of the sodium hydroxide solution is accurately known. Alternatively, the laboratory assistant may be required to prepare and standardise a fresh batch of sodium hydroxide on a monthly basis. In this case, he/she must understand the underpinning knowledge of basic acid/base theory, potential problems of interferences (such as slow absorption of carbon dioxide by sodium hydroxide solution) so as to ensure that the concentrations of workup solutions are accurately known. He/she must also be skilled in calculating and performing dilution when required to prepare such low concentrations (0.01M) of working solutions.

PMLTEST304B Prepare culture media

Unit Descriptor

This unit of competency covers the ability to prepare culture media free of contamination required and facilitate optimal growth of organisms and cells. It also includes the ability to organise the materials, equipment and work environment and follow standard methods.

This unit of competency has the following prerequisite(s):

PMLTEST305B Perform aseptic techniques.

This unit of competency is applicable to laboratory assistants in the biomedical, biological, environmental, food, pharmaceuticals industry sectors.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Prepare culture media	1.1 Prepare mixture of media and solvent to ensure solution and even settling of heat soluble materials 1.2 Label media to allow tracking in subsequent processes 1.3 Dispense media into vessels for sterilisation, leaving room for expansion during heating and cooling
2. Sterilise media	2.1 Load the steriliser in keeping with maximum permitted loads and appropriate positioning of materials 2.2 Ensure a sterilisation indicator is correctly placed with the load to monitor sterilisation process 2.3 Operate sterilisation cycle in accordance with manufacturer's requirements to achieve sterilisation at the required settings 2.4 Cool media to the temperature specified in the media formulation procedures
3. Pour, label and store media	3.1 Add labile constituents where necessary, under conditions that will not lead to their denaturation or contamination of media 3.2 Ensure even mixing of additives and media before dispensing 3.3 Aseptically dispense media to minimise occurrence of procedural contamination 3.4 Label media to allow for selection, avoiding areas of the culture vessel required for examination of colony growth 3.5 Store media to maximise shelf life and minimise contamination 3.6 Date batch media to ensure correct batch rotation 3.7 Incubate control plates as a sterility check

4. Perform quality control checks	4.1 Inspect media for any evidence of possible contamination or problems with structure or sterilisation 4.2 Check useability of selective media by growth of expected organism 4.3 Check stored stocks at regular intervals for conformance to required standards
5. Maintain work area and equipment to prevent cross-infection and contamination	5.1 Use personal protective equipment and safe work practices to ensure occupational health and safety of self and others 5.2 Place disposable and reuseable items into relevant receptacles 5.3 Clean and disinfect work area and equipment after use 5.4 Transport disposable and reusable contaminated materials to relevant areas for disinfection, sterilisation and cleaning or disposal.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Personnel work in accordance with work instructions and standard operating procedures which incorporate all relevant aspects of OHS legislation and the codes, guidelines, regulations and Australian standards applying to environmental hazards and dangerous goods.

Regulations, codes and standards may include

- AS 2243 Safety in laboratories
- AS 2500 Storage of goods
- AS 2503 Safety storage and handling of information cards
- AS 2982 Hand washing facilities
- SAA HB9 Occupational personal protection, and other relevant standards for protective, clothing (for example, AS 2161, AS 2210, AS 1337 and AS 1338)
- AS 4187 Code of Practice for cleaning, disinfecting and sterilising reusable medical and surgical instruments and equipment, and maintenance of associated environments in health care facilities.

The range of equipment may include

- balance
- pH meter
- hot plate stirrer, bunsen burners
- autoclave, Arnold steamer
- membrane filtration equipment
- measuring cylinders, flasks and glass ware, petri dishes
- distilled water apparatus
- automatic agar pourers
- labelling equipment
- refrigerators
- sterilisation indicators
- self refilling syringes
- Falcon dishes
- media storage bottles, tissue culture bottles.

Workplace information may include

- standard operating procedures (SOPs)
- client and product specifications
- Australian Quarantine Inspection Service requirements for safe disposal of plates and media
- operation and maintenance manuals for automated media preparation equipment
- production schedules and instructions
- material safety data sheets (MSDSs)
- good laboratory practice (GLP) and good manufacturing practice (GMP) manuals
- manufacturer's instructions or verbal direction from laboratory manager, supervisor or senior technician
- Food Standards Code Australia and New Zealand.

Media may be prepared from formulated powders obtained from microbiological companies or from first principles under supervision of a technical officer or scientist.

Cell and tissue culture media may include

- agars
- broths
- solutions
- slopes
- basic balanced salt solutions, such as Hank's or Kreb-Ringer's
- deeps
- enriched media, such as blood sugar, chocolate agar, tetrathionate broth, selenite broth
- control media
- differential media, such as eosin-methylene blue agar, MacConkey's agar.
- selective media, such as deoxycholate-citrate agar, Lowenstein-Jensen medium
- tissue culture media
- labile constituents, such as include blood, hormones or antibodies.

Sterilisation techniques could include autoclaving, steam and membrane filtration, boiling, microwaving, radiation, high temperature, high pressure steam, gas and chemical treatments.

Quality control checks include streaking out of cultures to a single colony and lawn cultures.

Hazards may include

- micro-organisms and agents associated with soil, air, water, blood and blood products, human or animal tissue and fluids
- sources of heat, such as ovens, burners, autoclaves
- sharps, broken glassware
- fluids under pressure, such as steam
- radiation used for sterilisation.

Safe work practices may include	• use of material safety data sheets (MSDSs) • use of personal protective equipment, such as safety glasses, gloves and coveralls • use of biohazard containers and laminar flow cabinets • correct labelling of reagents and hazardous materials • handling and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations • regular cleaning and/or decontaminating equipment and work areas.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- uses appropriate personal protective equipment
- uses a vessel large enough to endure adequate mixing and heating of the media
- prevents cross contamination
- follows enterprise procedures consistently
- confirms sterility of media, by using appropriate sterilisation techniques
- maintains adequate space between containers to ensure efficient sterilisation
- allows the chamber pressure of the autoclave to return to zero and temperature to cool to 80-90 DegreesC before opening autoclave door to prevent boil over or plugs/caps being blown off flasks or tubes
- carries out post sterilisation procedures, such as dispensing or adding using aseptic technique
- ensures the sterilised media has cooled down sufficiently to ensure that heat labile constituents, such as blood, hormones or antibodies are not inactivated when added to the media
- selects media suitable for isolating and/or growth of a specified organism
- labels and store culture media according to enterprise procedures
- accurately records data
- reports non-compliance, anomalies or out-of-specification results
- sorts, collects, treats, recycles or disposes of waste
- demonstrates ability of media to support growth of relevant micro-organism or tissue.

Underpinning knowledge

Competency includes the ability to apply and explain:

- the relationship between the correct preparation of culture media and the optimal growth of organisms or cells
- the purpose and features of culture media
- nature, properties and use of range of biological media
- accurate measuring techniques
- mathematical skills to calculate mass and volume
- the relationship between sterile practices, hygiene procedures and the ability to obtain growth free of contamination
- temperature control requirements
- basic microbiological concepts and terminology, including growth rates in culture, production of gas and haemolysis of red cells in media
- the importance of physical requirements, such as pH and isotonicity on optimal growth of organisms and cells
- importance of D, L isomers in media ingredients
- methods for purifying water for use in the preparation of culture media
- role of cell growth regulators/inhibitors in the culture medium
- role of macronutrients and micronutrients in the culture medium
- the effect of inappropriate storage on culture media quality and performance
- cleaning and sanitising requirements of equipment and work area
- relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of quality assurance results and examination of batches of media prepared by the candidate
- observation of the candidate preparing culture media
- written and/or oral questioning to assess underpinning knowledge

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLOHS302A Participate in laboratory/field workplace safety.
- PMLTEST305B Perform aseptic techniques.

Resource implications

Resources may include:

- work schedule and enterprise procedures, including advice on safe work practices
- relevant equipment and personal protective equipment
- material safety data sheets (MSDSs).

This competency in practice

Food processing

A laboratory assistant's task was to prepare and pour agar plates in readiness for milk sampling. The assistant collected all the equipment and material needed to make an agar plate and ensured the working area was suitably prepared. The agar solution was carefully prepared and poured into a large conical flask prior to sterilisation in the autoclave. On completion of the sterilisation cycle, the agar was cooled to 42 DegreesC in a water bath. It was then poured into the plates after flaming the neck of the flask. The lids were quickly replaced on the plates to minimise contamination. The plates were then stored. Any excess plates were bagged in a laminar flow unit and then placed in the fridge. The equipment was hot washed and the benches swabbed with 70% ethanol solution.

Biomedical

Media preparation is a routine task of the technical assistant. The methods and standard procedures are all documented but common working knowledge and standard 'don'ts' are not always written into the methods. Some ingredients, such as labile nutrients and antibiotics must be added under sterile conditions after the basic ingredients have been mixed and autoclaved. In one laboratory there is a list of ingredients not to be autoclaved posted on the notice board, in the media recipe book and for good measure on the autoclave itself. One day, a technical assistant who was preparing media added all the ingredients, including the glucose, then autoclaved all 20L of it. The technical assistant learned the consequences of not paying full attention to the procedure the hard way and spent most of the day removing the ' toffee' residue from inside the autoclave!

PMLTEST305B Perform aseptic techniques

Unit Descriptor

This unit of competency covers the ability to perform aseptic techniques to maintain the integrity of both the sample source and the sample. It applies to sampling techniques in tissue culture and to generic microbiological procedures.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory assistants and technicians working in the field or laboratory in the biomedical, biology, food and beverage and environmental sectors of the industry.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for aseptic sampling or transfer	1.1 Ensure that any sampling procedure conforms with the requirements of the sampling plan 1.2 Use specified personal protective clothing and equipment 1.3 Prepare the work area for safe and effective sample transfer 1.4 Select equipment and materials specified by the procedure 1.5 Organise equipment to minimise contamination during manipulations 1.6 Label containers for clear identification 1.7 Record details in relevant log or database
2. Transfer materials aseptically	2.1 Protect the integrity of the sample source by sterilising the sampling site and flaming the mouth of transport or culture vessel 2.2 Sterilise inoculating loops and/or pipette where used to prevent contamination 2.3 Perform transfer while minimising opportunities for contamination and cross-infection 2.4 After transfer, and before sealing the transport or culture vessel, flame the vessel mouth to maintain sterility 2.5 Re-sterilise inoculating loops, minimising the generation of aerosols 2.6 Streak plate inoculations to maximise potential for single colony growth and to avoid contamination 2.7 Label transport or culture vessels for clear identification
3. Maintain work area and equipment to prevent cross-infection and contamination	3.1 Place disposable and reuseable items into relevant receptacles 3.2 Clean and disinfect work area and equipment after use 3.3 Transport disposable and reusable contaminated materials to relevant areas for disinfection, sterilisation and cleaning or disposal.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	2
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Personnel work in accordance with work instructions and standard operating procedures which incorporate all relevant aspects of OHS legislation and the codes, guidelines, regulations and Australian standards applying to environmental hazards and dangerous goods.

Regulations, codes and standards may include

- AS/NZ 2243.3 Safety in laboratories, Part 3 - Microbiology
- AS 2500 Storage of goods
- AS 2503 Safety storage and handling information cards
- AS 2982 Hand washing facilities
- SAA HB9 Occupational personal protection, and other relevant standards for protective, clothing (for example, AS 2161, AS 2210, AS 1337 and AS 1338)
- AS 4187 Code of Practice for cleaning, disinfecting and sterilising reusable medical and surgical instruments and equipment, and maintenance of associated environments in health care facilities
- Food Standards Code Australia and New Zealand.

Facilities, equipment and processes would conform to the recommendations of AS/NZ 2243.3 Safety in laboratories, Part 3- Microbiology, and National Health and Medical Research Council guidelines on infection control.

Personal protective equipment may include	• gloves, safety glasses, goggles, face guards, coveralls, gowns, body suits, respirators • biohazard containers and laminar flow cabinets.
Aseptic sampling and transfers will typically involve accessing a sample source, using specified equipment to remove a sample and transferring it to a specified vessel without	• contamination of the sample source • contamination of the sample • cross contamination • contamination of the workplace.
Sampling transfers may include sample pot and transfer media and the subculturing and/or passaging of culture to	• sterile broth • media for isolation of colony • tissue culture media • media for continuous culture systems.
Samples could include	• body fluids and liquids • water and soil • sterile pharmaceuticals • yeasts and moulds • milk and yoghurt • swabs and smears • propagation tissue • plant material • fermented foods and beverages.
Equipment may include	• transfer equipment, such as inoculating loops, pipettes (quantitative and qualitative), flasks, tubes and spatulas • bunsen burners and bench incinerators • anaerobic jars • incubators, waterbaths, refrigerators, freezers and possibly dry ice and liquid nitrogen cylinders • laminar flow units and biohazard cabinets • autoclave or pressure cooker • swabs • continuous culture systems.

The range of material may involve

- solid and/or liquid media
- supplied media, such as media manufactured in the enterprise or raw material supplies for media
- disinfecting and sterilising agents and materials, such as methylated spirits, ethanol and ether
- disposable equipment and clothing
- tissue culture media
- growth media in broths, plates, deeps or slopes
- receptacles for safe disposal of wastes and for processing of reuseable materials
- bar coding material and labels.

Sterilisation techniques could include autoclaving, steam and membrane filtration, boiling, microwaving, radiation, high temperature, high pressure steam, gas and chemical treatments.

Hazards may include

- accessing the sample from difficult or dangerous areas
- dry ice and liquid nitrogen vapour
- UV light sources
- heat from bunsen burners
- molten agar
- sharps
- hazardous substances and/or infectious agents.

Workplace information may include

- standard operating procedures (SOPs)
- specifications for safe waste disposal of biohazardous materials
- production schedules and instructions
- work notes
- material safety data sheets (MSDSs)
- manufacturer's instructions
- verbal instructions from laboratory manager, supervisor or senior technician
- guidelines for small scale genetic manipulation work.

It is expected that all procedures, including recording of samples, operation of equipment and cleaning/decontamination will be carried out according to established laboratory procedures and these may vary across sectors. All sterilising equipment must meet state OHS legislation for pressure equipment. All samples and wastes must be handled in accordance with OHS and environmental guidelines and Australian Standard AS 2243.3.

Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- prevents cross contamination of sample source and sample
- manipulates equipment to prevent contamination of culture medium during transfer
- sterilises equipment as required to prevent cross contamination of work area, personnel and environment.

Underpinning knowledge

Competency includes the ability to apply and explain:

- principles of infection control related to occupational health and safety, sampling and transfer of materials in microbiological investigations
- disinfection and sterilisation procedures used in the collection, processing and safe disposal of samples and materials
- importance of pure culture techniques and aseptic transfer to the successful microbiological investigation and correct interpretation of laboratory results
- growth requirements of micro-organisms (bacteria, fungi, protozoans, viruses and multicellular parasites) in terms of their laboratory culture
- effects of physical and chemical agents on microbial growth and death.

The candidate must be able to follow defined OHS policies and procedures. In some instances the candidate may also need to apply:

- environmental requirements
- infection control procedures
- food safety principles
- relevant health, safety and environment requirements.

Specific industry

Additional knowledge requirements may apply for different industry sectors. For example, for the food processing industries:

- food spoilage symptoms
- beneficial/detrimental organisms relevant to specific food industry sector.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of quality assurance results and examination of samples transferred by the candidate
- observation of the candidate successfully transferring a range of samples
- written and/or oral questioning to assess underpinning knowledge (questioning will be appropriate to the language and literacy levels of the candidate).

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly.

Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLOHS302A Participate in laboratory/field workplace safety.

Resource implications

Resources may include:

- standard laboratory with appropriate equipment and materials
- enterprise procedures and standard methods
- material safety data sheets (MSDSs).

This competency in practice

Food processing

As part of the quality assurance program at an ice-cream manufacturer, six ice-creams were removed from the production line, placed in sterile bags and then stored in a freezer in the microbiology laboratory. Later in the morning, the laboratory assistant removed the samples from the freezer, registered the samples with the date received and test code and signed the register book. She/he then placed the samples in a water bath set at 42 DegreesC. While the samples were melting, the laboratory assistant labelled the respective agar plates with the registered codes. Using aseptic techniques she/he carefully transferred 1ml of ice-cream mix into the total plate count agar. The plates were then placed in the incubator. The final results were noted and recorded.

Biomedical

In preparation for antibiotic sensitivity testing and biochemical identification of presumed pathogenic bacteria, a technical assistant was asked to prepare a sterile peptone suspension of a lactose fermenting colony. The colony had been previously identified by the supervisor on a MacConkey's agar plate. The assistant labelled a 5mL tube of peptone broth with the sample number and a code for the identified colony and then donned a pair of disposable gloves. Bringing the labelled tube and the MacConkey's plate near to the Bunsen, she/he took an inoculating loop and sterilised it in the incandescent flame. She/he carefully cooled the loop in a sterile area of the agar and gently scraped off half the colony. With the other hand, and in the vicinity of the heated air of the Bunsen, she/he removed the cover of the peptone tube in her/his crooked finger. In a continuous and coordinated way she/he flamed the lip of the tube and emulsified the colony in the broth. She/he then flamed the lip of the tube and replaced its cover. Finally, the technical assistant resterilised the inoculating loop by introducing and holding it in the bunsen flame to minimise the generation of bacterial aerosols.

PMLTEST306B Assist with fieldwork

Unit Descriptor

This unit of competency describes the ability to perform tasks associated with organisation of fieldwork, field surveys and field camp operations. It also covers basic field survival skills and collection of samples in the field. This unit of competency does not include gaining clearance for animal trapping, tagging, keeping or experimentation. It does not cover animal handling techniques. The worker would only perform those tasks under the guidance and supervision of a scientific officer.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory and field assistants working in the environmental monitoring, mining, construction and rural industry sectors.

All aspects of field and laboratory work covered by this unit would be supervised by a scientific officer or technical officer. Though a supervisor may not always actually be present, the worker will follow standard operating procedures that clearly describe the permitted scope of practice.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Assist with organisation of fieldwork	1.1 Purchase supplies and equipment as specified by senior staff 1.2 Assemble supplies and equipment and check against inventory 1.3 Pack supplies and equipment appropriately for safe transport
2. Perform tasks related to field camp operations	2.1 Check unpacked items against inventory 2.2 Store supplies and equipment as specified 2.3 Restock supplies as necessary 2.4 Check sanitation facilities as required 2.5 Dispose of camp waste in accordance with safety and environmental requirements
3. Perform tasks related to field surveys	3.1 Assemble equipment for field work as per project specifications 3.2 Collect samples in accordance with enterprise procedures, animal care and ethics and other legislative requirements 3.3 Store samples in accordance with special requirements for continued wellbeing, viability or integrity of sample 3.4 Perform simple field measurements as directed 3.5 Collect and maintain records of environmental data as directed 3.6 Dispose of survey wastes in accordance with safety and environmental requirements

4. Demonstrate basic field survival skills	4.1 Follow specified safety procedures 4.2 Follow specified survival procedures in the event of emergencies and accidents 4.3 Wear suitable clothing as protection against solar radiation, extreme temperatures and impact injury
5. Assist with the close down of field camp	5.1 Pack supplies, equipment and samples appropriately for safe return transport 5.2 Check and clean used equipment to prevent deterioration and contamination 5.3 Return supplies and equipment to storage at enterprise location 5.4 Conduct a stocktake of equipment and supplies for replenishment where required 5.5 Assist in the dispatch of collected samples for laboratory analysis.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	2
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

All field work will be performed according to legislative and environmental requirements and industry guidelines and Codes of Practice.

In the field the worker and supervisor would generally have access to the following	• written fieldwork procedures, standard operating procedures and operating manuals • basic test procedures (validated and authorised) • basic sampling procedures (labelling, preparation, storage, transport and disposal) • safety requirements for equipment, materials or products • permits for wildlife capture and handling • animal welfare and ethics requirements, Codes of Practice • cleaning, hygiene and personal hygiene requirements • environmental requirements related to disposal of waste • incident and accident/injury reports • instructions to comply with new legislation, standards, guidelines and codes • first aid kit and survival manual.
Items of equipment may include	• pH meters, dissolved oxygen probes, portable colourimeters, field microscopes, hand centrifuges, sieves and filters • chemical field test kits • environmental monitoring systems • equipment required for the collection of samples and animals • equipment required for ensuring the wellbeing of animals • equipment suitable for the safe collection and disposal of biological and non- biological wastes • basic first aid equipment • data loggers • communication systems, such as two-way radio, conventional codes and symbols for signalling • tools, vehicle recovery equipment and spare parts • navigation and communication equipment, including global positioning system.
Hazards may include	• solar radiation, dust, noise • personnel getting lost • incidents or emergencies, such as snake or animal bites • severe weather conditions • manual handling of heavy objects • vehicle and boat handling in rough/remote conditions • moving machinery, hand tools.

Safety procedures may include	• use of personal protective equipment, such as sunscreen, hat, safety glasses, gloves, safety boots • 'stay with vehicle' and other basic survival techniques • use of a regular communication schedule • handling, storage and disposal of all hazardous materials/waste in accordance with MSDS, labels, enterprise procedures and regulations.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency	Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate: • completes tasks (associated with the organisation, set up, maintenance and close down of a field camp) efficiently and safely • collects samples in accordance with enterprise procedures and legislative requirements • maintains and stores samples in accordance with special requirements for continued wellbeing, viability and integrity of sample • records data according to enterprise procedures and legislative requirements • prepares documentation accurately and in accordance with requirements • performs all fieldwork in accordance with safety and environmental requirements. • disposes of wastes in accordance with safety and environmental requirements.

Underpinning knowledge

Competency includes the ability to apply and explain:

- terminology relevant to the physical chemistry, biology and ecology of samples and specimens
- enterprise procedures relating to sample collection, maintenance and storage
- enterprise procedures relating to field testing of samples
- specific legislation and Codes of Practice related to sample and animal collection
- principles of safety relating to fieldwork, such as use of LPG, operation of generators, use of protective clothing
- communication procedures using two-way radio and satellite phone
- basic field survival strategies, such as map reading, use of compass, 'stay with vehicle' in the event of accident or emergency
- documentation in accordance with enterprise procedures and legislative requirements
- relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of performance during field trips with a focus on sample collection and storage, accurate documentation, field testing of samples, collection of environmental data, safety aspects of fieldwork and basic field survival skills, team work
- paper exercises associated with organisation of fieldwork, fieldwork operations and basic field survival strategies
- role plays with a focus on accident and emergency situations requiring use of communication procedures and basic field survival strategies
- oral or written questions.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLORG301A Plan and conduct laboratory/field work
- PMLCOM300B Communicate with other people.

Resource implications

Resources may include:

- enterprise procedures, regulations and Codes of Practice
- relevant field equipment, samples, test kits and reagents.

This competency in practice

Environmental

On a field trip to determine the biodiversity of an island fringing reef, a technical assistant assisted in constructing a grid map of the study area. The assistant was then asked to count the number of six different species of plant in part of the grid, taking care to minimise the impact on the environment. The assistant was also required to accurately record the data on a map to show the location of each plant using a predetermined key. The survey was successfully completed because enterprise procedures were followed.

Testing

A technical assistant was asked to appropriately pack and safely transport water sampling and monitoring equipment to a distant field site. Firstly, the assistant checked that all the equipment was in working order and that he/she was able to use and maintain it. Given that the technical assistant was licenced to operate a small boat and was a competent underwater diver he/she was also asked to perform a simple underwater survey of macrophytes in a lake in the study area. This was done using standard safety and operating procedures and the results were recorded on a grid map and in the daily log book.

PMLTEST307B Prepare trial batches for evaluation

Unit Descriptor

This unit of competence covers the ability to prepare trial batches of materials for evaluation. Materials can include soil, minerals and manufactured products, such as concrete, asphalt, food, plastics, paint and other industrial chemicals.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory assistants working in all industry sectors.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for trial batch mixing	1.1 Identify the job, materials, appropriate procedures and safety requirements 1.2 Record description of the job to be undertaken, compare with specification and report any variations 1.3 Select and prepare tools, equipment and materials in accordance with job requirements 1.4 Confirm the properties and quantities of materials to be used 1.5 Confirm that the required materials are available and ready for use
2. Mix trial batch for evaluation	2.1 Measure out quantities of materials ready for mixing 2.2 Mix the materials according to established procedures 2.3 Discharge the mixture ready for inspection and testing according to established procedures 2.4 Record details of the mix and any observations according to established procedures
3. Evaluate properties of the mixture by inspection and standard test methods	3.1 Obtain representative samples of the mix for testing 3.2 Perform specified tests according to established procedures 3.3 Handle and transport samples in accordance with established procedures 3.4 Label samples and record details in accordance with established procedures
4. Clean equipment and dispose of materials	4.1 Clean mixing, measuring, sampling and testing equipment after use 4.2 Return unused materials to storage 4.3 Dispose of excess materials safely and ethically
5. Maintain records	5.1 Record data in accordance with established procedures 5.2 Maintain equipment records in accordance with established procedures 5.3 Maintain confidentiality of enterprise information

6. Maintain a safe work environment	6.1 Use established safe work practices and personal protective equipment to ensure personal safety and that of other laboratory personnel 6.2 Minimise the generation of wastes and environmental impacts 6.3 Ensure safe disposal of laboratory and hazardous wastes 6.4 Clean, care for and store equipment and reagents as required.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

This unit of competence describes work conducted by laboratory assistants, generally working under the guidance of a senior technician, scientific officer, laboratory supervisor/manager. Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements.

These procedures and requirements can include or be prepared from	• industry Codes of Practice • environmental legislation and regulations • standard operating procedures (SOPs) • equipment manuals • equipment start-up, operation and shutdown procedures • calibration and maintenance schedules • quality manuals • enterprise recording and reporting procedures • production and laboratory schedules • material, production and product specifications.
Materials, tools and equipment used may include	• soils, concrete, asphalt, aggregates, polymers, ceramics, metals, foodstuffs, solvents • ovens, sieves, balances, volumetric measures, mixers • hand tools, including shovels, scoops, spatulas • consumables, including sample bags, labels • documentation, including specifications, manufacturers' handbooks, worksheets • test equipment appropriate to the various materials.
Typical skills may include	• working safely with equipment and hazardous materials • working safely in laboratory conditions • setting up and maintaining tools and equipment • using tools and equipment to perform basic sampling techniques • using tools and equipment to perform basic testing techniques • basic calculations • observing and recording information on testing and sampling • making basic measurements of volume and mass • handling and storing materials appropriately.

Typical problems may include	• not following standard operating procedures • measurement errors • calculation errors • materials of unreliable quality • insufficient mixing • poor sampling procedures • equipment breakdown and breakage.
Hazards may include	• electric shock • biohazards, such as microbiological organisms and agents associated with soil, air, water • solar radiation, dust, noise • chemicals • sharps, broken glassware and hand tools • flammable liquids and gases • fluids under pressure • manual handling heavy objects • crushing, entanglement, cuts associated with moving machinery or falling objects.
Safety procedures may include	• recognising hazard warnings and safety signs • use of personal protective equipment, such as hard hats, hearing protection, sunscreen lotion, gloves, safety glasses, goggles, face guards, coveralls, safety boots • use of material safety data sheets (MSDS) • following established manual handling procedures • regular cleaning and/or decontaminating of equipment and work areas • ensuring access to service shut off points • identifying and reporting operating problems or equipment malfunctions.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- calculates batch quantities, concentrations and other relevant parameters
- follows standard operating procedures
- measures quantities accurately
- takes representative samples
- identifies and describes materials accurately
- handles and transports samples correctly
- records sampling and testing information
- uses tools and equipment effectively and efficiently
- observes, interprets and reports atypical situations
- communicates problems to appropriate personnel
- records and communicates work results
- works safely
- interprets information from materials safety data sheets.

Underpinning knowledge

Competency includes the ability to apply and explain:

- the properties of mixing materials and how they affect the properties of the final product
- hazards involved with materials and equipment involved
- measurement of mass and volume
- basic calculations involving SI units, proportion, ratio, and percentage
- representative sampling
- uses of various materials/enterprise products
- basic testing methods for relevant materials
- enterprise traceability requirements
- relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- analysis of trial batches prepared by the candidate over a period of time to ensure accurate and consistent work is obtained within required timelines
- inspection of workplace documentation completed by the candidate
- feedback from peers and supervisors
- use of suitable simulation and/or a range of case studies/scenarios.
- In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLSAMP302A Handle and transport samples or equipment
- PMLSAMP400B Prepare representative samples in accordance with a sampling plan
- PMLTEST300B Perform basic tests.

Resource implications

Resources may include:

- standard facility with appropriate tools, equipment and materials
- enterprise procedures, MSDS, product formulation/specifications.

This competency in practice

Construction materials

A laboratory assistant works for a concrete manufacturer. A client requires concrete for a specific project that cannot be supplied using existing standard mixes. The manufacturer must use special aggregates and cement to meet the durability and strength specifications for the project. The laboratory manager obtains quantities of the materials for evaluation purposes. The assistant tests the aggregates to determine their grading properties. From these results, he/she designs a mix to satisfy the project specifications using a standard design method. The mix requires the use of pozzolanic materials and admixtures that were obtained from the suppliers.

The manager provides the assistant with the batch quantities required to produce one cubic metre of concrete. To test the mix design, the assistant will produce a 20-litre batch in the laboratory. She/he calculates that this quantity will provide sufficient material for the required tests, without undue waste. She/he calculates the quantity of each material required for the trial batch. The assistant selects and prepares the tools and equipment she/he needs to mix, sample and test the concrete. She/he wears overalls, safety boots and glasses, and uses a barrier cream. She/he measures out the quantities required for the trial batch, charges the mixer and allows it to mix for the specified time. She/he then discharges the concrete onto a suitable surface. She/he checks its slump, cohesiveness and air content, recording the data on standard enterprise forms. The manager inspects the concrete, and decides that it is over-sanded and has excessive slump. She/he adjusts the batch quantities and draws up amended values. She/he disposes of the excess concrete and cleans the equipment and tools.

She/he then mixes a new batch using the amended figures. This process continues until the manager is satisfied with the concrete quality. She/he then mixes a larger batch so that she/he can prepare specimens for testing its hardened-state properties.

PMLTEST308A Perform microscopic examination

Unit Descriptor

This unit of competency covers the ability to prepare routine samples and examine them using a light microscope, standard methods and readily available advice. Personnel are required to set up microscopes for optimum resolution and observe, identify and report sample characteristics. The unit covers limited interpretation and analysis of results. Troubleshooting of equipment and procedures is not required

This unit of competency is based on, but is not equivalent to, the unit PMLTEST301A Perform biological laboratory procedures in PML99.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory or technical assistants in all industry sectors covered by this Training Package.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice'.

Unit Sector No sector assigned

ELEMENT	PERFORMANCE CRITERIA
1. Interpret test requirements	1.1 Review test request to identify samples to be tested, test method and equipment involved 1.2 Identify hazards associated with the sample, preparation methods, reagents and equipment and implement enterprise control measures
2. Set up work area for preparation and examination of samples	2.1 Collect equipment and reagents and arrange the workspace so that equipment can be used safely and efficiently 2.2 Perform pre-use and safety checks to ensure equipment is fit for purpose and report faulty or unsafe equipment to appropriate personnel 2.3 Check reagents are fit for purpose and report any items that require replacement
3. Prepare samples for examination	3.1 Log and label samples according to enterprise procedures to ensure traceability 3.2 Check suitability of the original and prepared sample for the examination and report unsuitable samples to appropriate personnel 3.3 Prepare and store the sample for examination following enterprise methods
4. Set up and use a light microscope	4.1 Set up the light path to optimise resolution 4.2 Select the appropriate objectives and filter for the sample being examined 4.3 Ensure that the lenses are clean 4.4 Adjust settings and alignment of the light path to optimise performance 4.5 Place sample correctly on the stage

5. Observe, identify and report sample characteristics	5.1 Recognise and identify significant sample characteristics 5.2 Perform required calculations accurately 5.3 Prepare and view control samples and check that results are consistent with expected values 5.4 Identify and report 'out of specification' or atypical results promptly to appropriate personnel 5.5 Record and report data in accordance with enterprise procedures
6. Maintain a safe work environment	6.1 Ensure safety and minimise cross contamination through the use of personal protective clothing and safety equipment 6.2 Handle all samples and equipment in accordance with enterprise safety protocols 6.3 Clean up spills using appropriate techniques to protect personnel, work area and environment 6.4 Minimise generation of waste and environmental impacts 6.5 Collect and dispose of all wastes safely 6.6 Report hazards and incidents to designated personnel using enterprise procedures.

KEY COMPETENCIES

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	1
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Personnel will have access to procedures that include or have been prepared from the following	• Australian and international standards, such as -
	  • AS ISO/IEC 17025 general requirements for the competence of testing and calibration laboratories
	  • ISO 9000 series Quality management and quality assurance standards
	  • AS 2243 Safety in Laboratories
	  • AS 2830 Good laboratory practice
	  • Codes of Practice (such as GLP and GMP)
	  • safety manuals
	  • quality manuals and equipment and procedure manuals
	  • standard operating procedures (SOPs) describing personal protective equipment requirements, indications for use of biohazard and laminar flow cabinets, containment and cleanup of spillages, and disposal of wastes
	• material safety data sheets (MSDSs)
	• enterprise recording and reporting procedures
	• production and laboratory schedules
	• material, production and product specifications.

Preparation of samples may include	• filtration • centrifugation • aseptic transfer of specimen • selection of diluent to preserve or enhance visibility of the cells to be counted • serial dilution to enable individual cells to be reliably counted • selection, filling and cover slipping of a clean, dry counting chamber to ensure even distribution of cells during filling • thin film or smear on a slide • fixing of films to minimise cell damage and the production of artefacts • staining of fixed material to illustrate required tissue or cell characteristics • mounting of stained films, sections and whole mounts to ensure long term preservation • permanent labels for smears, films and sections for presentation, storage and retrieval • filling a counting chamber in one continuous flow without bubbles or overflow.

Checking sample condition may include	• labelling • spillage • spoilage due to incorrect storage and transport conditions • temperature control • suitability for the examination. Pre-use checks may include calibration, cleaning and routine maintenance.
Equipment may include	• glass slides • counting chambers (for example, haemocytometer) • optical graticules and stage micrometers • tissue culture flasks.
Light microscopes may include	• bright field illumination microscopic examination up to 1000x magnification • stereomicroscopes, dissection microscopes • compound microscopes • phase contrast microscopes • inverted microscopes.
Biological samples may include	• smears, impression smears, sections, squashes, films and whole mounts • a monolayer of cells in smears and films • fixed smears for demonstration of bacteria by the methylene blue and Gram staining techniques • blood films stained by a Romanowsky technique to clearly show differentiation of granulocytes • stained sections of animal tissues using regressive haematoxylin and eosin to differentiate cytoplasmic and nuclear detail • differentially stained monocotyledon and dicotyledon stem sections to demonstrate the structure of vascular bundles (xylem, phloem and cambium) • stained whole mounts of helminths • whole mounts, such as liver flukes, planaria and samples of animal faeces to demonstrate ova, cysts and larvae • pond water organisms • onion root tip squash • midstream sample of urine.
Checking prepared samples may include looking for	• clean and scratch-free microscope slides to reduce artefacts • a homogeneous suspension of sample • films and smears that have been fixed rapidly • thin films with a monolayer of cells • appropriate whole mounts for intact organisms • correct sample identification during and after processing.

Sample characteristics are restricted to what can be viewed by bright field microscopy and may include	• number of cells (for example, cells in blood or other particulate samples, such as a yeast suspension or pollen grains) • type of cells, percentage of atypical cells, presence/absence of cells, size of cells, viable and non viable cells, trajectory • presence of stained material, such as starch • colour/staining, morphology • motility.
Calculations may include	• dilutions • percentage viability • number of cells in original sample after dilution • calculation of cells/ml in a number of squares of a counting chamber.
Hazards may include	• micoorganisms and agents associated with soil, air, water, blood and blood products, human or animal tissue and fluids • chemicals and stains • sharps, broken glassware • aerosols.
Safety practices and personal protective equipment may include	• use of material safety data sheets (MSDS) • use of personal protective equipment, such as safety glasses, gloves and coveralls • use of biohazard containers and laminar flow cabinet • correct labelling of reagents and hazardous materials • handling and storing hazardous materials and equipment in accordance with labels, MSDS, and manufacturer's instructions • ergonomic layout, correct illumination and organisation of workbench • regular cleaning and/or decontamination of equipment and work areas.
Health, safety and environment	All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence. All operations assume the potentially hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- follows enterprise standards, procedures and practices
- maintains personal safety and that of others
- uses personal protective clothing and other safety equipment correctly
- minimises cross contamination and contamination of the laboratory and environment
- minimises generation of aerosols as smears or films are prepared
- sets up the workbench and microscope ergonomically
- sets up, cleans and uses a light microscope to achieve optimum resolution of the specimen
- performs cell counts on diluted and undiluted samples
- performs basic cell measurements using grids
- logs and tracks samples through all steps from receiving a sample through to completion of a procedure and reporting
- follows enterprise quality control procedures
- correctly handles and stores samples and reagents

Underpinning knowledge

Competency includes the ability to apply and explain:

- basic structure and function of cells and organelles
- basic classes and classification of organsims of organisms, such as prokaryotes, eukaryotes, plants, animals, bacteria, viruses and prions
- cell physiology and processes, such as simple and facilitated diffusion, plasmolysis, osmosis, tonicity, active transport, energy production, mitosis, motility, phagocytosis and pinocystosis
- parts and function of a light microscope
- purposes and mechanisms of staining (for example, Gram +ve and -ve)
- interpretation and recording of test result, including simple calculations
- importance and appropriate use of controls and certified reference materials
- hazards and risks in laboratories associated with performing microscopic examination
- enterprise and/or legal traceability requirements
- relevant health, safety and environment requirements.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- observation of the candidate performing microscopic examinations
- review of data records prepared by the candidate, such as counts, observations, results
- feedback from supervisors and peers about adherence to enterprise/technical procedures
- questioning to assess underpinning knowledge.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PMLDATA200A Record and present data
- PMLTEST305B Perform aseptic techniques
- PMLOHS302A Participate in laboratory/field workplace safety
- PMLQUAL300B Contribute to the achievement of quality objectives.

Resource implications

Resources may include:

- standard laboratory equipped with appropriate equipment, such as light microscopes, samples, stains and counting chambers
- enterprise procedures, standard methods and materials.

This competency in practice

Food processing

A customer complaint is received about the baking properties of a flour delivery. The laboratory assistant at the flour mill is given the task of testing the starch content of the suspect flour. She/he prepares iodine stained samples of the returned flour and a range of baked and partially baked products prepared from it. First, the assistant makes up fresh iodine staining solution and then prepares slides of each sample for microscopic examination. She/he identifies the characteristic starch granules of the flour sample and records the degree of gelatinisation in the starch granules in the baked samples. She/he discusses the results with the supervisor and prepares a report for the customer.

Biomedical

A laboratory assistant works in the microbiology laboratory of a public hospital and is responsible for preparing and staining sputum smears from patients for micro and culture. The assistant puts on a clean gown and gloves before collecting the specimens from the reception area of the laboratory. The assistant prepares cultures of the sputum specimens on simple and selective media before preparing, fixing and staining smears for microscopic examination. The results are checked by the supervisor, entered into the Laboratory Information Management System (LIMS) and sent to the appropriate section of the hospital.

Environmental

A laboratory assistant prepares media for plant tissue culture. There has been some contamination of Gram-positive bacteria in the last two batches and the supervisor has initiated an overhaul of the preparation and aliquotting procedure. The laboratory assistant has been asked to follow the new procedure exactly and to remove samples at each stage of ingredient addition for microscopic examination. The laboratory assistant records the exact addition amounts, batch numbers and brands of the reagents; the location of the addition (which biohazard cabinet); the equipment used and the pre-sterilisation records of all equipment.

The laboratory assistant then prepares slides, fixes them and performs a Gram stain on each of the aliquots removed from the new preparation run. Microscopic analysis of each aliquot reveals nil contamination. The supervisor decides that there has been a breach in the old procedure and the laboratory assistant is asked to follow the new procedure and to perform a routine microscopic check on all batches for the next month.

UTPNEG147A Perform electrical/electronic drafting

Unit Descriptor This refers to the drafting of electrical circuits and use of drawing equipment as applied to the production of schematic and wiring diagrams

Stream Production Plant

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for drafting	1.1 Work requirements are identified from request/work orders or equivalent and clarified/confirmed with appropriate parties or by site inspection 1.2 Occupational health and safety standards, statutory requirements, relevant Australian standards, codes of practice, manufacturers' specifications, environmental requirements and enterprise procedures are identified, applied and monitored throughout the work procedure 1.3 Relevant plans, drawings and texts are selected and interpreted in accordance with the work plan 1.4 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training
2. Perform electrical drafting	2.1 Schematics drawn to indicate relative positioning of electrical/electronic components 2.2 Electrical drawings are produced in accordance with all relevant specification requirements 2.3 Electrical/electronic components selected from manufacturer's/suppliers catalogues to meet specification requirements 2.4 Drawings are produced in accordance with relevant standards
3. Complete the work	3.1 Drawings checked to ensure that assembly is possible in accordance with specification requirements 3.2 Drawings produced, registered and recorded in accordance with instructions/site documentation procedures 3.3 Relevant personnel notified and existing drawings/specification sheets updated as required

KEY COMPETENCIES

Key Competency	Performance Level
Communicating ideas and information	1
Collecting analysing and organising information	1
Planning and organising activities	1
Working with others and in teams	-
Using mathematical ideas and techniques	1
Solving problems	1
Using technology	1

RANGE STATEMENT

Relevant legislation, standards or codes of practice	may apply
Dimensions	may be notated in metric or imperial units
Circuit diagrams	will use electrical drawing symbols to Australian or equivalent standards
Types of circuits drafted	may include wiring, schematic and logic.
Drawing equipment used	may include Computer Aided Drafting (CAD), conventional drawing tools
Range description	Manual drafting and drawing equipment used

EVIDENCE GUIDE

Critical aspects of evidence

The knowledge and application of relevant sections of: Occupational, health and safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures

Preparation for drafting

Electrical drafting

Context of assessment	Competency Standards should be assessed in the workplace or simulated workplace and under the normal range of workplace conditions Assessment of this unit will be supported with documentary evidence, by means of endorsement stating type and application of work
Interdependent assessment of unit	Nil
Knowledge and Skills	A knowledge of: Occupational health and safety standards; Relevant statutory requirements, standards and codes of practice; Detailed drafting concepts; Technical drawings and data; Engineering practices (Electrical); Engineering drawing equipment; Electrical/electronic drawing symbols; Electrical/electronic circuits; Communication principles; Computer Aided Drawing systems The ability to: Apply occupational health and safety standards; Apply relevant statutory requirements and codes of practice; Interpret and use technical drawings and data; Perform electrical/electronic drafting; Use drawing equipment; Use Computer Aided Drawing systems; Communicate effectively; Apply data analysis techniques and tools.

Australian Government
Department of Education, Science and Training

MCM04 Competitive Manufacturing Training Package
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Manufacturing Skills Australia

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Creating Australia's Future

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