



Australian Government

MEM30005 Calculate force systems within simple beam structures

Release: 1

MEM30005 Calculate force systems within simple beam structures

Modification History

Release 1. Supersedes and is equivalent to MEM30005A Calculate force systems within simple beam structures.

Application

This unit of competency defines the skills and knowledge required to understand and calculate force systems within simple beam structures. It involves solving simple engineering problems involving forces and moments and to determining nominal sizes of simple beams subject to loading.

The applies to work in all manufacturing and engineering workplace environments.

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

MEM30012 Apply mathematical techniques in a manufacturing engineering or related environment

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. Determine the resultant and equilibrant of systems of coplanar forces	1.1 Follow standard operating procedures (SOPs) and comply with work health and safety (WHS) requirements at all times 1.2 Calculate the magnitude and direction of the resultant and equilibrant of coplanar force systems 1.3 Calculate the line of action of a resultant using the principle of moments
2. Determine reactions and moments for a	2.1 Calculate the support reactions for a simply supported horizontal beam using the equations of equilibrium and including the moment

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
simple horizontal beam subject to a combination of uniform and point loading	effect of a couple 2.2 Determine the possible types of failure that need to be considered 2.3 Draw shear force and bending moment diagrams 2.4 Determine bending stress 2.5 Complete calculations to determine the nominal size for the beam 2.6 Apply factors of safety to finalise nominal size of beam

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.

There is no Range of Conditions information for this unit of competency.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM30005A Calculate force systems within simple beam structures.

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 MEM30005 Calculate force systems within simple beam structures

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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:

- determining the resultant and equilibrant of systems of coplanar forces on at least two occasions
- determining nominal sizes for simple horizontal beam subject to a combination of uniform and point loading
- calculating force systems within simple beam structures on at least two occasions.

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:

- 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 including simply supported, point load, uniformly distributed load (UDL) and self-weight
- simple beams

- shear force and bending moment diagrams
- bending stress
- deflection by formula
- stress and strain
- shear stress and strain
- allowable stress
- factors of safety.
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Assessment Conditions

- Assessors must:
 - have vocational competency in calculating force systems within simple beam structures 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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