

MEM07007C Perform milling operations	
Unit descriptor	This unit of competency covers performing machining operations on a range of milling machines to produce components to required tolerances and specifications using all types of accessories.
Employability skills	This unit contains employability skills.
Prerequisite units	
	MEM07005C Perform general machining
	MEM09002B Interpret technical drawing
	MEM12023A Perform engineering measurements
	MEM18001C Use hand tools
Co-requisite units	
Application of the unit	<p>This unit of competency applies to a range of milling machines including vertical, horizontal and universal types, a range of precision measuring equipment and cutting tools.</p> <p>Work is performed to established processes, practices and to drawings, sketches, specifications and instructions as appropriate. Cutting tools are selected using International Standard Organisation (ISO) standards or according to standard operating procedure as appropriate.</p> <p>This unit has been developed for Engineering Tradesperson – Mechanical apprenticeship training and the recognition of trade level skills in milling operations. Skills covered by this unit are generally applied in occupational and work situations associated with trade level fitting and machining work.</p> <p>This unit has application in the MEM30205 Certificate III in Engineering – Mechanical qualification and other qualifications requiring a trade level of mill machine operation skills. Milling operations and the processes and associated level of skill covered by this unit are often described in industry by the term ‘1st Class Machining’.</p> <p>Band A</p> <p>Unit weight 4</p>
Competency field	
Unit sector	Machine and process operations

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1. Observe safety precautions	1.1. Correct safety procedures are observed and protective clothing and safety glasses worn
2. Determine job requirements	2.1. Drawings are interpreted, sequence of operation is determined and tooling is selected to produce component to specification

	2.2. Cutting parameters are determined
3. Perform milling operations	3.1. Milling operations are carried out to produce components to specification 3.2. Operations are undertaken using conventional and/or climb milling techniques and a variety of cutters including slab, gang, end, shell, slot, form, slitting 3.3. The full range of standard accessories is used including dividing heads and rotary tables as required
4. Check components for conformance with specifications	4.1. Components are checked for conformance to specification using appropriate techniques, tools, instruments and equipment

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills include:

- setting up jobs using appropriate equipment
- calculating and setting cutting feeds and speeds appropriate to the job
- interpreting drawings and job instructions/specifications
- milling components to specification
- visually and dimensionally checking components for conformance to specification

Required knowledge

Required knowledge includes:

- safety hazards associated with milling machines
- sequence of operations to achieve the job requirements
- cutter types and tooling geometry
- consequences of varying speeds and feeds from the optimum rates calculated
- effects of different materials on cutting speeds and feeds
- conventional and climb milling techniques and their applications
- the application of each of the following: slab, gang, shell, slot, form and slitting
- applications requiring the use of dividing heads and rotary tables when milling components
- the procedures for using dividing heads and rotary tables on milling machines
- appropriate techniques, tools and equipment to measure milled components
- use and application of personal protective equipment
- safe work practices and procedures

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. 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) may also be included.

Drawings	Drawings include: <ul style="list-style-type: none"> • engineering drawings to AS 1100/1102
Tooling	Tooling includes: <ul style="list-style-type: none"> • slab • gang • end • shell • slot • form • slitting cutters

Instruments	Instruments may include: <ul style="list-style-type: none"> • manual and digital micrometers • vernier calipers • dial indicators • scribing blocks
Cutting parameters	Cutting parameters may include: <ul style="list-style-type: none"> • setting up machine, feed and speed calculations
Accessories	Accessories may include: <ul style="list-style-type: none"> • dividing heads and rotary tables

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	A person who demonstrates competency in this unit must be able to perform a variety of milling operations to specifications. Competency in this unit cannot be claimed until all prerequisites have been satisfied
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently apply the skills covered in this unit of competency in new and different situations and contexts. Critical aspects of assessment and evidence include: <ul style="list-style-type: none"> • determining requirements for milling job including quantity, material, measurements and tolerances • correct job planning including identifying required measuring instruments and equipment, tooling, accessories and sequence of operations • correct fixing of job and tooling • calculation and setting of required speed and feed • correct monitoring of milling operation • milling undertaken to trade standard in terms of time and responsibility for own work • undertaking correct remedial procedures for out of specification results as per enterprise procedures e.g. procedures for scrapping or reworking of components not milled to specification.
Context of and specific resources for assessment	This unit has been developed to support training in and recognition of trade level competency in milling operations as applied to a trade level fitting and machining work environment. Assessment should emphasise a workplace context and procedures found in the candidate's workplace. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Method of assessment	Typically, persons engaged in Engineering Tradesperson – Mechanical work are required to apply their milling operations skills and techniques across a range of jobs and specifications.

	<p>A single assessment event is not appropriate. On the job assessment should be included as part of the assessment process wherever possible. Where assessment occurs off the job, judgement must consider evidence of the candidate's performance in a productive work environment that includes a sufficient range of appropriate tasks and materials to cover the scope of application for this unit.</p> <p>Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.</p> <p>The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.</p>
<p>Guidance information for assessment</p>	<p>This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with milling operations or other units requiring the exercise of the skills and knowledge covered by this unit.</p> <p>Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.</p>