Title	**Apply principles of lubrication to rotating and sliding machine elements**		
Level	**6**	**Credits**	**10**

Purpose	People credited with this unit standard are able to: explain and analyse the performance of lubricants and lubrication systems; select and specify lubricants; specify lubrication systems to match operational requirements; and identify causes of lubrication-associated problems and specify remedial action for rotating and sliding machine elements.

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; understanding of fundamental concepts of physics (mass, length, and time) and their derived units, including pressure, force, gravitational effect, velocity, acceleration, and energy; and knowledge and understanding of principles of bearing design, fluid dynamics, and thermodynamics.

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

a Examples given must be within the context of mechanical engineering or manufacturing.
b All activities must comply with applicable workplace procedures and must be consistent with accepted industry practice.

Outcomes and evidence requirements

Outcome 1

Explain and analyse the performance of lubricants and lubrication systems for rotating and sliding machine elements.

Range lubricants – oil, grease, oil and/or air mist.

Evidence requirements

1.1 Explanation of boundary, mixed, hydrodynamic, elastohydrodynamic, and hydrostatic principles establishes their role in lubrication.

Range film thickness, film strength, viscosity, energy conservation, relative velocity, environmental awareness.

1.2 Lubricants' performance is assessed in terms of lubricant properties.

Range performance – carbonisation, oxidation, ability to withstand pressure and temperature;
properties – viscosity, lubricity, chemical composition, film strength, miscibility.

1.3 Lubrication systems are differentiated in terms of their applications.

Range high pressure, low pressure, centrally distributed.

1.4 Lubrication systems' performance is assessed in terms of flow rate, pressure, and lubrication conditioning.

Outcome 2

Select and specify lubricants for rotating and sliding machine elements.

Range lubricants – oil, grease.

Evidence requirements

2.1 Lubricants selected match machine component requirements.

Range bearing type, bearing load, bearing material, bearing speed and machine speed.

2.2 Lubricants selected match the requirements of the operating environment.

Range ambient conditions, contaminants, requirements for occupational safety and health, requirements for environmental protection.

2.3 Lubricants are selected using the original equipment manufacturer (OEM) and lubricant suppliers' data, and specifications are verified with OEM and lubricant suppliers.

2.4 Maintenance requirements are defined in accordance with OEM and lubricant suppliers' and bearing producers' recommendations and specifications.

2.5 Lubricants are specified using current industry terminology for lubricant properties.

Outcome 3

Specify lubrication systems to match operational requirements for rotating and sliding machine elements.

Range lubricants – oil, grease, oil and/or air mist.

Evidence requirements

3.1 Lubrication systems and components are defined in schematic and/or sketch form to match specified lubricants and maintenance plan.

Range systems – high pressure, low pressure, centrally distributed; components – pumps, filters, heat exchangers, pressure controls, heat controls, distributors, alarm systems.

3.2 Performance criteria specified establish fitness for intended purpose.

3.3 Systems and components are specified using current industry terminology.

Outcome 4

Identify causes of lubrication-associated problems for rotating and sliding machine elements and specify remedial action.

Range lubricants – oil, grease.

Evidence requirements

4.1 Collation and analysis of data establish the nature of the problem as being lubrication-associated.

Range data – physical evidence, measurements, maintenance records, operational reports, laboratory reports.

4.2 Probable root causes of lubricant failure are identified in terms of lubricant properties, contamination identification, and working conditions.

4.3 Remedial actions specified restore operational integrity.

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	24 February 1998	31 December 2013
Review	2	27 October 2005	31 December 2014
Rollover	3	19 March 2010	31 December 2014
Rollover and Revision	4	19 September 2013	31 December 2021
Review	5	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 (CMR). 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.