

Title	Produce components by performing advanced engineering milling operations		
Level	4	Credits	15

Purpose	<p>This unit standard covers milling operations requiring close tolerances or complex calculations.</p> <p>People credited with this unit standard are able to prepare for, and perform advanced milling operations, and verify milling accuracy.</p>
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Classification	Mechanical Engineering > Engineering Machining and Toolmaking
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Available grade	Achieved
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Guidance Information

- 1 References

Health and Safety at Work Act 2015.
AMSE B4.2-1978, *Preferred Metric Limits and Fits*, The American Society of Mechanical Engineers.
- 2 Definitions

Accepted industry practice – approved codes of practice and standardised procedures accepted by the wider mechanical engineering industry sectors as examples of best practice.

Specifications – detail that defines an object being made; commonly communicated by annotated and dimensioned drawings; by written description, or by other communication media. External references may also be used to specify objects such as tables or industry standards.

Workplace procedures – procedures used by the organisation carrying out the work and applicable to the tasks being carried out. Examples are – standard operating procedures, safety procedures, equipment operating procedures, codes of practice, quality management practices and standards, procedures to comply with legislative and local body requirements.
- 3 Recommended for entry

Unit 2715, *Produce components by performing engineering milling operations*.
- 4 Related unit standards

This unit standard is one of a set used for assessing milling:

 - Unit 29671, *Demonstrate knowledge of machining equipment, tools, and principles* (Level 2); an introductory machining knowledge standard for use across mechanical engineering trades.

- Unit 29673, *Apply good work practices when performing basic mechanical engineering machining operations under supervision* (Level 2); an introductory practical machining standard for use across mechanical engineering trades.
- Unit 30281, *Perform milling and turning operations in mechanical engineering* (Level 3); a progressive general purpose unit standard for use across mechanical engineering trades.
- Unit 2715, *Produce components by performing engineering milling operations* (Level 3); a milling specific unit standard for machinists and toolmakers.
- Unit 2717, *Produce components by performing advanced engineering milling operations* (Level 4); an advanced milling specific unit standard for machinists and toolmakers.

5 Timeframe

All activities are expected to be completed within commercially acceptable timeframes.

Outcomes and performance criteria

Outcome 1

Prepare for advanced milling operations.

Range examples of advanced milling operations are – cutting of racks and gears, helical milling, splines, large hole boring, offset head milling; three of the above operations and the use of two accessories is required over a minimum of six different components; limits and fits must be in accordance with AMSE B4.2.

Performance criteria

- 1.1 Machine condition and capability are checked in accordance with job requirements and workplace procedures.
- 1.2 Specifications are interpreted and work planned in accordance with accepted industry practice.
- 1.3 Components are marked out in accordance with specifications.
- 1.4 Accessories and work-holding fixtures are installed to securely hold the work.

Range examples of typical accessories are – dial test indicators, sine bar/table, dividing heads, boring head, positioning devices.
- 1.5 Milling tools are selected in accordance with job requirements.
- 1.6 Optimum machining parameters, cutting speeds and revolutions per minute are determined using machine capability and nomograms or tables.
- 1.7 Cutting fluids are selected in accordance with machining requirements.

Outcome 2

Perform advanced milling operations.

Range evidence is required for the range of operations covered in outcome 1.

Performance criteria

- 2.1 Machine coolant type and flow are adjusted as required by machine and milling operations.
- 2.2 Damage to work and equipment is prevented in accordance with workplace procedures.
- 2.3 Components are machined and finished to tolerances, in accordance with specifications and workplace procedures.
- 2.4 Machine is cleaned and waste material disposed of in accordance with workplace procedures.

Outcome 3

Verify milling accuracy

Range milling tolerances – width +/-0.05mm, length +/-0.1mm.
Evidence is required for components milled for outcome 2.

Performance criteria

- 3.1 Components are measured using appropriate instruments to confirm dimensional accuracy.
- 3.2 Measurements are recorded in accordance with workplace procedures.

Planned review date	31 December 2022
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 January 1995	31 December 2012
Revision	2	14 April 1997	31 December 2012
Revision	3	8 July 1997	31 December 2012
Revision	4	13 November 1997	31 December 2012
Revision	5	5 January 1999	31 December 2012
Review	6	26 September 2001	31 December 2012
Review	7	20 June 2006	31 December 2022
Rollover and Revision	8	17 November 2011	31 December 2022
Review	9	14 December 2017	N/A

Consent and Moderation Requirements (CMR) reference

0013

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact Competenz qualifications@competenz.org.nz if you wish to suggest changes to the content of this unit standard.