



Australian Government

Assessment Requirements for MEM234019 Apply finite element analysis in engineering design

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MEM234019A Apply finite element analysis in engineering design.

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:

- interpreting and evaluating relevant information, documentation, specifications and drawings for finite element analysis (FEA) purposes
- determining functions, features and performance parameters of plant, structure or equipment to be analysed
- determining parameters of the brief or contract, work health and safety (WHS), regulatory, risk management and sustainability requirements
- applying FEA solution techniques on at least two occasions
- setting up FEA model, parameters, element mesh and nodes
- selecting appropriate solvers
- adjusting and optimising parameters
- generating and assessing solution file
- interpreting results, generating graphics and identifying significant issues
- validating software outputs
- communicating, advising, negotiating and reviewing with stakeholders and client throughout the process
- reporting and documenting 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:

- FEA task parameters for applications including:
 - stresses and displacements
 - natural frequencies
 - heat and temperature distribution
- design parameter briefs
- software modelling and validation techniques including:

- element type and shape for error minimisation
- library files
- geometry importation from other software packages
- application of boundary conditions
- validation using comparison with traditional solution of simple examples and reviewing of past successful applications
- methods for presentation of results including software-generated graphics
- measures of excessive stress and/or deformation and to recommend modifications
- software functions and features including:
 - deformed displays
 - colour contour plots, contour averaging and contour jumps
 - peeking, graphing and animating
 - multiple views
- coordinate systems including:
 - cartesian
 - polar
 - spherical coordinate systems
- stress concentrations
- structural loads including:
 - dead loads, live loads and wind loads
 - structural and non-structural mass
- material libraries including:
 - types of beam, plate and brick elements
 - properties of materials including stress, strain, modulus of elasticity, modulus of rigidity, Poisson's ratio and allowable stress
- stresses including:
 - equivalent stresses based on von Mises criterion and Tresca criterion
 - shear force and bending moment diagrams, bending stress and torsional stress
 - heat transfer modes (conduction, convection and radiation)
 - thermal stress
- accuracy checking methods including use of strain gauges and solvers
- software validation techniques.

Assessment Conditions

- Assessors must:
 - have vocational competency in applying finite element analysis in engineering design 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 available on VETNet -

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