Australian Government
Department of Education, Employment and Workplace Relations

MSA60108 Advanced Diploma of Manufacturing Technology

Revision Number: 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MSA60108 Advanced Diploma of Manufacturing Technology

Modification History

Not applicable.

Description

This qualification is suitable for delivery part time over a four year period. There are two specialist streams available:

- Metallurgy
- Polymer Technology.

Each stream offers an opportunity for significant choice in electives and each stream requires the same core units to be completed.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

EMPLOYABILITY SKILLS QUALIFICATION SUMMARY

MSA60108 Advanced Diploma of Manufacturing Technology

The following table contains a summary of the Employability Skills as identified by the manufacturing technology related industries for this qualification. This table should be interpreted in conjunction with the detailed requirements of each unit of competency packaged in this qualification. The outcomes described here are broad industry requirements that reflect skill requirements for this level.

Employability Skill	**Industry/enterprise requirements for this qualification include**:
Communication	• Communicate with members of supply chain • Use information and communication technology to interpret and analyse market and supply chain information and research new processes and products • Calculate costs • Use a range of communication and marketing tools to present concepts to a variety of audiences • Negotiate contracts with national and international networks • Complete documentation and maintain records
Teamwork	• Network with clients, industry professionals, supply chain personnel and all levels of internal management • Provide product information to others in the team
Problem-solving	• Interpret and evaluate market information for use in current and future practices • Determine cost effective supply of materials and resources through the supply chain • Analyse consumer behaviour to inform marketing processes and identify market opportunities • Calculate cost estimates • Map and establish supply chain processes • Evaluate designs and identify opportunities for improvement
Initiative and enterprise	• Secure new networks with industry professionals and clients • Implement new product development processes • Participate in product improvement processes • Implement sales and marketing plans
Planning and organising	• Undertake effective planning of own and others' work to achieve desired outcomes within agreed time-frames • Schedule meetings and correspondences with networks • Monitor quality processes and analyse outcomes • Plan and implement contingency plans to respond to incidents

EMPLOYABILITY SKILLS QUALIFICATION SUMMARY	
	and problems • Coordinate quality assurance • Coordinate people and processes to achieve desired goals • Define roles and responsibilities of others
Self-management	• Manage work plans and priorities and define responsibilities • Manage client and industry relationships and networks • Manage data flows and record keeping • Monitor own work against industry standards
Learning	• Develop or adjust processes based on new information • Conduct research to increase knowledge of industry practices and opportunities • Develop contacts and networks to support work activity
Technology	• Use information and communication technology to acquire, manage and share data and maintain communication networks. • Use computer-aided design technology to develop new products

Packaging Rules

Packaging Rules

To be awarded an Advanced Diploma of Manufacturing Technology competency must be achieved in **thirty one** (**31**) units of competency:

- **six** (**6**) core units of competency
- **twenty five** (**25**) elective units of competency chosen as described below.

Core units

The following **six** (**6**) units must be chosen:

Unit code	Unit title
MEM16006A	Organise and communicate information
MEM16008A	Interact with computing technology
MEM23001A	Apply advanced mathematical techniques in a manufacturing engineering or related environment
MEM30012A	Apply mathematical techniques in a manufacturing engineering or related environment

Unit code	Unit title
MSACMT251A	Apply quality standards
MSAENV272B	Participate in environmentally sustainable work practices

Prerequisites
Units marked with an asterisk have one or more prerequisite requirements. The prerequisites for these units are to be counted in the total number of units required in the elective group. Please refer to the individual units for details.

Elective units
Choose 25 units as specified below for each specialist stream.

Group A - specialist streams
Choose **twenty five** (**25**) elective units as specified to achieve a specialist stream.

Note:

- All units from each specialist stream are available in Group B as General Electives.
- Five elective units may also be chosen from other qualifications in this Training Package, other endorsed Training Packages and accredited courses, as specified below.
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Metallurgy specialist stream
Select **twenty five** (**25**) elective units:

- a minimum of **fourteen** (**14**) from the list below
- the balance may be chosen from Group B

Note:

- at least six of the 14 metallurgy elective units must be coded MSATCM5---
- the unit *MSATCM406A Apply basic chemistry principles to metallurgy* must also be selected if it has not already been completed as part of a lower qualification

Unit code	Unit title	
MEM22001A	Perform engineering activities	
MEM22002A	Manage self in the engineering environment	*
MEM23061A	Select and test mechanical engineering materials	
MEM24012B	Apply metallurgy principles	

Unit code	Unit title	
MEM30007A	Select common engineering materials	
MSATCM401A	Prepare and examine metallographic samples	
MSATCM402A	Monitor and test sands, cores and moulds	
MSATCM403A	Evaluate mould design and gating	
MSATCM404A	Undertake and interpret results of chemical analysis on metal samples	
MSATCM405A	Determine and supervise heat treatment of metal	*
MSATCM406A	Apply basic chemistry principles to metallurgy	
MSATCM501A	Calculate and predict chemical outcomes in metallurgical situations	*
MSATCM502A	Identify and describe equipment for mineral and chemical processing plants	*
MSATCM503A	Recommend a refractory for an application	
MSATCM504A	Select metal forming process	*
MSATCM505A	Select metal joining process	*
MSATCM506A	Monitor blast furnace operations	*
MSATCM507A	Monitor primary steel making process	*
MSATCM508A	Monitor secondary steelmaking operations	*
MSATCM509A	Recommend ferrous and non ferrous metals or alloys for an application	*
MSATCM510A	Apply metallurgical principles and techniques in welding and other thermal processes	*
MSATCM511A	Apply metallurgy principles and practice to determine metal forming and shaping	

Unit code	Unit title	
	processes	
MSATCM512A	Apply metallurgy principles and practice to optimise furnace operation	
MSATCM513A	Plan and complete metallurgical projects	*
MSATCM514A	Select surface treatment methods for metallic components or products	
MSATCM515A	Analyse metallurgical failures of components and recommend preventative measures	*
MSATCM516A	Select non metallic materials for engineering applications manufacturing, engineering and structural	
MSATCM517A	Determine corrosion prevention strategies for metal and alloys	
MSATCM518A	Interpret complex binary phase diagrams	*

Polymer technology specialist stream
Select **twenty five** (**25**) elective units:

- a minimum of **ten** (**10**) from the two groups below
- the balance may be chosen from Group B

Polymer technology group 1
Choose at least one of the following units:

Unit code	Unit title	
PMBTECH601B	Develop a new product	*
PMBTECH602B	Develop a new die or tool	*
PMBTECH603B	Design structural/mechanical polymeric components	*

Polymer technology group 2
Choose up to nine of the following units:

Unit code	Unit title	
MSACMT675A	Facilitate the development of a new product	*
PMAOPS550B	Develop a colour formulation	
PMAOPS600B	Modify plant	
PMBTECH501B	Analyse equipment performance	*
PMBTECH502B	Review and analyse production trials and specify re-trials	*
PMBTECH503B	Determine rheology and output of plastics materials from processing equipment	*
PMBTECH504B	Determine heat transfer loads for processing equipment	*
PMBTECH505B	Choose polymer materials for an application	*
PMBTECH506B	Analyse the design of products and tools	*
PMBTECH507B	Develop fibre composite products using cored laminate techniques	*
PMBTECH508A	Develop a new compound	
PMBTECH509A	Modify an existing product	
PMBTECH510A	Analyse failure in polymeric materials	

Group B - General electives

The balance of units for each specialist stream may be chosen from this list as specified below:

Metallurgy specialist stream Up to 11 units

Polymer technology specialist stream Up to 15 units

Unit code	Unit title	
AUM4003A	Interpret customer requirements	
FDFOPTSD2A	Work in a socially diverse environment	
LMTGN4016A	Contribute to the development of products or processes	
LMTGN5004A	Manage installation and commissioning of equipment and systems	
MEM06003C	Carry out heat treatment	
MEM09002B	Interpret technical drawing	
MEM09003B	Prepare basic engineering drawing	
MEM09004B	Perform electrical/electronic detail drafting	*
MEM09005B	Perform basic engineering detail drafting	*
MEM09141A	Represent mechanical engineering designs	*
MEM09142A	Represent mechatronic engineering designs	*
MEM09151A	Apply computer aided modeling and data management techniques to mechanical engineering designs	*
MEM09152A	Apply computer aided modelling and data management techniques to mechatronic engineering designs	*
MEM12003B	Perform precision mechanical measurement	
MEM12005B	Calibrate measuring equipment	*
MEM12022B	Program coordinate measuring machine (advanced)	

Unit code	Unit title	
MEM12023A	Perform engineering measurements	
MEM12024A	Perform computations	
MEM12025A	Use graphical techniques and perform simple statistical computations	
MEM13002B	Undertake occupational health and safety activities in the workplace	
MEM13010A	Supervise occupational health and safety in an industrial work environment	*
MEM13013B	Work safely with ionising radiation	
MEM14001B	Schedule material deliveries	
MEM14002B	Undertake basic process planning	
MEM14003B	Undertake basic production scheduling	
MEM14005A	Plan a complete activity	
MEM14061A	Plan and design mechanical engineering projects	*
MEM14062A	Plan and design mechatronic engineering projects	*
MEM14063A	Plan and design manufacturing engineering projects	*
MEM14064A	Plan and design maintenance engineering projects	*
MEM14081A	Apply mechanical engineering fundamentals to support design and development of projects	*
MEM14082A	Apply mechatronics fundamentals to support design and development of engineering projects	*
MEM15001B	Perform basic statistical quality control	
MEM15004B	Perform inspection	

Unit code	Unit title	
MEM15005B	Select and control inspection processes and procedures	*
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	*
MEM16010A	Write reports	*
MEM18001C	Use hand tools	
MEM18002B	Use power tools/hand held operations	
MEM18003C	Use tools for precision work	
MEM18006B	Repair and fit engineering components	
MEM18010C	Perform equipment condition monitoring and recording	
MEM18016B	Analyse plant/equipment condition monitoring results	*
MEM18055B	Dismantle, replace and assemble engineering components	
MEM22002A	Manage self in the engineering environment	*
MEM22003A	Manage engineering resources	*
MEM22004A	Manage engineering projects	*
MEM22005A	Manage engineering operations	*
MEM22006A	Source and estimate materials	*
MEM22007A	Manage environmental effects of	*

Unit code	Unit title	
	engineering activities	
MEM22008A	Manage change and technical development	*
MEM22009A	Manage technical sales and promotions	*
MEM23002A	Apply calculus in engineering situations	*
MEM23003A	Operate and program computers and/or controllers in engineering situations	*
MEM23041A	Apply basic scientific principles and techniques in mechanical engineering situations	*
MEM23051A	Apply basic electro and control scientific principles and techniques in mechanical and manufacturing engineering situations	
MEM23061A	Select and test mechanical engineering materials	
MEM23062A	Select and test mechatronic engineering materials	
MEM23071A	Select and apply mechanical engineering methods, processes and construction techniques	
MEM23072A	Select and apply mechatronic engineering methods, processes and construction techniques	
MEM23081A	Apply scientific principles and techniques in mechanical engineering situations	
MEM23082A	Apply scientific principles and techniques in mechatronic engineering situations	*
MEM23083A	Apply industrial engineering principles and techniques in manufacturing	

Unit code	Unit title	
	engineering situations	
MEM23091A	Apply mechanical system design principles and techniques in mechanical engineering situations	*
MEM23092A	Apply automated systems principles and techniques in engineering situations	*
MEM23093A	Apply plant and process design principles and techniques in engineering situations	*
MEM23094A	Apply maintenance systems principles and techniques in engineering situations	*
MEM24002B	Perform penetrant testing	*
MEM24003B	Perform basic magnetic particle testing	*
MEM24004B	Perform magnetic particle testing	*
MEM24005B	Perform basic eddy current testing	*
MEM24006B	Perform eddy current testing	*
MEM24007B	Perform ultrasonic thickness testing	*
MEM24008B	Perform ultrasonic testing	*
MEM24009B	Perform basic radiographic testing	*
MEM24010B	Perform radiographic testing	*
MEM24011B	Establish non destructive tests	*
MEM30001A	Use computer aided drafting systems to produce basic engineering drawings	*
MEM30002A	Produce basic engineering graphics	*
MEM30003A	Produce detailed engineering drawings	*
MEM30004A	Use CAD to create and display 3D models	*

Unit code	Unit title	
MEM30005A	Calculate force systems within simple beam structures	*
MEM30006A	Calculate stresses in simple structures	*
MEM30007A	Select common engineering materials	*
MEM30008A	Apply basic economic and ergonomic concepts to evaluate engineering applications	
MEM30009A	Contribute to the design of basic mechanical systems	*
MEM30012A	Apply mathematical techniques in a manufacturing engineering or related environment	
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	

Unit code	Unit title	
	manufactured product	
MEM30024A	Participate in quality assurance techniques	*
MEM30027A	Prepare basic programs for programmable logic controllers	
MEM30028A	Assist in sales of technical products/systems	
MSACMC410A	Lead change in a manufacturing environment	
MSACMC610A	Manage relationships with non-customer external organisations	
MSACMC611A	Manage people relationships	
MSACMC612A	Manage workplace learning	
MSACMS401A	Ensure process improvements are sustained	
MSACMS600A	Develop a competitive manufacturing system	
MSACMS601A	Analyse and map a value chain	
MSACMS602A	Manage a value chain	*
MSACMS603A	Develop manufacturing related business plans	
MSACMS604A	Manage competitive manufacturing processes in a jobbing shop environment	
MSACMT230A	Apply cost factors to work practices	
MSACMT260A	Use planning software systems in manufacturing	
MSACMT261A	Use SCADA systems in manufacturing	
MSACMT280A	Undertake root cause analysis	

Unit code	Unit title	
MSACMT430A	Improve cost factors in work practices	
MSACMT440A	Lead 5S in a manufacturing environment	
MSACMT450A	Undertake process capability improvements	
MSACMT451A	Mistake proof a production process	
MSACMT452A	Apply statistics to processes in manufacturing	
MSACMT481A	Undertake proactive maintenance analyses	
MSACMT482A	Assist in implementing a proactive maintenance strategy	
MSACMT620A	Develop quick changeover procedures	
MSACMT621A	Develop a Just in Time (JIT) system	*
MSACMT622A	Design a process layout	
MSACMT623A	Develop a levelled pull system of manufacturing	
MSACMT630A	Optimise cost of product	*
MSACMT631A	Undertake value analysis of product costs in terms of customer requirements	
MSACMT640A	Manage 5S system in a manufacturing environment	
MSACMT650A	Determine and improve process capability	
MSACMT652A	Design an experiment	*
MSACMT660A	Develop the application of enterprise systems in manufacturing	
MSACMT661A	Determine and establish information collection requirements and processes	

Unit code	Unit title	
MSACMT670A	Develop and manage sustainable energy practices	
MSACMT671A	Develop and manage sustainable environmental practices	
MSACMT675A	Facilitate the development of a new product	*
MSACMT681A	Develop a proactive maintenance strategy	
MSACMT683A	Adapt a proactive maintenance strategy for a seasonal or cyclical manufacturing operation	*
MSAENV472B	Implement and monitor environmentally sustainable work practices	
MSAENV672B	Develop workplace policy and procedures for environmental sustainability	
MSAPMOHS300A	Facilitate the implementation of OHS for a work group	
MSAPMOHS400A	Contribute to workplace OHS management system	
MSAPMOHS401A	Assess risk	
MSAPMOHS510A	Manage risk	
MSAPMOPS400A	Optimise process/plant area	
MSAPMOPS401A	Trial new process or product	
MSAPMOPS601A	Design equipment and system modifications	
MSAPMSUP303A	Identify equipment faults	
MSAPMSUP390A	Use structured problem solving tools	
MSATCM301A	Test the mechanical properties of	

Unit code	Unit title	
	materials	
MSATCM302A	Monitor basic ferrous melting and casting processes	
MSATCM303A	Monitor basic non-ferrous melting and casting processes	
MSATCM304A	Interpret basic binary phase diagrams	
MSATCM305A	Demonstrate basic knowledge of casting operations	
MSL973001A	Perform basic tests	
MSL973006A	Prepare trial batches for evaluation	
MSL973007A	Perform microscopic examination	
MSL974001A	Prepare, standardise and use solutions	
MSL974003A	Perform chemical tests and procedures	
MSL974005A	Perform physical tests	
MSL974010A	Perform mechanical tests	
MSL975016A	Perform complex tests to measure engineering properties of materials	
PMAOHS310B	Investigate incidents	
PMAOPS350B	Match and adjust colour	
PMAOPS450B	Solve colour problems	
PMAOPS550B	Develop a colour formulation	*
PMASUP420B	Minimise environmental impact of process	
PMASUP520B	Review procedures to minimise environmental impact of processes	
PMASUP540B	Analyse equipment performance	
PMBPREP304C	Set a die	

Unit code	Unit title	
PMBPREP305B	Change extrusion die and calibration setup	
PMBPROD235C	Use materials and process knowledge to complete work operations	
PMBPROD430B	Trial a new die/tool	
PMBPROD431B	Trial a new, advanced or complex mould	
PMBTECH301B	Use material and process knowledge to solve problems	*
PMBTECH302A	Modify existing compounds	
PMBTECH303A	Make minor modifications to products	
PMBTECH401B	Predict polymer properties and characteristics	*
PMBTECH402B	Set up and remove complex dies	*
PMBTECH406A	Diagnose production equipment problems	
PMBTECH501B	Analyse equipment performance	*
PMBTECH502B	Review and analyse production trials and specify re-trials	*
PMBTECH503B	Determine rheology and output of plastics materials from processing equipment	*
PMBTECH504B	Determine heat transfer loads for processing equipment	*
PMBTECH505B	Choose polymer materials for an application	
PMBTECH506B	Analyse the design of products and tools	*
PMBTECH507B	Develop fibre composite products using cored laminate techniques	

Unit code	**Unit title**	
PMBTECH508A	Develop a new compound	*
PMBTECH509A	Modify an existing product	
PMBTECH510A	Analyse failure in polymeric materials	
	A maximum of **five** (**5**) units can be selected from this Training Package, other endorsed Training Packages and accredited courses where those units are available for inclusion at Diploma or Advanced Diploma level.	