



Australian Government

Department of Education, Employment and Workplace Relations

MEM04017B Develop and manufacture gear, conveyor screw and propeller patterns

Release: 1

MEM04017B Develop and manufacture gear, conveyor screw and propeller patterns

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers laying out and manufacturing gear, conveyor screw and propeller patterns.
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Application of the Unit

Application of the unit	<p>This unit applies to the manufacture of patterns for all types of cast gears, conveyor screws, marine propellers etc., utilising the full range of timbers and composites, appropriate pattern making principles and techniques. Gear patterns may be segmented or any other method used to minimise timber shrinkage or warpage and to achieve the required strength. Conveyor and marine screws may be built up using predetermined thickened timber, either over a mandrel or a layout. Patterns may be set up on a joint board or plated for ease of moulding.</p> <p>Where precision measurement is required, Unit MEM12003B (Perform precision mechanical measurement) should also be considered.</p> <p>When assembly of plated patterns is required, Unit MEM04012B (Assemble plated patterns) should also be considered.</p> <p>Band: A Unit Weight: 4</p>
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM04010B	Develop and manufacture wood patterns
	MEM04018B	Perform general woodworking machine operations
	MEM09002B	Interpret technical drawing
	MEM12006C	Mark off/out (general engineering)
	MEM12023A	Perform engineering measurements
	MEM12024A	Perform computations
	MEM18001C	Use hand tools
	MEM18002B	Use power tools/hand held operations
	MEM30012A	Apply mathematical techniques in a manufacturing engineering or related environment

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

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.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Determine job requirements	1.1. Drawings, instructions and specifications are interpreted and understood. 1.2. Appropriate material is selected to specifications. 1.3. Moulding, cast techniques and foundry processes are applied in determining the type of pattern required.
2. Lay out pattern	2.1. Pattern parameters are calculated. 2.2. Pattern is laid out showing tapers, machining allowances, core prints and method of construction etc. to specification. 2.3. Jigs and fixtures are developed and manufactured to aid the manufacture of the pattern form as required.
3. Manufacture pattern	3.1. Materials are marked out and construction is developed to meet specifications. 3.2. Pattern or pattern component parts are produced to size and shape and checked for compliance with specifications using acceptable wood pattern making techniques, procedures and utilising appropriate hand and hand held power tools. 3.3. Pattern component parts are joined or fixed as required, according to specifications, using acceptable pattern making techniques and procedures. 3.4. Pattern is correctly marked, colour-coded and/or tagged in compliance with specifications or standard operating procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This section describes the skills and knowledge required for this unit.
Required skills
Look for evidence that confirms skills in: <ul style="list-style-type: none"> • determining job requirements from written instructions, standard operating procedures, sketches, drawings and other applicable reference documents • planning and sequencing operations • checking and clarifying task-related information

REQUIRED SKILLS AND KNOWLEDGE

- selecting appropriate materials to suit the moulding/casting techniques and foundry process
- laying out the pattern/core boxes
- constructing patterns/core boxes
- joining and fixing component parts
- checking patterns
- calculating contraction rates/pitch/proportions/profiles
- undertaking relevant engineering calculations

Required knowledge

Look for evidence that confirms knowledge of:

- timber, epoxy resin and composite product knowledge including features, characteristics and applications
- moulding and casting techniques for cast gears, conveyor screws and marine propellers
- tooling required for casting/moulding
- methoding techniques
- the use and application of jigs and fixtures
- methods of construction
- techniques, tools and equipment to measure, mark out&produce gear, conveyor screw&propeller patterns
- mathematical calculations and formulae required to manufacture patterns/core boxes - contraction, taper, pitch, profiles, clearances, machining allowances
- identification coding and numbering
- pattern checking techniques
- mouldability i.e. surface finish, face taper, convex or concave perspectives, undercuts, etc.
- use and application of personal protective equipment
- safe work practices and procedures
- hazards and control measures associated with developing and manufacturing gear, conveyor screw and propeller patterns

Evidence Guide

EVIDENCE GUIDE	
<p>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.</p>	
<p>Overview of assessment</p>	<p>A person who demonstrates competency in this unit must be able to develop and manufacture gear, conveyor screw and propeller patterns. Competency in this unit cannot be claimed until all prerequisites have been satisfied.</p>
<p>Critical aspects for assessment and evidence required to demonstrate competency in 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>
<p>Context of and specific resources for assessment</p>	<p>This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. 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.</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 manufacturing gear, conveyor screw and propeller patterns or other units requiring the exercise of the skills and knowledge covered by this unit.</p>
<p>Method of assessment</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. 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>

EVIDENCE GUIDE

Guidance information for assessment	
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Range Statement**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.

Material	Hardwood, softwood, epoxy resins, composites
Pattern parameters	Pitch circles, pressure angles, tooth form, left and right hand flight helix, pitch axial dimensions, angles, tapers, clearances, contraction allowances appropriate to developing various types of gear, conveyor and propeller forms
Calculated	The determination of contraction rates, pitch, proportions, profiles as well as general engineering calculations

Unit Sector(s)

Unit sector	
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Co-requisite units

Co-requisite units	

Competency field

Competency field	Casting and moulding
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