



**Australian Government**

# **MEM23123A Evaluate manufacturing processes**

**Release 1**

## **MEM23123A Evaluate manufacturing processes**

### **Modification History**

Release 1 - New unit. Replaces MEM23093A, but not equivalent.

### **Unit Descriptor**

This unit of competency covers the evaluation of plant, facilities, services, labour and skills distribution used for manufacturing processes against defined process performance parameters. It includes the evaluation and assessment of plant layout and material flows for efficient manufacturability of product and maintainability of the plant and process.

### **Application of the Unit**

This unit applies to manufacturing processes for products, machinery, tools or components for structures. Evaluations may be required for a variety of reasons, including assessing impact of proposals for new products or investigating potential change in processes to meet regulatory, sustainability or efficiency requirements. Efficiency evaluations are based on lean systems and techniques. Where more in-depth training in lean systems and techniques is required relevant competitive systems and practices units should be selected.

The unit is suitable for people working as, supervisors, technicians, and design draftspersons and those pursuing manufacturing, engineering or related technical qualifications and careers.

### **Licensing/Regulatory Information**

Not applicable.

### **Pre-Requisites**

Not applicable.

## Employability Skills Information

This unit contains employability skills.

### Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element.

### Elements and Performance Criteria

1	Determine scope of manufacturing processes	1.1	Identify manufacturing context and processes
		1.2	Identify features and functions of plant, facilities, services, labour and skill distribution used for manufacturing processes
		1.3	Identify stakeholders to be consulted as part of the evaluation
		1.4	Confirm work health and safety (WHS) and regulatory requirements, codes of practice, standards, risk assessment and registration requirements for manufacturing plant
		1.5	Investigate sustainability implications of manufacturing processes
		1.6	Identify sources of professional and technical assistance
2	Evaluate manufacturing processes	2.1	Identify manufacturing principles and techniques required to evaluate and optimise the processes
		2.2	Identify appropriate analysis techniques, software and software validation techniques
		2.3	Evaluate and assess facilities, services, plant and tooling in relation to product manufacturability and maintainability
		2.4	Evaluate and assess process layout, use of automation and process control using lean systems and techniques

- 2.5 Evaluate and assess materials, product flow and transfer operations, buffer and emergency stocks, warehousing, stores and logistics using lean systems and techniques
  - 2.6 Evaluate WHS and regulatory compliance and risk management practices of manufacturing processes and maintenance procedures
  - 2.7 Evaluate processes for sustainability
  - 2.8 Evaluate process compatibility with maintenance management system
  - 2.9 Evaluate labour requirements and skills distribution
  - 2.10 Evaluate process information flows for control and process improvement
- 3 Report results
    - 3.1 Review results of evaluation and assessment with stakeholders
    - 3.2 Provide recommendations for improvements, where appropriate
    - 3.3 Provide reports and documentation, such as layouts, programs and flow charts

## Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

### Required skills

Required skills include:

- identifying parameters and context of manufacturing processes
- investigating sustainability implications of manufacturing processes
- identifying appropriate manufacturing processes and analysis techniques and software
- evaluating WHS and regulatory requirements, automation safety and risk management compliance, sustainability and standards
- investigating existing or planned software against manufacturing technical and efficiency requirements
- applying lean systems and techniques to evaluate:
  - facilities and services
  - plant and tooling
  - process layout
  - automation and process control
  - materials and product flow
  - buffer and emergency stocks
  - stores and warehousing
  - transport and logistics
  - maintenance management system
  - labour and skill requirements
- reporting and documenting results of scoping, principles and techniques identification and evaluation of systems, layouts, programs and flow charts

### Required knowledge

Required knowledge includes:

- important features of products and processing options with regard to:
  - marketing options and advantages
  - economic, social and sustainability implications of products and processes
  - WHS and other regulatory requirements
- plant, facilities, services and process layout
- range of common modern manufacturing technical and work organisation processes, including:
  - volume production using transfer lines

- cellular manufacturing
- jobbing
- metal shaping processes, such as casting, forging and machining
- metal assembly, fabricating and joining
- plastic and rubber product manufacturing, including various types of moulding and assembly
- surface finishing based processes (e.g. electroplating)
- process transfers and materials handling
- packaging
- warehousing, stores, and provision for logistics and transport
- labour and skills distribution requirements of plant and processes
- asset maintainability and reliability concepts and processes
- process automation and control options
- techniques for process improvement, including:
  - material and product flow measurement and improvement
  - feedback on product manufacturability for possible product modification
  - feedback from maintenance and life cycle costs for plant
  - quality assurance (QA), quality control (QC) and statistical process control (SPC) feedback
  - customer feedback on cost, quality, delivery and reliability
- maintenance management systems and compatibility with manufacturing processes
- information flows and software options for process measurement and control
- budgeting and costing processes
- WHS, risk management, safe work methods statements (SWMS), work permits, material safety data sheets (MSDS), codes of practice, regulations, standards and regulatory requirements

## Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

<p><b>Overview of assessment</b></p>	<p>A person who demonstrates competency in this unit must be able to evaluate plant, facilities, services and processes against defined process performance parameters. This includes working individually and as part of a team in accordance with organisational procedures.</p>
<p><b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b></p>	<p>Assessors must be satisfied that the candidate can competently and consistently:</p> <ul style="list-style-type: none"> <li>• determine features and functions of manufacturing processes, including manufacturing principles and techniques used and relevant internal and external context of manufacturing processes</li> <li>• identify relevant lean systems and techniques and apply in evaluation of manufacturing processes</li> <li>• evaluate WHS, regulatory, automation safety and risk management compliance</li> <li>• investigate sustainability implications of manufacturing processes</li> <li>• evaluate software, facilities, services, plant and equipment tooling, process layout, automation and process control</li> <li>• identify appropriateness of materials and product flow and transfer operations, buffer and emergency stocks, warehousing, stores and compatibility of maintenance management system</li> <li>• report and document results.</li> </ul>
<p><b>Context of and specific resources for assessment</b></p>	<ul style="list-style-type: none"> <li>• 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, then a simulated working environment must be used where the range of conditions reflects realistic workplace situations.</li> <li>• The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team.</li> <li>• Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</li> <li>• Access must be provided to appropriate learning</li> </ul>

	and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.
<b>Method of assessment</b>	<ul style="list-style-type: none"> <li>• Assessment must satisfy the endorsed Assessment Guidelines of the MEM05 Metal and Engineering Training Package.</li> <li>• Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge.</li> <li>• Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure correct interpretation and application.</li> <li>• Assessment may be applied under project-related conditions (real or simulated) and require evidence of process.</li> <li>• Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.</li> <li>• Assessment may be in conjunction with assessment of other units of competency where required.</li> </ul>
<b>Guidance information for assessment</b>	Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy capacity of the candidate and the work being performed.

## 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. 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) may also be included.

<b>Defined parameters</b>	<p>Defined parameters may include</p> <ul style="list-style-type: none"> <li>• target cost</li> <li>• target outgoing quality levels and warranty costs</li> <li>• production rates</li> <li>• stock levels and availability to customer order</li> <li>• productivity</li> <li>• working capital</li> </ul>
---------------------------	--



	<ul style="list-style-type: none"> <li>• plant utilisation</li> </ul>
<b>Context of manufacturing processes</b>	<p>The context of manufacturing operations includes:</p> <ul style="list-style-type: none"> <li>• customer requirements</li> <li>• market considerations</li> <li>• product and process sustainability</li> <li>• lean systems</li> <li>• product manufacturability</li> <li>• system maintainability</li> <li>• facilities, services, plant and tooling requirements</li> <li>• supply chains</li> <li>• material and product flow</li> <li>• transfer operations</li> <li>• process control</li> <li>• labour requirements and skills distribution</li> <li>• information flow</li> <li>• systems thinking</li> <li>• continuous improvement and constraint and contingency management</li> <li>• WHS and regulatory requirements and risk management</li> </ul>
<b>Automation safety</b>	<p>Automation safety refers to the reliance on emergency stop, failsafe design, redundancy, interlocks and data integrity. Standards apply to general plant design and use as well as the functional safety of safety-related electrical, electronic and programmable electronic control systems</p>
<b>Appropriate technical and professional assistance</b>	<p>Appropriate technical and professional assistance may include:</p> <ul style="list-style-type: none"> <li>• technical support and advice relating to elements which have intrinsic dangers, such as: <ul style="list-style-type: none"> <li>• high pressure</li> <li>• energised fluid vessels</li> <li>• high temperatures and heat energy capacity</li> <li>• wiring with high current control voltages above extra low voltage</li> </ul> </li> <li>• professional support for technologies, such as: <ul style="list-style-type: none"> <li>• specialist electric motor drives and controllers</li> <li>• specialist materials, plastics, metal alloys and nano materials</li> <li>• special processes, foundry, alloy welding, heat treatment, sealing and fastening</li> </ul> </li> </ul>
<b>WHS, regulatory requirements, codes of</b>	<p>WHS, regulatory requirements and enterprise procedures may include:</p>

<b>practice and enterprise procedures</b>	<ul style="list-style-type: none"> <li>• WHS Acts and regulations</li> <li>• relevant standards</li> <li>• codes of practice from Australian and overseas engineering and technical associations and societies</li> <li>• risk assessments</li> <li>• registration requirements</li> <li>• safe work practices</li> <li>• state and territory regulatory requirements applying to electrical work</li> </ul>
<b>Standards and codes</b>	Standards and codes refer to all relevant Australian and international standards and codes applicable to a particular manufacturing process
<b>Sustainability</b>	<p>Sustainability is used to mean the entire sustainable performance of the organisation/plant including:</p> <ul style="list-style-type: none"> <li>• meeting all regulatory requirements</li> <li>• conforming to all industry covenants, protocols and best practice guides</li> <li>• minimising ecological and environmental footprint of process, plant and product</li> <li>• maximising economic benefit of process plant and product to the organisation and the community</li> <li>• minimising the negative WHS impact on employees, community and customer</li> </ul>
<b>Continuous improvement implementation</b>	<p>Continuous improvement of manufacturing processes may result in changes to plant, facilities, services, layout, materials flows, handling and logistics. It may include techniques, such as:</p> <ul style="list-style-type: none"> <li>• balanced scorecard</li> <li>• current and future state mapping</li> <li>• measuring performance against benchmarks</li> <li>• process improvement, problem solving and decision making</li> <li>• data management, generation, recording, analysing, storing and use of software</li> <li>• training for improvement systems participation</li> <li>• technical training</li> <li>• systems thinking</li> <li>• constraints and contingency management</li> </ul>
<b>Lean systems and techniques</b>	<p>Lean systems and techniques used in evaluations can vary according the type of production and product and may include:</p> <ul style="list-style-type: none"> <li>• performance indicators based on customer value</li> <li>• continuous improvement, including kaizen</li> <li>• just-in-time (JIT) and kanban</li> </ul>

	<ul style="list-style-type: none"> <li>• pull system for production and services</li> <li>• elimination and/or limitation of waste, where waste is defined as effort and resources not contributing to customer value</li> <li>• mistake proofing</li> <li>• standardisation of work</li> <li>• quick changeover</li> <li>• planning benchmarks and techniques: <ul style="list-style-type: none"> <li>• cycle time</li> <li>• takt time</li> <li>• pack out</li> <li>• pitch</li> <li>• line balancing</li> <li>• overall equipment effectiveness (availability x performance efficiency x quality rate)</li> </ul> </li> <li>• problem solving and decision making tools: <ul style="list-style-type: none"> <li>• total quality management (TQM) tools</li> <li>• root cause analysis (RCA)</li> <li>• failure mode and effects analysis (FMEA)</li> <li>• design review based on failure mode (DRBFM)</li> <li>• constraints and contingencies management</li> </ul> </li> <li>• total productive maintenance</li> <li>• value stream analysis</li> <li>• visual factory techniques</li> </ul>
<b>Automation</b>	Automation options range from manual operations with manual information generation, handling, analysis and storage to islands of automation supported by manual interfaces with some electronic information processing to systems with major automation and networked data handling
<b>Information flow requirements</b>	<p>Information flow may include:</p> <ul style="list-style-type: none"> <li>• SPC and QA data</li> <li>• production planning and maintenance systems information</li> <li>• visual information feedback to stakeholders</li> </ul> <p>Information processing may include:</p> <ul style="list-style-type: none"> <li>• software and networks for automated data handling, analysis, display and storage</li> </ul>

## Unit Sector(s)

**Competency field**

**Unit sector**          Engineering science

**Custom Content Section**

Not applicable.