

Title	Demonstrate and apply knowledge of mechanical equipment and diagnostics in a dairy processing operation		
Level	3	Credits	20

Purpose	<p>People credited with this unit standard are able to describe: properties of solids, liquids and gases; product pumping systems; underlying principles of engineering applicable to a dairy processing operation; operating principles of mechanical components; and, safe operating procedures for mechanical equipment, in a dairy processing operation.</p> <p>They will also be able to: identify plant state before conducting intrusive maintenance; and, apply diagnostic techniques to assess the effectiveness of mechanical equipment, in a dairy processing operation.</p>
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Classification	Dairy Processing > Dairy Processing - Core Skills
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Available grade	Achieved
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Guidance Information

- 1 Legislation relevant to this unit standard includes but is not limited to:
 - Health and Safety at Work Act 2015.
- 2 Definition

Organisational requirements refer to instructions to staff on policy and procedures which are documented in memo or manual format and are available in the workplace. These requirements include but are not limited to – site specific requirements, manufacturer’s specifications, product quality specifications, and legislative requirements.
- 3 For the purposes of assessment:
 - evidence for the practical components of this unit standard must be supplied from the workplace.
 - evidence for all outcomes must be presented in accordance with organisational requirements.

Outcomes and performance criteria

Outcome 1

Describe properties of solids, liquids and gases in a dairy processing operation.

Performance criteria

- 1.1 Describe solids, liquids and gases in terms of shape retention, fluidity and compressibility.
- 1.2 Describe the effects of absorbing or releasing heat energy in terms of changes in volume, temperature and state.
- 1.3 Describe the implications of static and moving liquids in relation to product quality.

Outcome 2

Describe product pumping systems used in a dairy processing operation.

Performance criteria

- 2.1 Describe the role of pumps in relation to overcoming resistance in pumping systems.

Range resistance issues include but are not limited to – static head, friction head, suction head, delivery head.
- 2.2 Describe operating principles of product pumps in terms of performance characteristics and typical applications.

Range product pumps may include but are not limited to – centrifugal, positive displacement, diaphragm, piston, worm drive; evidence of three product pumps is required.
- 2.3 Describe product pumps in terms of methods of flow control.

Range product pumps may include but are not limited to – centrifugal, positive displacement, diaphragm, piston, worm drive; evidence of three product pumps is required.
- 2.4 Describe pump operating practices and remedies for pumping problems in accordance with manufacturers requirements.

Range pumping problems include but are not limited to – cavitation, capacity, overloading, water-hammer.

Outcome 3

Describe underlying principles of engineering applicable to a dairy processing operation.

Performance criteria

- 3.1 Describe factors influencing the efficiency of heat transfer in relation to dairy processing.

- 3.2 Describe the advantages and disadvantages of direct versus indirect methods of heat transfer in relation to operating processes.
- Range evidence of two advantages and two disadvantages is required.
- 3.3 Describe separation techniques used in dairy processing in terms of particle size and particle characteristics.
- Range separation techniques include but are not limited to – precipitation, conventional filtration, centrifugal separation, membrane filtration.
- 3.4 Describe the control of surface area to volume ratio in relation to operational processes.
- Range processes may include but are not limited to – homogenisation, spray-drying, separation or moisture expulsion from cheese and casein curds;
evidence of one process is required.

Outcome 4

Describe the operating principles of mechanical components used in a dairy processing operation.

Performance criteria

- 4.1 Describe operating principles of bearings in terms of friction reduction and accommodation of axial and radial loads and speed requirements.
- 4.2 Describe valves in terms of their operating function.
- Range valves may include but are not limited to – isolation valves, regulation valves, check valves, diversion valves;
evidence of three valves is required.
- 4.3 Describe pneumatic linear and rotary stem motion valve actuators in terms of their mode of operation and configuration for fail-safe operation, operating limitations and typical applications.
- 4.4 Describe drive transmissions in terms of transmitting power and motion, reducing friction and their typical applications.
- Range transmissions may include but are not limited to – vee-belt drives, direct-drive couplings, reduction gear drives, variable speed drives;
evidence of three transmissions is required.
- 4.5 Describe operating principles of seals in terms of sealing, reducing friction and their typical applications.
- Range seals include but are not limited to – compressed packing seals, mechanical seals.

Outcome 5

Describe safe operating procedures for mechanical equipment used in a dairy processing operation.

Performance criteria

5.1 Describe safe operating procedures for mechanical equipment in terms of operating within design load and operating conditions.

Range evidence of three operating procedures is required.

5.2 Describe mechanical equipment an operator can check in terms of maintaining its design life.

Range checks may include but are not limited to – mechanical drives, bearings, pumps, seals, valves;
evidence of three checks is required.

5.3 Describe safe operating procedures for mechanical equipment in terms of manufacturer's guidelines for prevention of damage or deterioration to product.

Range damage or deterioration may include but is not limited to – fat globule damage, prevention of foaming, microbiological deterioration;
evidence of three types is required.

5.4 Describe the process for integrity checks of mechanical equipment in terms of manufacturer's guidelines.

Range integrity checks may include but are not limited to – unit filter, sifter screens, pumps, seals, rotary valves, magnets;
evidence of three checks is required.

Outcome 6

Identify plant state before conducting intrusive maintenance in a dairy processing operation.

Performance criteria

6.1 Identify plant state before conducting intrusive maintenance.

Range plant state includes but are not limited to – pressurized lines, plant on clean-in-place, plant on product

Outcome 7

Apply diagnostic techniques to assess the effectiveness of mechanical equipment in a dairy processing operation.

Performance criteria

- 7.1 Apply diagnostic techniques to identify trends for mechanical equipment.
- 7.2 Assess operational risks for mechanical equipment based on diagnostic test results.
- 7.3 Apply safe work practices when carrying out diagnostic testing of mechanical equipment.
- 7.4 Apply hygienic procedures to prevent food contamination.
- 7.5 Record diagnostic results and report recommended solutions.

Planned review date	31 December 2025
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	10 December 2020	N/A

Consent and Moderation Requirements (CMR) reference	0022
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact the Primary Industry Training Organisation standards@primaryito.ac.nz if you wish to suggest changes to the content of this unit standard.