MEM50212 Diploma of Engineering - Technical

Release: 4

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# Modification History

Release 4 - Removal of superseded unit from Group B electives (MEM14082A replaced in V9 by MEM14090A). Equivalent.

Release 3 - Imported elective unit UEPMNT419A replaced by UEPMNT419B. No change in outcomes.

Release 2 - ISC correction - MEM09141A and MEM09142A removed from packaging rules (units superseded and replaced in version 9)

# Description

Not applicable

# Pathways Information

Not Applicable

# Licensing/Regulatory Information

There are no specific licences that relate to this qualification. However, for employment at paraprofessional levels in the aeronautical and avionic fields in the Australian aviation industry, the Australian Defence Force (ADF) and the Civil Aviation Safety Authority (CASA) have requirements that must be met. Units designed to meet these requirements are included as electives in this qualification. Advice on the selection of electives to meet ADF and CASA requirements is given at the end of this qualification.

# Entry Requirements

Not applicable

# Employability Skills Summary

|  |  |
| --- | --- |
| Employability Skill | Industry/enterprise requirements for this qualification include: |
| Communication | * Read, interpret and analyse information on specifications, design briefs, charts, lists, drawings and other applicable reference documents
* Research, organise, analyse and communicate complex information from reference texts, manufacturer's catalogues and industrial magazines, websites, use of phone, email and fax
* Communicate effectively across a range of communication networks in the workplace, including attending meetings and facilitating small group discussions and meetings on relevant engineering and trade related issues, writing memos or letters, making telephone calls
* Produce, interpret and analyse engineering drawings, charts and graphs
* Prepare and disseminate verbal or written technical information, instructions, work plans, reports, specifications and other documentation
* Identify, access, interpret and analyse trade related information in an enterprise, including quality documentation, equipment manufacturer specifications, engineering data sheets, production and maintenance records and national standards
* Use engineering terminology and language appropriate to the situation and target audience
* Write technical or non-technical reports that include some level of analysis and/or research
 |
| Teamwork | * Work alone or as part of a team that may include apprentices, other tradespersons, technicians, engineers and production personnel
* Provide clear and precise information to team members
* Delegate and supervise work where appropriate
 |
| Problem-solving | * Analyse information and data from operations, processes, and test results including determining trends from graphical data
* Develop solutions and recommendations to trade related problems based on analysis of data
* Apply mathematical techniques and scientific principles to engineering situations (including arithmetic, algebraic expressions with one independent variable, two-dimensional geometry, trigonometry, linear functions, basic quadratic functions, basic statistical methods and statistical process control)
* Perform hazard and risk analysis
 |
| Initiative and enterprise | * Be capable of applying trade-related skills and knowledge in new and different situations and contexts
* Apply statistical processes to make recommendations solutions for equipment and process improvements or to improve sustainability of operations
* Make modifications to work plans and schedules to overcome unforeseen difficulties or developments
* Initiate significant modifications to plant and equipment that lead to desired changes in performance
 |
| Planning and organising | * Organise, sort, categorise and sequence information
* Select and use planning techniques and tools to plan, sequence and prioritise work operations
* Prepare, monitor and review work plans, schedules, programs and budgets
 |
| Self-management | * Carry out work within given timeframe, process and quality constraints
* Carry out work safely and in accordance with company policy and procedures and legislative requirements
* Monitor work to ensure compliance with legislation, codes and national standards
 |
| Learning | * Use manuals, online help and other reference materials as required to research technical information and data suitable and appropriate for advanced trade and technician applications
* Identify and consult appropriate personnel and technical experts or other reference sources to obtain/verify information
* Provide and communicate information to other team members
* Provide on the job training and monitor trainee progress
* Maintain knowledge of relevant legislative requirements, codes and standards
 |
| Technology | * Use computing technology to access, input and store information
* Apply engineering knowledge and principles
* Search computer databases and internet for technical information and data suitable and appropriate for advanced trade applications
* Inspect engineering plant, equipment and systems for optimum operation and undertake modifications as required
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# Packaging Rules

The minimum requirements for achievement of the MEM50212 Diploma of Engineering - Technical are:

* completion of the five (5) core units of competency listed below, and
* fifteen (15) elective units, to bring the total number of units to twenty (20).

Elective units must be selected as follows:

* up to eight (8) general elective units from the list in Group A
* at least seven (7) specialist elective units from Group B, to bring the total number of elective units to fifteen (15).

Three (3) appropriate Group B electives may be chosen from other endorsed Training Packages and accredited courses where those units are available for inclusion at Diploma level. Note that the elective units listed below include all of the units that are approved for selection from the MEM05 Training Package for use in this qualification. This meets the NSSC requirement that one sixth of the total units must be able to be selected from other qualifications in the same Training Package.

Note that when selecting elective units any prerequisite units must also be completed. Note that prerequisites can only count towards the number of electives required if they are listed in the groups below (refer to units for details).

Additional qualification descriptors

The following additional descriptors are approved for use with this qualification:
Mechanical, Mechatronics, Manufacturing, Maintenance, Aeronautical and Avionic.

Core units

* Select all of the units from this list.

|  |  |
| --- | --- |
| Unit code | Unit title |
| MEM16006A | Organise and communicate information |
| MEM16008A | Interact with computing technology |
| MEM30007A | Select common engineering materials |
| MEM30012A | Apply mathematical techniques in a manufacturing, engineering or related environment |
| MSAENV272B | Participate in environmentally sustainable work practices |

Electives units

Group A - general electives

* Select up to eight (8) units from this list.

| Unit code | Unit title | Prerequisites |
| --- | --- | --- |
| MEM09002B | Interpret technical drawing |  |
| MEM09202A | Produce freehand sketches |  |
| MEM09203A | Measure and sketch site information |  |
| MEM09204A | Produce basic engineering detail drawings  | \* |
| MEM09205A | Produce electrical schematic drawings  | \* |
| MEM09206A | Produce drawings for mechanical services  | \* |
| MEM09207A | Produce drawings for reticulated services | \* |
| MEM09208A | Detail fasteners and locking devices in mechanical drawings | \* |
| MEM09209A | Detail bearings, seals and other componentry in mechanical drawings | \* |
| MEM09211A | Produce drawings or models for industrial piping | \* |
| MEM09212A | Produce detailed drawings of steel to non-steel connections | \* |
| MEM09213A | Produce schematic drawings for hydraulic and pneumatic fluid power systems | \* |
| MEM09216A | Interpret and produce curved 3-D shapes and patterns |  |
| MEM09217A | Prepare plans for pipe and duct fabrication | \* |
| MEM09218A | Participate in drafting projects for building services | \* |
| MEM09219A | Prepare drawings for fabricated sheet metal products | \* |
| MEM12024A | Perform computations |  |
| MEM13013B | Work safely with ionizing radiation |  |
| MEM15001B | Perform basic statistical quality control |  |
| MEM16003B | Provide advanced customer service |  |
| MEM16012A | Interpret technical specifications and manuals |  |
| MEM16014A | Report technical information |  |
| MEM18001C | Use hand tools |  |
| MEM24001B | Perform basic penetrant testing | \* |
| MEM24003B | Perform basic magnetic particle testing | \* |
| MEM24005B | Perform basic eddy current testing | \* |
| MEM24007B | Perform ultrasonic thickness testing | \* |
| MEM24009B | Perform basic radiographic testing | \* |
| MEM30005A | Calculate force systems within simple beam structures | \* |
| MEM30006A | Calculate stresses in simple structures | \* |
| MEM30008A | Apply basic economic and ergonomic concepts to evaluate engineering applications |  |
| MEM30009A | Contribute to the design of basic mechanical systems | \* |
| MEM30010A | Set up basic hydraulic circuits |  |
| MEM30011A | Set up basic pneumatic circuits |  |
| MEM30013A | Assist in the preparation of a basic workplace layout |  |
| MEM30014A | Apply basic just in time systems to the reduction of waste |  |
| MEM30015A | Develop recommendations for basic set up time improvements |  |
| MEM30016A | Assist in the analysis of a supply chain |  |
| MEM30017A | Use basic preventative maintenance techniques and tools |  |
| MEM30018A | Undertake basic process planning |  |
| MEM30019A | Use resource planning software systems in manufacturing |  |
| MEM30020A | Develop and manage a plan for a simple manufacturing related project |  |
| MEM30021A | Prepare a simple production schedule |  |
| MEM30022A | Undertake supervised procurement activities |  |
| MEM30023A | Prepare a simple cost estimate for a manufactured product |  |
| MEM30024A | Participate in quality assurance techniques | \* |
| MEM30025A | Analyse a simple electrical system circuit | \* |
| MEM30026A | Select and test components for simple electronic switching and timing circuits | \* |
| MEM30027A | Prepare basic programs for programmable logic controllers |  |
| MEM30028A | Assist in sales of technical products/systems |  |
| MEM30031A | Operate computer-aided design (CAD) system to produce basic drawing elements |  |
| MEM30032A | Produce basic engineering drawings |  |
| MEM30033A | Use computer-aided design (CAD) to create and display 3-D models | \* |
| CPCCOHS1001A | Work safely in the construction industry |  |
| MEA101B | Interpret occupational health and safety practices in aviation maintenance |  |
| MEA105C | Apply quality standards applicable to aviation maintenance processes | \* |
| MEA107B | Interpret and use aviation maintenance industry manuals and specifications |  |
| MEA108B | Complete aviation maintenance industry documentation | \* |
| MEA109B | Perform basic hand skills, standard trade practices and fundamentals in aviation maintenance | \* |
| MEA270A | Lay out avionic systems | \* |
| MEA271A | Lay out avionic flight management systems | \* |
| MEA340A | Lay out and set up aircraft systems | \* |
| MEA341A | Apply basic aircraft design characteristics | \* |
| MSAENV472B | Implement and monitor environmentally sustainable work practices  |  |
| MSATCS301A | Interpret architectural and engineering design specifications for structural steel detailing | \* |
| MSATCS302A | Detail bolts and welds for structural steelwork connections | \* |
| UEPMNT419B | Perform civil drafting |  |
| Prerequisites: | Where a unit has prerequisites then those prerequisite units can only be used in the count towards the total number of units where they are listed in the table above.  |  |

Group B - specialist electives

* Select at least seven (7) units from this list to bring the total number of elective units to fifteen (15).

| Unit code | Unit title | Prerequisites |
| --- | --- | --- |
| MEM09011B | Apply basic engineering design concepts |  |
| MEM09210A | Create 3-D solid models using computer-aided design (CAD) system | \* |
| MEM09214A | Perform advanced engineering detail drafting | \* |
| MEM09215A | Supervise detail drafting projects | \* |
| MEM09220A | Apply surface modelling techniques to 3-D drawings | \* |
| MEM09221A | Create 3-D model assemblies using computer-aided design (CAD) system | \* |
| MEM09222A | Interpret and maintain or restore original drawings | \* |
| MEM09143A | Represent aeronautical engineering designs | \* |
| MEM09144A | Represent avionic engineering designs | \* |
| MEM09155A | Prepare mechanical models for computer-aided engineering (CAE) | \* |
| MEM09156A | Prepare mechatronic models for computer-aided engineering (CAE) | \* |
| MEM09157A | Perform mechanical engineering design drafting |  |
| MEM09158A | Perform mechatronics engineering design drafting |  |
| MEM12005B | Calibrate measuring equipment | \* |
| MEM12022B | Program coordinate measuring machines (advanced) | \* |
| MEM12025A | Use graphical techniques and perform simple statistical computations | \* |
| MEM13010A | Supervise occupational health and safety in an industrial work environment | \* |
| MEM14001B | Schedule material deliveries |  |
| MEM14002B | Undertake basic process planning |  |
| MEM14003B | Undertake basic production scheduling |  |
| MEM14081A | Apply mechanical engineering fundamentals to support design and development of projects | \* |
| MEM14083A | Apply aeronautical fundamentals to support design and development of engineering projects | \* |
| MEM14084A | Apply avionic fundamentals to support design and development of engineering projects | \* |
| MEM14085A | Apply mechanical engineering analysis techniques |  |
| MEM14086A | Apply mechatronic engineering analysis techniques |  |
| MEM14087A | Apply manufactured product design techniques | \* |
| MEM14088A | Apply maintenance engineering techniques to equipment and component repairs and modifications | \* |
| MEM14089A | Integrate mechanical fundamentals into an engineering task | \* |
| MEM14090A | Integrate mechatronic fundamentals into an engineering task | \* |
| MEM14091A | Integrate manufacturing fundamentals into an engineering task | \* |
| MEM14092A | Integrate maintenance fundamentals into an engineering task | \* |
| MEM15007B | Conduct product and/or process capability studies | \* |
| MEM15008B | Perform advanced statistical quality control | \* |
| MEM15010B | Perform laboratory procedures |  |
| MEM15011B | Exercise external quality assurance | \* |
| MEM15012B | Maintain/supervise the application of quality procedures | \* |
| MEM18016B | Analyse plant and equipment condition monitoring results | \* |
| MEM22002A | Manage self in the engineering environment | \* |
| MEM22012A | Coordinate resources for an engineering project or operation |  |
| MEM22013A | Coordinate engineering projects |  |
| MEM22014A | Coordinate engineering-related manufacturing operations | \* |
| MEM22015A | Source and estimate engineering materials requirements |  |
| MEM22017A | Coordinate continuous improvement and technical development |  |
| MEM22018A | Coordinate sales and promotion of engineering-related products or services |  |
| MEM23003A | Operate and program computers and/or controllers in engineering situations | \* |
| MEM23004A | Apply technical mathematics |  |
| MEM23006A | Apply fluid and thermodynamics principles in engineering | \* |
| MEM23007A | Apply calculus to engineering tasks | \* |
| MEM23052A | Apply basic electro and control scientific principles and techniques in aeronautical engineering situations |  |
| MEM23063A | Select and test mechanical engineering materials | \* |
| MEM23064A | Select and test mechatronic engineering materials | \* |
| MEM23073A | Select and apply aeronautical engineering methods, processes and construction techniques | \* |
| MEM23074A | Select and apply avionic engineering methods, processes and construction techniques | \* |
| MEM23109A | Apply engineering mechanic principles | \* |
| MEM23111A | Select electrical equipment and components for engineering applications | \* |
| MEM23112A | Investigate electrical and electronic controllers in engineering applications | \* |
| MEM23139A | Design a basic single zone duct distribution system | \* |
| MEM23140A | Determine operational parameters for building HVAC hydronic systems | \* |
| MEM23142A | Determine psychrometric processes and system performance | \* |
| MEM23143A | Apply energy management principles | \* |
| MEM23145A | Apply codes and regulations to air conditioning designs | \* |
| MEM23148A | Develop energy management solutions | \* |
| MEM23151A | Commission and optimise performance of HVAC/R systems | \* |
| MEM23152A | Apply principles of refrigeration food storage technology |  |
| MEM23154A | Analyse and service HVAC/R control systems | \* |
| MEM24002B | Perform penetrant testing | \* |
| MEM24004B | Perform magnetic particle testing | \* |
| MEM24006B | Perform eddy current testing | \* |
| MEM24008B | Perform ultrasonic testing | \* |
| MEM24010B | Perform radiographic testing | \* |
| MEM24011B | Establish non-destructive tests | \* |
| MEM24012C | Apply metallurgy principles |  |
| MEM30029A | Use workshop equipment and processes to complete an engineering project |  |
| CPPBDN5013A | Develop and collaborate on building information models for small-scale building design projects |  |
| MEA272B | Apply basic scientific principles and techniques in avionic engineering situations |  |
| MEA273A | Select and test avionic engineering materials |  |
| MEA342A | Apply basic aircraft power plant design characteristics | \* |
| MEA349B | Apply basic scientific principles and techniques in aeronautical engineering situations |  |
| MEA350A | Select and test aeronautical engineering materials |  |
| MSS403010A | Facilitate change in an organisation implementing competitive systems and practices  |  |
| MSS405010A | Manage relationships with non-customer external organisations |  |
| MSS405011A | Manage people relationships |  |
| MSS405012A | Manage workplace learning |  |
| MSS403001A | Implement competitive systems and practices |  |
| MSS403002A | Ensure process improvements are sustained |  |
| MSS405001A | Develop competitive systems and practices for an organisation |  |
| MSS405002A | Analyse and map a value stream |  |
| MSS405003A | Manage a value stream |  |
| MSS405004A | Develop business plans in an organisation implementing competitive systems and practices |  |
| MSS402030A | Apply cost factors to work practices |  |
| MSS402060A | Use planning software systems in operations |  |
| MSS402061A | Use SCADA systems in operations |  |
| MSS402080A | Undertake root cause analysis |  |
| MSS403021A | Facilitate a Just in Time system |  |
| MSS403030A | Improve cost factors in work practices  |  |
| MSS403032A | Analyse manual handling processes |  |
| MSS403040A | Facilitate and improve implementation of 5S |  |
| MSS404050A | Undertake process capability improvements | \* |
| MSS403051A | Mistake proof an operational process |  |
| MSS404052A | Apply statistics to operational processes |  |
| MSS404060A | Facilitate the use of planning software systems in a work area or team |  |
| MSS404061A | Facilitate the use of SCADA systems in a team or work area |  |
| MSS404081A | Undertake proactive maintenance analyses  |  |
| MSS404082A | Assist in implementing a proactive maintenance strategy |  |
| MSS405020A | Develop quick changeover procedures |  |
| MSS405021A | Develop a Just in Time system |  |
| MSS405030A | Optimise cost of product or service |  |
| MSS405031A | Undertake value analysis of a product or process costs in terms of customer requirements |  |
| MSS405040A | Manage 5S system in an organisation |  |
| MSS405050A | Determine and improve process capability | \* |
| MSS405060A | Develop the application of enterprise control systems in an organisation |  |
| MSS405061A | Determine and establish information collection requirements and processes |  |
| MSS405070A | Develop and manage sustainable energy practices |  |
| MSS405075A | Facilitate the development of a new product | \* |
| MSS405081A | Develop a proactive maintenance strategy |  |
| MSATCS501A | Detail standardised structural connections | \* |
| MSATCS502A | Detail structural steel members | \* |
| MSATCS503A | Incorporate structural steel detailing into fabrication and construction project management |  |
| MSATCS504A | Detail ancillary steelwork | \* |
| Prerequisites: | Where a unit has prerequisites then those prerequisite units can only be used in the count towards the total number of units where they are listed in the table above.  |  |

In addition to the above, the minimum requirements for this qualification can also be met by holders of the MEM30505 Certificate III in Engineering -Technical or equivalent subject to the completion of the specified Core units of competency as well as the additional elective units drawn from Group B.

#### Packaging advice to meet Australian Defence Force (ADF) and the Civil Aviation Safety Authority (CASA) requirements

In order to meet the requirements of both Regulators for employment as para-professionals in aeronautical and avionic fields in the Australian aviation industry, electives must be selected as described below for the Aeronautical and Avionic streams.

#### Aeronautical stream

* Select the following seven (7) units from Group A.

|  |  |
| --- | --- |
| MEA101B | Interpret occupational health and safety practices in aviation maintenance |
| MEA105C | Apply quality standards applicable to aviation maintenance processes\* |
| MEA107B | Interpret and use aviation maintenance industry manuals and specifications |
| MEA108B | Complete aviation maintenance industry documentation\* |
| MEA109B | Perform basic hand skills, standard trade practices and fundamentals\* |
| MEA340A | Lay out and set up aircraft systems\* |
| MEA341A | Apply basic aircraft design characteristics\* |

* Select the following seven (7) units from Group B.

|  |  |
| --- | --- |
| MEA342A | Apply basic aircraft power plant design characteristics\* |
| MEA349B | Apply basic scientific principles and techniques in aeronautical engineering situations |
| MEA350A | Select and test aeronautical engineering materials |
| MEM09143A | Represent aeronautical engineering designs\* |
| MEM14083A | Apply aeronautical fundamentals to support design and development of engineering projects\* |
| MEM23052A | Apply basic electro and control scientific principles and techniques in aeronautical engineering situations |
| MEM23073A | Select and apply aeronautical engineering methods, processes and construction techniques\* |

To bring the total number of electives to fifteen (15), one (1) additional unit can be chosen from Groups A or B, or from Diploma level units in the MEA11 Aeroskills Training Package.

#### Avionic stream

* Select the following seven (7) units from Group A

|  |  |
| --- | --- |
| MEA101B | Interpret occupational health and safety practices in aviation maintenance |
| MEA105C | Apply quality standards applicable to aviation maintenance processes\* |
| MEA107B | Interpret and use aviation maintenance industry manuals and specifications |
| MEA108B | Complete aviation maintenance industry documentation\* |
| MEA109B | Perform basic hand skills, standard trade practices and fundamentals\* |
| MEA270A | Lay out avionic systems\* |
| MEA271A | Lay out avionic flight management systems\* |

* Select the following five (5) units from Group B

|  |  |
| --- | --- |
| MEA272B | Apply basic scientific principles and techniques in avionic engineering situations |
| MEA273A | Select and test avionic engineering materials |
| MEM09144A | Represent avionic engineering designs\* |
| MEM14084A | Apply avionic fundamentals to support design and development of engineering projects\* |
| MEM23074A | Select and apply avionic engineering methods, processes and construction techniques\* |

To bring the total number of electives to fifteen (15), another three (3) units are to be selected as follows:

* a minimum of two (2) additional units must be chosen from Group B
* a maximum of one (1) additional unit can be chosen from Group A, or from Diploma level units in the MEA11 Aeroskills Training Package.