Title	**Demonstrate and apply knowledge of strength of materials in mechanical engineering**		
Level	**5**	**Credits**	**15**

Purpose	People credited with this unit standard are able to analyse the strength of materials used for steel components in mechanical engineering, and demonstrate knowledge of and determine safe working stresses of steel components used in mechanical engineering.

Classification	Mechanical Engineering > Applied Principles of Mechanical Engineering

Available grade	Achieved

Entry information	
Recommended skills and knowledge	Previously acquired competence in the transposition of formulae, the manipulation of equations, and the use of trigonometric functions, and hold Unit 21775, *Demonstrate knowledge of mathematical principles for mechanical engineering*.

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
Steel components include – beams, columns, shafts, joints, springs.

4 Assessment information
a Numerous reference texts and training manuals on strength of materials and engineering planning 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

Analyse the strength of materials used for steel components in mechanical engineering.

Evidence requirements

1.1 Component properties are calculated, and formulae are selected and applied for various loading configurations.

Range properties – stress, strain;
formulae for – stress, strain, complex stress, principal stress, planes, shear distribution, stress concentration;
loading configurations – concentrated loads, uniformly distributed loads, combined loads.

1.2 The selection of instruments for measuring strain and deflection matches the instruments' performance characteristics and the operational requirements of mechanical engineering applications.

Outcome 2

Demonstrate knowledge of and determine safe working stresses of steel components used in mechanical engineering.

Range evidence of safe working stresses for a minimum of two steel components is required.

Evidence requirements

2.1 The effects of stress concentrations are determined.

2.2 The effects of fatigue are determined.

2.3 Theories of failure are explained in terms of probable causes and effects.

Replacement information	This unit standard and unit standard 21784 replaced unit standard 11390.

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.