

Title	Demonstrate knowledge of and apply good work practices when performing machining operations in MaPS environment		
Level	2	Credits	7

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 machines and machine components; demonstrate knowledge of machining principles; demonstrate knowledge of cutting tools; apply good work practices when performing machining operations; apply good work practices when completing machining operations.</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>).

R. Culley (2010) *Fitting and Machining*. Melbourne, Australia, RMIT Publishing, ISBN 9781921426780.
- Definitions

MaPS refers to Manufacturing pathways skills.

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.

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

Good work practices – safe, efficient, and effective routine work practices that are generally accepted by an industry sector. These may include standard operating procedures such as: a series of specific steps to complete a job, health and safety practices, care and use of tools and equipment, use of personal protective equipment, communications, and reporting. They may also include compliance with quality standards, manufacturer’s instructions, and workshop policies and procedures

covering: housekeeping, personnel hygiene, drug and alcohol use, computer and internet use, and privacy.

Job specifications refers to instructions relevant to the safe completion of the specific task, such as technical specifications, assembly instructions, drawings, parts lists, standards, codes of practice, test and commissioning procedures, and verbal instructions.

Under supervision refers to working under the direction of a suitably qualified tradesperson or trainer who oversees the learner and is responsible for ensuring that the quality of work meets the required standard.

Workshop procedures refers to procedures used by the school carrying out the work and applicable to the tasks being carried out. They may include but are not limited to – 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.

Workshop recycling procedures – procedures used by the school workshop to recycle materials. Examples are – ferrous-nonferrous metal scrap bins, sorting of recyclable materials.

- 3 Range – any 2 of – drill press, lathe, milling machine.
 Drilling – a minimum of two different sized holes between 3 mm and 20 mm.
 Turning – must include turning diameter and turning length, any 2 of – taper turning using compound slide, cutting grooves, drilling, parting off.
 Milling – any 3 of – slotting, drilling, facing, end milling.
 Machining tolerances using mill or lathe – diameter +/-0.2 mm, linear +/-0.5 mm.
- 4 Assessment information
 Demonstrated knowledge must be within the context of mechanical engineering and aligned with accepted industry practice. All explanations and skills demonstrated must be in accordance with the references listed above.
 It is recommended that the skills in this unit standard be assessed using a project integrating all the skills contained in the unit.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of machines and machine components.

Performance criteria

- 1.1 Machines are identified and their principles of operation are described.
- Range principles of operation include but are not limited to – power supply, rotation of cutting tool or workpiece, holding of workpiece and cutting tool, basic controls.
- 1.2 Machine components are identified, and their functions are described.
- 1.3 Potential hazards associated with given task are identified and methods are put in place to manage them.

1.4 Routine machine maintenance activities are explained.

Range checks, lubrication, cleaning.

Outcome 2

Demonstrate knowledge of machining principles.

Performance criteria

2.1 The principles of cutting material using machines are described.

Range includes but not limited to – cutting speed, feed speed, material hardness, cutting fluids.

2.2 The functions of coolant in machining operations are described.

Range cooling, lubricating, chip removing, preventing corrosion.

Outcome 3

Demonstrate knowledge of cutting tools.

Performance criteria

3.1 Different types of drills, lathe cutting, and milling tools are identified and an example given for the use of each.

Range tools may include but not limited to – taper shank, twist drill shanks, centre drill, positive and negative turning tool, slot drill and end mill, face milling cutter.

3.2 Drill point angle and the relationship to hardness of material is described.

3.3 Mechanics of cutting is explained.

Range may include but not limited to – rake angle, material properties, clearance angle, shear angle.

Outcome 4

Apply good work practices when performing machining operations.

Performance criteria

4.1 Machine and work area are prepared for machining operations.

4.2 Job specifications are interpreted, and machining process and tolerances are established.

- 4.3 Machining parameters for the task are determined.
Range speed rate, feed rate, machine capacity.
- 4.4 Cutting tools appropriate for the operations to be performed are selected.
- 4.5 Tools and workpieces are mounted securely.
- 4.6 Equipment is set for machining parameters in accordance with job specifications.
- 4.7 Cutting speeds and feed rates are applied in accordance with material properties.
Range evidence is required of at least two different materials.
- 4.8 Machining is performed to meet job specifications.

Outcome 5

Apply good work practices when completing machining operations.

Performance criteria

- 5.1 Completion activities specific to the task and work area are carried out.
Range examples of completion activities – tooling checked, and any defects reported, tooling returned to storage, waste material disposed of in accordance with workshop recycling procedures, documentation completed.
- 5.2 Any damage to the equipment and work area is reported.
Range includes but not limited to – cutting tools sharpening, machine components.

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.