

MEM Manufacturing and Engineering
TRAINING PACKAGE
Version 4
WA NOMINAL HOURS GUIDE

Introduction

This Guide has been generated to enable the stakeholders in this Industry in Western Australia to participate in the managed implementation of the National MEM Manufacturing and Engineering Training Package.

This Guide is designed to aid Registered Training Organisations (RTOs) to convert from existing Training Package qualifications to new Training Package qualifications within the scope of their training delivery.

The Guide should be read in conjunction with the endorsed components of the Training Package.

Version 4 of the MEM Manufacturing and Engineering was released by Training.Gov.Au (TGA) on the 3/02/2023.

Transition Arrangements

Registered Training Organisations (RTOs) are required to deliver Training Package qualifications in accordance with the Standards for RTOs. For further information visit the Training Accreditation Council website www.tac.wa.gov.au.

Nominal Hours

Nominal hours are the hours of training notionally required to achieve the outcomes of units of competency.

Nominal hours are identified for nationally endorsed qualifications. Nominal hours may vary for a qualification depending on the selection of units of competency.

In Western Australia, nominal hours are used as a mechanism for funding allocation.

Contact Details

For Training Packages content information, please contact:

Training Curriculum Services

Tel: (08) 6551 5541

Email: trainingpackages@dtwd.wa.gov.au

Qualifications and Nominal Hours

The following table provides a summary of the qualifications and nominal hours in the training package.

National Code	National Title	Nominal Hours
MEM10119	Certificate I in Engineering	144
MEM10222	Certificate I in Boating Services	152
MEM20219	Certificate II in Engineering - Production Technology	576
MEM20322	Certificate II in Boating Services	242
MEM20422	Certificate II in Engineering Pathways	354
MEM30119	Certificate III in Engineering - Production Systems	864
MEM30219	Certificate III in Engineering - Mechanical Trade	864
MEM30422	Certificate III in Engineering - Electronic Trade	864
MEM30522	Certificate III in Engineering - Technical	360
MEM30619	Certificate III in Jewellery Manufacture	864
MEM30719	Certificate III in Marine Craft Construction	864
MEM30819	Certificate III in Locksmithing	864
MEM30919	Certificate III in Boating Services	490
MEM31019	Certificate III in Watch and Clock Service and Repair	864
MEM31119	Certificate III in Engineering - Composites Trade	870
MEM31219	Certificate III in Engineering - Industrial Electrician	996
MEM31322	Certificate III in Refrigeration and Air Conditioning	864
MEM31419	Certificate III in Engineering - Fixed and Mobile Plant Mechanic	864
MEM31519	Certificate III in Engineering - Toolmaking Trade	972
MEM31622	Certificate III in Engineering - Patternmaking Trade	972
MEM31719	Certificate III in Engineering - Casting and Moulding Trade	864
MEM31822	Certificate III in Engineering - Textile Mechanic	864
MEM31922	Certificate III in Engineering - Fabrication Trade	864

MEM40119	Certificate IV in Engineering	1184
MEM40222	Certificate IV in Boating Services	729
MEM40322	Certificate IV in Advanced Jewellery Manufacture	1188
MEM40422	Certificate IV in Engineering Drafting	620
MEM50119	Diploma of Engineering - Advanced Trade	1573
MEM50222	Diploma of Engineering - Technical	756
MEM50322	Diploma of Jewellery and Object Design	1060
MEM50422	Diploma of Engineering - Non-Destructive Testing	815
MEM50522	Diploma of Engineering - Materials	864
MEM50622	Diploma of Engineering - Prototyping	841
MEM50722	Diploma of Engineering - Planning	824
MEM50822	Diploma of Applied Technologies	858
MEM60122	Advanced Diploma of Engineering	1296
MEM60222	Advanced Diploma of Jewellery and Object Design	1520
MEM60322	Advanced Diploma of Engineering - Planning	1226
MEM80122	Graduate Diploma of Engineering	266

Skill Sets and Nominal Hours

The following table provides a summary of the skill sets and nominal hours in the training package.

National Code	National Title	Nominal Hours
MEMSS00002	Non-Destructive Testing - Level 2 NDT practitioner	342

Units of Competency and Nominal Hours

The following table provides a summary of the units of competency and nominal hours in the training package.

National Code	National Title	Nominal Hours	Points
MEM03001	Perform manual production assembly	36	4
MEM03002	Perform precision assembly	36	4
MEM03003	Perform sheet and plate assembly	36	4
MEM03004	Perform electronic/electrical assembly (production)	72	8
MEM03005	Rework and repair (electrical/electronic production)	72	8
MEM03006	Set assembly stations	18	2
MEM04001	Operate melting furnaces	36	4
MEM04002	Perform gravity die casting	18	2
MEM04003	Operate pressure die casting machine	36	4
MEM04004	Prepare and mix sand for metal moulding	36	4
MEM04006	Operate sand moulding and core making machines	72	8
MEM04007	Pour molten metal	36	4
MEM04008	Fettle and trim metal castings/forgings	36	4
MEM04018	Perform general woodworking machine operations	36	4
MEM04019	Perform refractory installation and repair	36	4
MEM04020	Supervise individual ferrous melting and casting operation	40	4
MEM04021	Supervise individual non-ferrous melting and casting operation	40	4
MEM04022	Examine appropriateness of methoding for mould design	40	4
MEM04023	Undertake prescribed tests on foundry-related materials	40	4
MEM04024	Produce moulds and cores by hand	36	4
MEM04025	Produce moulds and cores by hand (advanced)	108	12
MEM04026	Develop and manufacture spur gear patterns	18	2
MEM04027	Develop and manufacture bevel gear patterns	18	2

MEM04028	Develop and manufacture chain gear and sprocket patterns	18	2
MEM04029	Develop and manufacture conveyor screw patterns	18	2
MEM04030	Develop and manufacture propeller patterns	18	2
MEM04031	Develop and manufacture flat back wood patterns	90	4
MEM04032	Develop and manufacture irregular joint wood patterns	27	3
MEM04033	Develop and manufacture turned wood patterns	27	3
MEM04034	Develop and manufacture wooden wheel patterns	36	4
MEM04035	Develop and manufacture pipe patterns	36	4
MEM04036	Maintain patterns	18	2
MEM04037	Develop and manufacture split patterns	18	2
MEM04038	Produce polymer patterns	72	8
MEM04039	Assemble plated patterns	72	8
MEM04040	Develop and manufacture polystyrene patterns	18	2
MEM04041	Develop and manufacture production patterns	72	8
MEM04042	Develop and manufacture vacuum forming moulds and associated equipment	54	6
MEM04043	Develop and manufacture precision models	54	6
MEM05001	Perform manual soldering/desoldering - electrical/electronic components	36	4
MEM05002	Perform high reliability soldering and desoldering	36	4
MEM05003	Perform soft soldering	36	2
MEM05004	Perform routine oxy fuel gas welding	18	2
MEM05005	Carry out mechanical cutting	18	2
MEM05006	Perform brazing and/or silver soldering	18	2
MEM05007	Perform manual heating and thermal cutting	18	2
MEM05009	Perform automated thermal cutting	18	2
MEM05010	Apply fabrication, forming and shaping techniques	72	8
MEM05012	Perform routine manual metal arc welding	18	2
MEM05013	Perform manual production welding	18	2

MEM05014	Monitor quality of production welding/fabrications	18	2
MEM05027	Perform aluminothermic welding	18	2
MEM05037	Perform geometric development	54	6
MEM05038	Perform advanced geometric development - cylindrical/rectangular	18	2
MEM05039	Perform advanced geometric development - conical	18	2
MEM05040	Perform advanced geometric development - transitions	36	4
MEM05049	Perform routine gas tungsten arc welding	18	2
MEM05050	Perform routine gas metal arc welding	18	2
MEM05052	Apply safe welding practices	36	4
MEM05056	Perform routine flux core arc welding	18	2
MEM05057	Perform routine submerged arc welding	18	2
MEM05059	Perform advanced welding using submerged arc welding	36	4
MEM05060	Perform welds to code standards using submerged arc welding process	72	8
MEM05061	Apply basic metallurgy principles to welding applications	72	8
MEM05062	Apply welding and welding related codes and standards	36	4
MEM05063	Write and proof robotic welding system programs	54	6
MEM05064	Establish and maintain a weld record management system	36	4
MEM05065	Maintain weld records	36	4
MEM05066	Develop and maintain welding procedures	54	6
MEM05067	Establish and maintain a welding procedure management system	54	6
MEM05068	Apply welding procedure specifications	36	4
MEM05069	Undertake advanced weld repair and maintenance	54	6
MEM05070	Write and proof programs for NC/CNC thermal cutting machines	54	6
MEM05071	Perform advanced manual thermal cutting, gouging and shaping	18	2
MEM05072	Perform advanced welding using manual metal arc welding process	36	4
MEM05073	Perform advanced welding using gas metal arc welding process	36	4
MEM05074	Perform advanced welding using gas tungsten arc welding process	36	4

MEM05075	Perform advanced welding using oxy acetylene welding process	36	4
MEM05076	Perform welding supervision	90	10
MEM05077	Perform welding inspection	90	10
MEM05078	Apply welding principles	36	4
MEM05079	Perform welds to code standards using flux core arc welding process	72	8
MEM05080	Perform welds to code standards using gas metal arc welding process	72	8
MEM05081	Perform welds to code standards using gas tungsten arc welding process	72	8
MEM05082	Perform pipe welds to code standards using manual metal arc welding process	72	8
MEM05083	Perform welds to code standards using manual metal arc welding process	72	8
MEM05084	Perform advanced welding using flux core arc welding process	36	4
MEM05085	Select welding processes	18	2
MEM05086	Set and edit computer controlled thermal cutting machines	36	4
MEM05087	Write basic NC/CNC programs for thermal cutting machines	54	6
MEM05088	Perform welds to code standards using oxy fuel gas welding process	72	8
MEM05089	Assemble fabricated components	72	8
MEM05090	Weld using manual metal arc welding process	36	4
MEM05091	Weld using gas metal arc welding process	36	4
MEM05092	Weld using gas tungsten arc welding process	36	4
MEM05093	Weld using submerged arc welding process	36	4
MEM05094	Repair, replace and/or modify fabrications	36	4
MEM05095	Weld using flame powder spraying	36	4
MEM05096	Weld using flux core arc welding process	36	4
MEM05097	Weld using oxy fuel gas welding process	36	4
MEM06001	Perform hand forging	36	4
MEM06002	Perform hammer forging	36	4
MEM06003	Carry out heat treatment	54	6
MEM06004	Select heat treatment processes and test finished product	54	6

MEM06005	Perform drop and upset forging	36	4
MEM06006	Repair springs	36	4
MEM06007	Perform basic incidental heat/quenching, tempering and annealing	18	2
MEM06008	Hammer forge complex shapes	36	4
MEM06009	Hand forge complex shapes	36	4
MEM07001	Perform operational maintenance of machines/equipment	18	2
MEM07002	Perform precision shaping/planing/slotting operations	36	4
MEM07003	Perform routine machine setting	36	4
MEM07004	Perform complex machine setting	72	8
MEM07005	Perform general machining	72	8
MEM07006	Perform lathe operations	36	4
MEM07007	Perform milling operations	36	4
MEM07008	Perform grinding operations	36	4
MEM07009	Perform precision jig boring operations	36	4
MEM07010	Perform tool and cutter grinding operations	36	4
MEM07011	Perform complex milling operations	36	4
MEM07012	Perform complex grinding operations	36	4
MEM07013	Perform machining operations using horizontal and vertical boring machines	36	4
MEM07014	Perform electro-discharge machining (EDM) operations	36	4
MEM07015	Set computer controlled machines and processes	18	2
MEM07016	Set and edit computer controlled machines and processes	36	4
MEM07018	Write basic NC and CNC programs	36	4
MEM07019	Program NC and CNC machining centre	18	2
MEM07020	Program multiple spindle and multiple axis NC and CNC machining centre	18	2
MEM07021	Perform complex lathe operations	36	4
MEM07022	Program CNC wire cut machines	18	2
MEM07023	Program and set up CNC manufacturing cell	54	6

MEM07024	Operate and monitor machine and process	36	4
MEM07025	Perform advanced machine and process operation	54	6
MEM07026	Perform advanced plastic processing	54	6
MEM07027	Perform advanced press operations	54	6
MEM07028	Operate computer controlled machines and processes	18	2
MEM07029	Perform routine sharpening and maintenance of production tools and cutters	36	4
MEM07030	Perform basic metal spinning lathe operations	72	8
MEM07031	Perform complex metal spinning lathe operations	36	4
MEM07032	Use workshop machines for basic operations	18	2
MEM07033	Operate and monitor basic boiler	54	6
MEM07039	Write programs for industrial robots	36	4
MEM07040	Set multistage integrated processes	54	6
MEM07041	Perform production machining	70	8
MEM07042	Undertake corrections and basic maintenance to aluminium extrusion dies and die support systems	36	4
MEM07043	Identify causes of faulty aluminium extrusions	54	6
MEM07044	Test a new aluminium extrusion die	36	4
MEM08001	Perform wire, jig and barrel load/unload work	36	4
MEM08002	Pre-treat work for subsequent surface coating	36	4
MEM08003	Perform electroplating operations	54	6
MEM08004	Finish work using wet, dry and vapour deposition methods	36	4
MEM08005	Prepare and produce specialised coatings	36	4
MEM08006	Produce clear and/or coloured and/or sealed anodised films on aluminium	18	2
MEM08007	Control surface finish production and finished product quality	36	4
MEM08008	Operate and control surface finishing waste treatment process	27	3
MEM08009	Make up solutions	18	2
MEM08010	Manually finish/polish materials	54	6
MEM08011	Prepare surfaces using solvents and/or mechanical means	18	2

MEM08012	Prepare surfaces by abrasive blasting (basic)	36	4
MEM08013	Prepare surfaces by abrasive blasting (advanced)	36	4
MEM08014	Apply protective coatings (basic)	36	4
MEM08015	Apply protective coatings (advanced)	36	4
MEM08016	Control blast coating by-products, materials and emissions	9	1
MEM08018	Electroplate engineering coatings	54	6
MEM08019	Electroplate protective finishes	54	6
MEM08020	Electroplate decorative finishes	54	6
MEM09002	Interpret technical drawing	36	4
MEM09003	Prepare basic engineering drawing	72	8
MEM09004	Perform electrical or electronic detail drafting	72	8
MEM09005	Perform basic engineering detail drafting	72	8
MEM09006	Perform advanced engineering detail drafting	36	4
MEM09007	Perform advanced mechanical detail drafting	36	4
MEM09008	Perform advanced structural detail drafting	36	4
MEM09009	Create 2-D drawings using computer-aided design system	72	8
MEM09010	Create 3-D models using computer-aided design system	36	4
MEM09011	Apply basic engineering design concepts	54	6
MEM09021	Interpret and produce drawings of curved 3-D shapes	36	4
MEM09022	Create 2-D code files using computer-aided manufacturing system	72	4
MEM09023	Create 3-D code files using computer-aided manufacturing system	144	6
MEM09155	Prepare mechanical models for computer-aided engineering (CAE)	40	0
MEM09156	Prepare mechatronic models for computer-aided engineering (CAE)	40	0
MEM09157	Perform mechanical engineering design drafting	60	0
MEM09158	Perform mechatronics engineering design drafting	60	0
MEM09201	Work effectively in an engineering drafting workplace	20	0
MEM09202	Produce freehand sketches	40	0

MEM09203	Measure and sketch site information	40	0
MEM09204	Produce basic engineering detail drawings	72	0
MEM09205	Produce electrical schematic drawings	72	0
MEM09206	Produce drawings for mechanical services	60	0
MEM09207	Produce drawings for reticulated services	60	0
MEM09208	Detail fasteners and locking devices in mechanical drawings	40	0
MEM09209	Detail bearings, seals and other componentry in mechanical drawings	40	0
MEM09210	Create 3D solid models using computer-aided design (CAD) system	80	0
MEM09211	Produce drawings or models for industrial piping	60	0
MEM09212	Produce detailed drawings of steel to non-steel connections	60	0
MEM09213	Produce schematic drawings for hydraulic and pneumatic fluid power systems	60	0
MEM09214	Perform advanced engineering detail drafting	80	0
MEM09215	Supervise detail drafting projects	40	0
MEM09216	Interpret and produce curved 3D shapes and patterns	36	0
MEM09217	Prepare plans for pipe and duct fabrication	40	0
MEM09218	Participate in drafting projects for building services	40	0
MEM09219	Prepare drawings for fabricated sheet metal products	40	0
MEM09220	Apply surface modelling techniques to 3D drawings	80	0
MEM09221	Create 3D model assemblies using computer-aided design (CAD) system	80	0
MEM09222	Interpret and maintain or restore original drawings	20	0
MEM09223	Interpret design specifications for structural steel detailing	35	0
MEM09224	Detail bolts and welds for structural steelwork connections	15	0
MEM09225	Detail standardised structural connections	50	0
MEM09226	Detail structural steel members	70	0
MEM09227	Establish structural steel detailing project arrangements	50	0
MEM09228	Detail ancillary steelwork	35	0
MEM09229	Read and interpret technical engineering drawings	35	0

MEM10002	Terminate and connect electrical wiring	27	3
MEM10003	Install and test electrical wiring and circuits up to 1000 volts a.c. and 1500 volts d.c.	88	12
MEM10004	Enter and change programmable controller operational parameters	18	2
MEM10005	Commission programmable controller programs	36	4
MEM10006	Install machine/plant	36	4
MEM10007	Modify control systems	54	6
MEM10008	Undertake commissioning procedures for plant and/or equipment	36	4
MEM10009	Install refrigeration and air conditioning plant and equipment	36	4
MEM10010	Install pipework and pipework assemblies	36	4
MEM10011	Terminate and connect specialist cables	27	3
MEM10012	Erect structures	36	4
MEM10013	Install split air conditioning systems and associated pipework	36	6
MEM10016	Terminate and test electrical wiring and accessories	36	4
MEM10018	Select cable types and sizes to suit loads and electrical installation environment	36	4
MEM10019	Select circuit protection devices by type and rating, fit to switchboards and install earthing	36	2
MEM10020	Install low voltage cabling and fit-off accessories, appliances and equipment	36	4
MEM10021	Inspect, test and verify electrical installations	36	4
MEM10022	Commission and decommission high and low voltage equipment or installations	36	2
MEM10023	Design and connect control switching of circuits for building services and industrial equipment	36	4
MEM10024	Install and troubleshoot luminaires and ancillary equipment	36	2
MEM10025	Undertake a capstone assessment	9	1
MEM11001	Erect/dismantle scaffolding and equipment	36	4
MEM11002	Erect/dismantle intermediate scaffolding and equipment	36	4
MEM11003	Coordinate erection/dismantling of complex scaffolding/equipment	36	4
MEM11004	Undertake dogging	36	4
MEM11005	Pick and process order	36	4
MEM11006	Perform production packaging	18	2

MEM11007	Administer inventory procedures	36	4
MEM11008	Package materials (stores and warehouse)	18	2
MEM11009	Handle/move bulk fluids/gases	36	4
MEM11010	Operate mobile load shifting equipment	36	4
MEM11011	Undertake manual handling	18	2
MEM11012	Purchase materials	54	6
MEM11013	Undertake warehouse receival process	36	4
MEM11014	Undertake warehouse dispatch process	36	4
MEM11015	Manage warehouse inventory system	54	6
MEM11016	Order materials	18	2
MEM11017	Organise and lead stocktakes	36	4
MEM11018	Organise and maintain warehouse stock receival and dispatch system	54	6
MEM11019	Undertake tool store procedures	36	4
MEM11020	Perform advanced warehouse computer operations	36	4
MEM11021	Perform advanced operation of load shifting equipment	18	2
MEM11022	Operate fixed/moveable load shifting equipment	36	4
MEM11023	Operate a bridge and gantry crane	9	4
MEM11024	Undertake basic rigging	9	4
MEM11025	Operate a non-slewing mobile crane of greater than three tonnes capacity	9	4
MEM12001	Use comparison and basic measuring devices	18	2
MEM12002	Perform electrical/electronic measurement	18	2
MEM12003	Perform precision mechanical measurement	18	2
MEM12004	Perform precision electrical/electronic measurement	36	4
MEM12005	Calibrate measuring equipment	54	6
MEM12006	Mark off/out (general engineering)	36	4
MEM12007	Mark off/out structural fabrications and shapes	36	4
MEM12019	Measure components using coordinate measuring machines	36	4

MEM12020	Set and operate coordinate measuring machines	18	2
MEM12021	Program coordinate measuring machines	36	4
MEM12022	Program coordinate measuring machines (advanced)	18	2
MEM12023	Perform engineering measurements	48	5
MEM12024	Perform computations	27	3
MEM12025	Use graphical techniques and perform simple statistical computations	18	2
MEM12026	Perform advanced trade calculations in a manufacturing, engineering or related environment	36	4
MEM13001	Perform emergency first aid	9	1
MEM13003	Work safely with industrial chemicals and materials	18	2
MEM13004	Work safely with molten metals/glass	18	2
MEM13006	Collect and evaluate work health and safety data for an enterprise or section of an enterprise	36	4
MEM13007	Maintain water treatment systems for cooling towers	18	2
MEM13015	Work safely and effectively in manufacturing and engineering	18	2
MEM13016	Work in hazardous areas	18	2
MEM13017	Apply safety practices, procedures and compliance standards associated with licensed electrical work	18	2
MEM13018	Work safely with ionizing radiation	36	4
MEM13019	Undertake work health and safety activities in the workplace	27	3
MEM13020	Supervise work health and safety in an industrial work environment	36	4
MEM14001	Schedule material deliveries	72	8
MEM14002	Undertake basic process planning	72	8
MEM14003	Undertake production scheduling	72	8
MEM14006	Plan work activities	32	4
MEM14085	Apply mechanical engineering analysis techniques	60	0
MEM14086	Apply mechatronic engineering analysis techniques	40	0
MEM14087	Apply manufactured product design techniques	40	0
MEM14088	Apply maintenance engineering techniques to equipment and component repairs and modifications	70	0
MEM14089	Integrate mechanical fundamentals into an engineering task	55	0

MEM14090	Integrate mechatronic fundamentals into an engineering task	55	0
MEM14091	Integrate manufacturing fundamentals into an engineering task	55	0
MEM14092	Integrate maintenance fundamentals into an engineering task	55	0
MEM15001	Perform basic statistical quality control	18	2
MEM15003	Use improvement processes in team activities	36	4
MEM15004	Perform inspection	18	2
MEM15005	Select and control inspection processes and procedures	36	4
MEM15007	Conduct product and/or process capability studies	54	6
MEM15008	Perform advanced statistical quality control	18	2
MEM15010	Perform laboratory procedures	72	8
MEM15011	Exercise external quality assurance	54	6
MEM15012	Maintain/supervise the application of quality procedures	36	4
MEM15015	Examine trading practices	45	5
MEM15016	Inspect pre-packed articles	72	8
MEM15017	Use and maintain reference standards	27	3
MEM15018	Investigate consumer complaints	54	6
MEM15019	Conduct a field inspection	108	12
MEM15020	Perform inspection of measuring instruments	108	12
MEM15021	Conduct audits of servicing licensees and public weighbridge licensees	36	4
MEM15022	Verify reference standards	72	8
MEM16001	Give formal presentations and take part in meetings	18	2
MEM16002	Conduct formal interviews and negotiations	36	4
MEM16003	Provide advanced customer service	18	2
MEM16004	Perform internal/external customer service	18	2
MEM16005	Operate as a team member to conduct manufacturing, engineering or related activities	18	2
MEM16006	Organise and communicate information	18	2
MEM16008	Interact with computing technology	18	2

MEM16009	Research and analyse engineering information	18	2
MEM16010	Write reports	18	2
MEM16011	Communicate with individuals and small groups	18	2
MEM16012	Interpret technical specifications and manuals	36	4
MEM16013	Operate in a self-directed team	18	2
MEM16014	Report technical information	18	2
MEM17001	Assist in development and deliver training in the workplace	18	2
MEM17002	Conduct workplace assessment	18	2
MEM17003	Assist in the provision of on-the-job training	18	2
MEM18001	Use hand tools	18	2
MEM18002	Use power tools/hand held operations	18	2
MEM18003	Use tools for precision work	36	4
MEM18004	Maintain and overhaul mechanical equipment	36	4
MEM18005	Perform fault diagnosis, installation and removal of bearings	36	4
MEM18006	Perform precision fitting of engineering components	54	6
MEM18007	Maintain and repair mechanical drives and mechanical transmission assemblies	36	4
MEM18008	Balance equipment	18	2
MEM18009	Perform precision levelling and alignment of machines and engineering components	36	4
MEM18010	Perform equipment condition monitoring and recording	36	4
MEM18011	Shut down and isolate machines/equipment	18	2
MEM18012	Perform installation and removal of mechanical seals	18	2
MEM18013	Perform gland packing	18	2
MEM18014	Manufacture press tools and gauges	72	8
MEM18015	Maintain tools and dies	36	4
MEM18016	Analyse plant and equipment condition monitoring results	36	4
MEM18017	Modify mechanical systems and equipment	72	8
MEM18018	Maintain pneumatic system components	36	4

MEM18019	Maintain pneumatic systems	36	4
MEM18020	Maintain hydraulic system components	36	4
MEM18021	Maintain hydraulic systems	36	4
MEM18022	Maintain fluid power controls	72	8
MEM18023	Modify fluid power system operation	72	8
MEM18045	Fault find and repair electrical equipment/components up to 250 volts single phase supply	36	4
MEM18046	Fault find and repair electrical equipment/components up to 1000 volts a.c./1500 volts d.c.	90	10
MEM18048	Fault find and repair/rectify basic electrical circuits	108	12
MEM18049	Disconnect/reconnect fixed wired equipment up to 1000 volts a.c./1500 volts d.c.	27	3
MEM18050	Disconnect/reconnect fixed wired equipment over 1000 volts a.c./1500 volts d.c.	27	3
MEM18051	Fault find and repair/rectify complex electrical circuits	54	6
MEM18053	Modify fluid power control systems	54	6
MEM18054	Fault find, test and calibrate instrumentation systems and equipment	72	8
MEM18055	Dismantle, replace and assemble engineering components	27	3
MEM18056	Diagnose and repair analog equipment and components	90	10
MEM18057	Maintain/service analog/digital electronic equipment	54	6
MEM18058	Modify electronic equipment	36	4
MEM18059	Modify electronic systems	36	4
MEM18060	Maintain, repair control instrumentation - single and multiple loop control systems	72	8
MEM18061	Maintain/calibrate complex control systems	72	8
MEM18062	Install, maintain and calibrate instrumentation sensors, transmitters and final control elements	72	8
MEM18063	Terminate signal and data cables	36	4
MEM18064	Maintain instrumentation system components	54	6
MEM18065	Diagnose and repair digital equipment and components	90	10
MEM18066	Diagnose and repair microprocessor-based equipment	54	6
MEM18067	Tune control loops - multi controller or multi element systems	54	6
MEM18069	Maintain, repair instrumentation process control analysers	54	6

MEM18070	Modify complex electrical circuits and systems	54	6
MEM18071	Connect and disconnect fluid conveying system components	18	2
MEM18072	Manufacture fluid conveying conductor assemblies	36	4
MEM18083	Handle fluorocarbon refrigerants according to regulations	9	1
MEM18084	Commission and decommission split air conditioning systems	35	4
MEM18085	Install, service and repair domestic air conditioning and refrigeration appliances	55	6
MEM18086	Test, recover, evacuate and charge refrigeration systems	36	4
MEM18087	Service and repair domestic and light commercial refrigeration and air conditioning equipment	54	6
MEM18088	Maintain and repair commercial air conditioning systems and components	36	4
MEM18089	Maintain and repair central air handling systems	54	6
MEM18090	Maintain and repair industrial refrigeration systems and components	54	6
MEM18091	Maintain and repair multistage, cascade and/or ultra-cold industrial refrigeration systems	36	4
MEM18092	Maintain and repair commercial and/or industrial refrigeration and/or air conditioning controls	54	6
MEM18093	Maintain and repair integrated industrial refrigeration and/or large air handling system controls	72	8
MEM18094	Service and repair commercial refrigeration	54	6
MEM18095	Maintain and repair cooling towers/evaporative condensers and associated equipment	36	4
MEM18096	Maintain, repair/replace and adjust refrigerant flow controls and associated equipment	54	6
MEM18097	Manufacture cavity dies	72	8
MEM18098	Prepare to perform work associated with fuel system installation and servicing	18	2
MEM18100	Fault-find, test and rectify AC machines and circuits	36	4
MEM18102	Fault-find, test and rectify single and three-phase transformers	36	4
MEM18103	Fault-find, test and rectify electrical circuits and equipment	36	4
MEM18104	Dismantle, replace and assemble electrical components and equipment	36	3
MEM18105	Disconnect and reconnect high voltage fixed wired equipment	36	3
MEM18106	Terminate communication and data cables	36	4
MEM18108	Troubleshoot analog and digital electronic equipment	36	4
MEM18109	Troubleshoot instrumentation systems and equipment	36	4

MEM19001	Perform jewellery metal casting	54	6
MEM19002	Prepare jewellery illustrations	36	4
MEM19003	Handle gem materials	18	2
MEM19004	Handle and examine gemstone materials	54	6
MEM19005	Produce three-dimensional precision items	72	8
MEM19006	Replace watch batteries	9	1
MEM19007	Perform gemstone setting	54	6
MEM19008	Prepare jewellery designs	54	6
MEM19009	Perform investment procedures for lost wax casting process	9	1
MEM19010	Produce rubber moulds for lost wax casting process	18	2
MEM19011	Perform wax injection of moulds for lost wax casting process	18	2
MEM19012	Produce jewellery wax model	36	4
MEM19013	Produce jewellery metal masters	36	4
MEM19014	Perform hand engraving	36	4
MEM19015	Perform jewellery enamelling	36	4
MEM19016	Construct jewellery components	36	4
MEM19017	Fabricate jewellery items	54	6
MEM19018	Repair jewellery items	54	6
MEM19020	Fault find and maintain micro-mechanisms	36	4
MEM19021	Diagnose and service micro-mechanisms	54	6
MEM19022	Perform precision micro-mechanism diagnosis and servicing	54	6
MEM19023	Apply drawing and rendering techniques to jewellery or object design	36	4
MEM19024	Use computer-aided design (CAD) to create and display 3D jewellery or object models	36	4
MEM19025	Create and present designs for jewellery or other 3D objects	36	4
MEM19026	Investigate quality and application of jewellery materials	18	2
MEM19027	Produce life drawings for presenting jewellery or object designs	72	0
MEM19028	Select materials and new technologies for jewellery or 3D object design applications	18	2

MEM19029	Produce a professional jewellery design or 3D object portfolio	36	0
MEM19030	Research and recommend sustainable design improvements	54	0
MEM19031	Produce renderings and technical drawings for jewellery or object design construction	18	2
MEM19032	Design and implement mechanisms in jewellery items	72	0
MEM19033	Create silversmithing objects	36	4
MEM19034	Apply chain manufacture process	18	2
MEM19035	Plan and apply casting techniques for jewellery or object designs	36	4
MEM19036	Use specialised techniques to produce jewellery or objects	54	0
MEM19037	Plan and implement chenier fabrication process	18	2
MEM19038	Apply traditional techniques to jewellery or 3D object production	54	4
MEM19039	Plan, conduct and supervise a jewellery or object exhibition or program	54	0
MEM19040	Create and manufacture jewellery or object design prototypes for the mass market	54	0
MEM19041	Experiment with jewellery or object designs	54	0
MEM19042	Render images using computer graphics software	36	0
MEM19043	Oversee jewellery or object design production	72	0
MEM19044	Repair and restore antique jewellery	36	4
MEM19045	Set gems in channel style settings	36	4
MEM19046	Apply grain setting techniques	36	4
MEM19047	Set gems in claw and bezel style settings	36	4
MEM19048	Develop and apply complex borders and decorations for hand engraving	36	4
MEM19049	Develop and apply heraldic designs for hand engraving	18	2
MEM19050	Hand carve engraving work	36	4
MEM19051	Construct multiple stone settings	36	4
MEM19052	Produce complex objects using silversmithing techniques	36	4
MEM19053	Create complex findings and mechanisms for jewellery items	36	4
MEM19054	Fabricate platinum jewellery items	36	4
MEM19057	Research the gemstone market and complete pre-cutting processes	27	3

MEM19058	Cut and polish solid gemstones	72	8
MEM19059	Complete pre-cutting processes for gemstone assemblies	27	3
MEM19060	Cut and polish a gemstone assembly	72	8
MEM19061	Carve and polish gemstones	72	8
MEM19062	Production cut and polish gemstones	36	4
MEM19063	Use a faceting machine	36	4
MEM19064	Cut gemstone spheres and beads	27	3
MEM19065	Obtain rough and polished gemstones	9	1
MEM19066	Identify the requirements for establishing a gemstone-cutting workshop	18	2
MEM19067	Apply advanced pre-cutting processes to complex gemstones	36	4
MEM20015	Produce hand cut keys	18	2
MEM20016	Produce keys by cutting to code	18	2
MEM20017	Produce keys by duplication	18	2
MEM20018	Identify and program transponder keys	18	2
MEM20019	Service automotive transponder systems using diagnostic equipment	18	2
MEM20020	Use EEPROM programmers to service automotive transponder systems	18	2
MEM20021	Perform a building security inspection	18	2
MEM20022	Modify and repair security equipment and systems	36	4
MEM20023	Assemble and test lock mechanisms	54	6
MEM20024	Install and upgrade locks and hardware	36	4
MEM20025	Gain entry	36	4
MEM20026	Install and maintain door control devices and systems	18	2
MEM20027	Maintain and service mechanical locking devices	54	6
MEM20028	Plan and prepare a master key system	54	4
MEM20029	Develop and implement a master key system	36	6
MEM20030	Gain entry and reinstate fire and security containers	36	4
MEM20031	Gain entry and reinstate automotive locking systems	36	4

MEM20032	Service and repair fire and security containers	54	6
MEM20033	Service and repair mechanical automotive locking systems	54	4
MEM20035	Perform a site security survey	18	2
MEM21001	Replace watch batteries, capacitors and bands	18	2
MEM21002	Perform watch movement exchange	18	2
MEM21003	Perform watch case servicing, repair and refurbishment	36	4
MEM21004	Clean watch and clock components	18	2
MEM21005	Diagnose faults in quartz watches	18	2
MEM21006	Service quartz watches	36	4
MEM21007	Service complex quartz watches	36	4
MEM21008	Service mechanical watches	36	4
MEM21009	Inspect, diagnose, adjust and repair mechanical watches	36	4
MEM21010	Service watch power generating systems	18	2
MEM21011	Service calendar and other dial indication mechanisms for watches	36	4
MEM21012	Service and repair mechanical watch oscillating systems	36	4
MEM21013	Service, test and adjust watch escapements	36	4
MEM21014	Service mechanical chronograph watches	54	6
MEM21015	Perform precision watch timing and adjustment	54	6
MEM21016	Install and set up clocks	18	2
MEM21017	Service and repair clock timepieces	54	6
MEM21018	Service clock escapements and oscillating systems	36	4
MEM21019	Service and repair clock striking mechanisms	36	4
MEM21020	Service and repair clock chiming mechanisms	54	6
MEM21021	Restore clockwork mechanisms	54	6
MEM21022	Manufacture watch and clock components	54	6
MEM21023	Plan, set up and operate horological workshop or service centre	36	4
MEM22001	Perform engineering activities	40	0

MEM22002	Manage self in the engineering environment	40	0
MEM22007	Manage environmental effects of engineering activities	40	0
MEM22012	Coordinate resources for an engineering project or operation	20	0
MEM22013	Coordinate engineering projects	40	0
MEM22014	Coordinate engineering-related manufacturing operations	40	0
MEM22015	Source and estimate engineering materials requirements	20	0
MEM22017	Coordinate continuous improvement and technical development	60	0
MEM22018	Coordinate sales and promotion of engineering-related products or services	20	0
MEM23003	Operate and program computers and/or controllers in engineering situations	40	0
MEM23004	Apply technical mathematics	60	0
MEM23005	Apply statistics and probability techniques to engineering tasks	35	0
MEM23006	Apply fluid and thermodynamics principles in engineering	70	0
MEM23007	Apply calculus to engineering tasks	40	0
MEM23008	Apply advanced algebra and numerical methods to engineering tasks	100	0
MEM23052	Apply basic electro and control scientific principles and techniques in aeronautical engineering	54	0
MEM23063	Select and organise mechanical engineering material tests	20	0
MEM23064	Select and organise mechatronic engineering material tests	20	0
MEM23086	Apply scientific principles and techniques in avionic engineering situations	54	0
MEM23109	Apply engineering mechanics principles	55	0
MEM23111	Select electrical equipment and components for engineering applications	35	0
MEM23112	Investigate electrical and electronic controllers in engineering applications	35	0
MEM23113	Evaluate hydrodynamic systems and system components	55	0
MEM23114	Evaluate thermodynamic systems and components	55	0
MEM23115	Evaluate fluid power systems	55	0
MEM23116	Evaluate programmable logic controller and related control system component applications	55	0
MEM23117	Evaluate microcontroller applications	55	0
MEM23118	Apply production and service control techniques	70	0

MEM23119	Evaluate continuous improvement processes	70	0
MEM23120	Select mechanical machine and equipment components	70	0
MEM23121	Analyse loads on frames and mechanisms	70	0
MEM23122	Evaluate computer integrated manufacturing systems	40	0
MEM23123	Evaluate manufacturing processes	40	0
MEM23124	Measure and analyse noise and vibration	55	0
MEM23125	Evaluate maintenance systems	55	0
MEM23126	Evaluate industrial robotic applications	55	0
MEM23129	Evaluate thermal loads for heating, ventilation, air conditioning and refrigeration	70	0
MEM23130	Coordinate servicing and fault-finding of HVACR control systems	55	0
MEM23131	Evaluate rapid prototyping applications	55	0
MEM23132	Evaluate rapid manufacturing processes	55	0
MEM23133	Evaluate rapid tooling applications	55	0
MEM23134	Evaluate jigs and fixtures	35	0
MEM23135	Evaluate moulding tools and processes	35	0
MEM23136	Evaluate stamping and forging tools	35	0
MEM23137	Evaluate rolling tools and processes	35	0
MEM23138	Evaluate suitability of materials for engineering-related applications	35	0
MEM23139	Design a basic single zone duct distribution system	35	0
MEM23140	Determine operational parameters for building HVAC hydronic systems	35	0
MEM23141	Complete a building thermal performance survey	70	0
MEM23142	Determine psychrometric processes and system performance	55	0
MEM23143	Apply energy management principles	70	0
MEM23144	Contribute to the design of a commercial refrigeration system	90	0
MEM23145	Apply codes and regulations to air conditioning designs	70	0
MEM23146	Contribute to the design of industrial refrigeration systems	70	0
MEM23147	Contribute to the design of hydronic systems	35	0

MEM23148	Develop energy management solutions	35	0
MEM23149	Contribute to the design of commercial and industrial exhaust systems	35	0
MEM23150	Contribute to the design of heating systems	35	0
MEM23151	Commission and optimise performance of HVACR systems	35	0
MEM23152	Apply principles of refrigeration food storage technology	35	0
MEM23153	Contribute to the design of heat exchanger systems	35	0
MEM23154	Analyse and service HVACR systems	70	0
MEM234001	Plan and manage engineering-related projects or operations	36	0
MEM234002	Integrate engineering technologies	36	0
MEM234003	Design machines and ancillary equipment	54	0
MEM234004	Design for engineering-related noise and vibration mitigation	54	0
MEM234005	Design hydrodynamic pumping systems	54	0
MEM234006	Evaluate and select thermodynamic systems or subsystems	36	0
MEM234007	Design fluid power systems	36	0
MEM234008	Design plant using computer simulations	36	0
MEM234009	Design computer-integrated manufacturing systems	54	0
MEM234010	Design microcontroller applications	36	0
MEM234011	Design programmable logic controller applications	54	0
MEM234012	Design integrated maintenance management systems	54	0
MEM234013	Plan and design engineering-related manufacturing processes	54	0
MEM234014	Design a robotic system	36	0
MEM234015	Design hydronic heat exchanger systems	36	0
MEM234016	Design refrigeration systems	36	0
MEM234017	Design exhaust, ventilation and dust collection systems	36	0
MEM234018	Design heating, ventilation, air conditioning and refrigeration control systems	54	0
MEM234019	Apply finite element analysis in engineering design	36	0
MEM234020	Coordinate small lot manufacture using rapid manufacture processes	36	0

MEM234021	Apply statistics to technology problems	36	0
MEM234022	Apply advanced calculus to technology problems	36	0
MEM234023	Apply differential equations to technology problems	36	0
MEM234024	Apply advanced mathematics to technology problems	36	0
MEM234025	Apply numerical methods to technology problems	36	0
MEM234026	Develop and coordinate engineering-related contingency plans	36	0
MEM234027	Plan and manage materials supply for an engineering project or manufacturing operation	36	0
MEM234028	Produce and manage technical documentation	36	0
MEM234029	Produce and manage technical publications	36	0
MEM234030	Provide specialised technical and engineering guidance to other technical employees	36	0
MEM234031	Manage installation, commissioning or modification of machines and equipment	36	0
MEM234032	Manage fluid power-related technologies in an organisation	36	0
MEM234033	Lead engineering-related quality operations in an organisation	36	0
MEM234034	Manage heating, ventilation, air conditioning and refrigeration systems or projects	36	0
MEM234035	Maintain and apply technical and engineering skills	36	0
MEM234036	Apply configuration management procedures in engineering project management	70	0
MEM234037	Perform maintenance-related integrated logistic support management activities	70	0
MEM234038	Apply systems engineering procedures to engineering design project management	70	0
MEM234039	Provide technical support for prototyping in large engineering and fabrication projects	35	0
MEM234040	Plan space allocation for large steel based fabrication and construction projects	35	0
MEM234041	Manage steel supply for major fabrication projects	35	0
MEM24001	Perform basic penetrant testing	18	2
MEM24002	Perform penetrant testing	36	4
MEM24003	Perform basic magnetic particle testing	18	2
MEM24004	Perform magnetic particle testing	36	4
MEM24005	Perform basic eddy current testing	18	2
MEM24006	Perform eddy current testing	54	6

MEM24007	Perform ultrasonic thickness testing	18	2
MEM24008	Perform ultrasonic testing	54	6
MEM24009	Perform basic radiographic testing	18	2
MEM24010	Perform radiographic testing	54	6
MEM24011	Establish non-destructive tests	108	12
MEM24012	Apply metallurgical principles	36	4
MEM24014	Perform thermography tests	90	4
MEM24015	Perform digital and computed radiography	55	6
MEM24016	Perform eddy current array tests	55	6
MEM24017	Perform visual testing to non-destructive testing standards	90	4
MEM24018	Perform advanced ultrasonic testing	70	6
MEM24019	Apply codes and standards to non-destructive testing	20	4
MEM24020	Apply materials technology principles to non-destructive tests	55	4
MEM25001	Apply fibre-reinforced materials	18	2
MEM25002	Form and integrate fibre-reinforced structures	36	4
MEM25003	Set up marine vessel structures	36	4
MEM25004	Fair and shape surfaces	18	2
MEM25005	Construct and assemble marine vessel timber components	72	8
MEM25006	Undertake marine sheathing operations	18	2
MEM25007	Maintain marine vessel surfaces	36	4
MEM25008	Repair marine vessel surfaces and structures	18	4
MEM25009	Form timber shapes using hot processes	18	2
MEM25010	Perform fitout procedures	36	4
MEM25011	Install marine systems	72	8
MEM25012	Install and test operations of marine auxiliary systems	54	6
MEM25013	Produce three-dimensional plugs/moulds	54	12
MEM25014	Perform marine slipping operations	36	2

MEM25015	Assemble and install equipment and accessories/ancillaries	18	2
MEM26001	Lay up composites using open moulding techniques	54	6
MEM26002	Lay up composites using vacuum closed moulding techniques	54	6
MEM26003	Lay up composites using pressure closed moulding techniques	54	6
MEM26004	Make basic plugs for composites fabrication	27	3
MEM26005	Make basic moulds for composites fabrication	27	3
MEM26006	Mark and cut out sheets for composite use	36	4
MEM26007	Select and use reinforcing appropriate for product	36	4
MEM26008	Select and use resin systems appropriate for product	36	4
MEM26009	Select and use cores and fillers appropriate for product	18	2
MEM26010	Store and handle composite materials	18	2
MEM26011	Determine materials and techniques for a composite component or product	54	6
MEM26012	Record and trial work processes for one-off composite products	36	4
MEM26013	Select and use composite processes or systems appropriate for product	36	4
MEM26014	Adjust resin chemicals for current conditions	36	4
MEM26015	Select and apply repair techniques	54	6
MEM26016	Select and use joining techniques	54	6
MEM26017	Prepare composite or other substrate surfaces	36	4
MEM26018	Organise composite trials	36	4
MEM26019	Finish a composite product	36	4
MEM26020	Identify and interpret required standards for composites	18	2
MEM27001	Maintain and repair stationary and mobile plant engine cooling systems	18	2
MEM27002	Test and repair compression ignition systems	36	4
MEM27003	Overhaul engine fuel system components	72	8
MEM27004	Maintain and repair engine lubrication systems	18	2
MEM27005	Tune diesel engines	36	4
MEM27006	Diagnose and rectify batteries, low voltage sensors and circuits	72	8

MEM27007	Diagnose and rectify low voltage starting systems	18	2
MEM27008	Maintain induction, exhaust and emission control systems	36	4
MEM27009	Diagnose and rectify braking systems	54	6
MEM27010	Diagnose and rectify low voltage charging systems	18	2
MEM27011	Maintain track type undercarriage on mobile plant	36	4
MEM27012	Maintain mobile plant suspension systems	36	4
MEM27013	Maintain steering systems	36	4
MEM27014	Diagnose and rectify automatic transmissions	72	8
MEM27015	Diagnose and rectify drive line and final drives	36	4
MEM27016	Diagnose and maintain electronic controlling systems on mobile and stationary plant	36	4
MEM27017	Maintain, fault find and rectify hydraulic systems for mobile plant	36	4
MEM27018	Test, diagnose and rectify mobile and stationary plant external monitoring and control systems	36	4
MEM27019	Diagnose, repair and replace diesel engines in stationary and mobile plant	45	5
MEM27020	Apply knowledge of large combustion engine operations to service and maintenance tasks	18	2
MEM27021	Maintain, fault find and repair stationary plant gas turbine engines	54	6
MEM27022	Maintain, fault find and repair traction drive mechanics	36	4
MEM27023	Diagnose and rectify fieldbus circuits in mobile and stationary plant and equipment	36	4
MEM27024	Diagnose and rectify mobile plant hydrostatic systems	36	4
MEM27025	Maintain, diagnose and rectify fluid power controls in mobile equipment	54	6
MEM27026	Service and repair mobile plant air conditioning systems	36	4
MEM27027	Install or modify mobile plant air conditioning systems	36	4
MEM27028	Diagnose and rectify manual transmissions	36	4
MEM27029	Maintain wheels and tyres	18	2
MEM27030	Perform engine bottom-end overhaul	36	4
MEM27031	Perform engine top-end overhaul	72	8
MEM27032	Service combustion engines	18	2
MEM27033	Perform advanced equipment testing and diagnostics on mobile plant and equipment	72	8

MEM29001	Work in Industry 4.0	35	0
MEM29002	Commission a cyber-physical system	70	0
MEM29003	Apply CAD and CAM technologies in an Industry 4.0 workplace	70	0
MEM29004	Analyse and problem solve a PLC based industrial control system	90	0
MEM29005	Diagnose faults in digital control systems	70	0
MEM29006	Use a SCADA system to assist Industry 4.0 operations in manufacturing and engineering	90	0
MEM29007	Apply networking technology principles for manufacturing and engineering applications	80	0
MEM29008	Analyse and manage data in cloud-based systems	70	0
MEM29009	Prepare, configure and test collaborative robots for industrial operations	70	0
MEM29010	Plan and implement preventative maintenance procedures in an Industry 4.0 manufacturing workplace	70	0
MEM29011	Develop a business case for Industry 4.0 implementation in a workplace	55	0
MEM29012	Access and use a digital twin for operational purposes	45	0
MEM29013	Integrate sensors into digital manufacturing processes	45	0
MEM30005	Calculate force systems within simple beam structures	40	0
MEM30006	Calculate stresses in simple structures	40	0
MEM30007	Select common engineering materials	40	0
MEM30008	Apply basic economic and ergonomic concepts to evaluate engineering applications	20	0
MEM30009	Contribute to the design of basic mechanical systems	40	0
MEM30010	Set up basic hydraulic circuits	20	0
MEM30011	Set up basic pneumatic circuits	24	0
MEM30012	Apply mathematical techniques in a manufacturing engineering or related environment	60	4
MEM30013	Assist in the preparation of a basic workplace layout	40	0
MEM30014	Apply basic just in time systems to the reduction of waste	40	0
MEM30015	Develop recommendations for basic set up time improvements	40	0
MEM30016	Assist in the analysis of a supply chain	40	0
MEM30017	Use basic preventative maintenance techniques and tools	40	0
MEM30018	Undertake basic process planning	40	0

MEM30019	Use resource planning software systems in manufacturing	40	0
MEM30020	Develop and manage a plan for a simple manufacturing related project	40	0
MEM30021	Prepare a simple production schedule	40	0
MEM30022	Undertake supervised procurement activities	20	0
MEM30023	Prepare a simple cost estimate for a manufactured product	40	0
MEM30024	Participate in quality assurance techniques	20	0
MEM30025	Analyse a simple electrical system circuit	20	0
MEM30026	Select and test components for simple electronic switching and timing circuits	20	0
MEM30027	Prepare basic programs for programmable logic controllers	20	0
MEM30028	Assist in sales of technical products	20	0
MEM30029	Use workshop equipment and processes to complete an engineering project	55	0
MEM30031	Operate computer-aided design (CAD) system to produce basic drawing elements	40	0
MEM30032	Produce basic engineering drawings	80	0
MEM30033	Use computer-aided design (CAD) to create and display 3D models	40	0
MEM48001	Test the mechanical properties of materials	30	0
MEM48002	Monitor ferrous melting and casting processes	30	0
MEM48003	Monitor nonferrous melting and casting processes	20	0
MEM48004	Interpret basic binary phase diagrams	20	4
MEM48005	Apply basic knowledge of casting operations	30	0
MEM48006	Prepare and examine metallographic samples	40	0
MEM48007	Monitor and test sands, cores and moulds	40	0
MEM48008	Evaluate mould design and gating	40	0
MEM48009	Undertake and interpret results of chemical analysis on metal samples	50	0
MEM48010	Determine and supervise heat treatment of metal	40	0
MEM48011	Apply basic chemical principles to metallurgy	60	0
MEM48012	Calculate and predict chemical outcomes in metallurgical situations	40	0
MEM48013	Identify and select equipment for mineral and chemical processing plants	40	0

MEM48014	Recommend a refractory for an application	40	0
MEM48015	Select metal forming process	50	0
MEM48016	Select metal joining process	50	0
MEM48017	Monitor blast furnace operations	50	0
MEM48018	Monitor primary steel making process	50	0
MEM48019	Monitor secondary steel making operations	50	0
MEM48020	Recommend ferrous and nonferrous metals or alloys for an application	50	0
MEM48021	Apply metallurgical principles and techniques in welding and other thermal processes	60	0
MEM48022	Apply metallurgical principles and practice to determine metal forming and shaping processes	60	0
MEM48023	Apply metallurgical principles and practice to optimise furnace operation	60	0
MEM48024	Plan and complete metallurgical projects	40	0
MEM48025	Select surface treatment methods for metallic components or products	40	0
MEM48026	Analyse metallurgical failures of components and recommend preventative measures	60	0
MEM48027	Select non-metallic materials for engineering applications	60	0
MEM48028	Determine corrosion prevention strategies for metal and alloys	60	0
MEM48029	Interpret and produce complex binary phase diagrams	40	0
MEM48030	Apply materials selection analysis techniques	110	0
MEM48031	Select ceramic and glass materials for engineering and manufacturing applications	35	0
MEM48032	Select composite materials for engineering and manufacturing applications	70	0
MEM48033	Apply chemistry principles to materials used in manufacturing and engineering processes	70	0
MEM48034	Apply efficient materials management techniques to composite manufacturing operations	55	0
MEM50001	Classify recreational boating technologies and features	54	0
MEM50002	Work safely on marine craft	12	1
MEM50003	Follow work procedures to maintain the marine environment	12	1
MEM50004	Maintain quality of environment by following marina codes	12	1
MEM50005	Refuel vessels	36	0
MEM50006	Check operational capability of marine craft	36	0

MEM50007	Check operational capability of sails and sail operating equipment	18	0
MEM50008	Carry out trip preparation and planning	36	0
MEM50009	Safely operate a mechanically powered recreational boat	18	2
MEM50010	Respond to boating emergencies and incidents	27	0
MEMPE001	Use engineering workshop machines	55	0
MEMPE002	Use electric welding machines	35	0
MEMPE003	Use oxy-acetylene and soldering equipment	35	0
MEMPE004	Use fabrication equipment	35	0
MEMPE005	Develop a career plan for the engineering and manufacturing industries	20	0
MEMPE006	Undertake a basic engineering project	70	0
MEMPE007	Pull apart and re-assemble engineering mechanisms	25	0

Mapping Qualifications

The following table provides an overview of the qualifications from Version 4 which replace qualifications from the existing version of the MEM Manufacturing and Engineering Training Package.

MEM Current Qualification			MEM Replacement Qualification			
National Code	National Title	Nominal Hours	E / NE	National Code	National Title	Nominal Hours
			-	MEM50422	Diploma of Engineering - Non-Destructive Testing	815
			-	MEM50522	Diploma of Engineering - Materials	864
			-	MEM50622	Diploma of Engineering - Prototyping	841
			-	MEM50722	Diploma of Engineering - Planning	824
			-	MEM50822	Diploma of Applied Technologies	858
			-	MEM60322	Advanced Diploma of Engineering - Planning	1226

Mapping Skill Sets

The following table provides an overview of the skill sets from Version 4 which replace skill sets from the existing version of the MEM Manufacturing and Engineering Training Package.

MEM Current Skill Set			MEM Replacement Skill Set		
National Code	National Title	Nominal Hours	E / NE	National Code	Nominal Hours

No changes occurred between MEM v3 & v4.

Mapping Units of Competency

The following table provides an overview of the units of competency from Version 4 which replace units of competency from the existing version of the MEM Manufacturing and Engineering Training Package.

MEM Current Unit				MEM Replacement Unit		
National Code	National Title	Nominal Hours	E / NE	National Code	National Title	Nominal Hours
			-	MEM234039	Provide technical support for prototyping in large engineering and fabrication projects	35
			-	MEM234040	Plan space allocation for large steel based fabrication and construction projects	35
			-	MEM234041	Manage steel supply for major fabrication projects	35
			-	MEM24014	Perform thermography tests	90
			-	MEM24015	Perform digital and computed radiography	55
			-	MEM24016	Perform eddy current array tests	55
			-	MEM24017	Perform visual testing to non-destructive testing standards	90
			-	MEM24018	Perform advanced ultrasonic testing	70
			-	MEM24019	Apply codes and standards to non-destructive testing	20
			-	MEM24020	Apply materials technology principles to non-destructive tests	55
			-	MEM29001	Work in Industry 4.0	35
			-	MEM29002	Commission a cyber-physical system	70
			-	MEM29003	Apply CAD and CAM technologies in an Industry 4.0 workplace	70
			-	MEM29004	Analyse and problem solve a PLC based industrial control system	90
			-	MEM29005	Diagnose faults in digital control systems	70
			-	MEM29006	Use a SCADA system to assist Industry 4.0 operations in manufacturing and engineering	90
			-	MEM29007	Apply networking technology principles for manufacturing and engineering applications	80
			-	MEM29008	Analyse and manage data in cloud-based systems	70
			-	MEM29009	Prepare, configure and test collaborative robots for industrial operations	70

			-	MEM29010	Plan and implement preventative maintenance procedures in an Industry 4.0 manufacturing workplace	70
			-	MEM29011	Develop a business case for Industry 4.0 implementation in a workplace	55
			-	MEM29012	Access and use a digital twin for operational purposes	45
			-	MEM29013	Integrate sensors into digital manufacturing processes	45
			-	MEM48030	Apply materials selection analysis techniques	110
			-	MEM48031	Select ceramic and glass materials for engineering and manufacturing applications	35
			-	MEM48032	Select composite materials for engineering and manufacturing applications	70
			-	MEM48033	Apply chemistry principles to materials used in manufacturing and engineering processes	70
			-	MEM48034	Apply efficient materials management techniques to composite manufacturing operations	55

Apprenticeships

The following table provides a summary of the apprenticeships that have been affected by changes in this MEM Manufacturing and Engineering training package update.

Please refer to the current *Register of Class A and B qualifications* found on the Department of Training and Workforce Development website for the official list of apprenticeships in Western Australia.

National Code	National Title	Apprenticeship	Nominal Hours	E / NE	National Code	National Title	Nominal Hours
---------------	----------------	----------------	---------------	--------	---------------	----------------	---------------

No changes occurred between MEM v3 & v4.

Traineeships

The following table provides a summary of the traineeships that have been affected by changes in this MEM Manufacturing and Engineering training package update.

Please refer to the current *Register of Class A and B qualifications* found on the Department of Training and Workforce Development website for the official list of apprenticeships in Western Australia.

National Code	National Title	Traineeship	Nominal Hours	E / NE	National Code	National Title	Nominal Hours
---------------	----------------	-------------	---------------	--------	---------------	----------------	---------------

No changes occurred between MEM v3 & v4.

Pre-Apprenticeships

The following table provides a summary of the pre-apprenticeships that have been affected by changes in this MEM Manufacturing and Engineering training package update.

Please refer to the current *list of pre-apprenticeship courses* found on the Department of Training and Workforce Development website for the official list of pre-apprenticeships in Western Australia.

National Code	National Title	Pre-Apprenticeship	Nominal Hours	E / NE	National Code	National Title	Nominal Hours
---------------	----------------	--------------------	---------------	--------	---------------	----------------	---------------

No changes occurred between MEM v3 & v4.