



Australian Government

MEMPE006A Undertake a basic engineering project

Release 1

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Modification History

New unit - Release 1

Unit Descriptor

This unit of competency is intended to provide the learner with the opportunity to plan and undertake an engineering project which can be completed in an institutional environment.

Included in this unit is the opportunity to use a basic computer-aided drafting (CAD) system to produce engineering type drawings. The drawings produced have to be fit for purpose but do not necessarily need to conform to drawing standard, such as *AS 1100.101-1992 Technical drawing - General principles*.

This unit is also intended to provide the learner with the opportunity to incorporate the skills available in other units to produce a functional engineering product in an institutional environment. Skills such as welding and machining do not need to be pre-developed but can be developed in an integrated way as required throughout the project progress.

Application of the Unit

This unit is designed for use in a pre-employment skills introduction program and is suitable for use in institutional based vocational programs. Skills development will take place under direct supervision.

This unit is not to be used in a traineeship or apprenticeship training program or associated qualifications. It is only to be used in pre-employment programs and carries no credit towards apprenticeship/trade and other qualification types in manufacturing and engineering.

This unit should be integrated with the skills development undertaken through other units in this qualification.

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. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

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| 1 | Research engineering materials and components | 1.1 | Determine the uses of <i>engineering materials</i> , such as types and forms of metals, polymers (thermo setting and thermo plastic) and fibres |
| | | 1.2 | Describe the advantages of the engineering materials when compared to each other |
| | | 1.3 | Determine commonly available <i>shapes of metal materials</i> , such as sheet, plate, bar, angle iron and other common shapes |
| | | 1.4 | Determine <i>methods used to join metal</i> pieces, such as, threads, pins, circlips, rivets, welding, folded joints and adhesives |
| | | 1.5 | Describe the advantages of the different metal joining methods |
| | | 1.6 | Determine the types of plain and anti-friction bearings, including type of materials, used in machines |
| | | 1.7 | Describe the advantages and disadvantages of the different types of bearings |
| 2 | Develop a metals-based project | 2.1 | Research and decide on a realistic project that can be completed in the institution in the available time |
| | | 2.2 | Determine the types of material required for the project |

- 2.3 Determine the amount of material and components required
 - 2.4 Gain approval for the project
- 3 Determine drawing requirements
 - 3.1 Research engineering drawing practices
 - 3.2 Decide how drawings will be produced, e.g. using a CAD systems and/or hand drawing equipment, and/or freehand sketches
 - 3.3 Decide on appropriate dimensioning methods for the drawings produced
 - 3.4 Decide on methods and conventions for naming and saving new or modified drawings
- 4 Create project drawings
 - 4.1 Produce drawings of the completed project using either CAD systems, hand drawing equipment or freehand sketches
 - 4.2 Produce drawings of the individual project components using either CAD systems, hand drawing equipment or freehand sketches
 - 4.3 Review drawings with teacher/instructor and peers
 - 4.4 Modify drawings as required
 - 4.5 Produce an items and materials list using the either the CAD system or other computer software
- 5 Plan the manufacture of the product
 - 5.1 Determine the machines, tools and equipment required
 - 5.2 Determine the sequence of individual component manufacture and measures needed to protect manufactured components from damage
 - 5.3 Develop a plan for the assembly of the project
 - 5.4 Get advice and approval for the project and plan

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| 6 | Manufacture the product | 6.1 | Use and wear appropriate personal protective equipment |
| | | 6.2 | Follow safe working practices and procedures |
| | | 6.3 | Manufacture and store components and acquire stock components according to the developed plan |
| | | 6.4 | Assemble product according to the developed and approved plan |
| | | 6.5 | Check for conformance to requirements throughout the manufacture and assembly process |
| | | 6.6 | Submit the project for final endorsement |
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| 7 | Complete work requirements | 7.1 | Clear work area of waste and clean according to requirements |
| | | 7.2 | Maintain and/or store machines, tools and equipment according to instructions |

Required Skills and Knowledge

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

Required skills

Required skills include:

- working safely
- selecting engineering materials for a project
- selecting engineering components for a project
- determining appropriate joining methods for engineering materials and components
- researching and evaluating engineering projects for their appropriateness in an educational institution
- producing drawings of an assembled project and its components
- planning the manufacture of an engineering project, including all necessary calculations
- producing components following created drawings
- assembling project
- tidying/cleaning work area as appropriate
- returning tools, equipment and project items to designated storage areas and/or conditions
- using and applying personal protective equipment

Required knowledge

Required knowledge includes:

- safe working practices in an engineering workshop
- sources of information on engineering materials and components
- sources of information on engineering projects
- engineering drawing practices
- methods of joining metals
- the need for drawings that others can follow

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>Overview of assessment</p>	<p>A person who demonstrates competency in this unit must be able to research, plan and make an engineering project in a learning institution.</p>
<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>Assessors must be satisfied that the candidate can</p> <ul style="list-style-type: none"> • work safely • select engineering materials for a project • select engineering components for a project • determine appropriate joining methods for engineering materials and components • research and evaluate engineering projects for their appropriateness in an educational institution • produce drawings of an assembled project and its components • plan the manufacture of an engineering project, including all necessary calculations • produce components following created drawings • assemble project • clean and store equipment as instructed.
<p>Context of and specific resources for assessment</p>	<ul style="list-style-type: none"> • This unit must be assessed in a learning institution. • Assessment must cover the successful manufacture of a project. • The skills covered by this unit would be demonstrated by an individual working alone or in a team and under direct supervision. • The assessment environment should not disadvantage the candidate. • This unit may be assessed in conjunction with any other units addressing the safety, quality, communication, hand tools, machine operation, equipment operation, recording and reporting associated with making the project.
<p>Method of assessment</p>	<ul style="list-style-type: none"> • Assessment must satisfy the endorsed Assessment

	<p>Guidelines of the MEM05 Metal and Engineering Training Package.</p> <ul style="list-style-type: none">• Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure correct interpretation and application.• 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.• Assessment should be in conjunction with assessment of the all skills and units integrated into the project.
Guidance information for assessment	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.

<p>Engineering materials</p>	<p>Engineering materials may include but are not limited to:</p> <ul style="list-style-type: none"> • types of metal • thermo setting and thermo plastic polymers • fibre glass • carbon fibre
<p>Shapes of metal materials</p>	<p>Metal material shapes may include but are not limited to:</p> <ul style="list-style-type: none"> • sheet • plate • bar • angle iron • extruded forms • channel • beams
<p>Methods used to join metal</p>	<p>Methods used to join metal may include but are not limited to:</p> <ul style="list-style-type: none"> • threaded fasteners • pins • circlips • rivets • welding • folded joints • adhesives

Unit Sector(s)

Competency field

Unit sector

Custom Content Section

Not applicable.