



**Australian Government**

# **MEM23120 Select mechanical machine and equipment components**

**Release: 1**

# MEM23120 Select mechanical machine and equipment components

## Modification History

Release 1. Supersedes and is equivalent to MEM23120A Select mechanical machine and equipment components.

## Application

This unit of competency defines the skills and knowledge required for the technical selection of mechanical machine and equipment components. It includes analysis of the application to determine suitability of components and use of performance analysis software.

The unit applies to selecting components of machines or equipment based on mechanical engineering-related technical criteria to ensure appropriate performance and compliance with standards. It applies to selection tasks based on analyses completed by an individual or the use of technical criteria supplied by professional engineers or equipment suppliers. The use of calculus for technical analysis is not covered by this unit.

The unit is suitable for people working as mechanical detailers or designers and draftspersons and for those pursuing careers and qualifications in mechanical engineering or related disciplines.

This unit does not cover selection of electric motors, electrical components, fluid power components such as pumps, control components and support structures or structural fastening and welding with eccentric loadings. These are covered in other units.

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

## Pre-requisite Unit

MEM23004 Apply technical mathematics

MEM23109 Apply engineering mechanics principles

MEM30005 Calculate force systems within simple beam structures

MEM30006 Calculate stresses in simple structures

## Competency Field

Engineering science

## 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. Establish scope of machine components selection task     | 1.1 Identify stakeholders to be consulted on selection tasks<br>1.2 Determine compliance requirements of work health and safety (WHS) and regulatory requirements, codes of practice, standards, and risk assessment considerations<br>1.3 Review features and functions of mechanical machines and components<br>1.4 Investigate sustainability implications of component selection task<br>1.5 Establish availability of technical and professional assistance                                                                               |
| 2. Examine technical specifications for component selection | 2.1 Confirm performance requirements of machines or equipment components<br>2.2 Select appropriate analysis techniques using graphs, tables, nomograms or computer-aided solutions based on the work requirements<br>2.3 Analyse operating conditions of components and determine component selection criteria<br>2.4 Review design loads, working stresses, allowable deformations and factor of safety for machine components<br>2.5 Determine component arrangement, limits, fits and clearances, assembly, fastening and alignment methods |
| 3. Select machine components                                | 3.1 Specify arrangement and assembly requirements<br>3.2 Advise stakeholders of selection and make any required adjustments<br>3.3 Ensure traceability of analysis and component selection                                                                                                                                                                                                                                                                                                                                                     |
| 4. Report results                                           | 4.1 Record results of examination and component selection processes<br>4.2 Provide documentation including calculations, estimations, specifications, diagrams and drawings                                                                                                                                                                                                                                                                                                                                                                    |

## 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. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Machine and equipment components performing mechanical functions includes one or more of the following:                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• shafts, bearings and couplings</li> <li>• power screws, gear drives and spur gears</li> <li>• chain, belt drives, brakes and clutches.</li> </ul>                                                                                                                                                                                                                                                                           |
| Appropriate licensed technical and professional assistance includes:                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>• technical support and advice relating to elements which have intrinsic dangers</li> <li>• professional support for technologies.</li> </ul>                                                                                                                                                                                                                                                                                 |
| Sustainability implications include:                                                                                                                                                                                                                                                          | <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> |
| Analysis of machines, equipment and components includes:                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>• static and dynamic analysis of loads</li> <li>• stresses and deformations resulting</li> <li>• transmitted power, torque and speed</li> <li>• machine operator interface in terms of ergonomics and safety</li> <li>• environmental effects, including noise, energy efficiency, heat generation and dust generation</li> <li>• graphical and mathematical methods and software options.</li> </ul>                         |
| Appropriate computer-aided solutions and validation techniques include:                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• performance analysis and computer-aided design (CAD) modelling</li> <li>• comparison of traditional solutions for simple design problems with software solutions to the same design problems</li> <li>• review of previously implemented design challenges which were completed using the software.</li> </ul>                                                                                                              |

## Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23120A Select mechanical machine and equipment components.

## Links

Companion Volume implementation guides are found in VETNet -

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

# Assessment Requirements for MEM23120 Select mechanical machine and equipment components

## Modification History

Release 1. Supersedes and is equivalent to MEM23120A Select mechanical machine and equipment components.

## 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:

- evaluating machine components and arrangements for compliance with work health and safety (WHS) and regulatory requirements and risk assessment
- determining component arrangement, limits, fits and clearances, assembly, fastening and alignment of components
- investigating sustainability implications of components selection task
- reviewing features and functions of machine and equipment components
- reviewing design loads, working stresses, allowable deformations and factor of safety, component arrangements, limits and fits, assembly, adjustment and fastening methods required by the task on at least two occasions
- identifying relevant analysis support including graphs, tables, nomograms or computer-aided solutions and validation techniques
- selecting and specifying machine components on at least two occasions, including arrangement and assembly requirements
- reporting and documenting results of component selection, including calculations, specifications, diagrams and drawings.

*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:

- WHS and regulatory requirements, codes of practice, standards and risk management requirements relevant to mechanical component selection processes
- machine and equipment mechanical components
- technical and professional assistance
- current options and trends in performance analysis software including underpinning program techniques and software validation techniques
- properties of common machine and component materials.
-

## Assessment Conditions

- Assessors must:
  - have vocational competency in selecting mechanical machine and equipment components 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.
- 

## Links

Companion Volume implementation guides are found in VETNet -

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