



Australian Government

MEM30006 Calculate stresses in simple structures

Release: 1

MEM30006 Calculate stresses in simple structures

Modification History

Release 1. Supersedes and is equivalent to MEM30006A Calculate stresses in simple structures.

Application

This unit of competency defines the skills and knowledge required to determine stresses and their effect on the strength and stability of simple structures and mechanical components in centrally-loaded bolted connections, fillet and butt-welded connections. It includes the verification of the stress levels using appropriate reference material such as design manuals, handbooks, relevant codes and regulations, databases and manufacturers' references.

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

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 stresses in simple structures and mechanical components	1.1 Follow standard operating procedures (SOPs) and comply with work, health and safety (WHS) requirements at all times 1.2 Determine the shear stresses in simple bolted connections 1.3 Determine the nominal weld size or length of weld required on simple welded connections to meet load requirements 1.4 Draw and use torque distribution diagrams to calculate torsional shear stress and angle of twist on threaded bolts subjected to torques

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
2. Verify stress levels using appropriate reference material	2.1 Use appropriate reference materials to verify that stress loading is acceptable 2.2 Report verification results

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.

Simple structures calculations are limited to consideration of centrally-loaded:	• bolted connections • fillet and butt-welded connections.
Reference materials include:	• design manuals • handbooks • relevant codes and regulations • databases • manufacturer references.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM30006A Calculate stresses in simple structures.

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 MEM30006 Calculate stresses in simple 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 stresses in simple structures and mechanical components on at least two occasions
- drawing and using torque distribution diagrams
- using relevant codes and reference material
- verifying stress levels using appropriate reference material
- reporting verification results.

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:

- stress and strain:
 - normal stress and strain
 - modules of elasticity
 - deformation
 - Poisson's ratio
 - shear stress and strain
 - modulus of rigidity
 - yield stress, ultimate stress, proportional limit, factor of safety and allowable stress
- centrally-loaded connections
- bolted connections
- shear, tensile, torque and bearing stresses
- centrally-loaded welded connections
- fillet and butt welds including method of failure
- size and length of weld
- effect of hole punching
- longitudinal stress
- relevant codes and reference material.

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Assessment Conditions

- Assessors must:
 - have vocational competency in calculating stresses in simple 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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