Australian Government

MEM60112 Advanced Diploma of Engineering

Release 2

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MEM60112 Advanced Diploma of Engineering

Modification History

Release 2 – Equivalent. ISC code correction in Avionic stream to updated unit MEM23086A.

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 follow information on legislative and regulatory requirements, codes of practice, specifications, design briefs, charts, lists, drawings and other applicable reference documents • Access, organise and communicate information from reference texts, manufacturer's catalogues and industrial magazines, websites, use of phone, email and fax • Negotiate, develop, implement and document work instructions, outcomes and performance measures • Communicate complex ideas through presentations, meetings and one-on-one communication • Prepare reports, graphics, specifications and other documentation • Use standard engineering drawing symbols, references, terminology and scientific notation • Consult and advise internal and external clients to ensure clarification of requirements for projects or operations • Liaise with internal and external stakeholders and others to confirm specifications and discuss alternatives • Research, evaluate and report information on systems, techniques, requirements, options and solutions
Teamwork	• Work alone or as part of single and multi-disciplinary teams that includes other para-professionals, professionals, trades and production personnel • Provide clear and precise information to team members • Negotiate and communicate with stakeholders • Continually monitor and review team performance • Delegate and supervise work where appropriate
Problem-solving	• Analyse and evaluate information to determine requirements, strategies and solutions (including benefit/cost analysis) • Apply and manipulate 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, significant figures) • Evaluate and rank engineering options • Evaluate environmental and sustainability performance of equipment and processes and make recommendations for improvements • Perform hazard and risk analysis

	• Identify and select common engineering materials by their principal properties • Diagnose performance and process problems
Initiative and enterprise	• Be capable of applying skills and knowledge in new and different situations and contexts • Use judgement and discretion • Facilitate and capitalise on change and innovation • Generate innovative and creative ideas, approaches and solutions
Planning and organising	• Design and plan documentation for particular applications • Plan and sequence work operations • Manage work priorities and resources • Prepare, monitor and review work plans, programs and budgets • Identify requirements and manage processes to ensure adequate resourcing, programming, maintenance and training for operations
Self-management	• Manage own time and own processes • Complete tasks in a competent and timely manner • Set personal goals and plans • Gain and use feedback to improve personal performance • Address all legislation, codes and standards related to safety, environmental impact and sustainability issues
Learning	• Undertake research by consulting appropriate personnel, technical experts, manuals, online help and other reference materials as required • Evaluate career options and develop career path strategy • Review and maintain academic development, work experience, ethical practice, indemnity, negotiation, consultation and human relations with respect to the practice of engineering • Manage learning opportunities in and outside the workplace • Mentor others • Identify options for professional development opportunities
Technology	• Apply engineering knowledge and principles • Select and apply engineering techniques and associated technologies, software and hardware • Use technology appropriately to manage work priorities and commitments • Use a CAD program, computer and peripherals

Packaging Rules

The minimum requirements for achievement of the MEM60112 Advanced Diploma of Engineering are:

- completion of the **seven (7)** core units of competency listed below, and
- completion of **twenty three (23)** elective units, to bring the total number of units to **thirty (30)**.

Group A and Group B elective units must be selected as follows:

- up to **eight (8)** general elective units from the list in Group A
- at least **fifteen (15)** specialist elective units from Group B, to bring the total number of elective units to **twenty three (23)**.

Note that when selecting elective units any prerequisite units must also be completed and count towards the required number of elective units (refer to units for details).
Five (5) appropriate Group B electives may be chosen from other endorsed Training Packages and accredited courses where those units are available for inclusion at Advanced Diploma.
Note that the Group A and B elective units listed below include all the MEM units that are approved for selection 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.

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

Core units

- Select all of the units from this list.

Unit code	Unit title
MEM16006A	Organise and communicate information
MEM16008A	Interact with computing technology
MEM22001A	Perform engineering activities
MEM22002A	Manage self in the engineering environment
MEM30007A	Select common engineering materials
MEM30012A	Apply mathematical techniques in a manufacturing, engineering or related environment
MSAENV272B	Participate in environmentally sustainable work practices

Elective units
Group A - general

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

Unit code	Unit title	Prerequisites
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	*
MEM12024A	Perform computations	
MEM13013B	Work safely with ionising radiation	
MEM15001B	Perform basic statistical quality control	
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	

Unit code	Unit title	Prerequisites
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) system to create and	*

Unit code	Unit title	Prerequisites
	display 3-D models	
MSAENV472B	Implement and monitor environmentally sustainable work practices	
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

- Select at least **fifteen (15)** units from this list to bring the total number of elective units to **twenty three (23)**.

Unit code	Unit title	Prerequisites
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	*
MEM09143A	Represent aeronautical engineering designs	*
MEM09144A	Represent avionic engineering designs	*
MEM09153A	Apply computer aided modelling and data management techniques to aeronautical engineering designs	*
MEM09154A	Apply computer aided modelling and data management techniques to 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	

Unit code	Unit title	Prerequisites
MEM09204A	Produce basic engineering detail drawings	*
MEM09205A	Produce electrical schematic drawings	*
MEM12005B	Calibrate measuring equipment	*
MEM12022B	Program coordinate measuring machine (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	
MEM14065A	Plan and design aeronautical engineering projects	*
MEM14066A	Plan and design avionic engineering projects	*
MEM14083A	Apply aeronautical engineering fundamentals to support design and development of engineering projects	*
MEM14084A	Apply avionic engineering 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	*

Unit code	Unit title	Prerequisites
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 application of quality procedures	*
MEM18016B	Analyse plant/equipment condition monitoring results	*
MEM22007A	Manage environmental effects of engineering activities	*
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	
MEM23005A	Apply statistics and probability techniques to engineering tasks	*
MEM23006A	Apply fluid and thermodynamics principles in engineering	*
MEM23007A	Apply calculus to engineering tasks	*
MEM23008A	Apply advanced algebra and numerical methods to engineering tasks	*
MEM23052A	Apply basic electro and control scientific principles and techniques in aeronautical engineering situations	
MEM23063A	Select and test mechanical engineering materials	*

Unit code	Unit title	Prerequisites
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	*
MEM23084A	Apply scientific principles and techniques in aeronautical engineering situations	*
MEM23086A	Apply scientific principles and techniques in avionic engineering situations	*
MEM23095A	Apply aeronautical system design principles and techniques in aeronautical engineering situations	*
MEM23096A	Apply avionic system design principles and techniques in avionic engineering situations	*
MEM23097A	Apply automated systems principles and techniques in aeronautical engineering situations	*
MEM23098A	Apply automated systems principles and techniques in avionic engineering situations	*
MEM23109A	Apply engineering mechanic principles	*
MEM23111A	Select electrical equipment and components for engineering applications	*
MEM23112A	Investigate electric and electronic controllers in engineering applications	*
MEM23113A	Evaluate hydrodynamic systems and system components	*
MEM23114A	Evaluate thermodynamic systems and components	*
MEM23115A	Evaluate fluid power systems	*
MEM23116A	Evaluate programmable logic controller and related control system component applications	*
MEM23117A	Evaluate microcontroller applications	*
MEM23118A	Apply production and service control techniques	*

Unit code	Unit title	Prerequisites
MEM23119A	Evaluate continuous improvement processes	*
MEM23120A	Select mechanical machine and equipment components	*
MEM23121A	Analyse loads on frames and mechanisms	*
MEM23122A	Evaluate computer integrated manufacturing systems	*
MEM23123A	Evaluate manufacturing processes	
MEM23124A	Measure and analyse noise and vibration	*
MEM23125A	Evaluate maintenance systems	*
MEM23126A	Evaluate industrial robotic applications	*
MEM23129A	Evaluate thermal loads in heating, ventilation, air conditioning and refrigeration	*
MEM23130A	Coordinate servicing and fault finding of HVAC/R control systems	*
MEM23131A	Evaluate rapid prototyping applications	*
MEM23132A	Evaluate rapid manufacturing processes	*
MEM23133A	Evaluate rapid tooling applications	*
MEM23134A	Evaluate jigs and fixtures	*
MEM23135A	Evaluate moulding tools and processes	*
MEM23136A	Evaluate stamping and forging tools	*
MEM23137A	Evaluate rolling tools and processes	*
MEM23138A	Evaluate suitability of materials for engineering related applications	*
MEM23141A	Complete a building thermal performance survey	*
MEM23144A	Contribute to the design of a commercial refrigeration system	*
MEM23146A	Contribute to the design of industrial refrigeration systems	*
MEM23147A	Contribute to the design of hydronic systems	*

Unit code	Unit title	Prerequisites
MEM23149A	Contribute to the design of commercial and industrial exhaust systems	*
MEM23150A	Contribute to the design of heating systems	*
MEM23153A	Contribute to the design of heat exchanger 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	
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	
MSS403001A	Implement competitive systems and practices	
MSS403002A	Ensure process improvements are sustained	
MSS403010A	Facilitate change in an organisation implementing competitive systems and practices	
MSS403021A	Facilitate a Just in Time system	
MSS403023A	Monitor a levelled pull system of operations	
MSS403030A	Improve cost factors in work practices	
MSS403032A	Analyse manual handling processes	

Unit code	Unit title	Prerequisites
MSS403040A	Facilitate and improve implementation of 5S	
MSS403051A	Mistake proof an operational process	
MSS404050A	Undertake process capability improvements	*
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	
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	
MSS405005A	Manage competitive systems and practices in an organisation responding to individual and unique customer orders	
MSS405010A	Manage relationships with non-customer external organisations	
MSS405011A	Manage people relationships	
MSS405012A	Manage workplace learning	
MSS405020A	Develop quick changeover procedures	
MSS405021A	Develop a Just in Time system	
MSS405022A	Design a process layout	
MSS405023A	Develop a levelled pull system for operations and processes	
MSS405030A	Optimise cost of product or service	

Unit code	Unit title	Prerequisites
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	*
MSS405052A	Design an experiment	*
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	
MSS405083A	Adapt a proactive maintenance strategy for a seasonal or cyclical manufacturing business	
MSAENV672B	Develop workplace policy and procedures for sustainability	
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 the MEM50212 Diploma of 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 paraprofessionals 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 **twelve (12)** 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*
MEM09153A	Apply computer aided modelling and data management techniques to aeronautical engineering designs*
MEM14065A	Plan and design aeronautical engineering projects*
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*
MEM23084A	Apply scientific principles and techniques in aeronautical engineering situations*
MEM23095A	Apply aeronautical system design principles and techniques in aeronautical engineering situations*
MEM23097A	Apply automated systems principles and techniques in aeronautical engineering situations*

To bring the total number of electives to **twenty three (23)**, another four units are to be selected as follows:

- a minimum of **three (3)** additional units must be chosen from Group B
- a maximum of **one (1)** additional unit can be chosen from Group A, or from the Advanced 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 **ten (10)** 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*
MEM09154A	Apply computer aided modelling and data management techniques to avionic engineering designs*
MEM14066A	Plan and design avionic engineering projects*
MEM14084A	Apply avionic fundamentals to support design and development of engineering projects*
MEM23074A	Select and apply avionic engineering methods, processes and construction techniques*
MEM23086A	Apply scientific principles and techniques in avionic engineering situations*
MEM23096A	Apply avionic system design principles and techniques in avionic engineering situations*
MEM23098A	Apply automated systems principles and techniques in avionic engineering situations*

To bring the total number of electives to t**wenty three (23)**, another **six (6)** units are to be selected as follows:

- a minimum of **five (5)** additional units must be chosen from Group B
- a maximum of **one (1)** additional unit can be chosen from Group A, or from Advanced Diploma level units in the MEA11 Aeroskills Training Package.
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