



Australian Government

Assessment Requirements for MEM23121

Analyse loads on frames and mechanisms

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MEM23121A Analyse loads on frames and mechanisms.

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:

- identifying and reviewing features, functions and performance requirement of frames, beams and mechanisms
- identifying complex calculations requiring professional engineering assistance
- establishing dynamics, design loads, working stresses, allowable deformations and factor of safety element arrangements for calculations to be done
- evaluating assembly and fastening methods, analysis techniques, software and software validation techniques
- identifying relevant analysis support including graphs, tables, nomograms or computer-aided solutions and validation techniques
- analysing static and dynamic operating conditions and determining design or selection parameters on at least two occasions
- optimising frame, beam and mechanism elements for strength, deflection, arrangement and fastening on at least two occasions
- communicating and negotiating with stakeholders, professionals and technicians and adjusting accordingly
- evaluating frames, beams and mechanisms for work health and safety (WHS) and regulatory requirements and risk management compliance
- reporting and documenting results of analysis 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, and directives and standards, including those related to risk management
- structural support and machine elements
- current options and trends in performance analysis software including underpinning program and software validation techniques

- technical and professional assistance
- types and functions of frames and mechanisms
- mechanisms for converting linear to rotary motion and rotary to linear motion
- lifting machines
- design loads, working stresses, allowable deflections and factor of safety for machine elements
- conditions for equilibrium
- non-coplanar and force systems
- equilibrium of non-coplanar and non-concurrent force systems
- reactions at beam supports including simply supported, overhung and cantilever beam with vertical and oblique concentrated, uniform and variable distributed loads and couples
- shear force and bending moments and diagrams
- vertical and oblique concentrated and uniform and variable distributed loads
- types and locations of stresses including:
 - combined stresses
 - thermal stress due to restrained expansion
 - stress concentration and fatigue due to alternating stresses
- centre of gravity and percussion
- methods of analysis of frames and trusses
- deflection of beams
- statically indeterminate beams
- buckling of compressed members
- loads and stresses on bolted and welded connections
- static versus dynamic forces, balanced and unbalanced
- dynamics and laws of rotational motion
- dynamic analysis of mechanisms
- linked bodies in motion including types, impulse, momentum and work energy methods
- work, energy and power for balanced and unbalanced force systems.
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Assessment Conditions

- Assessors must:
 - have vocational competency in analysing loads on frames and mechanisms 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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Links

Companion Volume implementation guides are found in VETNet -

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