Australian Government

Department of Education, Employment and Workplace Relations

MEM30006A Calculate stresses in simple structures

Release: 1

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Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers determining stresses and their effect on the strength and stability of simple structures and mechanical components.

Application of the Unit

Application of the unit	This unit applies to the calculation of stresses in centrally loaded bolted connections, fillet and butt welded connections. All work is carried out under supervision. **Band**: **0** **Unit Weight**: **0**

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM30012A	Apply mathematical techniques in a manufacturing engineering or related environment

Employability Skills Information

Employability skills	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

ELEMENT	PERFORMANCE CRITERIA
1. Determine stresses in simple structures and mechanical components	1.1. The shear stresses in simple bolted connections are determined. 1.2. The nominal weld size or length of weld required on simple welded connections is determined to meet load requirements. 1.3. Torque distribution diagrams are drawn and used to calculate torsional shear stress and angle of twist on threaded bolts subjected to torques.
2. Verify stress levels using appropriate reference material	2.1. Appropriate reference materials are used to verify that stress loading is acceptable and in accordance with standard operational procedures. 2.2. Verification results are reported according to standard operational procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Look for evidence that confirms skills in:

- interpreting drawings and graphical representations
- calculating stresses using given formulas
- construction of torque distribution diagrams
- accessing relevant codes and reference material
- interpreting results against reference materials

Required knowledge

Look for evidence that confirms knowledge of:

- stress and strain:
  - normal stress and strain
  - modules of elasticity
  - deformation
  - Poisson's Ratio
  - shear stress and strain

REQUIRED SKILLS AND KNOWLEDGE

- modulus of rigidity
- yield stress, ultimate stress, proportional limit, factor of safety, allowable stress
- centrally loaded connections
- bolted connections
- shear, tensile, torque and bearing stresses
- centrally loaded welded connections
- fillet and butt welds, method of failure
- size and length of weld
- effect of hole punching
- longitudinal stress
- how to access and use relevant codes and reference material

Evidence Guide

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.	
Overview of assessment	A person who demonstrates competency in this unit must be able to calculate stresses in simple structures as defined. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.
Context of and specific resources for assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate. This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with calculating stresses in simple structures, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

EVIDENCE GUIDE	
Guidance information for assessment	

Range Statement

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.	
Simple structures	Limited to consideration of centrally loaded bolted connections, fillet and butt welded connections
Reference materials	May include design manuals, handbooks, relevant codes and regulations, databases and manufacturers' references

Unit Sector(s)

Unit sector	

Co-requisite units

Co-requisite units		

Competency field

Competency field	Engineering technician