Title	**Demonstrate knowledge of, and test, material properties used in mechanical engineering applications**		
Level	**5**	**Credits**	**15**

Purpose	People credited with this unit standard are able to: demonstrate knowledge of the properties of materials used in mechanical engineering applications; and test material properties and identify likely causes of material failure.

Classification	Mechanical Engineering > Applied Principles of Mechanical Engineering

Available grade	Achieved

Explanatory notes

1 References
Health and Safety at Work Act 2015 and supporting Regulations.

2 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.

3 Range
Competence is to be demonstrated with reference to a ferrous metal and three other materials which may include but are not limited to – aluminium, brass, copper, zinc, magnesium, titanium, polymers, solid timber, concrete, ceramics, adhesives, composites; individually and/or in combination.

4 Assessment information
Numerous reference texts and training manuals on material properties are available and may be used; however, no one textbook or source of information is envisaged. All activities must comply with applicable workplace procedures and must be consistent with accepted industry practice.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of the properties of materials used in mechanical engineering applications.

Evidence requirements

1.1 Description of material properties are related to manufacturing processes and establish the suitability of materials.

Range properties may include but are not limited to – hardness, rigidity, strength (including impact strength), ductility, malleability, machinability, treatability, creep, fatigue, toughness, resistance to corrosion and erosion, compatibility, permeability, resistivity, electrical and thermal conductivity, toxicity, transition temperature, co-efficient of expansion;
processes may include but are not limited to – welding, forging, casting, cutting, pressing, bending, spinning, machining, extrusion, finishing.

1.2 Suitability of materials for their intended applications are determined from interpreting the equilibrium diagrams.

1.3 Changes in material properties are explained in terms of causes and effects.

Range causes may include but are not limited to – time, treatment, alloying and composition, work, contamination, environment, stress, surface finish, corrosion.

Outcome 2

Test material properties and identify likely causes of material failure.

Evidence requirements

2.1 Destructive and/or non-destructive testing methods are matched to the properties to be tested.

2.2 Destructive and/or non-destructive tests are conducted in accordance with manufacturing specifications and workplace procedures.

2.3 Data is analysed to confirm the material properties and to establish the nature of any actual or potential materials-associated problems.
Range data may include but is not limited to – observation, measurements, laboratory reports.

2.4 Likely causes of material failure are identified in terms of material properties, material structure, and/or environment.

2.5 The assistance of qualified professionals is sought for specialist advice on causes of material failure.

2.6 Required documentation is completed in accordance with workplace procedures.

Range may include – hard copy and/or electronic documentation.

Replacement information	This unit standard replaced unit standard 11394.

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	27 October 2005	31 December 2016
Rollover	2	19 March 2010	31 December 2021
Review	3	20 October 2016	N/A

Consent and Moderation Requirements (CMR) reference	0013

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Please note
Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMRs). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

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.