Title	**Provide solutions for casting defects**		
Level	**5**	**Credits**	**15**

Purpose	People credited with this standard are able to prepare analysis data, and establish solution strategies for casting defects.

Classification	Mechanical Engineering > Metal Forming

Available grade	Achieved

Guidance Information

1 Unit 2380, *Inspect and test metal formed products*; Unit 4799, *Test the physical properties of engineering metals*; Unit 8089, *Use statistical process control tools for the control and improvement of processes*; and Unit 20849*, Develop and implement a plan to gather, analyse and report on information for management of quality* are recommended for entry into this unit standard.

2 References and legislation
Health and Safety at Work Act 2015.
International Committee of Foundry Technical Associations. *International Atlas of Casting Defects.* Des Plaines, Illinois: The American Foundry Society (AFS*)*, 2007. ISBN: 978-0874330533.
Ishikawa, Dr K. *Guide to Quality Control.* Tokyo: Asian Productivity Organisation, 1986.

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
- a All activities must comply with applicable workplace procedures and must be consistent with accepted industry practice.
- b The text *Guide to Quality Control* should be used for reference to the 'Ishikawa method of analysis'.

Outcomes and performance criteria

Outcome 1
Prepare analysis data.

Performance criteria

1.1 Customer quality factors are ascertained.

Range factors may include but are not limited to – strength, fatigue, ductility, toughness, dimensional accuracy, aesthetics, weight, leak tightness, composition.

1.2 Test methods are selected and carried out to measure quality factors.

Range test methods – mechanical testing, dimensional inspection, pressure testing, non-destructive testing.

1.3 Any defects are identified in accordance with the *International Atlas of Casting Defects* (AFS/IACD).

1.4 Any defects are classified according to broad causal categories.

Range the categories are either – one category consisting of 48 types of defects revealed by mechanical testing, dimensional inspection, pressure (leak) testing or non-destructive testing (AFS/IACD); or – a category consisting of metallic projections, cavities, discontinuities, incomplete casting, incorrect dimensions, inclusions, structural anomalies, incorrect composition, incorrect mechanical properties.

1.5 Any defects are recorded for analysis.

Range data to be recorded may include but is not limited to – distribution occurrence, size, acuity, location, casting type, alloy, defect type, classification.

Outcome 2

Establish solution strategies for casting defects.

Performance criteria

2.1 Causes of defects are analysed by a statistical analysis method.

Range statistical analysis method may include but is not limited to cause and effect analysis using the Ishikawa method (fishbone diagram); causes of defects may include but are not limited to – mechanical design, alloy specification, pattern design, pattern making, moulding and core making, sand and binder preparation, metal preparation, casting, knockout, cleaning, heat treatment, packing.

2.2 Solution strategies are devised based on calculations of defect quality costs.

Range quality costs may include but are not limited to – prevention, appraisal, internal, external, scrap.

2.3 The solutions to causes of defects are identified and prioritised according to the optimal solution strategy.

Range optimal solution strategy is determined by but not limited to – Pareto, cost-benefit.

Planned review date	31 December 2021

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 July 1999	31 December 2012
Review	2	19 May 2006	31 December 2016
Rollover and Revision	3	17 November 2011	31 December 2022
Review	4	15 September 2016	N/A
Revision	5	23 November 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.