

Title	Produce ceramic shell moulds for use in the investment casting process in metal casting		
Level	3	Credits	15

Purpose	People credited with this unit standard are able to: prepare and test ceramic shell moulding materials; prepare stucco application equipment; make ceramic shell moulds; remove pattern material from mould; and prepare kiln and mould for firing, and complete documentation.
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Classification	Mechanical Engineering > Metal Forming
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Available grade	Achieved
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Guidance Information

- 1 Unit 21911, *Demonstrate knowledge of safety on engineering worksites*; and Unit 21912, *Apply safe working practices on an engineering worksite* is recommended for entry into this unit standard.
- 2 References and legislations
 Health and Safety at Work Act 2015 and supporting regulations.
 Hazardous Substances and New Organisms Act 1996.
 Resource Management Act 1991.
 WorkSafe New Zealand. *Health and Safety Guidelines on the Management of Hazards in the Metal Casting Industry*. Available at:
<http://www.business.govt.nz/worksafe/information-guidance/all-guidance-items/metal-casting-industry-health-and-safety-guidelines-for-the-management-of-hazards-in/metal-casting-hs-guidelines.pdf>.
- 3 Definitions
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.
Workplace procedures refer to procedures used by the organisation 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.

4 Assessment information

All activities must comply with applicable workplace procedures and must be consistent with accepted industry practice.

Outcomes and performance criteria

Outcome 1

Prepare and test ceramic shell moulding materials.

Range primary and secondary dip coat slurries, pattern wash and pre-wet fluids.

Performance criteria

- 1.1 Formulae for moulding materials are established in accordance with manufacturer's specification.
- 1.2 Materials are measured and mixed to specification.
- 1.3 Materials are tested and adjustments made to mix.

Outcome 2

Prepare stucco application equipment.

Range fluidised beds, or rain-towers.

Performance criteria

- 2.1 Stucco materials are cleaned from equipment and replenished.
- 2.2 Dust extraction equipment is checked for operation.

Outcome 3

Make ceramic shell moulds.

Performance criteria

- 3.1 Pattern tree is prepared for ceramic coating.
- 3.2 Tree is coated with slurry and stucco in even layers.
- 3.3 Solution conditions are monitored, and solutions are replaced or replenished.
- 3.4 Operational performance of stucco application equipment is monitored.
- 3.5 Coating is checked during build up, and any faults are rectified.
- 3.6 Curing and storage conditions for shells are monitored and adjusted.

Outcome 4

Remove pattern material from mould.

Performance criteria

- 4.1 Equipment is prepared and operated to remove material from mould.
- 4.2 Mould is examined, and any damage is repaired.
- 4.3 Used pattern material is recovered, and rejuvenated or disposed of.

Outcome 5

Prepare kiln and mould for firing, and complete documentation.

Performance criteria

- 5.1 Kiln is prepared and operated.
- 5.2 Moulds are fired in kiln, and presented.
- 5.3 Documentation for equipment and work is completed.

Planned review date	31 December 2021
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 October 1994	31 December 2012
Revision	2	14 April 1997	31 December 2012
Revision	3	5 January 1999	31 December 2012
Review	4	19 October 1999	31 December 2012
Review	5	19 May 2006	31 December 2016
Rollover and Revision	6	17 November 2011	31 December 2022
Review	7	15 September 2016	N/A
Revision	8	23 November 2017	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.