MSA50108	Diploma of Manufacturing Technology

Qualification Notes

This qualification is comprised of twenty (20) units of competency and would normally be delivered part time over a three year period. There are four (4) mandatory units that must be completed for all specialist streams as well as sixteen (16) electives.

This qualification has three specialist streams available. These are:
- Metallurgy
- Polymer technology
- Structural steel detailing.

Packaging Rules

To be awarded a Diploma of Manufacturing Technology competency must be achieved in twenty (20) units chosen as specified below.

Mandatory units (all specialist streams)

The following four (4) units are compulsory for all specialist streams in the Diploma of Manufacturing Technology.

Unit code	Unit title
MEM16006A	Organise and communicate information
MEM16008A	Interact with computing technology
MEM30012A	Apply mathematical techniques in a manufacturing engineering or related environment
MSACMT251A	Apply quality standards

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 or to the prerequisite table in MSA07v4.

Elective units
Choose sixteen (16) units as specified below for each specialist stream.

Metallurgy specialist stream
A minimum of ten (10) units must be chosen from the list below. The balance (up to six (6) units) can be chosen from the general electives group. Units listed below as metallurgy specialist stream electives can also be taken as general electives.

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	
MEM23061A	Select and test mechanical engineering materials	
MEM24012B	Apply metallurgy principles	

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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	
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	*

General electives: Up to six (6) of the sixteen (16) elective units may also be chosen from the general electives bank listed at the end of the specialist streams. Up to four (4) of the six (6) units may be chosen from any other endorsed Training package where those units are available for inclusion at the Diploma level.

Prerequisites: Units marked with an asterisk have a prerequisite requirement. The prerequisites for those units are to be counted in the total number of units required in the elective group. Please refer to the prerequisite table or in the individual unit.

Polymer technology specialist stream

A minimum of eight (8) units must be chosen from the list below. The balance (up to eight (8) units) can be chosen from the general electives group. Note that units listed below as polymer technology specialist stream electives can also be taken as general electives.

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Unit code	Unit title	
MSACMT675A	Facilitate the development of a new product	*
PMAOPS550A	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	*
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	

General electives: Up to eight (8) of the sixteen (16) elective units may also be chosen from the general electives bank listed at the end of the specialist streams. Up to four (4) of the eight (8) units may be chosen from any other endorsed Training package where those units are available for inclusion at the Diploma level.

Prerequisites: Units marked with an asterisk have a prerequisite requirement. The prerequisites for those units are to be counted in the total number of units required in the elective group. Please refer to the prerequisite table or in the individual unit.

Structural steel detailing specialist stream

A minimum of ten (10) structural steel detailing specialist stream units must be selected from the two groups below. A maximum of six (6) units can be chosen from the general electives group. Units listed below as structural steel detailing electives can also be taken as general electives.

Structural steel detailing – Group 1

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

Unit code	Unit title	
MSATSD301A	Interpret architectural and engineering design specifications for structural steel detailing	*
MSATSD302A	Detail bolts and welds for structural steelwork connections	*
MSATSD501A	Detail standardised structural connections	*
MSATSD502A	Detail structural steel members	*
MSATSD503A	Incorporate structural steel detailing into fabrication and construction project management	
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	

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MSATSD504A	Detail ancillary steelwork	*
MEM09006B	Perform advanced engineering detail drafting	*
MEM09009C	Create 2D drawings using computer aided design system	*
MEM16012A	Interpret technical specifications and manuals	
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	*

General electives: Up to six (6) of the sixteen (16) elective units may also be chosen from the general electives bank listed at the end of the specialist streams. Up to four (4) of the six (6) units may be chosen from any other endorsed Training package where those units are available for inclusion at the Diploma level.

Prerequisites: Units marked with an asterisk have a prerequisite requirement. The prerequisites for those units are to be counted in the total number of units required in the elective group. Please refer to the prerequisite table or in the individual unit.

General elective units for MSA50108 Diploma of Manufacturing Technology

Balance of units for each specialist stream to be chosen as follows:

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	
AUM4003A	Interpret customer requirements	
FDFOPTSD2A	Work in a socially diverse environment	
LMTGN4016A	Contribute to the development of products or processes	
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	*
MEM09011B	Apply basic engineering design concepts	*
MEM09021B	Interpret and produce curved 3 dimensional shapes	
MEM09141A	Represent mechanical engineering designs	*
MEM09142A	Represent mechatronic engineering designs	*
MEM09151A	Apply computer aided modelling 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	*

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MEM12022B	Program coordinate measuring machine (advanced)	
MEM12023A	Perform engineering measurements	
MEM12024A	Perform computations	
MEM12025B	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	
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	
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	
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	
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	*

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MEM22007A	Manage environmental effects of 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 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	*
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	

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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 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	
MSACMS201A	Sustain process improvements	
MSACMS400A	Implement a competitive manufacturing system	
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	
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	
MSACMT421A	Facilitate a Just in Time (JIT) system	
MSACMT430A	Improve cost factors in work practices	
MSACMT432A	Analyse manual handling processes	
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	
MSACMT460A	Facilitate the use of planning software systems in manufacturing	*
MSACMT461A	Facilitate SCADA systems in a manufacturing team or work area	*
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	*

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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	*
MSACMT660A	Develop the application of enterprise systems in manufacturing	
MSACMT661A	Determine and establish information collection requirements and processes	
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	
MSAENV472A	Implement and monitor environmentally sustainable work practices	
MSAENV672A	Develop workplace policy and procedures for 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	
PMAOPS350A	Match and adjust colour	
PMAOPS450A	Solve colour problems	
PMBPREP304C	Set a die	
PMBPREP305B	Change extrusion die and calibration setup	
PMBPREP508B	Produce drawings	
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	
PMLTEST300B	Perform basic tests	
PMLTEST307B	Prepare trial batches for evaluation	
PMLTEST308A	Perform microscopic examination	
PMLTEST402B	Prepare, standardise and use solutions	
PMLTEST404A	Perform chemical tests and procedures	
PMLTEST406A	Perform physical tests	
PMLTEST411A	Perform mechanical tests	
PMLTEST520A	Perform complex tests to measure engineering properties of materials	

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EMPLOYABILITY SKILLS QUALIFICATION SUMMARY

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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	• complete workplace documentation and records • use communication technologies efficiently • develop work instructions, specifications and procedures • demonstrate effective and appropriate communication and interpersonal skills when dealing with people from NESB • communicate with all team members • demonstrate effective and appropriate communication and interpersonal skills when dealing with clients • use most appropriate communication method given priority, cost and customer facilities • access, interpret and apply technical information
Teamwork	• work cooperatively with people of different ages, gender, race or religion • liaise with and provide support to other team members • work as part of a team • identify and manage performance required to meet internal and external customer needs in own work and team • manage technical processes and provide problem solving support to others
Problem solving	• investigate problem causes • identify, rectify or report potential difficulties associated with manufacture of products or provision of services • identify environmental features, regulations, insurance requirements, legal requirements and other factors which may affect the product or service to be provided • use material and process knowledge to solve problems • identify hazards and suggest control measures • determine production requirements • conduct tests and analyse results to determine and assess production requirements
Initiative and enterprise	• seek feedback on products, processes and procedures • gather and analyse information and apply to work related processes • record information on the quality and other indicators of products • support achievement of efficient production processes • determine and act on situations requiring further information or problem solving

Planning and organising	• identify hazards and implement appropriate hazard control measures • demonstrate time management skills • source and prepare materials and resources • sequence work to maximise safety and productivity
Self management	• interpret and apply relevant acts and regulations • keep the work area clean and tidy at all times • monitor own work and work of team and identify and act on any quality issues • understand own work activities • manage own time to meet deadlines • implement workplace procedures and instructions
Learning	• implement learning activities as appropriate to ensure achievement of specified production requirements • assess competencies in meeting job requirements • be supportive, assertive and use interpersonal skills • identify own training needs and seek skill development if required • gather feedback to own work to assess effectiveness in meeting objectives and integrate information into own practice
Technology	• use computer software applications effectively • work with technology safely and according to workplace standards • help others use technology efficiently and safely • use testing technology