



Australian Government

MEM04027 Develop and manufacture bevel gear patterns

Release: 1

MEM04027 Develop and manufacture bevel gear patterns

Modification History

Release 1. Supersedes but is not equivalent to MEM04017 Develop and manufacture gear, conveyor screw and propeller patterns.

Application

This unit of competency defines the skills and knowledge required to manufacture patterns for cast bevel gears. Bevel gear patterns may be segmented or any other method used to minimise material shrinkage or warpage to achieve the required strength.

It covers timber, epoxy and composite constructions incorporating appropriate pattern making principles and techniques. Patterns may be set up on a joint board or plated for ease of moulding.

Where the assembly of plated patterns is required, unit MEM04039 Assemble plated patterns should also be selected.

Where the selection and use of precision measurement is required, unit MEM12003 Perform precision mechanical measurement should also be selected.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Band: A

Unit Weight: 2

Pre-requisite Unit

MEM04018 Perform general woodworking machine operations

MEM09002 Interpret technical drawing

MEM11011 Undertake manual handling

MEM12006 Mark off/out (general engineering)

MEM12023 Perform engineering measurements

MEM12024 Perform computations

MEM12026 Perform advanced trade calculations in a manufacturing, engineering or related environment

MEM13015 Work safely and effectively in manufacturing and engineering

MEM14006 Plan work activities

MEM16006 Organise and communicate information

MEM18001 Use hand tools

MEM18002 Use power tools/hand held operations

Competency Field

Casting and moulding

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine job requirements	1.1 Follow standard operating procedures (SOPs) 1.2 Comply with work health and safety (WHS) requirements at all times 1.3 Use appropriate personal protective equipment (PPE) in accordance with SOPs 1.4 Identify job requirements from specifications
2. Develop and lay out bevel gear patterns	2.1 Determine type of pattern through application of moulding or casting techniques and foundry processes 2.2 Select material to meet specifications 2.3 Calculate pattern parameters based on specifications 2.4 Lay out pattern to specifications, showing tapers, machining allowances, core prints and method of construction 2.5 Develop and manufacture jigs or fixtures that aid the manufacture of the pattern form
3. Manufacture pattern	3.1 Mark out material and develop construction to meet specifications 3.2 Produce pattern or pattern component parts to size and shape using appropriate hand and hand-held power tools, techniques and procedures 3.3 Check pattern or pattern component parts for compliance with specifications 3.4 Join and fix pattern component parts to meet specifications 3.5 Colour code, mark or label pattern in accordance with SOPs

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.	
Specifications include one or more of the following:	• drawings • job sheets • work instructions.
Material includes one or more of the following:	• hardwood • softwood • epoxy resins • composites.
Pattern parameters include one or more of the following:	• pressure angles • pitch circles • tooth form • left and right-hand flight helix • pitch axial dimensions • angles • tapers • clearances • contraction allowances.

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM04027 Develop and manufacture bevel gear patterns

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- planning the appropriate pattern by identifying and interpreting specifications and other applicable reference documents to determine type of pattern required
- selecting appropriate materials and applying moulding or casting techniques and foundry processes suited to the type of bevel gear pattern required
- calculating pattern parameters to develop bevel gear forms
- laying out pattern to specifications on at least two occasions, showing tapers, machining allowances, core prints and method of construction
- designing and manufacturing required jigs and fixtures on at least two occasions
- manufacturing pattern by marking out material for construction, producing pattern or pattern components to size and shape utilising appropriate hand and power tools
- joining and fixing pattern component parts on at least two occasions and checking final product for compliance with specifications
- identifying pattern in accordance with SOPs.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)
- timber, epoxy resin and composite products including features, characteristics and applications
- moulding and casting techniques for cast bevel gears
- tooling required for casting and moulding
- methoding techniques
- use and application of jigs and fixtures
- methods of construction

- techniques, tools and equipment to measure, mark out and produce bevel gear patterns
- mathematical calculations and formulae required to manufacture patterns or core boxes including those related to contraction, taper, pitch, profiles, clearances and machining allowances
- identification coding and numbering
- pattern checking techniques
- mouldability including surface finish, face taper, convex or concave perspectives and undercuts.

Assessment Conditions

- Assessors must:
 - have vocational competency in the development and manufacture of bevel gear patterns at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the Standards for Registered Training Organisations 2015 or its replacement and comply with the National Vocational Education and Training Regulator Act 2011, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible, assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
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