



Australian Government

MEM23138 Evaluate suitability of materials for engineering-related applications

Release: 1

MEM23138 Evaluate suitability of materials for engineering-related applications

Modification History

Release 1. Supersedes and is equivalent to MEM23138A Evaluate suitability of materials for engineering-related applications.

Application

This unit of competency defines the skills and knowledge required to evaluate materials used in manufacturing, engineering or related applications for their suitability in engineering-related projects or processes. It requires consideration of materials with regard to design requirements, sustainability, product manufacturability, facilities, services, plant and tooling, and safe use.

It is suitable for people working as manufacturing, maintenance, design and drafting technicians or paraprofessionals, and those pursuing manufacturing engineering or related technical qualifications.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

MEM23004 Apply technical mathematics

Competency Field

Engineering science

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 scope of materials evaluation	1.1 Identify materials to be evaluated and their related manufacturing or engineering-related applications 1.2 Confirm stakeholders to be consulted on the evaluation 1.3 Confirm appropriate support, including technical and professional assistance, is available 1.4 Identify relevant work health and safety (WHS) and regulatory requirements, standards, codes of practice, risk management and organisational procedures

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. Prepare for evaluation	2.1 Review design information about related products and processes for material specifications 2.2 Identify analysis principles and techniques relevant to the materials, processes, services, plant and tooling covered by the evaluation 2.3 Identify appropriate analysis software and software validation techniques 2.4 Investigate sustainability implications of materials and related manufacturing or engineering processes
3. Evaluate materials and processes for an application	3.1 Determine properties of materials under evaluation, and supervise any required tests 3.2 Assess materials and related processes for compliance with WHS and other regulatory and risk management requirements 3.3 Assess material, product and processes for sustainability 3.4 Review materials for product and process suitability and process optimisation 3.5 Apply systems thinking, continuous improvement, problem-solving and decision-making, and constraint and contingency management principles and techniques to evaluation
4. Report results	4.1 Record results of evaluation 4.2 Provide documentation including tool, product and process analysis, and computer-aided design (CAD) files

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.	
Appropriate technical and professional assistance includes:	• technical support and advice relating to elements which have intrinsic dangers • professional support for technologies.
WHS, regulatory requirements and organisational procedures include:	• WHS acts, regulations and relevant standards • codes of practice from Australian and overseas engineering and technical associations and societies • risk assessments • registration requirements • safe work practices • state and territory regulatory requirements applying to electrical work.
Sustainability includes:	• meeting all regulatory requirements • conforming to all industry covenants, protocols and best practice guides • minimising ecological and environmental footprint of process, plant and product • maximising economic benefit of process plant and product to the organisation and the community • minimising the negative WHS impact on employees, community and customer.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23138A Evaluate suitability of materials for engineering-related applications.

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 MEM23138 Evaluate suitability of materials for engineering-related applications

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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 suitability of materials for manufacturing and engineering applications and processes on at least two occasions
- investigating sustainability implications for materials and related applications
- determining and reviewing material properties related to applications on at least two occasions
- identifying materials processing principles and techniques, including facilities, services, plant and tooling, and analysis techniques and software, including supervisory control and data acquisition (SCADA)
- evaluating work health and safety (WHS), regulatory and risk management compliance
- reporting and documenting results of evaluation.

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:

- sources of technical and professional assistance
- sustainability implications of materials and related manufacturing and engineering-related products and processes
- WHS and regulatory compliance requirements and risk management practices related to materials, including use of safety data sheets (SDS)
- software options for materials and process analysis
- common materials, properties and structures in manufacturing and engineering including:
 - mechanical, electrical, thermal, optical, chemical and magnetic properties
 - ferrous and nonferrous metals and alloys
 - polymers
 - ceramics
 - composites
 - glass
- cold working of metals

- metal heat treatment
- processes for working, shaping and joining of materials including:
 - metal machining
 - metal cutting
 - casting and moulding of metals
 - fabricating and welding of ferrous metals, nonferrous metals and plastics
 - injection, compression and blow moulding of plastics
 - extrusion of plastics and metals
 - electroplating
 - powder coating
 - composite lay-up and moulding
 - sintering of plastic and metal powders
 - additive and rapid processes
 - casting of metals
 - stamping, drawing and roll forming of sheet metals
 - forging of metals
 - hot and cold rolling of billets, structural sections and coiled sheet
- systems thinking, continuous improvement, problem-solving and decision-making, and constraint and contingency management principles and techniques
- reporting and documentation requirements.
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Assessment Conditions

- Assessors must:
 - have vocational competency in evaluating suitability of materials for engineering-related applications 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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