



**Australian Government**

# **MSA50108 Diploma of Manufacturing Technology**

**Revision Number: 4**

# MSA50108 Diploma of Manufacturing Technology

## Modification History

Release 4 - Imported elective units replaced by current versions. Equivalent.

Release 3 - MSACM units replaced by MSS units from MSS11v2 Sustainability Training Package.

Release 2 - Imported unit codes updated.

## Description

This qualification would normally be delivered part time over a three year period. There are three specialist streams available:

- Metallurgy
- Polymer technology
- Structural steel detailing.

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

MSA50108 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.

<b>Employability skill</b>	<b>Industry/enterprise requirements for this qualification include:</b>
Communication	<ul style="list-style-type: none"><li>• complete workplace documentation and records</li><li>• use communication technologies efficiently</li><li>• develop work instructions, specifications and procedures</li><li>• demonstrate effective and appropriate communication and interpersonal skills when dealing with people from NESB</li><li>• communicate with all team members</li><li>• demonstrate effective and appropriate communication and interpersonal skills when dealing with clients</li><li>• use most appropriate communication method given priority, cost and customer facilities</li><li>• access, interpret and apply technical information</li></ul>
Teamwork	<ul style="list-style-type: none"><li>• work cooperatively with people of different ages, gender, race or religion</li><li>• liaise with and provide support to other team members</li><li>• work as part of a team</li><li>• identify and manage performance required to meet internal and external customer needs in own work and team</li><li>• manage technical processes and provide problem solving support to others</li></ul>
Problem solving	<ul style="list-style-type: none"><li>• investigate problem causes</li><li>• identify, rectify or report potential difficulties associated with manufacture of products or provision of services</li><li>• identify environmental features, regulations, insurance requirements, legal requirements and other factors which may affect the product or service to be provided</li><li>• use material and process knowledge to solve problems</li><li>• identify hazards and suggest control measures</li><li>• determine production requirements</li><li>• conduct tests and analyse results to determine and assess production requirements</li></ul>
Initiative and enterprise	<ul style="list-style-type: none"><li>• seek feedback on products, processes and procedures</li><li>• gather and analyse information and apply to work related processes</li><li>• record information on the quality and other indicators of products</li><li>• support achievement of efficient production processes</li><li>• determine and act on situations requiring further information or problem solving</li></ul>
Planning and organising	<ul style="list-style-type: none"><li>• identify hazards and implement appropriate hazard control measures</li><li>• demonstrate time management skills</li></ul>

Employability skill	Industry/enterprise requirements for this qualification include:
	<ul style="list-style-type: none"> <li>source and prepare materials and resources</li> <li>sequence work to maximise safety and productivity</li> </ul>
Self management	<ul style="list-style-type: none"> <li>interpret and apply relevant acts and regulations</li> <li>keep the work area clean and tidy at all times</li> <li>monitor own work and work of team and identify and act on any quality issues</li> <li>understand own work activities</li> <li>manage own time to meet deadlines</li> <li>implement workplace procedures and instructions</li> </ul>
Learning	<ul style="list-style-type: none"> <li>implement learning activities as appropriate to ensure achievement of specified production requirements</li> <li>assess competencies in meeting job requirements</li> <li>be supportive, assertive and use interpersonal skills</li> <li>identify own training needs and seek skill development if required</li> <li>gather feedback to own work to assess effectiveness in meeting objectives and integrate information into own practice</li> </ul>
Technology	<ul style="list-style-type: none"> <li>use computer software applications effectively</li> <li>work with technology safely and according to workplace standards</li> <li>help others use technology efficiently and safely</li> <li>use testing technology</li> </ul>

## Packaging Rules

### Packaging Rules

To be awarded a Diploma of Manufacturing Technology competency must be achieved in **twenty one (21)** units of competency:

- five (5)** core units of competency
- sixteen (16)** elective units of competency chosen as described below.
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#### Core units

The following **five (5)** units must be chosen.

Unit code	Unit title
MEM16006A	Organise and communicate information

Unit code	Unit title
MEM16008A	Interact with computing technology
MEM30012A	Apply mathematical techniques in a manufacturing, engineering or related environment
MSS402051A	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

#### Group A - specialist streams

Choose **sixteen (16)** elective units as specified to achieve a specialist stream.

#### Note:

- All units from each specialist stream are available in Group B as General Electives.
- Four elective units may also be chosen from other qualifications in this Training Package, other endorsed Training Packages and accredited courses, as specified below.

#### Metallurgy specialist stream

Select **sixteen (16)** elective units:

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

#### Note:

- at least four (4) of the ten (10) 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	Prerequisites
MEM23004A	Apply technical mathematics	
MEM23063A	Select and test mechanical engineering materials	*

Unit code	Unit title	Prerequisites
MEM23109A	Apply engineering mechanic principles	*
MEM24012C	Apply metallurgy principles	
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 processes	

Unit code	Unit title	Prerequisites
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 **sixteen (16)** elective units:

- a minimum of **eight (8)** from the list below
- the balance may be chosen from Group B

Unit code	Unit title	Prerequisites
MSS405075A	Facilitate the development of a new product	*
PMAOPS550B	Develop a colour formulation	*
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	*

Unit code	Unit title	Prerequisites
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 C - Structural steel detailing specialist stream

Select **sixteen (16)** elective units:

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

#### Structural steel detailing - Group 1

All seven (7) of these specialist stream units must be chosen from this group.

Unit code	Unit title	Prerequisites
MSATCS301A	Interpret architectural and engineering design specifications for structural steel detailing	*
MSATCS302A	Detail bolts and welds for structural steelwork connections	*
MSATCS501A	Detail standardised structural connections	*
MSATCS502A	Detail structural steel members	*
MSATCS503A	Incorporate structural steel detailing into fabrication and construction project management	



Unit code	Unit title	Prerequisites
MEM05051A	Select welding processes	
MEM09002B	Interpret technical drawing	

## Structural steel detailing - Group 2

Three (3) units must be chosen from the list below.

Unit code	Unit title	Prerequisites
MSATCS504A	Detail ancillary steelwork	*
MEM09006B	Perform advanced engineering detail drafting	*
MEM09009C	Create 2D drawings using computer aided design system	*
MEM16012A	Interpret technical specifications and manuals	
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	*

## 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 six units
Polymer technology specialist stream	Up to eight units
Structural steel detailing	Up to six units

Unit code	Unit title	Prerequisites
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Unit code	Unit title	Prerequisites
AUM4003A	Interpret customer requirements	
FDFOP2005A	Work in a socially diverse environment	
LMTGN4016A	Contribute to the development of products or processes	
MEM06003C	Carry out heat treatment	
MEM09002B	Interpret technical drawing	
MEM09204A	Produce basic engineering detail drawings	*
MEM09205A	Produce electrical schematic drawings	*
MEM09005B	Perform basic engineering detail drafting	*
MEM09011B	Apply basic engineering design concepts	*
MEM09216A	Interpret and produce curved 3-D shapes and patterns	
MEM09157A	Perform mechanical engineering design drafting	
MEM09158A	Perform mechatronic engineering design drafting	
MEM09155A	Prepare mechanical models for computer-aided engineering (CAE)	*
MEM09156A	Prepare mechatronic models for computer-aided engineering (CAE)	*
MEM12003B	Perform precision mechanical measurement	
MEM12005B	Calibrate measuring equipment	*
MEM12022B	Program coordinate measuring machine (advanced)	
MEM12023A	Perform engineering measurements	
MEM12024A	Perform computations	
MEM12025A	Use graphical techniques and perform simple statistical computations	
MEM13002B	Undertake occupational health and safety	

Unit code	Unit title	Prerequisites
	activities in the workplace	
MEM13010A	Supervise occupational health and safety in an industrial work environment	*
MEM13013B	Work safely with ionising radiation	
MEM13014A	Apply principles of occupational health and safety in the work environment	
MEM14001B	Schedule material deliveries	
MEM14002B	Undertake basic process planning	
MEM14003B	Undertake basic production scheduling	
MEM14004A	Plan to undertake a routine task	
MEM14005A	Plan a complete activity	
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	*
MEM15001B	Perform basic statistical quality control	
MEM15004B	Perform inspection	

Unit code	Unit title	Prerequisites
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	*
MEM16005A	Operate as a team member to conduct manufacturing, engineering or related activities	
MEM16007A	Work with others in a manufacturing, engineering or related environment	
MEM16010A	Write reports	*
MEM18001C	Use hand tools	
MEM18002B	Use power tools/hand held operations	
MEM18003C	Use tools for precision work	
MEM18006C	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	*
MEM22012A	Coordinate resources for an engineering project or operation	
MEM22013A	Coordinate engineering projects	

Unit code	Unit title	Prerequisites
MEM22014A	Coordinate engineering-related manufacturing operations	*
MEM22015A	Source and estimate engineering materials requirements	
MEM22007A	Manage environmental effects of engineering activities	*
MEM22017A	Coordinate continuous improvement and technical development in an engineering-related project or operation	
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	*
MEM23041A	Apply basic scientific principles and techniques in mechanical engineering situations	
MEM23109A	Apply engineering mechanic principles	*
MEM23111A	Select electrical equipment and components for engineering applications	*
MEM23112A	Investigate electrical and electronic controllers in engineering applications	*
MEM23063A	Select and test mechanical engineering materials	*
MEM23064A	Select and test mechatronic engineering materials	*
MEM23113A	Evaluate hydrodynamic systems and system components	*
MEM23114A	Evaluate thermodynamic systems and	*

Unit code	Unit title	Prerequisites
	components	
MEM23115A	Evaluate fluid power systems	*
MEM23116A	Evaluate programmable logic controller and related control system components	*
MEM23117A	Evaluate microcontroller applications	*
MEM23118A	Apply production and service control techniques	*
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	*
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	*

Unit code	Unit title	Prerequisites
MEM30031A	Use 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	*
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	*
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	

Unit code	Unit title	Prerequisites
MEM30023A	Prepare a simple cost estimate for a manufactured product	
MEM30024A	Participate in quality assurance techniques	*
MEM30027A	Prepare basic programs for programmable logic controllers	
MEM30028A	Assist in sales of technical products/systems	
MSS402002A	Sustain process improvements	
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	
MSS403030A	Improve cost factors in work practices	
MSS403032A	Analyse manual handling processes	
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	



Unit code	Unit title	Prerequisites
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	
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	
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	
MSS015002A	Develop strategies for more sustainable use of resources	

Unit code	Unit title	Prerequisites
MSS405075A	Facilitate the development of a new product	*
MSS405081A	Develop a proactive maintenance strategy	
MSAENV472B	Implement and monitor environmentally sustainable work practices	
MSAENV672B	Develop workplace policy and procedures for environmental sustainability	
MSAPMOPS400A	Optimise process/plant area	*
MSAPMOPS401A	Trial new process or product	
MSAPMSUP303A	Identify equipment faults	
MSAPMSUP390A	Use structured problem solving tools	
MSATCM301A	Test the mechanical properties of 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	
PMAOPS350B	Match and adjust colour	
PMAOPS450B	Solve colour problems	
PMBPREP304C	Set a die	
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	

Unit code	Unit title	Prerequisites
	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	
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	
	<p>A maximum of four (4) general elective units may be chosen from this Training Package, other endorsed</p> <p>Training Packages and accredited courses where those units are available for inclusion at Diploma level.</p>	