



**Australian Government**

# **MEM30009 Contribute to the design of basic mechanical systems**

**Release: 1**

# MEM30009 Contribute to the design of basic mechanical systems

## Modification History

Release 1. Supersedes and is equivalent to MEM30009A Contribute to the design of basic mechanical systems.

## Application

This unit of competency defines the skills and knowledge required to contribute to basic mechanical system design. It includes the research of equipment functions and operational requirements, the preparation of preliminary documentation and the selection of components such as shafts, seals, bearings, fasteners, splines, cam, lifting systems, pneumatic circuits, hydraulic circuits, piping systems and mechanical features required to perform simple functions.

The unit applies to engineering or related activities and is suitable for people giving technical support in manufacturing or engineering operations and those pursuing technical qualifications and careers at paraprofessional or technician level. All work is carried out under supervision.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

## Pre-requisite Unit

MEM16008 Interact with computing technology

MEM30032 Produce basic engineering drawings

## Competency Field

Engineering technician

## Elements and Performance Criteria

| Elements                                                    | Performance Criteria                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i>            | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                            |
| 1. Research equipment function and operational requirements | 1.1 Follow standard operating procedures (SOPs) and comply with work health and safety (WHS) requirements at all times<br>1.2 Identify and obtain information required for design development<br>1.3 Consult appropriate personnel to determine requirements<br>1.4 Interpret information collected, prepare draft functional and |

| Elements                                         | Performance Criteria                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i> | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                 |
|                                                  | operational requirements and verify with supervisor or design team                                                                                                                                                                                                                                                     |
| 2. Prepare preliminary design documentation      | 2.1 Select appropriate components, assemblies and fasteners to perform the required function<br>2.2 Select components and/or materials from supplier or manufacturer catalogues as required<br>2.3 Apply appropriate and relevant codes to documentation<br>2.4 Refer documentation to a higher authority for approval |
| 3. File and issue completed documentation        | 3.1. Store and file approved documentation in accordance with SOPs<br>3.2. Issue approved documentation to relevant personnel                                                                                                                                                                                          |

## Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

## Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

|                                                                                         |                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Information and preliminary design documentation includes one or more of the following: | <ul style="list-style-type: none"> <li>• drawings</li> <li>• sketches</li> <li>• specifications</li> <li>• manuals.</li> </ul>                                           |
| Mechanical components include:                                                          | <ul style="list-style-type: none"> <li>• shafts</li> <li>• seals</li> <li>• bearings</li> <li>• fasteners, thread systems</li> <li>• splines</li> <li>• cams.</li> </ul> |

|                             |                                                                                                                                                                                                                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Drive components include:   | <ul style="list-style-type: none"> <li>• electric motors</li> <li>• internal combustion engines</li> <li>• brakes</li> <li>• clutches</li> <li>• belts and pulleys</li> <li>• chains and sprockets</li> <li>• gears</li> <li>• couplings</li> <li>• universal joints.</li> </ul>   |
| Mechanical systems include: | <ul style="list-style-type: none"> <li>• lifting systems: <ul style="list-style-type: none"> <li>• lifting jacks</li> <li>• hoists</li> <li>• winch equipment</li> </ul> </li> <li>• pneumatic systems</li> <li>• hydraulic systems</li> <li>• pumps and piping system.</li> </ul> |
| Pneumatic systems include:  | <ul style="list-style-type: none"> <li>• compressors</li> <li>• pneumatic components</li> <li>• typical circuits and applications</li> <li>• electrical control.</li> </ul>                                                                                                        |
| Hydraulic systems include:  | <ul style="list-style-type: none"> <li>• power packs</li> <li>• pumps and other components</li> <li>• typical circuits and applications</li> <li>• electrical control.</li> </ul>                                                                                                  |
| Pumping systems include:    | <ul style="list-style-type: none"> <li>• pumps and piping system</li> <li>• purpose of pumps and piping systems</li> <li>• pumps, valves, pipes and other components.</li> </ul>                                                                                                   |

## Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM30009A Contribute to the design of basic mechanical systems.

## Links

Companion Volume Implementation Guides are available on VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

# Assessment Requirements for MEM30009 Contribute to the design of basic mechanical systems

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## Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include:

- contributing to the design of basic mechanical systems on at least two occasions
- researching equipment function and operational requirements
- selecting appropriate components, assemblies and fasteners to perform the required function
- preparing preliminary design documentation
- issuing or filing completed documentation in accordance with SOPs.

*Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.*

## Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- relevant codes and standards
- basic mechanical components
- drive components
- lifting systems
- pneumatic systems and their advantages and disadvantages
- hydraulic systems and their advantages and disadvantages
- purpose of pumps and piping systems.
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## Assessment Conditions

- Assessors must:
  - have vocational competency in contributing to the design of basic mechanical systems at least to the level being assessed with relevant industry knowledge and experience

- satisfy the assessor requirements in the Standards for Registered Training Organisations 2015 or its replacement and comply with the National Vocational Education and Training Regulator Act 2011, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible, assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
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