



Australian Government
**Department of Education,
Science and Training**



Manufacturing Skills Australia

MCM04 Competitive Manufacturing Training Package

Volume 1 of 2

Version Number: 3
Review Date: 31 July 2006

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MCM04 Competitive Manufacturing Training Package

This is Volume 1 of a 2-volume set. This volume should not be used in isolation but in the context of the complete set for the Competitive Manufacturing Training Package.

The material contained within this volume is part of the endorsed component of the Competitive Manufacturing Training Package endorsed by the National Training Quality Council in September, 2004 and agreed by the Ministers.

Volume 1 of 2 Competitive Manufacturing Training Package (Background, Qualification Framework, Assessment Guidelines)

Covering the manufacturing sectors of:

Automotive Manufacturing

Chemical, Hydrocarbons and Oil Refining

Food Processing

Furnishing

Manufactured Mineral Products

Metal and Engineering

Sugar Milling

Textiles, Clothing and Footwear

Plastics, Rubber and Cable making, and related sectors

Volume 1 Background, Qualifications Framework, Assessment Guidelines

Volume 2 Units of Competency

This Training Package is to be reviewed by 31 July 2006.

MCM04 - Competitive Manufacturing Training Package

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Preliminary Information

Important Note to Users

Training Packages are not static documents; they are amended periodically to reflect the latest industry practices and are version controlled. It is essential that the latest version is always used.

Check the version number before commencing training or assessment

This Training Package is Version 3 - check whether this is the latest version by going to the National Training Information Service (www.ntis.gov.au) and locating information about the Training Package. Alternatively, contact Manufacturing Industry Skills Council at <http://www.mskills.org.au> to confirm the latest version number.

Explanation of version number conventions

The primary release Training Package is Version 1. When changes are made to a Training Package, sometimes the version number is changed and sometimes it is not, depending on the extent of the change. When a Training Package is reviewed it is considered to be a new Training Package for the purposes of version control, and is Version 1. Do not confuse the version number with the Training Packages national code (which remains the same during its period of endorsement).

Version modification history

The version details of this endorsed Training Package are in the table below. The latest information is at the top of the table.

Version	Release Date	Comments
1	September, 2004	Initial release
2	April, 2005	Inclusion of Certificates III and IV in Manufacturing Technology and new units of competency. Minor corrections (including to the diagram) to clarify packaging rules for Certificates III and IV in Competitive Manufacturing Replacement of Assessment Guidelines to reflect the endorsement of TAA04.
3	April 2006	Inclusion of Certificate II in Competitive Manufacturing, Certificate II in Manufacturing Technology as well as their new units of competency and additional elective units for existing qualifications.

Summary of AQF qualifications in this Training Package

Code	Title
MCM20105	Certificate II in Manufacturing Technology
MCM20205	Certificate II in Competitive Manufacturing
MCM30104	Certificate III in Competitive Manufacturing
MCM30204	Certificate III in Manufacturing Technology
MCM40104	Certificate IV in Competitive Manufacturing
MCM40204	Certificate IV in Manufacturing Technology
MCM50104	Diploma of Competitive Manufacturing
MCM60104	Advanced Diploma of Competitive Manufacturing

Units of competency in this Training Package and their prerequisites

Code	Title	Prerequisite
MCMC210A	Manage the impact of change on own work	None
MCMC410A	Lead change in a manufacturing environment	None
MCMC411A	Lead a competitive manufacturing team	None
MCMC413A	Lead team culture improvement	None
MCMC610A	Manage relationships with non-customer external organisations	None
MCMC611A	Manage people relationships	None
MCMC612A	Manage workplace learning	None
MCMC613A	Facilitate holistic culture improvement in a manufacturing enterprise	None
MCMC614A	Develop a communications strategy to support production	None
MCMO290A	Work safely in manufacturing	None
MCMP295A	Operate manufacturing equipment	None
MCMP296A	Make a small furniture item from timber	None
MCMP297A	Make an object from cloth using an existing pattern	None
MCMP298A	Make an object from metal	None
MCMP299A	Make an object from plastic	None
MCMS200A	Apply competitive manufacturing practices	None
MCMS201A	Sustain process improvements	None
MCMS400A	Implement a competitive manufacturing system	None
MCMS401A	Ensure process improvements are sustained	None
MCMS405A	Lead a manufacturing team using a balanced score card approach	None
MCMS600A	Develop a competitive manufacturing system	None
MCMS601A	Analyse and map a value chain	None
MCMS602A	Manage a value chain	MCMS601A MCMT631A
MCMS603A	Develop manufacturing related business plans	None

Code	Title	Prerequisite
MCMS604A	Manage competitive manufacturing processes in a jobbing shop environment	MCMS601A MCMT280A MCMT631A
MCMS605A	Develop a balanced score card	MCMS601A MCMT280A MCMT631A
MCMS606A	Introduce competitive manufacturing to a small or medium enterprise	None
MCMT220A	Apply quick changeover procedures	None
MCMT221A	Apply Just in Time (JIT) procedures	None
MCMT230A	Apply cost factors to work practices	None
MCMT231A	Interpret product costs in terms of customer requirements	None
MCMT240A	Apply 5S procedures in a manufacturing environment	None
MCMT250A	Monitor process capability	None
MCMT251A	Apply quality standards	None
MCMT260A	Use planning software systems in manufacturing	None
MCMT261A	Use SCADA systems in manufacturing	None
MCMT270A	Use sustainable energy practices	None
MCMT271A	Use sustainable environmental practices	None
MCMT280A	Undertake root cause analysis	None
MCMT281A	Contribute to the application of a proactive maintenance strategy	None
MCMT421A	Facilitate a Just in Time (JIT) system	None
MCMT423A	Monitor a manufacturing levelled pull system	None
MCMT430A	Improve cost factors in work practices	None
MCMT432A	Analyse manual handling processes	None
MCMT440A	Lead 5S in a manufacturing environment	None
MCMT441A	Facilitate continuous improvement in manufacturing	None
MCMT450A	Undertake process capability improvements	None
MCMT451A	Mistake proof a production process	None

Code	Title	Prerequisite
MCMT452A	Apply statistics to processes in manufacturing	None
MCMT453A	Use six sigma techniques	MCMT452A
MCMT460A	Facilitate the use of planning software systems in manufacturing	None
MCMT461A	Facilitate SCADA systems in a manufacturing team or work area	MCMT261A
MCMT481A	Undertake proactive maintenance analyses	None
MCMT482A	Assist in implementing a proactive maintenance strategy	None
MCMT483A	Support proactive maintenance	None
MCMT620A	Develop quick changeover procedures	None
MCMT621A	Develop a Just in Time (JIT) system	None
MCMT622A	Design a process layout	None
MCMT623A	Develop a levelled pull system of manufacturing	None
MCMT630A	Optimise cost of product	None
MCMT631A	Undertake value analysis of product costs in terms of customer requirements	None
MCMT632A	Analyse cost implications of maintenance strategy	None
MCMT640A	Manage 5S system in a manufacturing environment	None
MCMT641A	Implement a continuous improvement system	None
MCMT650A	Determine and improve process capability	None
MCMT652A	Design an experiment	MCMT452A
MCMT653A	Apply six sigma to process control and improvement	MCMT452A
MCMT660A	Develop the application of enterprise systems in manufacturing	None
MCMT661A	Determine and establish information collection requirements and processes	None
MCMT662A	Develop a documentation control strategy for a manufacturing enterprise	None
MCMT670A	Develop and manage sustainable energy practices	None
MCMT671A	Develop and manage sustainable environmental practices	None

Code	Title	Prerequisite
MCMT675A	Facilitate the development of a new product	None
MCMT681A	Develop a proactive maintenance strategy	None
MCMT682A	Adapt a proactive maintenance strategy to the process manufacturing sector	MCMT681A
MCMT683A	Adapt a proactive maintenance strategy for a seasonal or cyclical manufacturing operation	MCMT681A

Imported units of competency in this Training Package

Code	Title	Origin
AUM4003A	Interpret customer requirements - complex	AUM00
FDFOPTSD2A	Work in a socially diverse environment	FDF03
LMTPTDX04A	Contribute to the development of products or processes	LMT00
LMTPRGN05A	Participate in product engineering	LMT00
MEM12024A	Perform computations	MEM05
MEM15001B	Perform basic statistical quality control	MEM05
MEM16006A	Organise and communicate information	MEM05
MEM16008A	Interact with computing technology	MEM05
MEM30001A	Use computer aided drafting systems to produce basic engineering drawings	MEM05
MEM30002A	Produce basic engineering graphics	MEM05
MEM30003A	Produce detailed engineering drawings	MEM05
MEM30004A	Use CAD to create and display 3D models	MEM05
MEM30005A	Calculate force systems within simple beam structures	MEM05
MEM30006A	Calculate stresses in simple structures	MEM05
MEM30007A	Select common engineering materials	MEM05
MEM30008A	Apply basic economic and ergonomic concepts to evaluate engineering applications	MEM05
MEM30009A	Contribute to the design of basic mechanical systems	MEM05
MEM30010A	Set up basic hydraulic circuits	MEM05
MEM30011A	Set up basic pneumatic circuits	MEM05
MEM30012A	Apply mathematical techniques in a manufacturing engineering or related environment	MEM05
MEM30013A	Assist in the preparation of a basic workplace layout	MEM05
MEM30014A	Apply basic just in time systems to the reduction of waste	MEM05
MEM30015A	Develop recommendations for basic set up time improvements	MEM05
MEM30016A	Assist in the analysis of a supply chain	MEM05

Code	Title	Origin
MEM30017A	Use basic preventative maintenance techniques and tools	MEM05
MEM30018A	Undertake basic process planning	MEM05
MEM30019A	Use resource planning software systems in manufacturing	MEM05
MEM30020A	Develop and manage a plan for a simple manufacturing related project	MEM05
MEM30021A	Prepare a simple production schedule	MEM05
MEM30022A	Undertake supervised procurement activities	MEM05
MEM30023A	Prepare a simple cost estimate for a manufactured product	MEM05
MEM30024A	Participate in quality assurance techniques	MEM05
MEM30025A	Analyse a simple electrical system circuit	MEM05
PMASUP390A	Use structured problem solving tools	PMA02
PMLCOM300B	Communicate with other people	PML04
PMLDATA200A	Record and present data	PML04
PMLMAIN300B	Maintain the laboratory fit for purpose	PML04
PMLOHS301B	Work safely with instruments that emit ionising radiation	PML04
PMLOHS302A	Participate in laboratory/field workplace safety	PML04
PMLORG301A	Plan and conduct laboratory/field work	PML04
PMLQUAL300B	Contribute to the achievement of quality objectives	PML04
PMLQUAL301B	Apply critical control point requirements	PML04
PMLQUAL401B	Apply quality system and continuous improvement processes	PML04
PMLSAMP200A	Collect routine site samples	PML04
PMLSAMP201A	Handle and transport samples or equipment	PML04
PMLSAMP302A	Receive and prepare samples for testing	PML04
PMLSAMP400B	Obtain representative samples in accordance with sampling plan	PML04
PMLSCIG300B	Operate basic handblowing equipment	PML04
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment	PML04

Code	Title	Origin
PMLTEST300B	Perform basic tests	PML04
PMLTEST303B	Prepare working solutions	PML04
PMLTEST304B	Prepare culture media	PML04
PMLTEST305B	Perform aseptic techniques	PML04
PMLTEST306B	Assist with fieldwork	PML04
PMLTEST307B	Prepare trial batches for evaluation	PML04
PMLTEST308A	Perform microscopic examination	PML04
UTPNEG147A	Perform electrical/electronic drafting	UTP98

Explanation of the review date

The review date (shown on the title page and in the header of each page) indicates when the Training Package is expected to be reviewed in the light of changes such as changing technologies and circumstances. The review date is not an expiry date. Endorsed Training Packages and their components remain current until they are reviewed or replaced.

Overview

What is a Training Package?

A Training Package is an integrated set of nationally endorsed competency standards, assessment guidelines and Australian Qualifications Framework (AQF) qualifications for a specific industry, industry sector or enterprise.

Each Training Package:

- provides a consistent and reliable set of components for training, recognising and assessing people's skills, and may also have optional support materials
- enables nationally recognised qualifications to be awarded through direct assessment of workplace competencies
- encourages the development and delivery of flexible training which suits individual and industry requirements
- encourages learning and assessment in a work-related environment which leads to verifiable workplace outcomes.

How do Training Packages fit within the National Training Framework?

The National Training Framework is made up of the nationally agreed quality arrangements for the vocational education and training sector, the Australian Quality Training Framework (AQTF), and Training Packages endorsed by the National Training Quality Council (NTQC).

How are Training Packages developed?

Training Packages are developed by Industry Skills Councils or enterprises to meet the identified training needs of specific industries or industry sectors. To gain national endorsement of Training Packages, developers must provide evidence of extensive research, consultation and support within the industry area or enterprise.

How do Training Packages encourage flexibility?

Training Packages describe the skills and knowledge needed to perform effectively in the workplace without prescribing how people should be trained.

Training Packages acknowledge that people can achieve vocational competency in many ways by emphasising what the learner can do, not how or where they learned to do it. For example, some experienced workers might be able to demonstrate competency against the units of competency, and even gain a qualification, without completing a formal training program.

With Training Packages, assessment and training may be conducted at the workplace, off-the-job, at a training organisation, during regular work, or through work experience, work placement, work simulation or any combination of these.

Who can deliver and assess using Training Packages?

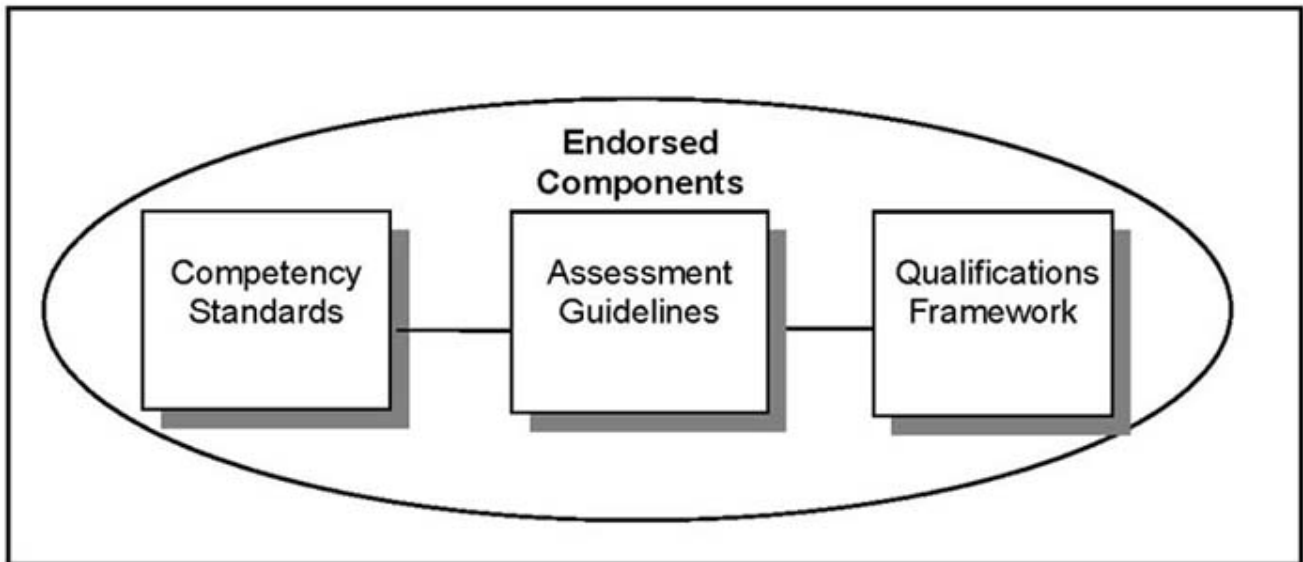
Training and assessment using Training Packages must be conducted by a Registered Training Organisation (RTO) that has the qualifications or specific units of competency on its scope of registration, or that works in partnership with another RTO as specified in the AQTF *Standards for Registered Training Organisations*.

Training Package Components

Training Packages are made up of mandatory components endorsed by the NTQC, and optional support materials.

Training Package Endorsed Components

The nationally endorsed components include the Competency Standards, Assessment Guidelines and Qualifications Framework. These form the basis of training and assessment in the Training Package and, as such, they must be used.



Competency Standards

Each unit of competency identifies a discrete workplace requirement and includes the knowledge and skills that underpin competency as well as language, literacy and numeracy; and occupational health and safety requirements. The units of competency must be adhered to in training and assessment to ensure consistency of outcomes.

Assessment Guidelines

The Assessment Guidelines provide an industry framework to ensure all assessments meet industry needs and nationally agreed standards as expressed in the Training Package and the *Standards for Registered Training Organisations*. The Assessment Guidelines must be followed to ensure the integrity of assessment leading to nationally recognised qualifications.

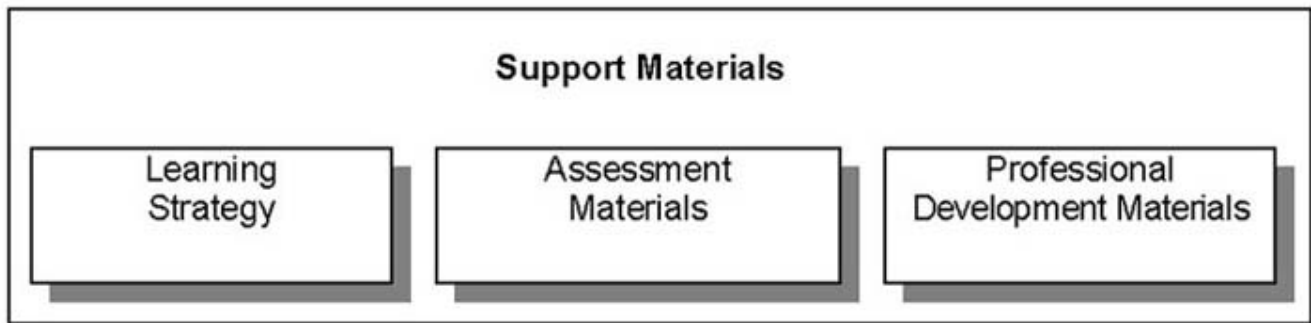
Qualifications Framework

Each Training Package provides details of those units of competency that must be achieved to award AQF qualifications. The rules around which units of competency can be combined to make up a valid AQF qualification in the Training Package are referred to as the packaging rules. The packaging rules must be followed to ensure the integrity of nationally recognised qualifications issued.

Training Package Support Materials

The endorsed components of Training Packages are complemented and supported by optional support materials that provide for choice in the design of training and assessment to meet the needs of industry and learners.

Training Package support materials can relate to single or multiple units of competency, an industry sector, a qualification or the whole Training Package. They tend to fall into one or more of the categories illustrated below.



Training Package support materials are produced by a range of stakeholders such as RTOs, individual trainers and assessors, private and commercial developers and Government agencies.

Where such materials have been quality assured through a process of noting by the NTQC, they display the following official logo. Noted support materials are listed on the National Training Information Service (NTIS), together with a detailed description and information on the type of product and its availability (www.ntis.gov.au).



It is not compulsory to submit support materials for noting; any resources that meet the requirements of the Training Package can be used.

Training Package, Qualification and Unit of Competency Codes

There are agreed conventions for the national codes used for Training Packages and their components. Always use the correct codes, exactly as they appear in the Training Package, **and with the title always following the code.**

Training Package Codes

Each Training Package has a unique five-character national code assigned when the Training Package is endorsed, for example MCM04. The first three characters are letters identifying the Training Package industry coverage and the last two characters are numbers identifying the year of endorsement.

Qualification Codes

Within each Training Package, each qualification has a unique eight-character code, for example MCM20105. The first three letters identify the Training Package; the first number identifies the qualification level (noting that arabic numbers are not used in qualification titles themselves); the next two numbers identify the position in the sequence of the qualification at that level; and the last two numbers identify the year in which the qualification was endorsed. (Where qualifications are added after the initial Training Package endorsement, the last two numbers may differ from other Training Package qualifications as they identify the year in which those particular qualifications were endorsed).

Unit of Competency Codes

Within each Training Package, each unit of competency has a unique code. The unit of

competency codes are assigned when the Training Package is endorsed, or when new units of competency are added to an existing endorsed Training Package.

A typical code is made up of 12 characters, normally a mixture of uppercase letters and numbers, as in MCMC210A. The first three characters signify the Training Package (MCM04Competitive Manufacturing Training Package in the above example) and up to eight characters, relating to an industry sector, function or skill area, follow. The last character is always a letter and identifies the unit of competency version. The A in the example above indicates that this is the original unit of competency. An incremented version identifier usually means that minor changes have been made. Typically this would mean that wording has changed in the range statement or evidence guide, providing clearer intent. Where changes are made that alter the outcome, a new code is assigned and the title is changed.

Training Package, Qualification and Unit of Competency Titles

There are agreed conventions for titling Training Packages and their components. Always use the correct titles, exactly as they appear in the Training Package, and with the code always placed before the title.

Training Package Titles

The title of each endorsed Training Package is unique and relates the Training Packages broad industry coverage.

Qualification Titles

The title of each endorsed Training Package qualification is unique. Qualification titles use the following sequence:

- firstly, the qualification is identified as either Certificate I, Certificate II, Certificate III, Certificate IV, Diploma or Advanced Diploma
- this is followed by the words in for Certificates I to IV and of for Diploma and Advanced Diploma
- then the industry descriptor follows, for example Telecommunications, and
- if applicable, the occupational or functional stream follows in brackets, for example (Computer Systems).

For example:

- MCM20105 Certificate II in Manufacturing Technology
- MCM20205 Certificate II in Competitive Manufacturing

Unit of Competency Titles

Each unit of competency title is unique. Unit of competency titles describe the competency outcome concisely, and are written in sentence case.

For example:

- MCMC210A Manage the impact of change on own work
- MCMC410A Lead change in a manufacturing environment

Introduction to the Competitive Manufacturing Training Package

The Competitive Manufacturing Training Package has been developed by the Competitive Manufacturing Initiative (CMI). The Training Package consists of two volumes, Volume 1 (this volume) which contains background, qualifications and assessment information and Volume 2 which contains the competency standards.

Overview of CMI

The Competitive Manufacturing Initiative (CMI) was a collaborative response from Australia's Manufacturing Industry Training Advisory Bodies (ITABs) to assist manufacturing industry improve manufacturing practice through the development of innovative vocational education and training (VET) qualifications and units of competency. The CMI development process has been funded by funded by ANTA. The original scoping project for the CMI was majority funded by industry.

The following ITABs formed the Project Management Group for the initial development of the CMI:

- Automotive Training Australia which covered:
 - passenger vehicles
 - trucks
 - bus and trailer manufacturing
 - most coach and body building
 - vehicle repair, service and retail
 - automotive after market, and
 - some component manufacturing.
- Light Manufacturing Training Australia which covered:
 - the textile clothing, footwear and leather industries. and
 - the furnishing industry.
- Manufacturing Learning Australia which covered process manufacturing industries such as:
 - chemical
 - hydrocarbons
 - oil
 - plastics
 - rubber
 - cable making
 - cement
 - clay
 - ceramic
 - concrete
 - refractories
 - plaster, and
 - fibre board.
- Manufacturing Engineering and Related Services ITAB which covered:
 - metal and engineering related manufacturing
 - heavy engineering
 - maintenance
 - aerospace, and
 - boating.
- National Food Industry Training Council which covered:
 - food and beverage
 - pharmaceutical, and
 - tobacco processing and manufacturing.

MERS ITAB acted as the secretariat for the development of CMI. However, users should now contact Manufacturing Skills Australia (MSA), the national Industry Skills Council that covers manufacturing to seek specific advice relevant to their area. Contact MSA on ph 02 9955 5500 or at www.mskills.com.au . The CMI website should also be checked for information and advice at www.cmi.org.au .

Industry Coverage

The CMI Training Package covers all of the manufacturing industry. At the 2001 census, the manufacturing industry employed 1,010,179 persons or 12% of the entire workforce. Manufacturing is the biggest sector in terms of contribution to gross domestic product where it contributes 13 % of the total product (*Ref: Manufacturing Industry Australia, 1999-2000, ABS, 8221.0*) and is also the sector with the highest value added contributing 12% of the total value (*Ref: Australian System of National Accounts, 2002-2003, ABS, 5204.0*) added to the economy. The Australian Bureau of Statistics notes (*Ref: Manufacturing Industry Australia, 1999-2000, ABS 8221.0*) that 'Manufacturing contributed more to Australian production...than any other industry'.

The CMI Training Package is complementary to the existing Training Packages covering specific manufacturing sectors. These sector specific Training Packages cover the knowledge and skills specifically required by those sectors. The CMI Training Package covers knowledge and skills associated with manufacturing practices and systems which are common across manufacturing sectors.

Development of MCM04

The Development Process

This project originated out of discussions within the Board of the Foundation for Australian Manufacturing Education (FAME) and the initial scoping study was financially supported by FAME, Australian Business Ltd and ANTA. Support for the project's aims and objectives was also given by the Australian Manufacturing Centre (AMC) and the Australian Industry Group. This scoping project (*Ref: Ratio Pty Ltd/Richard Jenkins & Associates/Sally Davis & Associates Scoping Project for Manufacturing Practice Competencies, Final Report, April 2000*) found that there was a bias in the then existing Training Packages of specific technical skills and insufficient coverage of the skills needed to manage, supervise and implement system skills needed in modern manufacturing. The scoping report identified a need for the development of units of competency in manufacturing practice, and possibly also qualifications in manufacturing practice.

The CMI Stage 2 project:

- investigated the scope of skills to be included in the CMI
- developed a marketing strategy and established a CMI website
- established a formal cooperative mechanism amongst the manufacturing ITABs
- established a brand and logo based on the title Competitive Manufacturing Initiative (CMI).

The CMI Stage 3 project then developed and validated a number of units of competency and qualifications. The development and validation was done by consulting industry generally and also by the use of industry experts. Care was taken through this process to ensure there was representation of each industry sector and type of manufacturing process. The use of competitive manufacturing practices is variable across the manufacturing sector, and one of the aims of developing this Training Package is to make training in these skills more widely available, so helping industry operate more effectively in a competitive environment. Initial consultation therefore focussed more on identified leaders in this area while validation focused more on the broader manufacturing industry.

Consultations undertaken as part of CMI Stage 2 and confirmed in Stage 3 indicated that the CMI qualifications and units would represent new content for many RTOs and that many of the skills could only be taught and assessed in a workplace environment. CMI Stage 3 therefore included a process to allow early identification of delivery issues through a trial site process. Five trial sites were selected to cover both a number of states and also each major

industry sector. The trial sites used (*Note: As the units were not endorsed at this stage there were some practical limitations on the 'use' of these unit*) the draft CMI units to map the draft units to current delivery and to validate the units and to determine any delivery issues. The trial sites were:

- Goulburn Ovens Institute of TAFE - Shepparton Campus
- Hunter Institute of Technology
- Onkaparinga Institute of TAFE
- Swinburne University - VET Division
- Western Sydney Institute of TAFE - Mt Druitt Campus

The Technology Cadetships

In August 2003 the Australian Industry Group with funding assistance from ANTA established a Manufacturing Technician Training Initiative project known colloquially as the Technology Cadetship Project. The aim of the project was to develop and promote more efficient pathways for school leavers to enter technical occupations in manufacturing industry. One of the key objectives was to establish entry level qualifications linked to on and off the job training in a cadetship arrangement.

The origin of the project was partly Australian Industry Group work on the National Industry Skills Initiative as well as comments and concerns by Ai Group members that pathways for the development of technician level skills in manufacturing were inefficient and generally took too long to be attractive to either enterprises or young people.

The Ai Group Manufacturing Technician Training Initiative included activities in a number of areas that were broader than a normal Training Package development project. These areas were:

- Identification and/or development of appropriate content in existing and/or new Training Packages;
- Marketing of technician level contract of employment arrangements to employers, young people, industry and the community generally;
- Establishment of appropriate employment arrangements;
- Establishing arrangements for the approval of contracts of employment by State Training Agencies
- Establishment of appropriate funding arrangements for both mainstream training delivery and employer financial incentives;
- Marketing of actual placements to Ai Group members and other employers.

While the Australian Industry Group conducted much of the content research and development for this submission, both the Ai Group and ANTA realised that Ai Group would not be able to put forward the new qualifications for endorsement under current policy arrangements.

The Australian Industry Group was consulted on the development of the Competitive Manufacturing Training Package and decided that the CMI was the most appropriate body to take over on a longer term basis the future content development of the Technology Cadetship and responsibility for endorsement of the work done to date. The CMI ITABs and Ai Group also agreed that the qualifications and units for the Technology Cadetship should be part of the responsibilities of the Manufacturing Industry Skills Council once it was established.

The Manufacturing Industry Skills Council has now been established and it is anticipated that the CMI will continue to exist as a sub committee function in the Manufacturing Skills Council and that arrangements will be made for on going participation of the Agri-Foods Skills Council and for automotive industry representation.

The term Technology Cadetship was developed to differentiate the level of training from that commonly found in apprenticeships and traineeships although the principle of combined off and on the training and mutual obligation of employer and employee is the same.

Awards, Licensing and other Regulatory Issues

Various awards and agreements apply within manufacturing industry. This Training Package was designed to allow for these different arrangements. It is appropriate to use this Training Package as part of an award/agreement, but it has not been designed to fit any particular award or agreement except for the Technology Cadetships.

The Technology Cadetships are designed to work with a variety of employment arrangements including Awards, enterprise agreements and Australian Workplace Agreements in a manner similar to apprenticeships and traineeships. However to facilitate early acceptance of the Technology Cadetship the Australian Industry Group and the Australian Manufacturing Workers Union (AMWU) have developed a new consent training Award for manufacturing which will give a specific employment arrangement option for most manufacturing sectors. This Award will be known as the Manufacturing and Associated Industries Training and Skills Development Award 2004 and will be presented to the Australian Industrial Relations Commission as a consent application in the week commencing 8 November 2004.

There are no general licensing issues, however specific licenses may be required in some jobs. The local regulations should be checked for details. The industry is generally subject to a range of regulatory control. These vary with the nature of the facility and to some extent on its location as most regulations are State based and many are enforced by local government. This Training Package allows for these differences without mandating them to specific units of competency which would not be appropriate.

Overview of MCM04 Training Package

General Comments

As MCM04 complements existing manufacturing Training Packages, provision is made in the qualifications for the importation of relevant sector specific units of competency into CMI qualifications. It is also expected that CMI units of competency will be imported into existing manufacturing Training Packages when they are reviewed, or under continuous improvement provisions. Not all CMI units of competency may be appropriate for any given sector.

Due to the nature of the CMI, it is expected that most delivery and assessment will be done in partnership with an enterprise, or group of enterprises, which are embarking on competitive manufacturing. A project style of delivery is envisaged for many units of competency.

It may be appropriate to grant recognition of current competence (RCC/RPL) for certain FMI units depending on the amount and type of contextualisation applied to the FMI unit. As the equivalence will depend on the contextualisation applied, it is not possible to give general advice at this stage. RCC should be applied on a case by case basis.

Companies embarking on competitive manufacturing will frequently choose different starting points, and often different names to describe what they are doing. This Training Package allows for these differences in approach and relevant units of competency should be selected to match the starting point and the strategies being adopted.

Qualifications Framework

The Australian Qualifications Framework

What is the Australian Qualifications Framework?

A brief overview of the Australian Qualifications Framework (AQF) follows. For a full explanation of the AQF see the *AQF Implementation Handbook, 3rd Edition 2002*. You can download it from the Australian Qualifications Advisory Board (AQFAB) website (www.aqf.edu.au) or obtain a hard copy by contacting AQFAB on phone 03 9639 1606 or by emailing AQFAB on aqfab@curriculum.edu.au

The AQF provides a comprehensive, nationally consistent framework for all qualifications in post-compulsory education and training in Australia. In the vocational education and training (VET) sector it assists national consistency for all trainees, learners, employers and providers by enabling national recognition of qualifications and Statements of Attainment.

Training Package qualifications in the VET sector must comply with the titles and guidelines of the AQF. Endorsed Training Packages provide a unique title for each AQF qualification which must always be reproduced accurately.

Qualifications

Training Packages can incorporate the following eight AQF qualifications.

- Certificate I in ...
- Certificate II in ...
- Certificate III in ...
- Certificate IV in ...
- Diploma of ...
- Advanced Diploma of ...
- Vocational Graduate Certificate of ...
- Vocational Graduate Diploma of ...

On completion of the requirements defined in the Training Package, a Registered Training Organisation (RTO) may issue a nationally recognised AQF qualification. Issuance of AQF qualifications must comply with the advice provided in the *AQF Implementation Handbook* and the Australian Quality Training Framework *Standards for Registered Training Organisations*, particularly Standard 10.

Statement of Attainment

Where an AQF qualification is partially achieved through the achievement of one or more endorsed units of competency, an RTO may issue a Statement of Attainment. Issuance of Statements of Attainment must comply with the advice provided in the *AQF Implementation Handbook* and the Australian Quality Training Framework *Standards for Registered Training Organisations*, particularly Standard 10.

Under the *Standards for Registered Training Organisations*, RTOs must recognise the achievement of competencies as recorded on a qualification or Statement of Attainment issued by other RTOs. Given this, recognised competencies can progressively build towards a full AQF qualification.

AQF Guidelines and Learning Outcomes

The *AQF Implementation Handbook* provides a comprehensive guideline for each AQF qualification. A summary of the learning outcome characteristics and their distinguishing features for each VET related AQF qualification is provided below.

Certificate I

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and skills would prepare a person to perform a defined range of activities most of which may be routine and predictable.

Applications may include a variety of employment related skills including preparatory access and participation skills, broad-based induction skills and/or specific workplace skills. They may also include participation in a team or work group.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate knowledge by recall in a narrow range of areas;
- demonstrate basic practical skills, such as the use of relevant tools;
- perform a sequence of routine tasks given clear direction
- receive and pass on messages/information.

Certificate II

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and skills would prepare a person to perform in a range of varied activities or knowledge application where there is a clearly defined range of contexts in which the choice of actions required is usually clear and there is limited complexity in the range of operations to be applied.

Performance of a prescribed range of functions involving known routines and procedures and some accountability for the quality of outcomes.

Applications may include some complex or non-routine activities involving individual responsibility or autonomy and/or collaboration with others as part of a group or team.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate basic operational knowledge in a moderate range of areas;
- apply a defined range of skills;
- apply known solutions to a limited range of predictable problems;
- perform a range of tasks where choice between a limited range of options is required;
- assess and record information from varied sources;
- take limited responsibility for own outputs in work and learning.

Certificate III

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and competencies would cover selecting, adapting and transferring skills and knowledge to new environments and providing technical advice and some leadership in resolution of specified problems. This would be applied across a range of roles in a variety of contexts with some complexity in the extent and choice of options available.

Performance of a defined range of skilled operations, usually within a range of broader related activities involving known routines, methods and procedures, where some discretion and judgement is required in the selection of equipment, services or contingency measures

and within known time constraints.

Applications may involve some responsibility for others. Participation in teams including group or team co-ordination may be involved.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate some relevant theoretical knowledge
- apply a range of well-developed skills
- apply known solutions to a variety of predictable problems
- perform processes that require a range of well-developed skills where some discretion and judgement is required
- interpret available information, using discretion and judgement
- take responsibility for own outputs in work and learning
- take limited responsibility for the output of others.

Certificate IV

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and competencies would cover a broad range of varied activities or application in a wider variety of contexts most of which are complex and non-routine. Leadership and guidance are involved when organising activities of self and others as well as contributing to technical solutions of a non-routine or contingency nature.

Performance of a broad range of skilled applications including the requirement to evaluate and analyse current practices, develop new criteria and procedures for performing current practices and provision of some leadership and guidance to others in the application and planning of the skills. Applications involve responsibility for, and limited organisation of, others.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating some theoretical concepts
- apply solutions to a defined range of unpredictable problems
- identify and apply skill and knowledge areas to a wide variety of contexts, with depth in some areas
- identify, analyse and evaluate information from a variety of sources
- take responsibility for own outputs in relation to specified quality standards
- take limited responsibility for the quantity and quality of the output of others.

Diploma

Characteristics of Learning Outcomes

Breadth, depth and complexity covering planning and initiation of alternative approaches to skills or knowledge applications across a broad range of technical and/or management requirements, evaluation and co-ordination.

The self directed application of knowledge and skills, with substantial depth in some areas where judgement is required in planning and selecting appropriate equipment, services and techniques for self and others.

Applications involve participation in development of strategic initiatives as well as personal

responsibility and autonomy in performing complex technical operations or organising others. It may include participation in teams including teams concerned with planning and evaluation functions. Group or team co-ordination may be involved.

The degree of emphasis on breadth as against depth of knowledge and skills may vary between qualifications granted at this level.

Distinguishing Features of Learning Outcomes

Do the competencies or learning outcomes enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating theoretical concepts, with substantial depth in some areas
- analyse and plan approaches to technical problems or management requirements
- transfer and apply theoretical concepts and/or technical or creative skills to a range of situations
- evaluate information, using it to forecast for planning or research purposes
- take responsibility for own outputs in relation to broad quantity and quality parameters
- take some responsibility for the achievement of group outcomes.

Advanced Diploma

Characteristics of Learning Outcomes

Breadth, depth and complexity involving analysis, design, planning, execution and evaluation across a range of technical and/or management functions including development of new criteria or applications or knowledge or procedures.

The application of a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts in relation to either varied or highly specific functions. Contribution to the development of a broad plan, budget or strategy is involved and accountability and responsibility for self and others in achieving the outcomes is involved.

Applications involve significant judgement in planning, design, technical or leadership/guidance functions related to products, services, operations or procedures.

The degree of emphasis on breadth as against depth of knowledge and skills may vary between qualifications granted at this level.

Distinguishing Features of Learning Outcomes

Do the competencies or learning outcomes enable an individual with this qualification to:

- demonstrate understanding of specialised knowledge with depth in some areas
- analyse, diagnose, design and execute judgements across a broad range of technical or management functions
- generate ideas through the analysis of information and concepts at an abstract level
- demonstrate a command of wide-ranging, highly specialised technical, creative or conceptual skills
- demonstrate accountability for personal outputs within broad parameters
- demonstrate accountability for personal and group outcomes within broad parameters.

Vocational Graduate Certificate

Characteristics of competencies or learning outcomes

- The self-directed development and achievement of broad and specialised areas of knowledge and skills, building on prior knowledge and skills.

- Substantial breadth and complexity involving the initiation, analysis, design, planning, execution and evaluation of technical and management functions in highly varied and highly specialised contexts.
- Applications involve making significant, high-level, independent judgements in major broad or planning, design, operational, technical and management functions in highly varied and specialised contexts. They may include responsibility and broad ranging accountability for the structure, management and output of the work or functions of others.
- The degree of emphasis on breadth, as opposed to depth, of knowledge and skills may vary between qualifications granted at this level.

Distinguishing features of learning outcomes

- Demonstrate the self-directed development and achievement of broad and specialised areas of knowledge and skills, building on prior knowledge and skills.
- Initiate, analyse, design, plan, execute and evaluate major broad or technical and management functions in highly varied and highly specialised contexts.
- Generate and evaluate ideas through the analysis of information and concepts at an abstract level.
- Demonstrate a command of wide-ranging, highly specialised technical, creative or conceptual skills in complex contexts.
- Demonstrate responsibility and broad-ranging accountability for the structure, management and output of the work or functions of others.

Vocational Graduate Diploma

Characteristics of competencies or learning outcomes

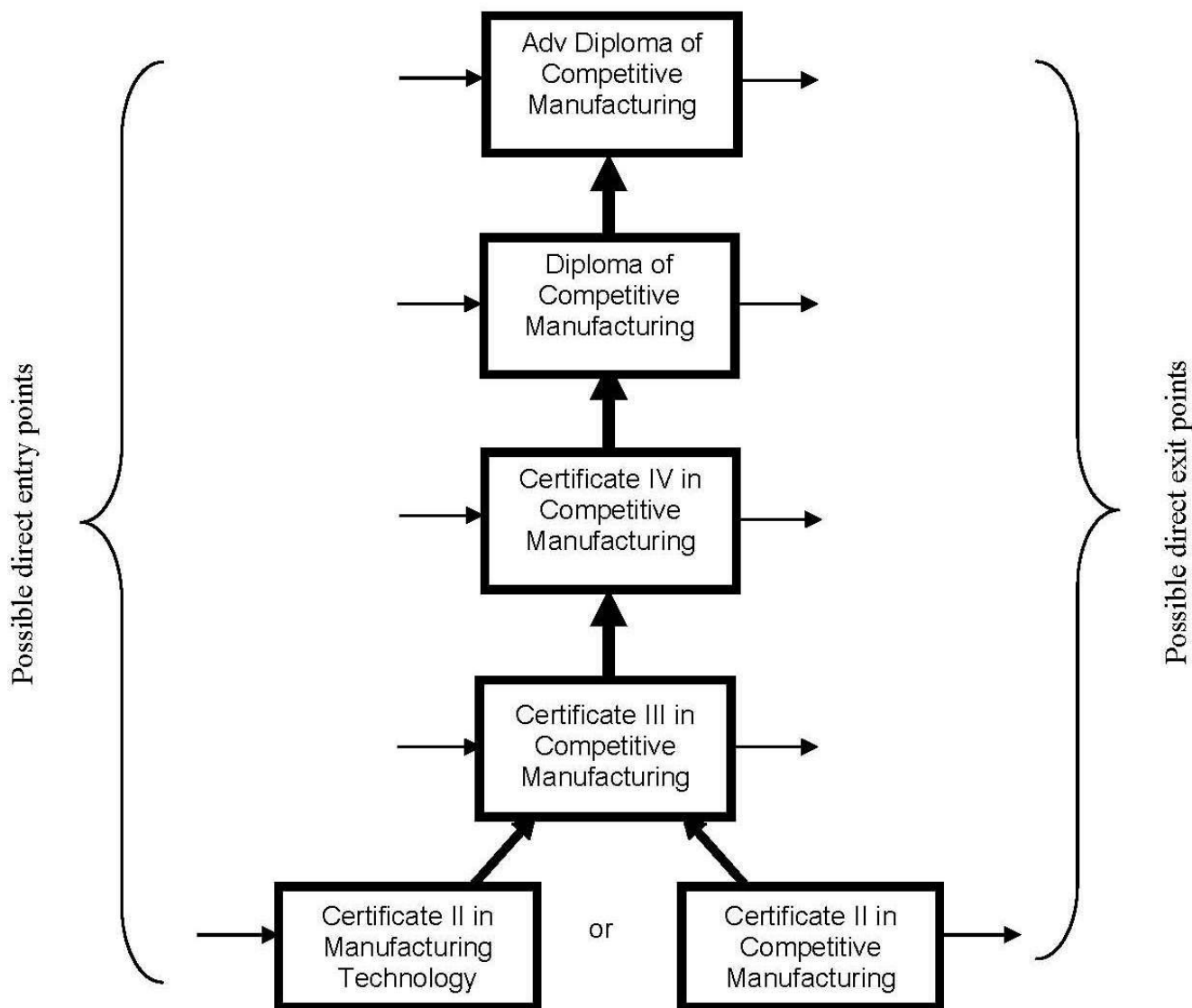
- The self-directed development and achievement of broad and specialised areas of knowledge and skills, building on prior knowledge and skills.
- Substantial breadth, depth and complexity involving the initiation, analysis, design, planning, execution and evaluation of major functions, both broad and highly specialised, in highly varied and highly specialised contexts.
- Further specialisation within a systematic and coherent body of knowledge.
- Applications involve making high-level, fully independent, complex judgements in broad planning, design, operational, technical and management functions in highly varied and highly specialised contexts. They may include full responsibility and accountability for all aspects of work and functions of others, including planning, budgeting and strategy development.
- The degree of emphasis on breadth, as opposed to depth, of knowledge and skills may vary between qualifications granted at this level.

Distinguishing features of learning outcomes

- Demonstrate the self-directed development and achievement of broad and highly specialised areas of knowledge and skills, building on prior knowledge and skills.
- Initiate, analyse, design, plan, execute and evaluate major functions, both broad and within highly varied and highly specialised contexts.
- Generate and evaluate complex ideas through the analysis of information and concepts at an abstract level.
- Demonstrate an expert command of wide-ranging, highly specialised, technical, creative or conceptual skills in complex and highly specialised or varied contexts.
- Demonstrate full responsibility and accountability for personal outputs.
- Demonstrate full responsibility and accountability for all aspects of the work or functions of others, including planning, budgeting and strategy.

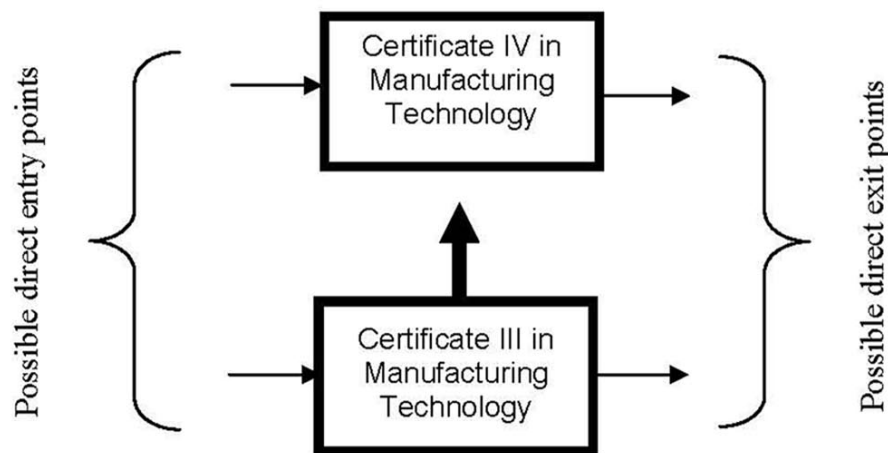
Qualification Pathways for Competitive Manufacturing

The diagram below represents a model of the available qualifications and pathways. Details are in the qualifications framework. Contact Manufacturing Skills Australia { www.mskills.com.au } for further details.



Qualification Pathways for Manufacturing Technology

The diagram below represents a model of the available qualifications and pathways. Details are in the qualifications framework. Contact Manufacturing Skills Australia { www.mskills.com.au } for further details.



General Advice - Competitive Manufacturing Qualifications

Qualifications may be awarded by a Registered Training Organisation (RTO) when competencies which meet the specified packaging requirements have been achieved. Competencies achieved which do not combine to make a certificate may be recognised by a Statement of Attainment issued by an RTO.

Competencies have been categorised into systems, change/interpersonal and tools units. The Certificate III requires a total of 8 units while each of the other qualifications requires a total of 10 units/an additional 10 units comprised of:

- a **minimum** number of MCM **systems** units from the specified list
- a **minimum** number of MCM **change/interpersonal** units from the specified list
- a **minimum** number of MCM **tools** units from the specified list
- the **balance** may be comprised of additional MCM units, or relevant units imported from another Training Package with a **maximum** number of imported units per qualification.

For people undertaking a structured learning program in CMI, competency is required in additional (new) units for each subsequent qualification (see later for details).

A structured Competitive Manufacturing learning program



Entry to any qualification may be at any level. A person can enter a program of training at any level.

New Apprenticeships

All Competitive Manufacturing Certificates within this Training Package are potential New Apprenticeships. However these qualifications have been developed primarily for existing manufacturing workers, especially those working as or likely to become team leaders. For this reason existing worker New Apprenticeships may be more appropriate than application to school leavers.

VET in Schools

The delivery and assessment of competencies aligned to AQF 2 under this Training Package in appropriately designed VET in schools programs is encouraged. However, due to the requirements to demonstrate competency, it would be difficult for a school to assess and award qualifications within MCM04 except in close partnership with an appropriate organisation from the industry. The AQTF rules are the overriding requirements in this regard.

The Certificate II in Manufacturing Technology has been developed specifically for use as a VET in schools program.

Prerequisites

Some units of competency have stated prerequisites (these have been kept to a minimum). In any approved training scheme, it is expected that competency will be attained in the prerequisite units before it is attained in the unit having the prerequisites. Imported units of competency may also have prerequisites which should be observed. In this situation a unit with two prerequisites will be counted as three units towards the qualification once competency has been attained in all units.

In an assessment of existing competency, it is possible to assess the unit and its prerequisites

together as an integrated assessment. In this situation as well, a unit with two prerequisites will be counted as three units towards the qualification once competency has been attained in all units.

Note that the achievement of prerequisite competencies will be recognised for the award of the qualification, regardless of the method by which the participant has gained the competencies (e.g. prior learning and/or experience). A person entering at AQF 3 and proceeding through the qualifications in an orderly manner might be expected to be assessed on the prerequisites. A person entering at a higher AQF level might expect to be able to demonstrate their competence in the prerequisite in any of a number of ways, including an assessment integrated with the higher unit. RTOs developing formal learning pathways may find the prerequisite trail useful in designing a hierarchical learning program, or they may choose to integrate the prerequisite unit into the higher level unit for purposes of delivery and assessment, or some other approach.

General Advice - Manufacturing Technology Qualifications

The following information sets out units and pathways that can be taken in the Certificate III and the Certificate IV in Manufacturing Technology. These qualifications have been developed to be delivered as part of a cadetship contract of training often called a Technology Cadetship. It is intended at a later date to expand Technology Cadetship related qualifications into additional areas and to also develop higher AQF level qualifications.

The units listed for both qualifications are taken from a number of existing Training Packages. These units have been examined for suitability in a cadetship environment and repackaged to suit entry level technology based training in manufacturing.

Qualifications may be awarded by a Registered Training Organisation (RTO) when competencies which meet the specified packaging requirements have been achieved. Competencies achieved which do not combine to make a certificate may be recognised by a Statement of Attainment issued by an RTO.

Structure of Technology Cadetships

The Technology Cadetship related qualifications are very flexible qualifications with a minimum number of core units and pathways that maximise flexibility. The electives have been chosen to give entry and operational skills in a wide range of manufacturing technology application areas. Each qualification consists of pathway options. Each pathway indicates the units that may be taken in that particular pathway. It is intended at a later date to add additional units and pathways to the qualifications.

Certificate III in Manufacturing Technology

This is comprised of ten units of competency and is normally delivered as part of a one year Technology Cadetship. There are two core units that must be completed for all pathways as well as eight electives.

Certificate IV in Manufacturing Technology

This is comprised of fifteen units of competency and is normally delivered as part of a two year Technology Cadetship. There are three core units that must be completed for all pathways.

Pathways

The Certificates III and IV in Manufacturing Technology have the same pathways available within each qualification, with each pathway offering an opportunity for significant choice in electives. The pathways are:

- CAD/Drafting pathway
- Manufacturing Operations pathway
- Laboratory Operations pathway
- Technical Officer pathway

Reference to these pathways may be included on any qualification statement that is issued. This could be achieved by adding the pathway descriptor below the formal title of the qualification as shown in example 1 or by an additional sentence as shown in example 2 below.

Example 1

Certificate III in Manufacturing Technology

Manufacturing Operations pathway

Example 2

Certificate III in Manufacturing Technology

Achieved through the Manufacturing Operations pathway

It should also be noted that a person holding the Metal and Engineering Training Package Certificate III in Engineering - Technician will satisfy all of the requirements for a Certificate III in Manufacturing Technology, and with an additional five units of competency from the particular pathway chosen will satisfy the requirements for a Certificate IV in Manufacturing Technology.

Key Competencies

The key competencies for the Certificate III in Manufacturing Technology and the Certificate IV in Manufacturing Technology are described in general terms earlier in this Volume One of the Competitive Manufacturing Training Package (MCM04).

The Key Competencies and the Certificate III in Manufacturing Technology

The following describes a typical application of the Key Competencies at Certificate III level.

The Certificate III in Manufacturing Technology qualification is aimed at school leavers who have completed Year 12 and who will require a level of competence needed to participate as members of their team and interact with supervisors and managers. The Certificate III in Manufacturing Technology is seen as the beginning of a career pathway in Technician skills and it is anticipated that many students will complete the qualification and proceed to further study at the Diploma and the Advanced Diploma level.

Performance level two of the key competencies requires a level of skill to manage activities requiring the selection, application and integration of a number of elements and to select from established criteria to judge quality of process and outcome. This was assessed as the most appropriate general level for key competency integration at the CMI Certificate III and also the Certificate IV level Manufacturing Technology qualification level. These qualifications are made up of technician level skills that require exercise of judgement and generally the equivalent of year 12 English, Mathematics and Science ability.

Each individual key competency was also examined to confirm that performance level two was appropriate for the Certificate III and IV qualifications and any exception to the Performance Level 2 Key Competency specification is noted.

It also needs to be noted that ' *the current definitions are problematic. The industry or workplace context is generally seen as far more indicative in determining the degree of difficulty of the application of the Key Competencies than the prescribed and abstracted*

performance?' (Ref: Australian National Training Authority, *Template for the Print Version of a Training Package*, February 2001, Appendix J) CMI and Technology Cadetship consultations have confirmed the importance of the workplace context and RTOs should exercise discretion in assessing the level of Key Competencies to integrate into CMI delivery.

1. Collecting, analysing and organising information

The execution of the competencies required for Certificate III always require the collection, analysis and organisation of data/information. A typical application would be a technology cadet who would need to clarify the purpose of a technical test and access and record information from a variety of sources. The person would be assessing information for relevance, accuracy and completeness in terms of the test to be undertaken. At this level this would be performed in accordance with relevant organisation procedures.

2. Communicating ideas and information

The Technology Cadet will be required to adapt modes and styles of communication to suit the enterprise environment and the purpose of the communication. The cadet will work closely with supervisors and qualified technicians and will be required to discuss specifications and technical processes. At this level this communication would be in accordance with organisation procedures.

3. Planning and organising activities

Self planning and organising (within an overall framework) is required from all employees in a competitive manufacturing organisation including Technology Cadets. They will have responsibility for achieving objectives and maximising the quality of outcomes or processes consistent with their level of responsibility and in accordance with procedures.

4. Working with others and in teams

Working in teams is fundamental to the way most competitive manufacturing organisations work. Teams may be single level work area teams, multidisciplinary, multi-level teams, permanent teams, ad hoc teams or any other combination of people may be termed a 'team'. As the Technology Cadet is in a learning environment within the enterprise working with others will be the norm.

5. Solving problems

This key competency requires performance level one in the CMI AQF 3 and 4 qualifications. At the Certificate III and IV level problems will typically be related to the process in some way, but may also be interpersonal or other problems. Many of the units focus on particular methods of identifying and solving problems. At this level the solving of problems would be in accordance with procedures and outcomes would always be checked with trainers and supervisors.

6. Using mathematical ideas and techniques

This key competency requires performance level two in the CMI AQF 3 and 4 qualifications. While some units do not require high level mathematical ideas and techniques the qualification as a whole requires skills appropriate to technician level work in manufacturing. This involves in most cases an ability to undertake and interpret tests, formulae or measurements that require performance level two mathematical ability.

7. Using technology

Technology cadets will be required to interact with the technology of the enterprise as a major activity. Increasingly this technology also includes interaction with digital technology in some way.

At the CMI Certificate III and IV level in a manufacturing organisation a person interprets the

purposes and objectives for the use of technology, and configures and manages a series of operations as a process, and selects technological practices to conform with the guidelines for health and safety, environmental impact and ethical practice, and uses them within those guidelines, and uses technological equipment and material proficiently for the prevailing environs and physical capacity. These interactions are in accordance with the procedures of the organisation.

Skill Sets

Definition

Skill sets are defined as single units of competency, or combinations of units of competency from an endorsed Training Package, which link to a licence or regulatory requirement, or defined industry need.

Wording on Statements of Attainment

Skill sets are a way of publicly identifying logical groupings of units of competency which meet an identified need or industry outcome. Skill sets are not qualifications.

Where skill sets are identified in a Training Package, the Statement of Attainment can set out the competencies a person has achieved in a way that is consistent and clear for employers and others. This is done by including the wording 'these competencies meet [the relevant skill set title or industry need is included]' on the Statement of Attainment. This wording applies only to skill sets that are formally identified as such in the endorsed Training Package.

All Statements of Attainment must include the wording 'A Statement of Attainment is issued by a Registered Training Organisation when an individual has completed one or more units of competency from a nationally recognised qualification'. The following may also be used 'these competencies form part of the [the relevant qualification(s) code and title are inserted]'.

This section below provides information on skill sets within this Training Package, with the following important disclaimer: **Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.**

Skill Sets in this Training Package

Where this section is blank, nationally recognised skill sets have yet to be identified in this industry.

Qualifications

MCM20105 Certificate II in Manufacturing Technology

This qualification applies to a learning and assessment environment where access to normal production operations is not available. A typical environment will be for application in a VET in Schools delivery environment or other simulated or trial manufacturing environment where a high degree of supervision exists. The units are suitable for delivery in a school environment and for schools to contextualize the units to local manufacturing industry activities.

To be awarded a Certificate II in Competitive Manufacturing, competency must be achieved in 10 units chosen from the following three groupings of Core, Manufacturing Practice and Manufacturing Technology units of competency. Five are to be completed from the Core and five completed from across the Manufacturing Technology and Manufacturing Practice groupings.

Core

All five of the following units must be completed:

Unit code	Unit title
MCMO290A	Work safely in manufacturing
MCMS200A	Apply competitive manufacturing practices
MCMT251A	Apply quality standards
MCMT280A	Undertake root cause analysis
MCMT271A	Use sustainable environmental practices

Elective units (five elective units to be chosen from the two groups below)

Manufacturing practice

At least one of the following units must be completed but up to four may be selected:

Unit code	Unit title
MCMS201A	Sustain process improvements
MCMC210A	Manage the impact of change on own work
MCMT231A	Interpret product costs in terms of customer requirements
MCMT250A	Monitor process capability
MCMT270A	Use sustainable energy practices

Manufacturing Technology

At least one of the following units must be completed but up to four may be selected:

Unit code	Unit title
MCMP295A	Operate manufacturing equipment

MCMP296A	Make a small furniture item from timber
MCMP297A	Make an object from cloth using an existing pattern
MCMP298A	Make an object from metal
MCMP299A	Make an object from plastic

The manufacturing technology units listed above have been specifically developed for the Certificate II in Manufacturing Technology. These units are shown on the following pages of this volume.

MCM20205 Certificate II in Competitive Manufacturing

To be awarded a Certificate II in Competitive Manufacturing, competency must be achieved in 10 units chosen as specified below.

Core

Three units must be completed:

MCMC210	Manage the impact of change on own work; and
MCMO290	Work safely in manufacturing (or equivalent endorsed OHS unit)

Plus one of

MCMS200	Apply competitive manufacturing practices
MCMS201	Sustain process improvements

Elective units (seven elective units to be chosen from the two groups below)

Competitive Manufacturing elective units

At least two units must be selected from this list:

MCMS200	Apply competitive manufacturing practices (if not selected in core)
MCMS201	Sustain process improvements (if not selected in core)
MCMT221	Apply Just in Time (JIT) procedures
MCMT230	Apply cost factors to work practices
MCMT231	Interpret product costs in terms of customer requirements
MCMT240	Implement 5S procedures in a manufacturing environment
MCMT250	Monitor process capability
MCMT251	Apply quality standards
MCMT260	Use planning software systems in manufacturing
MCMT261	Use SCADA systems in manufacturing
MCMT270	Use sustainable energy practices
MCMT271	Use sustainable environmental practices
MCMT280	Undertake basic root cause analysis
MCMT281	Apply a proactive maintenance strategy

General electives

Up to five units may be selected from competitive manufacturing units AQF 2 not already selected or from units that are available at AQF 2 in the following Training Packages or their successor Training Packages. Any associated prerequisites of those units contribute to the

total in their own right in arriving at the maximum of five.

- Aeroskills
- Automotive Industry Manufacturing
- Business Services
- Chemical, Hydrocarbons and Oil Refining
- Electrotechnology
- Food Processing
- Furnishing
- Laboratory Operations
- Manufactured Mineral Products
- Metal and Engineering
- Plastics, Rubber and CABLEmaking
- [Sugar Milling](#)
- Textile Clothing and Footwear Training Package

MCM30104 Certificate III in Competitive Manufacturing

To be awarded a Certificate III in Competitive Manufacturing, competency must be achieved in 8 units chosen as specified below. At least 3 of these units must be from the 400 series.

MCM Systems

The following MCM Systems unit must be chosen.

MCMS200A	Apply competitive manufacturing practices
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and one of the following units of competency:

MCMS201A	Sustain process improvements
MCMS401A	Ensure process improvements are sustained
MCMS405A	Lead a manufacturing team using a balanced score card approach

(Only one of MCMS201A, MCMS401A or MCMS405A may be counted towards the Certificate III)

MCM Change/interpersonal

At least one of the following MCM Change/interpersonal unit must be chosen.

MCMC210A	Manage the impact of change on own work
MCMC410A	Lead change in a manufacturing environment
MCMC411A	Lead a competitive manufacturing team
MCMC413A	Lead team culture improvement

(Only one of MCMC210A, MCMC410A, MCMC411A or MCMC413A may be counted towards the Certificate III)

MCM Tools

At least one of the following series 400 MCM Tools units must be chosen.

MCMT421A	Facilitate a Just in Time (JIT) system
MCMT423A	Monitor a manufacturing levelled pull system
MCMT430A	Improve cost factors in work practices
MCMT432A	Analyse manual handling processes
MCMT440A	Lead 5S in a manufacturing environment
MCMT441A	Facilitate continuous improvement in manufacturing
MCMT450A	Undertake process capability improvements
MCMT451A	Mistake proof a production process
MCMT452A	Apply statistics to processes in Manufacturing
MCMT453A	Use six sigma techniques

MCMT460A	Use planning software systems in manufacturing
MCMT461A	Facilitate SCADA systems in manufacturing team or work area
MCMT481A	Undertake proactive maintenance analyses
MCMT482A	Assist in implementing a proactive maintenance strategy
MCMT483A	Support proactive maintenance
PMASUP390A	Use structured problem solving tools

Other relevant units

No more than four relevant units at the AQF 2, 3 or 4 level may be selected from another relevant endorsed Training Package. Units chosen should be relevant to the workplace and would normally be drawn from the appropriate sector Training Package, or possibly the Business Services Training Package.

Balance of units

Sufficient additional CMI units should be chosen to achieve the required eight units. These may be selected from any of the lists above, or the list below. Remember of the total of eight units, at least three must be series 400 CMI units.

MCMT220A	Apply quick changeover procedures
MCMT221A	Apply Just in Time (JIT) procedures
MCMT230A	Apply cost factors to work practices
MCMT231A	Interpret product costs in terms of customer requirements
MCMT240A	Apply 5S procedures in a manufacturing environment
MCMT250A	Monitor process capability
MCMT251A	Apply quality standards
MCMT260A	Use planning software systems in manufacturing
MCMT261A	Use SCADA systems in manufacturing
MCMT270A	Use sustainable energy practices
MCMT271A	Use sustainable environmental practices
MCMT280A	Undertake root cause analysis
MCMT281A	Contribute to the application of a proactive maintenance strategy

The Key Competencies at Certificate III

The following describes a typical application of the Key Competencies at Certificate III level.

The Certificate III CMI qualification is aimed predominantly at team leaders who will require a level of competence needed to act as interface between members of their team and

supervisors and managers. Performance level two of the key competencies requires a level of skill to manage activities requiring the selection, application and integration of a number of elements and to select from established criteria to judge quality of process and outcome.

This was assessed as the most appropriate general level for key competency integration at the CMI Certificate III and also the Certificate IV level as the Certificate IV qualification is also aimed at team leaders. Each individual key competency was also examined to confirm that performance level two was appropriate for the CMI Certificate III and IV qualifications and any exception to the Performance Level 2 Key Competency specification is noted.

It also needs to be noted that *'the current definitions are problematic. The industry or workplace context is generally seen as far more indicative in determining the degree of difficulty of the application of the Key Competencies than the prescribed and abstracted performance'*. CMI consultations have confirmed the importance of the workplace context and RTOs should exercise discretion in assessing the level of Key Competencies to integrate into CMI delivery.

1. Collecting, analysing and organising information

The execution of the competencies required for Certificate III always require the collection, analysis and organisation of data/information. A typical application would be a team leader who would need to clarify the information needs of the team and the purposes of the information, and access and record information from a variety of sources. The person would be assessing information for relevance, accuracy and completeness in terms of the needs of his/her team and immediate supervisors. At this level this would be performed in accordance with relevant organisation procedures.

2. Communicating ideas and information

Competitive manufacturing organisations often utilise teamwork as a form of work organisation and require high levels of communication by team leaders with all stakeholders. The team leader will be required to adapt modes and styles of communication to suit the enterprise environment and the purpose of the communication. At this level this communication would be in accordance with organisation procedures.

3. Planning and organising activities

Self planning and organising (within an overall framework) is required from all employees in a competitive manufacturing organisation. In addition at the Certificate III level they also have some responsibility for the planning of work and activities more generally and for the organisation of others. They will have responsibility for achieving objectives and maximising the quality of outcomes or processes consistent with their level of responsibility and in accordance with procedures.

4. Working with others and in teams

Working in teams is fundamental to the way most competitive manufacturing organisations work. Teams may be single level work area teams, multidisciplinary, multi-level teams, permanent teams, ad hoc teams or any other combination of people may be termed a 'team'.

At the Certificate III level a person will usually have some responsibility for interpreting purposes and objectives to be achieved by working with others and organises procedures and timeframes to take account of different roles and perspectives; and works with others to achieve agreed objectives. The work in teams will be in accordance with procedures at this level.

5. Solving problems

In a competitive manufacturing organisation the authority to solve problems is typically more universally held than in other organisations, and effort is invested in equipping all employees to solve problems.

This key competency requires performance level one in the CMI AQF 3 and 4 qualifications. At the Certificate III and IV level problems will typically be related to the process in some way, but may also be interpersonal or other problems. Many of the 'tools' units focus on particular methods of identifying and solving problems. At this level the solving of problems would be in accordance with procedures, following problem solving techniques specified and implementing solutions defined in the procedures.

6. Using mathematical ideas and techniques

This key competency requires performance level one in the CMI AQF 3 and 4 qualifications. While some units require specific mathematical competence (such as MCMT230, 430, 452) most only require a level of numeracy sufficient to extract data from a simple specifications chart or spreadsheet and understand numbers and interpret what they mean. This is done in accordance with the procedures.

7. Using technology

Being the manufacturing industry, most employees will be required to interact with the technology of the process at least to some extent. Increasingly this technology also includes interaction with digital technology in some way.

At the CMI Certificate III and IV level in a manufacturing organisation a person interprets the purposes and objectives for the use of technology, and configures and manages a series of operations as a process, and selects technological practices to conform with the guidelines for health and safety, environmental impact and ethical practice, and uses them within those guidelines, and uses technological equipment and material proficiently for the prevailing environs and physical capacity. These interactions are in accordance with the procedures of the organisation.

MCM30204 Certificate III in Manufacturing Technology

To be awarded a Certificate III in Manufacturing Technology, competency must be achieved in 10 units chosen as specified below.

This qualification has four pathways available. These are:

- CAD/Drafting pathway
- Manufacturing Operations pathway
- Laboratory Operations pathway
- Technical Officer pathway

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

Note: The minimum requirements for the Certificate III in Manufacturing Technology can also be met by holders of the Metal and Engineering Training Package Certificate III in Engineering - Technician.

Core units

The following two units must be chosen:

Unit code	Unit title
MCMT251A	Apply quality standards
MEM30.12A	Apply mathematical techniques in a manufacturing engineering or related environment

Elective units for CAD/drafting pathway

At least eight elective units, including up to two free electives, must be chosen:

Unit code	Unit title
AUM4003A	Interpret customer requirements
LMTPRGN05A	Participate in product engineering
MEM12.24	Perform computations
MEM16.6A	Organise and communicate information
MEM16.8A	Interact with computing technology
MEM30.1A	Use computer aided design systems to produce basic engineering drawings *
MEM30.2A	Produce basic engineering graphics *
MEM30.3A	Produce engineering drawings *
MEM30.4A	Use CAD to create and display 3D models *
MEM30.7A	Select common engineering materials
MEM30.8A	Apply basic economic and ergonomic concepts to evaluate engineering

	applications
MEM30.10A	Set up basic hydraulic circuits
MEM30.11A	Set up basic pneumatic circuits
MEM30.13A	Assist in the preparation of a basic workplace layout
MEM30.25A	Analyse a simple electrical system circuit*
Free electives:	Up to two of the eight elective units of competency may also be chosen from the free electives bank listed at the end of the pathways or any other endorsed Training Packages where those units are available for inclusion at Certificate III.
Prerequisites:	Units marked with an asterisk have a prerequisite requirement. The prerequisites for these units should be counted in the total number of units required in the elective group. Please refer to the prerequisite table in this document.

Elective units for manufacturing operations pathway

At least eight elective units, including up to two free electives, must be chosen:

Unit code	Unit title
FDFOPTSD2A	Work in a socially diverse environment
MCMS200A	Apply competitive manufacturing practices
MCMS201A	Sustain process improvements
MCMS401A	Ensure process improvements are sustained
MCMT220A	Apply quick changeover procedures
MCMT230A	Apply cost factors to work practices
MCMT231A	Interpret product costs in terms of customer requirements
MCMT250A	Monitor process capability
MCMT260A	Use planning software systems in manufacturing
MCMT261A	Use SCADA systems in manufacturing
MCMT280A	Undertake root cause analysis
MCMT430A	Improve cost factors in work practices
MEM15.1B	Perform basic statistical quality control
MEM16.6A	Organise and communicate information
MEM16.8A	Interact with computing technology

MEM30.14A	Apply basic just in time systems to the reduction of waste
MEM30.15A	Develop recommendations for basic set up time improvements
MEM30.16A	Assist in the analysis of a supply chain
MEM30.17A	Use basic preventative maintenance techniques and tools
MEM30.18A	Undertake basic process planning
MEM30.19A	Use resource planning software systems in manufacturing*
MEM30.20A	Develop and manage a plan for a simple manufacturing related project
MEM30.21A	Prepare a simple production schedule
MEM30.23A	Prepare a simple cost estimate for a manufactured product
MEM30.24A	Participate in quality assurance techniques*
Free electives:	Up to two of the eight elective units of competency may also be chosen from the free electives bank listed at the end of the pathways or any other endorsed Training Packages where those units are available for inclusion at Certificate III.
Prerequisites:	Units marked with an asterisk have a prerequisite requirement. The prerequisites for these units should be counted in the total number of units required in the elective group. Please refer to the prerequisite table in this document.

Elective units for laboratory operations pathway

At least eight elective units, including up to two free electives, must be chosen:

Unit code	Unit title
LMTPTX04A	Contribute to the development of products or processes
MEM15.1B	Perform basic statistical quality control
MEM16.6A	Organise and communicate information
MEM16.8A	Interact with computing technology
MEM30.12A	Apply mathematical techniques in a manufacturing engineering or related environment
MEM30.24A	Participate in quality assurance techniques *
PMLCOM300B	Communicate with other people
PMLDATA200A	Record and present data
PMLMAIN300B	Maintain the laboratory fit for purpose
PMLOHS301B	Work safely with instruments that emit ionising radiation

PMLOHS302A	Participate in laboratory/field workplace safety
PMLORG301A	Plan and conduct laboratory/field work
PMLQUAL300B	Contribute to the achievement of quality objectives
PMLQUAL301B	Apply critical control point requirements
PMLQUAL401B	Apply quality system and continuous improvement processes
PMLSAMP200A	Collect routine site samples
PMLSAMP201A	Handle and transport samples or equipment
PMLSAMP302A	Receive and prepare samples for testing
PMLSAMP400B	Obtain representative samples in accordance with sampling plan
PMLSCIG300B	Operate basic handblowing equipment
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment
PMLTEST300B	Perform basic tests
PMLTEST303B	Prepare working solutions
PMLTEST304B	Prepare culture media
PMLTEST305B	Perform aseptic techniques
PMLTEST306B	Assist with fieldwork
PMLTEST307B	Prepare trial batches for evaluation
PMLTEST308A	Perform microscopic examination
Free electives:	Up to two of the eight elective units of competency may also be chosen from the free electives bank listed at the end of the pathways or any other endorsed Training Packages where those units are available for inclusion at Certificate III.
Prerequisites:	Units marked with an asterisk have a prerequisite requirement. The prerequisites for these units should be counted in the total number of units required in the elective group. Please refer to the prerequisite table in this document.

Elective units for technical officer pathway

At least eight elective units, including up to two free electives, must be chosen:

Unit code	Unit title
LMTPTDX04A	Contribute to the development of products or processes
MCMT231A	Interpret product costs in terms of customer requirements

MCMT260A	Use planning software systems in manufacturing
MCMT261A	Use SCADA systems in manufacturing
MCMT270A	Use sustainable energy practices
MCMT270A	Use sustainable energy practices
MCMT280A	Undertake root cause analysis
MCMT432A	Analyse manual handling processes
MEM15.1B	Perform basic statistical quality control
MEM16.6A	Organise and communicate information
MEM16.8A	Interact with computing technology
MEM30.7A	Select common engineering materials
MEM30.8A	Apply basic economic and ergonomic concepts to engineering designs and applications
MEM30.9A	Contribute to the design of basic mechanical systems*
MEM30.10A	Set up basic hydraulic circuits
MEM30.11A	Set up basic pneumatic circuits
MEM30.13A	Assist in the design of basic workplace layout
MEM30.16A	Assist in the analysis of a supply chain
MEM30.17A	Use basic preventative maintenance techniques and tools
MEM30.18A	Undertake basic process planning
MEM30.19A	Use resource planning software systems in manufacturing*
MEM30.20A	Develop and manage a plan for a simple manufacturing related project
MEM30.22A	Undertake supervised procurement activities
MEM30.23A	Prepare a simple cost estimate for a manufactured product
MEM30.24A	Participate in quality assurance techniques*
Free electives:	Up to two of the eight elective units of competency may also be chosen from the free electives bank listed at the end of the pathways or any other endorsed Training Packages where those units are available for inclusion at Certificate III.
Prerequisites:	Units marked with an asterisk have a prerequisite requirement. The prerequisites for these units should be counted in the total number of units required in the elective group. Please refer to the prerequisite table in this document.

Free electives bank for the MCM30204 Certificate III in Manufacturing Technology

Unit code	Unit title
AUM4003A	Interpret customer requirements
MEM30.1A	Use computer aided design systems to produce basic engineering drawings
MEM30.2A	Produce basic engineering graphics
MEM30.3A	Produce engineering drawings
MEM30.4A	Use CAD to create and display 3D models
MEM30.7A	Select common engineering materials
MEM30.8A	Apply basic economic and ergonomic concepts to engineering designs and applications
MEM30.9A	Contribute to the design of basic mechanical systems*
MEM30.10A	Set up basic hydraulic circuits
MEM30.11A	Set up basic pneumatic circuits
MEM30.10A	Set up basic hydraulic circuits
MEM30.11A	Set up basic pneumatic circuits
MEM30.13A	Assist in the preparation of a basic workplace layout
MEM30.14A	Apply basic just in time systems to the reduction of waste
MEM30.15A	Develop recommendations for basic set up time improvements
MEM30.16A	Assist in the analysis of a supply chain
MEM30.17A	Use basic preventative maintenance techniques and tools
MEM30.18A	Undertake basic process planning
MEM30.19A	Use resource planning software systems in manufacturing*
MEM30.20A	Develop and manage a plan for a simple manufacturing related project
MEM30.21A	Prepare a simple production schedule
MEM30.22A	Undertake supervised procurement activities
MEM30.23A	Prepare a simple cost estimate for a manufactured product
MEM30.24A	Participate in quality assurance techniques*
MEM30.25A	Analyse a simple electrical system circuit
MCMS200A	Apply competitive manufacturing practices

MCMS201A	Sustain process improvements
MCMS401A	Ensure process improvements are sustained
MCMT220A	Apply quick changeover procedures
MCMT230A	Apply cost factors to work practices
MCMT231A	Interpret product costs in terms of customer requirements
MCMT250A	Monitor process capability
MCMT260A	Use planning software systems in manufacturing
MCMT261A	Use SCADA systems in manufacturing
MCMT270A	Use sustainable energy practices
MCMT280A	Undertake root cause analysis
MCMT430A	Improve cost factors in work practices
MCMT432A	Analyse manual handling processes
FDFOPTSD2A	Work in a socially diverse environment
PMLCOM300B	Communicate with other people
PMLDATA200A	Record and present data
PMLMAIN300B	Maintain the laboratory fit for purpose
PMLOHS302A	Participate in laboratory/field workplace safety
PMLOHS301B	Work safely with instruments that emit ionising radiation
PMLORG301A	Plan and conduct laboratory/field work
PMLQUAL300B	Contribute to the achievement of quality objectives
PMLQUAL301B	Apply critical control point requirements
PMLQUAL401B	Apply quality system and continuous improvement processes
PMLSAMP200A	Collect routine site samples
PMLSAMP201A	Handle and transport samples or equipment
PMLSAMP302A	Receive and prepare samples for testing
PMLSAMP400B	Obtain representative samples in accordance with sampling plan
PMLSCIG300B	Operate basic handblowing equipment
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment
PMLTEST300B	Perform basic tests

PMLTEST303B	Prepare working solutions
PMLTEST304B	Prepare culture media
PMLTEST305B	Perform aseptic techniques
PMLTEST306B	Assist with fieldwork
PMLTEST307B	Prepare trial batches for evaluation
PMLEST308A	Perform microscopic examination
LMTPRGN05A	Participate in product engineering
LMTPDTX04A	Contribute to the development of products or processes

MCM40104 Certificate IV in Competitive Manufacturing

To be awarded a Certificate IV in Competitive Manufacturing, competency must be achieved in 10 units chosen as specified below. Holders of the Certificate III need to ensure that they have at least three additional series 400 units to any they may have gained competence in as part of the Certificate III.

MCM Systems

At least one of the following MCM Systems units must be chosen.

MCMS400A	Implement a competitive manufacturing system
MCMS401A	Ensure process improvements are sustained
MCMS405A	Lead a manufacturing team using a balanced score card approach

MCM Change/interpersonal

The following MCM Change/interpersonal unit must be chosen.

MCMC410A	Lead change in a manufacturing environment
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And one of the following units of competency:

MCMC411A	Lead a competitive manufacturing team
MCMC413A	Lead team culture improvement

MCM Tools

At least two of the following MCM Tools units must be chosen.

MCMT421A	Facilitate a Just in Time (JIT) system
MCMT423A	Monitor a manufacturing levelled pull system
MCMT430A	Improve cost factors in work practices
MCMT432A	Analyse manual handling processes
MCMT440A	Lead 5S in a manufacturing environment
MCMT441A	Facilitate continuous improvement in manufacturing
MCMT450A	Undertake process capability improvements
MCMT451A	Mistake proof a production process
MCMT452A	Apply statistics to processes in manufacturing
MCMT453A	Use six sigma techniques
MCMT460A	Use planning software systems in manufacturing
MCMT461A	Facilitate SCADA systems in manufacturing team or work area
MCMT481A	Undertake proactive maintenance analyses

MCMT482A	Assist in implementing a proactive maintenance strategy
MCMT483A	Support proactive maintenance
PMASUP390A	Use structured problem solving tools

Other relevant units

No more than four relevant units at the AQF 3, 4 or 5 level may be selected from another relevant endorsed Training Package. Units chosen should be relevant to the workplace and would normally be drawn from the appropriate sector Training Package, or possibly the Business Services Training Package.

Balance of units

Sufficient additional units should be chosen from the CMI units to achieve the required ten units.

The Key Competencies at Certificate IV

The Key Competencies at this level have been described in the preceding section on the CMI Certificate III. This is because the two qualifications are aimed at the same broad target group with the CMI Certificate IV being a more comprehensive qualification.

MCM40204 Certificate IV in Manufacturing Technology

To be awarded a Certificate IV in Manufacturing Technology, competency must be achieved in 15 units chosen as specified below.

This qualification has four pathways available. These are:

- CAD/Drafting pathway
- Manufacturing Operations pathway
- Laboratory Operations pathway
- Technical Officer pathway

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

Note: The minimum requirements for the Certificate IV in Manufacturing Technology can also be met by holders of the Metal and Engineering Training Package Certificate III in Engineering - Technician who complete five additional units of competency from the bank of units for the particular pathway chosen.

Core units

The following three units must be chosen:

Unit code	Unit title
MCMT251A	Apply quality standards
MEM30.12A	Apply mathematical techniques in a manufacturing engineering or related environment
MEM16.8A	Interact with computing technology

Elective units for CAD/drafting pathway

At least twelve elective units, including up to two free electives, must be chosen:

Unit code	Unit title
AUM4003A	Interpret Customer Requirements
LMTPRGN05A	Participate in product engineering
MCMS201A	Sustain process improvements
MCMT230A	Apply cost factors to work practices
MEM12.24A	Perform computations
MEM16.6A	Organise and communicate information
MEM30.1A	Use computer aided design systems to produce basic engineering drawings *
MEM30.2A	Produce basic engineering graphics*
MEM30.3A	Produce engineering drawings*

MEM30.4A	Use CAD to create and display 3D models*
MEM30.7A	Select common engineering materials
MEM30.8A	Apply basic economic and ergonomic concepts to evaluate engineering applications
MEM30.10A	Set up basic hydraulic circuits
MEM30.11A	Set up basic pneumatic circuits
MEM30.13A	Assist in the preparation of a basic workplace layout
MEM30.18A	Undertake basic process planning
MEM30.19A	Use resource planning software systems in manufacturing*
MEM30.20A	Develop and manage a plan for a simple manufacturing related project
MEM30.25A	Analyse a simple electrical system circuit*
UTPNEG147A	Perform electrical/electronic drafting
Free electives:	Up to two of the twelve elective units of competency may also be chosen from the free electives bank listed at the end of the pathways or any other endorsed Training Packages where those units are available for inclusion at Certificate IV.
Prerequisites:	Units marked with an asterisk have a prerequisite requirement. The prerequisites for these units should be counted in the total number of units required in the elective group. Please refer to the prerequisite table in this document.

Elective units for manufacturing operations pathway

At least twelve elective units, including up to two free electives, must be chosen:

Unit code	Unit title
FDFOPTSD2A	Work in a socially diverse environment
MEM15.1B	Perform basic statistical quality control
MEM16.6A	Organise and communicate information
MEM30.14A	Apply basic just in time systems to the reduction of waste
MEM30.15A	Develop recommendations for basic set up time improvements
MEM30.16A	Assist in the analysis of a supply chain
MEM30.17A	Use basic preventative maintenance techniques and tools
MEM30.18A	Undertake basic process planning
MEM30.19A	Use resource planning software systems in manufacturing*

MEM30.20A	Develop and manage a plan for a simple manufacturing related project
MEM30.21A	Prepare a simple production schedule
MEM30.23A	Prepare a simple cost estimate for a manufactured product
MEM30.24A	Participate in quality assurance techniques*
MCMS201A	Sustain process improvements
MCMT280A	Undertake root cause analysis
MCMS401A	Ensure process improvements are sustained
MCMT230A	Apply cost factors to work practices
MCMT430A	Improve cost factors in work practices
MCMT231A	Interpret product costs in terms of customer requirements
MCMT250A	Monitor process capability
MCMS200A	Apply competitive manufacturing practices
MCMT220A	Apply quick changeover procedures
MCMT260A	Use planning software systems in manufacturing
MCMT261A	Use SCADA systems in manufacturing
Free electives:	Up to two of the twelve elective units of competency may also be chosen from the free electives bank listed at the end of the pathways or any other endorsed Training Packages where those units are available for inclusion at Certificate IV.
Prerequisites:	Units marked with an asterisk have a prerequisite requirement. The prerequisites for these units should be counted in the total number of units required in the elective group. Please refer to the prerequisite table in this document.

Elective units for laboratory operations pathway

At least twelve elective units must be chosen:

Unit code	Unit title
LMPDXTX04A	Contribute To the Development of Products or Processes
MEM30.12A	Apply mathematical techniques in a manufacturing engineering or related environment
MEM30.19A	Use resource planning software systems in manufacturing*
MEM30.24A	Participate in quality assurance techniques*
MCMT261A	Use SCADA systems in manufacturing

MCMT270A	Use sustainable energy practices
PMLDATA200A	Record and present data
PMLSAMP200A	Collect routine site samples
PMLSAMP201A	Handle and transport samples or equipment
PMLSAMP300A	Receive and prepare samples for testing
PMLTEST300B	Perform basic tests
PMLTEST308A	Perform microscopic examination
PMLTEST303B	Prepare working solutions
PMLTEST304B	Prepare culture media
PMLTEST305B	Perform aseptic techniques
PMLTEST306B	Assist with fieldwork
PMLTEST307B	Prepare trial batches for evaluation
PMLMAIN300B	Maintain the laboratory fit for purpose
PMLOHS302A	Participate in laboratory/field workplace safety
PMLOHS301B	Work safely with instruments that emit ionising radiation
PMLQUAL300B	Contribute to the achievement of quality objectives
PMLQUAL301B	Apply critical control point requirements
PMLSCIG300B	Operate basic handblowing equipment
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment
PMLCOM300B	Communicate with other people
PMLORG301A	Plan and conduct laboratory/field work
PMLSAMP400B	Obtain representative samples in accordance with sampling plan
PMLTEST402B	Prepare, standardise and use solutions
PMLTEST403B	Assist with geotechnical site investigations
PMLTEST404A	Perform chemical tests and procedures
PMLQUAL400B	Contribute to the ongoing development of HACCP plans
PMLQUAL401B	Apply quality system and continuous improvement processes
Free electives:	Up to two of the twelve elective units of competency may also be chosen from the free electives bank listed at the end of the pathways or any other endorsed Training Packages where those units are available for inclusion at

	Certificate IV.
Prerequisites:	Units marked with an asterisk have a prerequisite requirement. The prerequisites for these units should be counted in the total number of units required in the elective group. Please refer to the prerequisite table in this document.

Elective units for technical officer pathway

At least twelve elective units, including up to two free electives, must be chosen:

Unit code	Unit title
LMTPDXTX-04A	Contribute to the development of products or processes
MEM15.1B	Perform basic statistical quality control
MEM16.6A	Organise and communicate information
MEM30.1A	Use computer aided design systems to produce basic engineering drawings*
MEM30.2A	Produce basic engineering graphics*
MEM30.3A	Produce engineering drawings*
MEM30.7A	Select common engineering materials
MEM30.8A	Apply basic economic and ergonomic concepts to engineering designs and applications
MEM30.9A	Contribute to the design of basic mechanical systems*
MEM30.10A	Set up basic hydraulic circuits
MEM30.11A	Set up basic pneumatic circuits
MEM30.13A	Assist in the design of basic workplace layout
MEM30.16A	Assist in the analysis of a supply chain
MEM30.17A	Use basic preventative maintenance techniques and tools
MEM30.18A	Undertake basic process planning
MEM30.19A	Use resource planning software systems in manufacturing*
MEM30.20A	Develop and manage a plan for a simple manufacturing related project
MEM30.22A	Undertake supervised procurement activities
MEM30.23A	Prepare a simple cost estimate for a manufactured product
MEM30.24A	Participate in quality assurance techniques*
MCMT231A	Interpret product costs in terms of customer requirements
MCMT260A	Use planning software systems in manufacturing

MCMT261A	Use SCADA systems in manufacturing
MCMT270A	Use sustainable energy practices
MCMT280A	Undertake root cause analysis
MCMT432A	Analyse manual handling processes
Free electives:	Up to two of the twelve elective units of competency may also be chosen from the free electives bank listed at the end of the pathways or any other endorsed Training Packages where those units are available for inclusion at Certificate IV.
Prerequisites:	Units marked with an asterisk have a prerequisite requirement. The prerequisites for these units should be counted in the total number of units required in the elective group. Please refer to the prerequisite table in this document.

Free electives bank for the MCM40204 Certificate IV in Manufacturing Technology

Unit code	Unit title
AUM4003A	Interpret customer requirements
FDFOPTSD2A	Work in a socially diverse environment
LMTPTDX-04A	Contribute to the development of products or processes
LMTPRGN05A	Participate in product engineering
MEM30.1A	Use computer aided design systems to produce basic engineering drawings
MEM30.2A	Produce basic engineering graphics
MEM30.3A	Produce engineering drawings
MEM30.4A	Use CAD to create and display 3D models
MEM30.7A	Select common engineering materials
MEM30.8A	Apply basic economic and ergonomic concepts to evaluate engineering applications
MEM30.9A	Contribute to the design of basic mechanical systems*
MEM30.10A	Set up basic hydraulic circuits
MEM30.11A	Set up basic pneumatic circuits
MEM30.12A	Apply mathematical techniques in a manufacturing engineering or related environment
MEM30.13A	Assist in the preparation of a basic workplace layout
MEM30.14A	Apply basic just in time systems to the reduction of waste

MEM30.15A	Develop recommendations for basic set up time improvements
MEM30.16A	Assist in the analysis of a supply chain
MEM30.17A	Use basic preventative maintenance techniques and tools
MEM30.18A	Undertake basic process planning
MEM30.19A	Use resource planning software systems in manufacturing*
MEM30.20A	Develop and manage a plan for a simple manufacturing related project
MEM30.21A	Prepare a simple production schedule
MEM30.22A	Undertake supervised procurement activities
MEM30.23A	Prepare a simple cost estimate for a manufactured product
MEM30.24A	Participate in quality assurance techniques*
MEM30.25A	Analyse a simple electrical system circuit*
MCMS201A	Sustain process improvements
MCMS200A	Apply competitive manufacturing practices
MCMS201A	Sustain process improvements
MCMS401A	Ensure process improvements are sustained
MCMT220A	Apply quick changeover procedures
MCMT230A	Apply cost factors to work practices
MCMT231A	Interpret product costs in terms of customer requirements
MCMT250A	Monitor process capability
MCMT260A	Use planning software systems in manufacturing
MCMT261A	Use SCADA systems in manufacturing
MCMT270A	Use sustainable energy practices
MCMT280A	Undertake root cause analysis
MCMT430A	Improve cost factors in work practices
MCMT432A	Analyse manual handling processes
PMLCOM300B	Communicate with other people
PMLDATA200A	Record and present data
PMLMAIN300B	Maintain the laboratory fit for purpose
PMLOHS301B	Work safely with instruments that emit ionising radiation

PMLOHS302A	Participate in laboratory/field workplace safety
PMLORG301A	Plan and conduct laboratory/field work
PMLQUAL300B	Contribute to the achievement of quality objectives
PMLQUAL301B	Apply critical control point requirements
PMLQUAL400B	Contribute to the ongoing development of HACCP plans
PMLQUAL401B	Apply quality system and continuous improvement processes
PMLSAMP200A	Collect routine site samples
PMLSAMP201A	Handle and transport samples or equipment
PMLSAMP302A	Receive and prepare samples for testing
PMLSAMP400B	Obtain representative samples in accordance with sampling plan
PMLSCIG300B	Operate basic handblowing equipment
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment
PMLTEST300B	Perform basic tests
PMLTEST303B	Prepare working solutions
PMLTEST304B	Prepare culture media
PMLTEST305B	Perform aseptic techniques
PMLTEST306B	Assist with fieldwork
PMLTEST307B	Prepare trial batches for evaluation
PMLTEST308A	Perform microscopic examination
PMLTEST402B	Prepare, standardise and use solutions
PMLTEST403B	Assist with geotechnical site investigations
PMLTEST404A	Perform chemical tests and procedures
UTPNEG147A	Perform electrical/electronic drafting

MCM50104 Diploma of Competitive Manufacturing

To be awarded a Diploma of Competitive Manufacturing, competency must be achieved in a total of 20 units comprised of the 10 units required for a Certificate IV and a further 10 chosen as specified below.

MCM Systems

At least one of the following MCM Systems units must be chosen.

MCMS600A	Develop a competitive manufacturing system
MCMS601A	Analyse and map a value chain
MCMS602A	Manage a value chain
MCMS603A	Develop manufacturing related business plans
MCMS604A	Manage competitive manufacturing processes in a jobbing shop environment
MCMS605A	Develop a balanced score card for use in competitive manufacturing
MCMS606A	Introduce competitive manufacturing to a small or medium enterprise

MCM Change/interpersonal

At least one of the following MCM Change/interpersonal units must be chosen.

MCMC610A	Manage relationships with non-customer external organisations
MCMC611A	Manage people relationships
MCMC612A	Manage workplace learning
MCMC613A	Facilitate holistic culture improvement in a manufacturing enterprise
MCMC614A	Develop a communications strategy to support production

MCM Tools

At least two of the following MCM Tools units must be chosen.

MCMT452A	Apply statistics to processes in manufacturing
MCMT620A	Develop quick changeover procedures
MCMT621A	Develop a Just in Time (JIT) system
MCMT622A	Design a process layout
MCMT623A	Develop a levelled pull system of manufacturing
MCMT630A	Optimise cost of product
MCMT631A	Undertake value analysis of product costs in terms of customer requirements
MCMT632A	Analyse cost implications of maintenance strategy

MCMT640A	Manage 5S system in a manufacturing environment
MCMT641A	Implement a continuous improvement system
MCMT650A	Determine and improve process capability
MCMT652A	Design an experiment
MCMT653A	Apply six sigma to process control and improvement
MCMT660A	Develop the application of enterprise systems in manufacturing
MCMT661A	Determine and establish information collection requirements and processes
MCMT662A	Develop a documentation control strategy for a manufacturing enterprise
MCMT670A	Develop and manage sustainable energy practices
MCMT671A	Develop and manage sustainable environmental practices
MCMT675A	Facilitate the development of a new product
MCMT681A	Develop a proactive maintenance strategy
MCMT682A	Adapt a proactive maintenance strategy to the process manufacturing sector
MCMT683A	Adapt a proactive maintenance strategy for a seasonal or cyclical manufacturing operation

Other relevant units

No more than four relevant units at the AQF 4, 5 or 6 level may be selected from another relevant endorsed Training Package. Units chosen should be relevant to the workplace and would normally be drawn from the appropriate sector Training Package, or possibly the Business Services Training Package.

Balance of units

Sufficient additional units should be chosen from the CMI units to achieve the required ten units.

The Key Competencies at Diploma level

The following describes a typical application of the Key Competencies at Diploma level. The Diploma level qualification is targeted at supervisors seeking a comprehensive training in managing manufacturing practice systems.

The competencies used at Diploma level predominantly require a level of competence needed to evaluate and sometimes reshape tasks. The Key Competencies for the Diploma level are at performance level 3. Any exceptions to this are noted below.

However it also needs to be noted that *'the current definitions are problematic. The industry or workplace context is generally seen as far more indicative in determining the degree of difficulty of the application of the Key Competencies than the prescribed and abstracted performance.'*

1. Collecting, analysing and organising information

The execution of the competencies required for the Diploma always requires the collection,

analysis and organisation of data/information. At this level there is often the need to determine what data is needed and then to evaluate whether the data collected will yield the required information. At this level this would be in accordance with protocols and policies and may be covered by procedures.

2. Communicating ideas and information

Competitive manufacturing organisations usually work in teams and require high levels of communication with all stakeholders. At this level there is the need to evaluate the effectiveness of communication flows and whether the information is appropriate for the decisions which need to be made and then making, or recommending changes. At this level this would be in accordance with protocols and policies and may be covered by procedures.

3. Planning and organising activities

At the Diploma level, not only is planning and organisation of self, others and resources undertaken, but there is an expectation that the effectiveness of these plans and organising will be evaluated and where appropriate changed/recommendations for change made. At this level this would be in accordance with protocols and policies and may be covered by procedures.

4. Working with others and in teams

Working in teams is fundamental to the way most competitive manufacturing organisations work. At this level the function of the teams and other interpersonal interactions should be being evaluated and improvements being made. At this level this would be in accordance with protocols and policies and may be covered by procedures.

5. Solving problems

Problem solving is a key activity at this level with the need to evaluate the tools needed to solve problems and then to modify the tools or acquire/recommend other tools to help the problem solving process. At the Diploma level the person might be expected to have a wide array of problem solving tools to choose from. At this level this would be in accordance with protocols and policies and may be covered by procedures. They might also be expected to generate novel solutions to problems which do not respond to standard solutions, possibly working with relevant technical experts.

6. Using mathematical ideas and techniques

While some units require specific mathematical competence (such as MCMT452, 630, 631, 650) most require a level of numeracy sufficient to understand numerical data/charts, interpret what they mean and communicate with technical experts about quantitative data. At this level this would be in accordance with protocols and policies and may be covered by procedures.

7. Using technology

At this level hands on competency with the technology of the process may not be required; however an understanding of the principles underpinning the manufacturing process will be required sufficient to evaluate its operation and to evaluate different courses of action while working with a technical expert. Computer usage would be expected. At this level this would be in accordance with protocols and policies and may be covered by procedures.

MCM60104 Advanced Diploma of Competitive Manufacturing

To be awarded an Advanced Diploma of Competitive Manufacturing, competency must be achieved in 30 units comprised of the 10 units required for a Certificate IV and a further 20 units chosen as specified below.

MCM Systems

At least two of the following MCM Systems units must be chosen.

MCMS600A	Develop a competitive manufacturing system
MCMS601A	Analyse and map a value chain
MCMS602A	Manage a value chain
MCMS603A	Develop manufacturing related business plans
MCMS604A	Manage competitive manufacturing processes in a jobbing shop environment
MCMS605A	Develop a balanced score card for use in competitive manufacturing
MCMS606A	Introduce competitive manufacturing to a small or medium enterprise

MCM Change/interpersonal

At least two units of the following MCM Change/interpersonal units must be chosen.

MCMC610A	Manage relationships with non-customer external organisations
MCMC611A	Manage people relationships
MCMC612A	Manage workplace learning
MCM613A	Facilitate holistic culture improvement in a manufacturing enterprise
MCM614A	Develop a communications strategy to support production

MCM Tools

At least four units of the following MCM Tools units must be chosen.

MCMT452A	Apply statistics to processes in manufacturing
MCMT620A	Develop quick changeover procedures
MCMT621A	Develop a Just in Time (JIT) system
MCMT622A	Design a process layout
MCMT623A	Develop a levelled pull system of manufacturing
MCMT630A	Optimise cost of product
MCMT631A	Undertake value analysis of product costs in terms of customer requirements
MCMT632A	Analyse cost implications of maintenance strategy

MCMT640A	Manage 5S system in a manufacturing environment
MCMT641A	Implement a continuous improvement system
MCMT650A	Determine and improve process capability
MCMT652A	Design an experiment
MCMT653A	Apply six sigma to process control and improvement
MCMT660A	Develop the application of enterprise systems in manufacturing
MCMT661A	Determine and establish information collection requirements and processes
MCMT662A	Develop a documentation control strategy for a manufacturing enterprise
MCMT670A	Develop and manage sustainable energy practices
MCMT671A	Develop and manage sustainable environmental practices
MCMT675A	Facilitate the development of a new product
MCMT681A	Develop a proactive maintenance strategy
MCMT682A	Adapt a proactive maintenance strategy to the process manufacturing sector
MCMT683A	Adapt a proactive maintenance strategy for a seasonal or cyclical manufacturing operation

Other relevant units

No more than eight relevant units at the AQF 4, 5 or 6 level may be selected from another relevant endorsed Training Package. Units chosen should be relevant to the workplace and would normally be drawn from the appropriate sector Training Package, or possibly the Business Services Training Package.

Balance of units

Sufficient additional units should be chosen from the CMI units to achieve the required twenty units (plus 10 units from the Certificate IV).

The Key Competencies at Advanced Diploma level

The following describes a typical application of the Key Competencies at Advanced Diploma level.

The competencies used at Advanced Diploma level predominantly require a level of competence needed to evaluate and reshape tasks. Key Competencies are required at performance level 3.

However it needs to be noted that *'the current definitions are problematic. The industry or workplace context is generally seen as far more indicative in determining the degree of difficulty of the application of the Key Competencies than the prescribed and abstracted performance.'*

1. Collecting, analysing and organising information

The execution of the competencies required for the Advanced Diploma always requires the collection, analysis and organisation of data/information. At this level there is often the need

to determine what data is needed and then to evaluate whether the data collected will yield the required information. At this level this would be in accordance with protocols and policies and may be covered by procedures.

2. Communicating ideas and information

Competitive manufacturing organisations usually work in teams and require high levels of communication with all stakeholders. At this level there is the need to evaluate the effectiveness of communication flows and whether the information is appropriate for the decisions which need to be made and then making, or recommending changes. At this level this would be in accordance with protocols and policies and may be covered by procedures.

3. Planning and organising activities

At the Advanced Diploma level, not only is planning and organisation of self, others and resources undertaken, but there is an expectation that the effectiveness of these plans and organising will be evaluated and where appropriate changed/ recommendations for change made. At this level this would be in accordance with protocols and policies and may be covered by procedures.

4. Working with others and in teams

Working in teams is fundamental to the way most competitive manufacturing organisations work. At this level the function of the teams and other interpersonal interactions should be being evaluated and improvements being made. At this level this would be in accordance with protocols and policies and may be covered by procedures.

5. Solving problems

Problem solving is a key activity at this level with the need to evaluate the tools needed to solve problems and then to modify the tools or acquire/recommend other tools to help the problem solving process. At the Advanced Diploma level the person might be expected to have an extensive array of problem solving tools to choose from. At this level this would be in accordance with protocols and policies and may be covered by procedures. They might also be expected to generate novel solutions to problems which do not respond to standard solutions, possibly working with relevant technical experts.

6. Using mathematical ideas and techniques

While some units require specific mathematical competence (such as MCMT452, 630, 631, 650) most require a level of numeracy sufficient to understand numerical data/charts, interpret what they mean and communicate with technical experts about quantitative data. At this level this would be in accordance with protocols and policies and may be covered by procedures.

7. Using technology

At this level hands on competency with the technology of the process may not be required, however an understanding of the principles underpinning the manufacturing process will be required sufficient to evaluate its operation and to evaluate different courses of action while working with a technical expert. Computer usage would be expected. At this level this would be in accordance with protocols and policies and may be covered by procedures.

Assessment Guidelines

Introduction

These Assessment Guidelines provide the endorsed framework for assessment of units of competency in this Training Package. They are designed to ensure that assessment is consistent with the Australian Quality Training Framework (AQTF) *Standards for Registered Training Organisations*. Assessments against the units of competency in this Training Package must be carried out in accordance with these Assessment Guidelines.

Assessment System Overview

This section provides an overview of the requirements for assessment when using this Training Package, including a summary of the AQTF requirements; licensing/registration requirements; and assessment pathways.

Benchmarks for Assessment

Assessment within the National Training Framework is the process of collecting evidence and making judgements about whether competency has been achieved to confirm whether an individual can perform to the standards expected in the workplace, as expressed in the relevant endorsed unit of competency.

In the areas of work covered by this Training Package, the endorsed units of competency are the benchmarks for assessment. As such, they provide the basis for nationally recognised Australian Qualifications Framework (AQF) qualifications and Statements of Attainment issued by Registered Training Organisations (RTOs).

Australian Quality Training Framework Assessment Requirements

Assessment leading to nationally recognised AQF qualifications and Statements of Attainment in the vocational education and training sector must meet the requirements of the AQTF as expressed in the *Standards for Registered Training Organisations*.

The *Standards for Registered Training Organisations* can be downloaded from the DEST website at www.dest.gov.au or can be obtained in hard copy from DEST. The following points summarise the assessment requirements under the AQTF.

Registration of Training Organisations

Assessment must be conducted by, or on behalf of, an RTO formally registered by a State or Territory Registering/Course Accrediting Body in accordance with the *Standards for Registered Training Organisations*. The RTO must have the specific units of competency and/or AQF qualifications on its scope of registration. See Section 1 of the *Standards for Registered Training Organisations*.

Quality Training and Assessment

Each RTO must have systems in place to plan for and provide quality training and assessment across all its operations. See Standard 1 of the *Standards for Registered Training Organisations*.

Assessor Competency Requirements

Each person involved in training, assessment or client service must be competent for the functions they perform. See Standard 7 of the *Standards for Registered Training Organisations* for assessor competency requirements. Standard 7 also specifies the competencies that must be held by trainers.

Assessment Requirements

The RTOs assessments must meet the requirements of the endorsed components of Training Packages within its scope of registration. See Standard 8 of the *Standards for Registered Training Organisations*.

Assessment Strategies

Each RTO must identify, negotiate, plan and implement appropriate learning and assessment strategies to meet the needs of each of its clients. See Standard 9 of the *Standards for Registered Training Organisations*.

Mutual Recognition

Each RTO must recognise the AQF qualifications and Statements of Attainment issued by any other RTO. See Standard 5 of the *Standards for Registered Training Organisations*.

Access and Equity and Client Services

Each RTO must apply access and equity principles, provide timely and appropriate information, advice and support services that assist clients to identify and achieve desired outcomes. This may include reasonable adjustment in assessment. See Standard 6 of the *Standards for Registered Training Organisations*.

Partnership Arrangements

RTOs must have, and comply with, written agreements with each organisation providing training and/or assessment on its behalf. See Standard 1.6 of *Standards for Registered Training Organisations*.

Recording Assessment Outcomes

Each RTO must have effective administration and records management procedures in place, and must record AQF qualifications and Statements of Attainment issued. See Standards 4 and 10.2 of the *Standards for Registered Training*.

Issuing AQF Qualifications and Statement of Attainment

Each RTO must issue AQF qualifications and Statements of Attainment that meet the requirements of the *AQF Implementation Handbook* and the endorsed Training Packages within the scope of its registration. An AQF qualification is issued once the full requirements for a qualification, as specified in the nationally endorsed Training Package are met. A Statement of Attainment is issued where the individual is assessed as competent against fewer units of competency than required for an AQF qualification. See Standard 10 and Section 2 of the *Standards for Registered Training Organisations*.

Licensing/Registration Requirements

This section provides information on licensing/registration requirements for this Training Package, with the following important disclaimer.

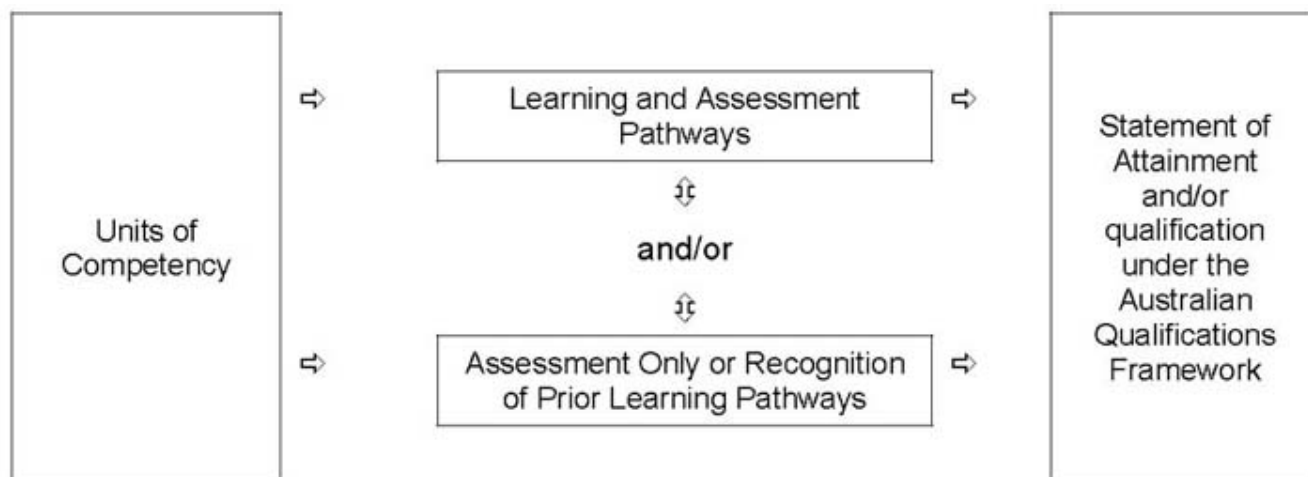
The developers of this Training Package, and ANTA, consider that no licensing or registration requirements apply to RTOs, assessors or candidates with respect to this Training Package. Contact the relevant State or Territory Department(s) to check if there are any licensing or registration requirements with which you must comply. For further information on this topic contact Manufacturing Skills Australia on (02) 9955 5500 or www.mskills.com.au.

Pathways

The competencies in this Training Package may be attained in a number of ways including through:

- formal or informal education and training
- experiences in the workplace
- general life experience, and/or
- any combination of the above.

Assessment under this Training Package leading to an AQF qualification or Statement of Attainment may follow a learning and assessment pathway, an assessment-only or recognition pathway, or a combination of the two as illustrated in the following diagram.



Each of these assessment pathways leads to full recognition of competencies held - the critical issue is that the candidate is competent, not how the competency was acquired.

Assessment, by any pathway, must comply with the assessment requirements set out in the *Standards for Registered Training Organisations*.

Learning and Assessment Pathways

Usually, learning and assessment are integrated, with assessment evidence being collected and feedback provided to the candidate at anytime throughout the learning and assessment process.

Learning and assessment pathways may include structured programs in a variety of contexts using a range of strategies to meet different learner needs. Structured learning and assessment programs could be: group-based, work-based, project-based, self-paced, action learning-based; conducted by distance or e-learning; and/or involve practice and experience in the workplace.

Learning and assessment pathways to suit New Apprenticeships have a mix of formal structured training and structured workplace experience with formative assessment activities through which candidates can acquire and demonstrate skills and knowledge from the relevant units of competency.

Assessment-Only or Recognition of Prior Learning Pathway

Competencies already held by individuals can be formally assessed against the units of competency in this Training Package, and should be recognised regardless of how, when or where they were achieved.

In an assessment-only or Recognition of Prior Learning (RPL) pathway, the candidate provides current, quality evidence of their competency against the relevant unit of competency. This process may be directed by the candidate and verified by the assessor, such as in the compilation of portfolios; or directed by the assessor, such as through observation of workplace performance and skills application, and oral and/or written assessment. Where the outcomes of this process indicate that the candidate is competent,

structured training is not required. The RPL requirements of Standard 8.2 of the *Standards for Registered Training Organisations* must be met.

As with all assessment, the assessor must be confident that the evidence indicates that the candidate is currently competent against the endorsed unit of competency. This evidence may take a variety of forms and might include certification, references from past employers, testimonials from clients, and work samples. The onus is on candidates to provide sufficient evidence to satisfy assessors that they currently hold the relevant competencies. In judging evidence, the assessor must ensure that the evidence of prior learning is:

- authentic (the candidates own work)
- valid (directly related to the current version of the relevant endorsed unit of competency)
- reliable (shows that the candidate consistently meets the endorsed unit of competency)
- current (reflects the candidates current capacity to perform the aspect of the work covered by the endorsed unit of competency), and
- sufficient (covers the full range of elements in the relevant unit of competency and addresses the four dimensions of competency, namely task skills, task management skills, contingency management skills, and job/role environment skills).

The assessment only or recognition of prior learning pathway is likely to be most appropriate in the following scenarios:

- candidates enrolling in qualifications who want recognition for prior learning or current competencies
- existing workers
- individuals with overseas qualifications
- recent migrants with established work histories
- people returning to the workplace, and
- people with disabilities or injuries requiring a change in career.

Combination of Pathways

Where candidates for assessment have gained competencies through work and life experience and gaps in their competence are identified, or where they require training in new areas, a combination of pathways may be appropriate.

In such situations, the candidate may undertake an initial assessment to determine their current competency. Once current competency is identified, a structured learning and assessment program ensures that the candidate acquires the required additional competencies identified as gaps.

Assessor Requirements

This section identifies the mandatory competencies for assessors, and clarifies how others may contribute to the assessment process where one person alone does not hold all the required competencies.

Assessor Competencies

The *Standards for Registered Training Organisations* specify mandatory competency requirements for assessors. For information, Standard 7.3 from the *Standards for Registered Training Organisations* follows:

7.3	a	The RTO must ensure that assessments are conducted by a person who has:
		<ul style="list-style-type: none">• the following competencies* from the Training Package for Assessment and Workplace Training, or demonstrated equivalent competencies:<ul style="list-style-type: none">• TAAASS401A Plan and organise assessment;• TAAASS402A Assess competence;

		<ul style="list-style-type: none"> • TAAASS404A Participate in assessment validation; • relevant vocational competencies, at least to the level being assessed.
	b	However, if a person does not have all of the competencies in Standards 7.3 a (i) and the vocational competencies as defined in 7.3 a (ii), one person with the competencies listed in Standard 7.3 a (i), and one or more persons who have the competencies listed in Standard 7.3 a (ii) may work together to conduct assessments.
		* A person who holds the competencies BSZ401A Plan assessment, BSZ402A Conduct assessment, and BSZ403A Review assessment from the Training Package for Assessment and Workplace Training will be accepted for the purposes of this standard. A person who has demonstrated equivalent competencies to BSZ401A and BSZ402A and BSZ403A in the period up to 12 months following publication of the Training and Assessment Training Package will also be accepted for the purposes of this standard.

MCM04 has adopted the ANTA model assessment guidelines as required. These model guidelines have been customised by the addition of Section 5 - Assessment for competitive manufacturing.

Designing Assessment Tools

This section provides an overview on the use and development of assessment tools.

Use of Assessment Tools

Assessment tools provide a means of collecting the evidence that assessors use in making judgements about whether candidates have achieved competency.

There is no set format or process for the design, production or development of assessment tools. Assessors may use prepared assessment tools, such as those specifically developed to support this Training Package, or they may develop their own.

Using Prepared Assessment Tools

If using prepared assessment tools, assessors should ensure these are benchmarked, or mapped, against the current version of the relevant unit of competency. This can be done by checking that the materials are listed on the National Training Information Service (<http://www.ntis.gov.au>). Materials on the list have been noted by the National Training Quality Council as meeting their quality criteria for Training Package support materials.

Developing Assessment Tools

When developing assessment tools, assessors must ensure that they:

- are benchmarked against the relevant unit or units of competency
- are reviewed as part of the validation of assessment strategies as required under 9.2 (i) of the *Standards for Registered Training Organisations*
- meet the assessment requirements expressed in the *Standards for Registered Training Organisations*, particularly Standards 8 and 9.

A key reference for assessors developing assessment tools is TAA04 Training and Assessment Training Package and the unit of competency TAAASS403A *Develop assessment tools*. There is no set format or process for the design, production or development of assessment materials.

Conducting Assessment

This section details the mandatory assessment requirements and provides information on equity in assessment including reasonable adjustment.

Mandatory Assessment Requirements

Assessments must meet the criteria set out in Standard 8 from the *Standards for Registered Training Organisations*. For information, Standard 8 from the *Standards for Registered Training Organisations* is reproduced below.

8		RTO Assessments
		The RTOs assessments meet the requirements of the endorsed components of Training Packages and the outcomes specified in accredited courses within the scope of its registration.
8.1		The RTO must ensure that assessments (including RPL):
	i.	comply with the assessment guidelines included in the applicable nationally endorsed Training Packages or the assessment requirements specified in accredited courses;
	ii.	lead to the issuing of a statement of attainment or qualification under the AQF when a person is assessed as competent against nationally endorsed unit(s) of competency in the applicable Training Package or modules specified in the applicable accredited course;
	iii.	are valid, reliable, fair and flexible;
	iv.	provide for applicants to be informed of the context and purpose of the assessment and the assessment process;
	v.	where relevant, focus on the application of knowledge and skill to standard of performance required in the workplace and cover all aspects workplace performance, including task skills, task management skills, contingency management skills and job role environment skills;
	vi.	involve the evaluation of sufficient evidence to enable judgements to be made about whether competency has been attained;
	vii.	provide for feedback to the applicant about the outcomes of the assessment process and guidance on future options in relation to those outcomes;
	viii.	are equitable for all persons, taking account of individual needs relevant to the assessment; and
	ix.	provide for reassessment on appeal.
8.2	a	The RTO must ensure that RPL is offered to all applicants on enrolment
	b	The RTO must have an RPL process that:
		i. is structured to minimise the time and cost to applicants; and
		ii. provides adequate information, support and opportunities for participants to engage in the RPL process.

Access and Equity

An individual's access to the assessment process should not be adversely affected by restrictions placed on the location or context of assessment beyond the requirements specified in this Training Package.

Reasonable adjustments can be made to ensure equity in assessment for people with disabilities. Adjustments include any changes to the assessment process or context that meet the individual needs of the person with a disability, but do not change competency outcomes. Such adjustments are considered reasonable if they do not impose an unjustifiable hardship on a training provider or employer. When assessing people with disabilities, assessors are encouraged to apply good practice assessment methods with sensitivity and flexibility.

Assessment for Competitive Manufacturing

General Issues

Assessment of competency will be in accordance with the relevant legislation applying in each State and Territory. The assessor has a legal duty under both legislation and common law duty of care to ensure that the assessment activities do not pose a risk to either the candidate or others (such as other workers or the community) who may be in the learning and assessment environment or affected by the learning or assessment activities.

Wherever possible integrated assessment, which reflects the grouping of competencies as they would be demonstrated in an actual work role, is the preferred means of assessment. The context of the assessment is defined in each unit of competency.

Assessment Considerations for 'Systems' and 'Change/interpersonal' Units

These units reflect the need to consider the system as a whole in competitive manufacturing and also that change is a regular part of life in competitive manufacturing. It may be difficult to assess these units independently and a better approach may be to integrate their assessment with that of one or more 'tools' units.

Project-based Assessment

Many of the units of competency (particularly those at Diploma and Advanced Diploma level) lend themselves to a project-based assessment as many of these competencies would be undertaken as part of a project in the workplace. Using these projects for assessment, or alternatively requiring the assessee to undertake a project specifically for assessment fits well with the competency. Where project-based assessment is undertaken, then care needs to be taken to not contaminate the evidence of competence with other factors which may occur but which are not directly related to the competency. It is also important for any external RTO to be aware of, and observe, any confidentiality issues which may arise during the project. The timing of project-based assessment needs to fit with the requirements of the organisation where the project is being conducted and this may not fit conveniently with any external timetable.

Integrated Assessment

It is the intention that the ability to perform the unit of competency as a whole be the key criterion in any assessment process.

Further, it is frequently appropriate to assess more than one unit of competency at the same time, either because the competencies combine to make a whole job component or because certain competencies are only practised in combination with other competencies in a particular workplace. The assessment of more than one unit of competency concurrently is desirable, provided adequate evidence is gathered for each competency involved.

Simulation

Where it is not possible to gather sufficient assessment evidence from a workplace then assessment may occur off the job in some circumstances. 'Off the job' means that the candidate is not in productive work at the time the evidence is gathered. In these instances an appropriate simulation must be used where the range of conditions and experiences reflects realistic workplace situations.

The true test of competency should always relate to whether the individual can perform to the standards expected in the workplace, as expressed in the units of competency.

Further Sources of Information

The section provides a listing of useful contacts and resources to assist assessors in planning, designing, conducting and reviewing of assessments against this Training Package.

Contacts

Manufacturing Skills Australia PO Box 289 NORTH SYDNEY NSW 2059

Ph 02 9955 5500 Fax 02 9955 8044 Web: www.mskills.com.au Email: info@mskills.com.au

Australian Training Products Ltd

Level 25, 150 Lonsdale Street

MELBOURNE VIC 3000

PO Box 12211

A'Beckett Street Post Office

MELBOURNE VIC 8006

Telephone: (03) 9655 0600

Fax: (03) 9639 4684

Web: www.atpl.net.au

Email: sales@atpl.net.au

Innovation and Business Industry Skills Council

Building B, Level 2

192 Burwood Road

Telephone: (03) 9815 7000

Fax: (03) 9815 7001

Email: virtual@ibsa.org.au

General Resources

Refer to <http://antapubs.dest.gov.au/publications/search.asp> to locate the following ANTA publications.

AQF Implementation Handbook, third Edition. Australian Qualifications Framework Advisory Board, 2002, aqf.edu.au

Australian Quality Training Framework (AQTF) - for general information go to:
www.dest.gov.au/sectors

Australian Quality Training Framework (AQTF) - for resources and information go to:

www.dest.gov.au

Australian Quality Training Framework *Standards for Registered Training Organisations*, Australian National Training Authority, Melbourne, 2005. Available in hard copy from State and Territory Training Authorities or can be downloaded from www.dest.gov.au

TAA04 Training and Assessment Training Package. This is available from the Innovation and Business Skills Australia (IBSA) Industry Skills Council and can be viewed, and components downloaded, from the National Training Information Service (NTIS). National Training Information Service, an electronic database providing comprehensive information about RTOs, Training Packages and accredited courses - www.ntis.gov.au *Style Guide for Training Package Support Materials*, Australian National Training Authority, Melbourne, 2003. Can be downloaded from the ANTA page at www.dest.gov.au

Assessment Resources

Training Package Assessment Guides - a range of resources to assist RTOs in developing Training Package assessment materials developed by DEST with funding from the Department of Education, Training and Youth Affairs. It is made up of 10 separate titles, as described at the ANTA publications page of www.dest.gov.au. Go to www.resourcegenerator.gov.au/loadpage.asp?TPAG.htm

Printed and/or CD ROM versions of the Guides can be purchased from Australian Training Products (ATP). The resource includes the following guides:

- Training Package Assessment Materials Kit
- Assessing Competencies in Higher Qualifications
- Recognition Resource
- Kit to Support Assessor Training
- Candidates Kit: Guide to Assessment in New Apprenticeships
- Assessment Approaches for Small Workplaces
- Assessment Using Partnership Arrangements
- Strategies for ensuring Consistency in Assessment
- Networking for Assessors
- Quality Assurance Guide for Assessment

An additional guide "Delivery and Assessment Strategies" has been developed to complement these resources.

Assessment Tool Design and Conducting Assessment

VETASSESS AND; Western Australian Department of Training and Employment 2000, *Designing Tests - Guidelines for designing knowledge based tests for Training Packages*. Vocational Education and Assessment Centre 1997, *Designing Workplace Assessment Tools, A self-directed learning program*, NSW TAFE.

Manufacturing Learning Australia 2000, *Assessment Solutions*, Australian Training Products, Melbourne.

Rumsey, David 1994, *Assessment practical guide*, Australian Government Publishing Service, Canberra.

Assessor Training

Australian Committee on Training Curriculum (ACTRAC) 1994, *Assessor training program - learning materials*, Australian Training Products, Melbourne.

Australian National Training Authority, *A Guide for Professional Development*, ANTA,

Brisbane.

Australian Training Products Ltd *Assessment and Workplace Training, Training Package - Toolbox*, ATPL Melbourne.

Green, M, et al. 1997, *Key competencies professional development Package*, Department for Education and Childrens Services, South Australia.

Victorian TAFE Association 2000, *The professional development CD: A learning tool*, VTA, Melbourne.

Assessment System Design and Management

Office of Training and Further Education 1998, *Demonstrating best practice in VET project - assessment systems and processes*, OTFE Victoria.

Toop, L., Gibb, J. and; Worsnop, P. *Assessment system designs*, Australian Government Publishing Service, Canberra.

Western Australia Department of Training and VETASSESS 1998, *Kit for Skills Recognition Organisations*, WADOT, Perth.

Competency Standards

What is competency?

The broad concept of industry competency concerns the ability to perform particular tasks and duties to the standard of performance expected in the workplace. Competency requires the application of specified skills, knowledge and attitudes relevant to effective participation in an industry, industry sector or enterprise.

Competency covers all aspects of workplace performance and involves performing individual tasks; managing a range of different tasks; responding to contingencies or breakdowns; and, dealing with the responsibilities of the workplace, including working with others. Workplace competency requires the ability to apply relevant skills, knowledge and attitudes consistently over time and in the required workplace situations and environments. In line with this concept of competency Training Packages focus on what is expected of a competent individual in the workplace as an outcome of learning, rather than focussing on the learning process itself.

Competency standards in Training Packages are determined by industry to meet identified industry skill needs. Competency standards are made up of a number of units of competency each of which describes a key function or role in a particular job function or occupation. Each unit of competency within a Training Package is linked to one or more AQF qualifications.

Contextualisation of Units of Competency by RTOs

Registered Training Organisation (RTOs) may contextualise units of competency to reflect local outcomes required. Contextualisation could involve additions or amendments to the unit of competency to suit particular delivery methods, learner profiles, specific enterprise equipment requirements, or to otherwise meet local needs. However, the integrity of the overall intended outcome of the unit of competency must be maintained.

Any contextualisation of units of competency in this endorsed Training Package must be within the bounds of the following advice. In contextualising units of competency, RTOs:

- must not remove or add to the number and content of elements and performance criteria
- may add specific industry terminology to performance criteria where this does not distort or narrow the competency outcomes
- may make amendments and additions to the range statement as long as such changes do not diminish the breadth of application of the competency and reduce its portability, and/or
- may add detail to the evidence guide in areas such as the critical aspects of evidence or resources and infrastructure required where these expand the breadth of the competency but do not limit its use.

Components of Units of Competency

The components of units of competency are summarised below, in the order in which they appear in each unit of competency.

Unit Title

The unit title is a succinct statement of the outcome of the unit of competency. Each unit of competency title is unique, both within and across Training Packages.

Unit Descriptor

The unit descriptor broadly communicates the content of the unit of competency and the skill area it addresses. Where units of competency have been contextualised from units of

competency from other endorsed Training Packages, summary information is provided. There may also be a brief second paragraph that describes its relationship with other units of competency, and any licensing requirements.

Prerequisite Units (optional)

If there are any units of competency that must be completed before the unit, these will be listed.

Application of the Unit

This sub-section fleshes out the unit of competency's scope, purpose and operation in different contexts, for example, by showing how it applies in the workplace.

Competency Field (Optional)

The competency field either reflects the way the units of competency are categorised in the Training Package or denotes the industry sector, specialisation or function. It is an optional component of the unit of competency.

Sector (optional)

The industry sector is a further categorisation of the competency field and identifies the next classification, for example an elective or supervision field.

Elements of Competency

The elements of competency are the basic building blocks of the unit of competency. They describe in terms of outcomes the significant functions and tasks that make up the competency.

Performance Criteria

The performance criteria specify the required performance in relevant tasks, roles, skills and in the applied knowledge that enables competent performance. They are usually written in passive voice. Critical terms or phrases may be written in bold italics and then defined in range statement, in the order of their appearance in the performance criteria.

Required Skills and Knowledge

The essential skills and knowledge are either identified separately or combined. Knowledge identifies what a person needs to know to perform the work in an informed and effective manner. Skills describe the application of knowledge to situations where understanding is converted into a workplace outcome.

Key Competencies

The way the Key Competencies relate to the unit will be described (unless the developer has described them at the level of the qualification). The Key Competencies are described in more detail at the end of this section.

Range Statement

The range statement provides a context for the unit of competency, describing essential operating conditions that may be present with training and assessment, depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts. As applicable, the meanings of key terms used in the performance criteria will also be explained in the range statement.

Evidence Guide

The evidence guide is critical in assessment as it provides information to the Registered Training Organisation (RTO) and assessor about how the described competency may be demonstrated. The evidence guide does this by providing a range of evidence for the

assessor to make determinations, and by providing the assessment context. The evidence guide describes:

- conditions under which competency must be assessed including variables such as the assessment environment or necessary equipment
- relationships with the assessment of any other units of competency
- suitable methodologies for conducting assessment including the potential for workplace simulation
- resource implications, for example access to particular equipment, infrastructure or situations
- how consistency in performance can be assessed over time, various contexts and with a range of evidence, and
- the required underpinning knowledge and skills

Key Competencies

All Training Packages require the integration of Key Competencies either in each unit of competency, or across a qualification, depending on industry needs and preferences.

The Key Competencies were first defined in 1992 in the project report, *Putting General Education to Work: The Key Competencies Report* (Mayer Committee 1992). The skills and knowledge they describe are essential for effective workplace participation and involve the sorts of capabilities commonly used by employers as selection criteria. They underpin the ability of employees to adapt to technological, organisational, societal and functional change.

The Key Competencies are generic, in that they apply to work in general, rather than to particular occupations or industries. They focus on the application of knowledge and skills in an integrated way in workplace situations. The seven Key Competencies are:

1 Communicating ideas and information

The capacity to communicate effectively with others using the range of spoken, written, graphic and other non-verbal means of expression.

2 Collecting, analysing and organising information

The capacity to locate, sift and sort information in order to select what is required and to present it in a useful way, and evaluate both the information itself and the sources and methods used to collect it.

3 Planning and organising activities

The capacity to plan and organise ones own work activities, including making good use of time and resources, sorting out priorities and monitoring ones performance.

4 Working with others in teams

The capacity to interact effectively with other people both on a one-to-one basis and in groups, including understanding and responding to the needs of a client and working effectively as a member of a team to achieve a shared goal.

5 Using mathematical ideas and techniques

The capacity to use mathematical ideas, such as number and space, and techniques such as estimation and approximation, for practical purposes.

6 Solving problems

The capacity to apply problem-solving strategies in purposeful ways, both in situations where the problem and the solution are clearly evident and in situations requiring creative thinking and a creative approach to achieve a desired outcome.

7 Using technology

The capacity to apply technology, combining the physical and sensory skills needed to operate equipment with the understanding of scientific and technological principles needed to explore and adapt systems.

Performance Levels

There are three levels of performance defined within the Key Competencies. These are stand-alone levels and do not correspond to the AQF qualification levels.

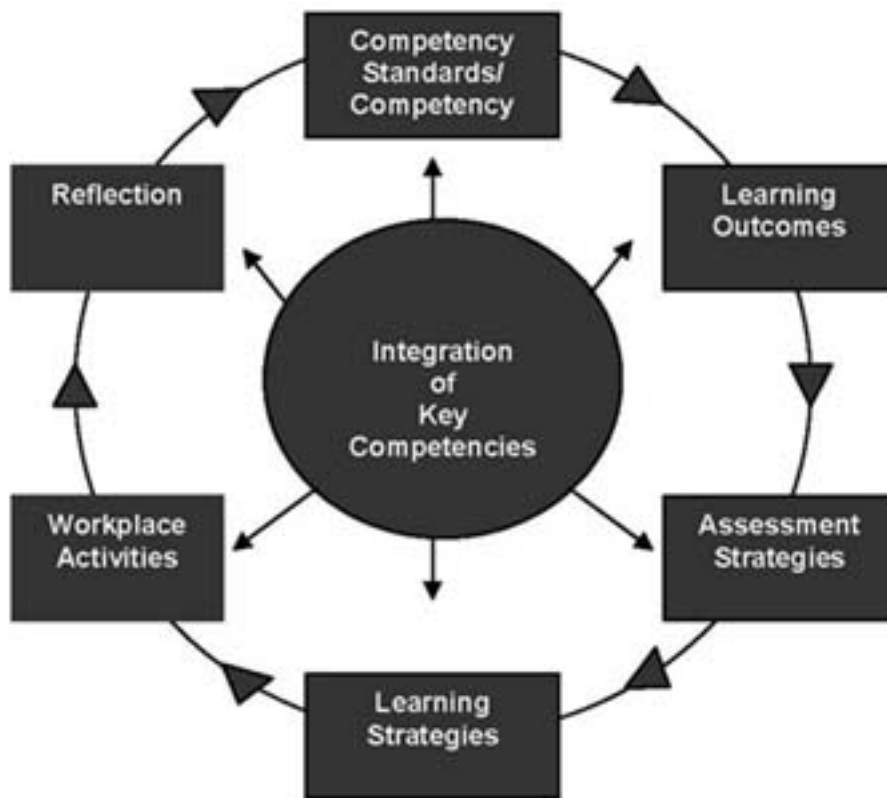
- **Performance Level 1** is concerned with the level of competence needed to *undertake* activities efficiently with sufficient self-management to meet the explicit requirements of the activity, and to make judgements about the quality of outcomes against established criteria.
- **Performance Level 2** describes the competence needed to *manage* activities requiring the selection, application and integration of a number of elements, and to select from established criteria to judge quality of process and outcome.
- **Performance Level 3** describes the competence needed to *evaluate and reshape* processes, to establish and use principles in order to determine appropriate ways of approaching activities, and to establish criteria for judging quality of process and outcome.

However, relating performance to the specific industry or workplace context may be more useful than interpreting the somewhat abstracted performance levels provided above. Where the Key Competencies are defined in the unit of competency, you will find them in a table, together with examples of their application, to help with assessment of their performance.

Also, in evaluating the level of performance for the Key Competencies, consider the performance expectations at the AQF qualification level involved.

Delivery and Assessment of Key Competencies

The Key Competencies are integral to workplace competency, and, as such must be explicitly considered in the design, customisation, delivery and assessment of vocational education and training programs as represented diagrammatically below.



Units of Competency

Units of competency have been categorised as:

- systems - coded MCMS###A
- change/interpersonal - coded MCMC###A or
- tools - coded MCMT###A.

Units must be chosen from each category for qualification purposes. There are most units in the 'tools' category and this is to cater for the wide variety of approaches chosen by competitive manufacturing organisations.

There are no specified 'core' units.

Imported Units

Where sector specific competencies are required, these should be imported from the relevant sector specific Training Package. Relevant units at the same level or at an AQF level one up or one below the selected CMI qualification should be chosen.

Using the CMI units

The development of CMI units and qualifications will occur in number of stages. The units and qualifications in the MCM04 Training Package represent the first development stage and have been written to meet the needs of workers who need manufacturing practice skills in addition to specific technical skills.

The CMI units have been written with the intention that they be used in a number of contexts.

The units have been packaged into specific Competitive Manufacturing qualifications. These are appropriate for individuals and enterprises where the need for generic manufacturing practice skills is dominant over the need for specific technical skills. The requirements for a Competitive Manufacturing qualification is detailed in the Qualifications Framework.

The units are also intended to be imported into sector specific Training Packages and

qualifications. This would be appropriate where the need for sector specific and/or technical skills is dominant, but there is also a need for generic manufacturing practice skills. The requirements for these sector specific qualifications will be contained in their respective Training Packages and Qualifications Frameworks.

It is expected that many personnel in manufacturing will have some need of the manufacturing practice skills defined by the Competitive Manufacturing units of competency. Their importation into manufacturing Training Packages is encouraged. Imported units should show the original code number and unit title. The unit code may be used as a first indicator or possibly appropriate AQF level such that 200 series units may be around AQF 2, 400 series units around AQF 4 and 600 series units around AQF 6. The importation of units should allow for this estimate to vary by one AQF level (either up or down) and final decisions on the level in which they are to be packaged in the importing Training Package needs to be made with consideration of the industry and following normal processes for making these decisions.



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MCM04 Competitive Manufacturing Training Package

Competitive Manufacturing Training Package (Background, Qualification Framework, Assessment Guidelines)

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