Australian Government

MEM50522 Diploma of Engineering - Materials

Release: 2

MEM50522 Diploma of Engineering - Materials

Modification History

Release	Comments
2	Elective units updated.
1	This qualification was first released in MEM Manufacturing and Engineering Release 4.0.

Qualification Description

This qualification provides technical skills and knowledge related to ferrous and nonferrous metals, polymers, composites and ceramics and their application in manufacturing and engineering processes.

Completion of this qualification will enable a person to work in a variety of roles requiring industrial materials knowledge and skills, including working as part of a multidisciplinary design team, supervising the processing of materials, providing expert materials supervision to materials-intensive manufacturing processes, and technical sales roles requiring specialist materials knowledge.

The qualification provides broad technical skill and knowledge across common engineering materials and related manufacturing and engineering processes and equips workers for supervisory and operations management roles where specialist materials skills and knowledge are required.

It has the following streams:

- Manufacturing Materials Management. This stream provides broad technical skill and knowledge across common engineering materials and materials- related manufacturing and engineering processes. This stream is suitable for people in supervisory and operations management roles where specialist materials skills and knowledge are required.
- Metal Technology. This stream provides technical skill and knowledge for manufacturing based on metal and alloy materials.
- Polymer Technology. This stream provides technical skill and knowledge for manufacturing based on polymer materials.
- Composites Technology. This stream provides technical skill and knowledge for manufacturing based on composite materials.

Streams cover recognised industry subsectors and are achieved by choosing units listed under stream headings. They are not specialisations listed on qualification testamurs (i.e. certificates) but are identifiable via records of results.

Licensing/Regulatory Information

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

Entry Requirements

Nil

Packaging Rules

Total number of units = 18

- Five core units
- Thirteen elective units, consisting of:
  - a minimum of four Group A units
  - other units to bring the total number of elective units to thirteen. These may come from Group B, C and D; no more than two can come from Group A; no more than five can come from Group E; up to four may come from any endorsed Training Package or accredited course – these units must contribute to a valid, industry-supported vocational outcome.

CORE UNITS

Unit code	Unit title	Prerequisites
MEM30007	Select common engineering materials	
MEM30012	Apply mathematical techniques in a manufacturing engineering or related environment	
MEM48030	Apply materials selection analysis techniques	*
MEM48033	Apply chemistry principles to materials used in manufacturing and engineering processes	
MSMENV272	Participate in environmentally sustainable work practices	

ELECTIVE UNITS

Prerequisites for elective units must be completed. Prerequisites only count towards the number of electives required for a group if they are listed in that group. See individual units for details of prerequisites.

Group A – Manufacturing Materials Management

Unit code	Unit title	Prerequisites
MEM09229	Read and interpret technical engineering drawings	

MEM14001	Schedule material deliveries	*
MEM22015	Source and estimate engineering materials requirements	*
MEM23138	Evaluate suitability of materials for engineering-related applications	*
MEM24039	Apply materials technology principles to non-destructive tests	*
MEM234020	Coordinate small lot manufacture using rapid manufacture processes	
MEM234027	Plan and manage materials supply for an engineering project or manufacturing operation	
MEM48001	Test the mechanical properties of materials	
MEM48012	Calculate and predict chemical outcomes in metallurgical situations	*
MEM48020	Recommend ferrous and nonferrous metals or alloys for an application	*
MEM48031	Select ceramic and glass materials for engineering and manufacturing applications	
MEM48032	Select composite materials for engineering and manufacturing applications	
MSL975032	Provide input to production trials	
MSMOPS401	Trial new process or product	
MSS405056	Use three or six sigma processes to determine and improve process capability	*
MSS405076	Facilitate the development of a new product	*
PMBTECH401E	Predict polymer properties and characteristics	
PMBTECH505E	Choose polymer materials for an application	*

Group B – Metal technology

For this stream, select a minimum of four units coded MEM48014 or higher from the list below.

Unit code	Unit title	Prerequisites

MEM48002	Monitor ferrous melting and casting processes	
MEM48003	Monitor nonferrous melting and casting processes	
MEM48004	Interpret basic binary phase diagrams	
MEM48006	Prepare and examine metallographic samples	*
MEM48007	Monitor and test sands, cores and moulds	
MEM48008	Evaluate mould design and gating	*
MEM48009	Undertake and interpret results of chemical analysis on metal samples	
MEM48010	Determine and supervise heat treatment of metal	*
MEM48011	Apply basic chemical principles to metallurgy	
MEM48012	Calculate and predict chemical outcomes in metallurgical situations	*
MEM48014	Recommend a refractory for an application	
MEM48015	Select metal forming process	*
MEM48016	Select metal joining process	*
MEM48021	Apply metallurgical principles and techniques in welding and other thermal processes	*
MEM48022	Apply metallurgical principles and practice to determine metal forming and shaping processes	
MEM48023	Apply metallurgical principles and practice to optimise furnace operation	
MEM48025	Select surface treatment methods for metallic components or products	
MEM48026	Analyse metallurgical failures of components and recommend preventative measures	*
MEM48028	Determine corrosion prevention strategies for metal and alloys	
MEM48029	Interpret and produce complex binary phase diagrams	*

Group C – Polymer Technology

For this stream, select a minimum of four and a maximum of seven units from the list below.

Unit code	Unit title	Prerequisites
PMBTECH302E	Modify existing compounds	
PMBTECH501E	Analyse equipment performance	*
PMBTECH502E	Analyse production trials	*
PMBTECH506E	Analyse the design of products and tools for polymer injection moulding	*
PMBTECH508E	Develop a new compound	
PMBTECH509E	Modify an existing product	
PMBTECH601E	Develop a new product	*
PMBTECH602E	Develop a new die or tool	*
PMBTECH603E	Design structural or mechanical polymer components	*

Group D – Composites Technology

For this stream, select four units from the list below and an additional three units from either the list below or from the polymer technology stream.

MEM26012	Record and trial work processes for one-off composite products	*
MEM26013	Select and use composite processes or systems appropriate for product	*
MEM26014	Adjust resin chemicals for current conditions	*
MEM48034	Apply efficient materials management techniques to composite manufacturing operations	*
PMBTECH403E	Test thermoset composite laminates and materials	
PMBTECH507E	Develop fibre-composite products using cored-laminate techniques	

Group E – General Electives

Unit code	Unit title	Prerequisites
MEM06003	Carry out heat treatment	*
MEM09002	Interpret technical drawing	*

MEM11011	Undertake manual handling	*
MEM12003	Perform precision mechanical measurement	*
MEM12005	Calibrate measuring equipment	*
MEM12023	Perform engineering measurements	*
MEM12024	Perform computations	*
MEM13015	Work safely and effectively in manufacturing and engineering	
MEM13018	Work safely with ionizing radiation	
MEM13019	Undertake work health and safety activities in the workplace	
MEM13020	Supervise work health and safety in an industrial work environment	*
MEM14006	Plan work activities	*
MEM14091	Integrate manufacturing fundamentals into an engineering task	*
MEM15010	Perform laboratory procedures	*
MEM15011	Exercise external quality assurance	*
MEM15012	Maintain/supervise the application of quality procedures	*
MEM16006	Organise and communicate information	*
MEM16008	Interact with computing technology	*
MEM16010	Write reports	*
MEM16012	Interpret technical specifications and manuals	*
MEM22007	Manage environmental effects of engineering activities	*
MEM23004	Apply technical mathematics	
MEM23006	Apply fluid and thermodynamics principles in engineering	*
MEM23007	Apply calculus to engineering tasks	*

MEM23063	Select and organise mechanical engineering material tests	*
MEM23064	Select and organise mechatronic engineering material tests	*
MEM23109	Apply engineering mechanics principles	*
MEM29001	Work in Industry 4.0	
MEM48005	Apply basic knowledge of casting operations	
MEM48013	Identify and select equipment for mineral and chemical processing plants	*
MSL904003	Perform standard calibrations	
MSL974032	Perform chemical tests and procedures	
MSMOPS400	Optimise process/plant area	
MSS402084	Undertake root cause analysis	
MSS404056	Apply statistics to operational processes	
MSS404080	Undertake process capability improvements	
MSS405025	Analyse and map a value stream	
MSS405038	Optimise process costs	
MSS405047	Undertake analysis of cost and waste in terms of customer value	
PMBTECH406E	Diagnose production equipment problems	

Pre-requisite Requirements

Unit of competency	Prerequisite requirement
MEM48026 Analyse metallurgical failures of components and recommend preventative measures	MEM48006 Prepare and examine metallographic samples MEM48004 Interpret basic binary phase diagrams
MEM48008 Evaluate mould design and gating	MEM48005 Apply basic knowledge of casting operations

	MEM48004 Interpret basic binary phase diagrams
MEM16006 Organise and communicate information	MEM13015 Work safely and effectively in manufacturing and engineering
MEM26014 Adjust resin chemicals for current conditions	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering
MEM48029 Interpret and produce complex binary phase diagrams	MEM48004 Interpret basic binary phase diagrams
MEM22015 Source and estimate engineering materials requirements	MEM16006 Organise and communicate information
MEM23064 Select and organise mechatronic engineering material tests	MEM23004 Apply technical mathematics MEM23109 Apply engineering mechanics principles
PMBTECH602E Develop a new die or tool	PMBTECH506E Analyse the design of products and tools
PMBTECH601E Develop a new product	PMBTECH502E Review and analyse production trials and specify retrials PMBTECH505E Choose polymer materials for an application
PMBTECH502E Analyse production trials	MSMOPS401 Trial new process or product
MEM48015 Select metal forming process	MEM48011 Apply basic chemical principles to metallurgy MEM30007 Select common engineering materials MEM09229 Read and interpret technical engineering drawings MEM48012 Calculate and predict chemical outcomes in metallurgical situations
MEM24039 Apply materials technology principles to non-destructive tests	MEM30007 Select common engineering materials

MEM12005 Calibrate measuring equipment	MEM16006 Organise and communicate information MEM12003 Perform precision mechanical measurement MEM13015 Work safely and effectively in manufacturing and engineering MEM12002 Perform electrical/electronic measurement MEM11011 Undertake manual handling MEM12023 Perform engineering measurements
MEM14091 Integrate manufacturing fundamentals into an engineering task	MEM23004 Apply technical mathematics
MEM15012 Maintain/supervise the application of quality procedures	MEM16006 Organise and communicate information MEM15001 Perform basic statistical quality control MEM12025 Use graphical techniques and perform simple statistical computations MEM12024 Perform computations MEM13015 Work safely and effectively in manufacturing and engineering
MEM26013 Select and use composite processes or systems appropriate for product	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering
PMBTECH506E Analyse the design of products and tools for polymer injection moulding	MSMOPS401 Trial new process or product
MSS405076 Facilitate the development of a new product	MSS404056 Apply statistics to operational processes

MEM14001 Schedule material deliveries	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering
MEM16010 Write reports	MEM16006 Organise and communicate information MEM14006 Plan work activities MEM13015 Work safely and effectively in manufacturing and engineering
MEM13020 Supervise work health and safety in an industrial work environment	MEM13019 Undertake work health and safety activities in the workplace
MEM23063 Select and organise mechanical engineering material tests	MEM23004 Apply technical mathematics MEM23109 Apply engineering mechanics principles
MEM12024 Perform computations	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering
PMBTECH501E Analyse equipment performance	MSMOPS401 Trial new process or product PMBTECH401E Predict polymer properties and characteristics
MEM26012 Record and trial work processes for one-off composite products	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering
MEM22007 Manage environmental effects of engineering activities	MEM16006 Organise and communicate information
MEM14006 Plan work activities	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering

MEM23006 Apply fluid and thermodynamics principles in engineering	MEM23004 Apply technical mathematics
MEM06003 Carry out heat treatment	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering MEM11011 Undertake manual handling
MSS405056 Use three or six sigma processes to determine and improve process capability	MSS404056 Apply statistics to operational processes
MEM48034 Apply efficient materials management techniques to composite manufacturing operations	MEM48032 Select composite materials for engineering and manufacturing applications
MEM15010 Perform laboratory procedures	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering MEM11011 Undertake manual handling
MEM48013 Identify and select equipment for mineral and chemical processing plants	MEM48011 Apply basic chemical principles to metallurgy MEM48004 Interpret basic binary phase diagrams
MEM48020 Recommend ferrous and nonferrous metals or alloys for an application	MEM48004 Interpret basic binary phase diagrams
MEM48016 Select metal joining process	MEM48011 Apply basic chemical principles to metallurgy MEM30007 Select common engineering materials MEM09229 Read and interpret technical engineering drawings MEM48012 Calculate and predict chemical outcomes in metallurgical situations

MEM16008 Interact with computing technology	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering
MEM23138 Evaluate suitability of materials for engineering-related applications	MEM23004 Apply technical mathematics
MEM48021 Apply metallurgical principles and techniques in welding and other thermal processes	MEM48011 Apply basic chemical principles to metallurgy MEM30007 Select common engineering materials MEM09229 Read and interpret technical engineering drawings MEM48016 Select metal joining process MEM48012 Calculate and predict chemical outcomes in metallurgical situations
PMBTECH603E Design structural or mechanical polymer components	PMBTECH505E Choose polymer materials for an application
MEM16012 Interpret technical specifications and manuals	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering
MEM09002 Interpret technical drawing	MEM16006 Organise and communicate information MEM12024 Perform computations MEM13015 Work safely and effectively in manufacturing and engineering MEM12023 Perform engineering measurements
MEM12023 Perform engineering measurements	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering

MEM15011 Exercise external quality assurance	MEM16006 Organise and communicate information MEM15004 Perform inspection MEM15005 Select and control inspection processes and procedures MEM13015 Work safely and effectively in manufacturing and engineering MEM11011 Undertake manual handling
MEM48006 Prepare and examine metallographic samples	MEM48004 Interpret basic binary phase diagrams
MEM48010 Determine and supervise heat treatment of metal	MEM16006 Organise and communicate information MEM06003 Carry out heat treatment MEM48004 Interpret basic binary phase diagrams MEM13015 Work safely and effectively in manufacturing and engineering MEM11011 Undertake manual handling
MEM11011 Undertake manual handling	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering
MEM12003 Perform precision mechanical measurement	MEM16006 Organise and communicate information MEM13015 Work safely and effectively in manufacturing and engineering MEM11011 Undertake manual handling MEM12023 Perform engineering measurements
MEM48030 Apply materials selection analysis techniques	MEM30007 Select common engineering materials

	MEM30012 Apply mathematical techniques in a manufacturing engineering or related environment
MEM23007 Apply calculus to engineering tasks	MEM23004 Apply technical mathematics
PMBTECH505E Choose polymer materials for an application	PMBTECH401E Predict polymer properties and characteristics
MEM23109 Apply engineering mechanics principles	MEM23004 Apply technical mathematics
MEM48012 Calculate and predict chemical outcomes in metallurgical situations	MEM48011 Apply basic chemical principles to metallurgy

Qualification Mapping Information

Current Code and Title	Previous Code and Title	Comments	Equivalence
MEM50522 Diploma of Engineering - Materials		This qualification has been created to address a requirement by industry that is not covered by an existing qualification.	Newly created

Links

Companion volumes, including implementation guides, are found on the national training register - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=45a7f1d5-61a5-447a-9688-7abbd7e1a5c7.