

Title	Demonstrate and apply knowledge of mechanical engineering drawings and geometric construction in MaPS environment		
Level	2	Credits	4

Purpose	<p>This unit standard has been designed for secondary school learners in a manufacturing pathway skills (MaPS) programme.</p> <p>People credited with this unit standard are able to: demonstrate knowledge of drawing principles; interpret mechanical engineering drawings; produce mechanical engineering orthographic drawing in third angle; construct geometric details manually.</p>
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Classification	Mechanical Engineering > Manufacturing Pathways Skills
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Available grade	Achieved
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Guidance Information

- Legislation and references relevant to this unit standard:

Health and Safety at Work Act 2015.

Safety in Technology Education: A Guidance Manual for New Zealand Schools 2017 and any subsequent versions of this document, available from Ministry of Education website (<https://education.govt.nz>).

SAA/SNZ HB1:1994, *Technical drawing for students*, available from Standards New Zealand.

Boundy, A. W. 2011, *Engineering Drawing*, 8th ed., McGraw-Hill Inc, Australia, ISBN 0071016767.
- Definitions

CAD – Computer Aided Drawing.

Geometrical construction – constructing of lines, angles, line segments, and geometric shapes, using only straight edge and a compass.

Interpretation – the recognition and understanding of features shown graphically in the drawing.

Manually – produced by-hand using non-electronic drawing instruments.

MaPS environment refers to any workplace or context where work or activities related to the Manufacturing and Engineering sector take place.

MaPS project refers to a project undertaken in a MaPS environment under general supervision, using a range of tools, equipment and materials, and involving standard processes.

MaPS refers to Manufacturing pathways skills.

Materials list (also referred to as *bill of materials*) – List of the raw materials, sub-assemblies, intermediate assemblies, sub-components, parts, and the quantities of each needed to manufacture the item depicted in the drawing.

Specifications – detail that defines an object being made; commonly communicated by annotated and dimensioned drawings; by written description, or by other communication media.

3 Assessment information

All explanations and skills demonstrated must be in accordance with references and legislation listed above.

Drawings for outcome 2 will be provided by the assessor.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of drawing principles.

Performance criteria

1.1 Drawing principles are explained.

Range scale, third angle orthographic projection, isometric, oblique.

1.2 The characteristics of good drawing practice and the reasons for these are explained.

Range communication of requirements and specifications, avoidance of ambiguity, scaling, dimensional accuracy, clarity.

1.3 The purpose and contents of the drawing title block are identified and explained.

1.4 General engineering and welding symbols are interpreted.

Range symbols may include but not limited to – datum point, diameter, radius, square, centre line, angularity, machining, plus six other general engineering symbols.

1.5 Fastener types are identified from symbols.

Range thread pitch, grades of bolts, types of pins, types of nuts, types of washers.

Outcome 2

Interpret mechanical engineering drawings.

Range one detail drawing and one assembly drawing.

Performance criteria

2.1 Drawing views and sections are interpreted.

Range may include but are not limited to – projection angle; cutting planes and direction of viewing.

2.2 Drawing lines are interpreted.

Range may include but are not limited to – continuous thick, continuous thin, continuous ruled with zig-zag, dashed, chain, section, dimension and extension lines.

2.3 Dimensions and tolerances are interpreted from given drawings.

Range dimensions and size tolerances may include but are not limited to – length, diameter, radius, positioning of holes, countersink, chamfer; dimensioning for – bolts, nuts, screws, screw threads, keyways.

2.4 Drawing symbols are interpreted for one of each type of fasteners.

Range thread pitch, grades of bolts, types of pins, types of nuts, types of washers.

2.5 Materials list is interpreted and required materials are established.

Range may include but are not limited to – raw materials, types and quantity of fasteners.

Outcome 3

Produce mechanical engineering orthographic drawing in third angle.

Range manually or using CAD.

Performance criteria

3.1 Objects to be drawn are identified.

3.2 Tolerances are established from job specifications.

3.3 Objects are drawn according to the drawing standard.

Range front view, plan view, side views, views are labelled, dimensions and tolerances included.

Outcome 4

Construct geometric details manually.

Range bisection of two lines and two angles, one 6 and one 8-hole pitch circle diameter (PCD), divide two lines into equal parts.

Performance criteria

4.1 Construction is completed using only a rule and compass.

Planned review date	31 December 2024
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 April 2020	N/A

Consent and Moderation Requirements (CMR) reference	0013
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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.