

<b>Title</b>	<b>Describe metal forming and foundry processes</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>15</b>

<b>Purpose</b>	<p>This unit standard is intended primarily for use in the training of personnel in the metal forming industry.</p> <p>People credited with this unit standard are able to describe: metal forming processes; metal casting processes; and foundry methods and processes.</p>
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<b>Classification</b>	Mechanical Engineering > Metal Forming
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 Legislation  
Health and Safety at Work Act 2015 and supporting regulations.  
Hazardous Substances and New Organisms Act 1996.
- 2 Definitions  
*Accepted industry practice* refers to approved codes of practice and standardised procedures accepted by the metal forming industry sector as examples of best practice.  
*Metal forming* refers to the metalworking process of creating metal parts and objects through, for example sand casting, die casting, investment casting, continuous casting, centrifugal casting, forging, extrusion, three-dimensional additive metal manufacturing.  
*Workplace procedures* refer to documented policies and procedures set by the organisation carrying out the work, and to documented or other directions provided to staff, and applicable to the tasks being carried out. They may include but are not limited to – standard operating procedures, site specific procedures, site safety procedures, equipment operating procedures, codes of practice, quality assurance procedures, product quality specifications, references, Approved Codes of Practice, housekeeping standards, environmental considerations, and procedures to comply with legislative and local body requirements relevant to the industry sector.
- 3 Assessment information
  - a All activities must comply with relevant legislative and/or regulatory requirements.
  - b All activities must comply with applicable workplace procedures and must be consistent with accepted industry practice.

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## Outcomes and performance criteria

### Outcome 1

Describe metal forming processes.

Range metal forming processes may include but are not limited to – forging, rolling, extrusion, casting, wire drawing, sheet metal working, spinning, swaging, thread rolling.

### Performance criteria

1.1 Metal forming processes are described in terms of its operation, uses or applications, suitable materials, and characteristics.

1.2 Quality aspects of components produced by metal forming processes are described.

Range tight tolerances, practical tolerances, linear tolerances, flatness, bend.

1.3 Defects encountered in the metal formed products, and their minimisation techniques are described.

Range defects may include but are not limited to – super plastic deformation; metal forming defects.

1.4 Waste from metal forming operations and their management techniques are described.

### Outcome 2

Describe metal casting processes.

Range expendable casting may include but is not limited to – sand, plastic, shell, plaster, investment (lost-wax techniques); non-expendable casting may include but is not limited to – permanent, die, centrifugal, continuous casting.

### Performance criteria

2.1 Common casting processes are described.

Range expendable, non-expendable.

2.2 Moulding materials and their requirements are described.

2.3 Types of patterns and pattern materials are described.

2.4 Applications, and advantages and disadvantages of each of the casting processes are described, and the materials best suited for each of the casting processes are identified.

2.5 Casting defects and their remedies are described.

Range evidence of two defects is required.

2.6 Waste from casting operations and their management techniques are described.

### Outcome 3

Describe foundry methods and processes.

#### Performance criteria

3.1 Typical foundry methods and processes are described.

Range may include but are not limited to – patternmaking; pattern design and contraction rates; moulding and moulding types; melting and pouring; solidification, ejection, cleaning, heat treatment; inspection; recycling; runner systems, shrinkage feeding, moulding consumables.

3.2 Types of furnaces used in the metal forming industry are described.

3.3 Common metals used in foundries are described.

3.4 Quality control in foundry systems and processes is described.

3.5 Personal safety requirements when working in a foundry are described.

3.6 Impact of a foundry operation on the environment and their management techniques are described.

3.7 Waste from a foundry operation and their management techniques are described.

<b>Planned review date</b>	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	22 August 2019	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0013
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

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**Comments on this unit standard**

Please contact Competenz [qualifications@competenz.org.nz](mailto:qualifications@competenz.org.nz) if you wish to suggest changes to the content of this unit standard.