

<b>Title</b>	<b>Demonstrate and apply knowledge of the mechanics of machines in mechanical engineering</b>		
<b>Level</b>	<b>6</b>	<b>Credits</b>	<b>15</b>

<b>Purpose</b>	People credited with this unit standard are able to analyse mechanisms and machine dynamics, and demonstrate and apply knowledge of vibration and its effects on machinery.
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<b>Classification</b>	Mechanical Engineering > Applied Principles of Mechanical Engineering
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<b>Available grade</b>	Achieved
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<b>Entry information</b>	
<b>Recommended skills and knowledge</b>	Unit 21774, <i>Demonstrate and apply knowledge of mechanical dynamics for mechanical engineering.</i>

**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 Assessment information  
Numerous reference texts and training manuals on mechanics of machines 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.

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## Outcomes and evidence requirements

### Outcome 1

Analyse mechanisms and machine dynamics.

Range evidence of analysis of two different machines is required.

### Evidence requirements

1.1 Linkages and cams are analysed in terms of properties and/or quantities using either analytical or graphical techniques.

Range motion, velocity, acceleration, force, torque, power.

1.2 Power transmission systems are analysed in terms of features and application.

Range clutches, brakes, belt drives, chain drives, pulleys, flywheels, gear drives;  
gear drives – simple, compound, epicyclic.

1.3 Bearings and lubrication are specified to meet machine operation requirements.

Range bearings – axial, radial, and combined loadings.

### Outcome 2

Demonstrate and apply knowledge of vibration and its effects on machinery.

### Evidence requirements

2.1 Machine elements are analysed in terms of vibration.

Range simple harmonic motion, periodic motion, free and forced vibrations, self excitation, natural frequency.

2.2 Principles of vibration measurement are described and vibration effects are analysed for shafts, couplings, and drives.

Range vibration may include but is not limited to – transverse vibration, torsional vibration, whirling of shafts.

2.3 Principles of balancing are described and applied for rotational and reciprocating machinery.

Range static balance, dynamic balance, single-plane balancing, multi-plane balancing, balancing machines.

2.4 Principles of acoustics, noise measurement, and noise control are described and applied for machining systems.

Range principles of acoustics – sound generation, intensity, pressure, fields, transmission, noise criteria;  
noise measurement – scales, instrumentation, standards.

<b>Replacement information</b>	This unit standard replaced unit standard 11391.
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<b>Planned review date</b>	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	27 October 2005	31 December 2016
Rollover and Revision	2	19 March 2010	31 December 2021
Review	3	20 October 2016	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>.

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