

Title	Demonstrate knowledge of the fundamentals of mechanical wood pulps and pulping processes		
Level	4	Credits	7

Purpose	People credited with this unit standard are able to demonstrate knowledge of: mechanical pulps and their characteristics; the refiner mechanical pulping processes and their advantages; pulp latency and pulp thickening as they relate to mechanical pulps; the pulp screening and cleaning stages that follow the refining stage.
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Classification	Wood Fibre Manufacturing > Pulp and Paper Technology
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Available grade	Achieved
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Guidance Information

1 Definition

Worksite documentation refers to organisation policies and procedures that are documented in memo, electronic, or manual format and available in the workplace, and are consistent with manufacturer's requirements. They may include but are not limited to – standard operating procedures, site specific procedures, site safety procedures, equipment operating procedures, quality assurance procedures, product quality specifications, references, approved codes of practice, housekeeping standards, environmental considerations, sustainability, on-site briefings, supervisor's instructions, and procedures to comply with legislative and local body requirements relevant to the pulp and paper industry.

2 Assessment Information

Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable service information, worksite documentation and legislative requirements. This includes the knowledge and use of suitable tools and equipment.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of mechanical pulps and their characteristics.

Performance criteria

1.1 Mechanical pulps are explained in terms of lignin content and yield.

- 1.2 Link between wood structure and the extraction of different types of fibres is identified in terms of hardwood and softwood.
- 1.3 Properties of mechanical pulps are identified and explained.
- Range properties may include but are not limited to opacity, strength, stiffness, permanence, brightness, absorption.
- 1.4 Advantages of mechanical pulps are identified and explained.
- Range advantages may include but are not limited to – yield, cost, opacity, bulk, stiffness, and absorption.
- 1.5 Disadvantages of mechanical pulps are identified and explained.
- Range disadvantages may include but are not limited to – strength, permanence, brightness, energy, and bleachability.
- 1.6 Grades of products that use mechanical pulp are identified.
- 1.7 Energy used in mechanical pulping is compared with other pulping options.

Outcome 2

Demonstrate knowledge of the refiner mechanical pulping processes and their advantages.

Performance criteria

- 2.1 Advantages of refiner based pulping systems are identified and explained.
- Range raw materials, quality, yield.
- 2.2 Components and layout of a refiner mechanical pulp mill are identified.
- Range chip transport and preparation, refiner stages, rejects, screening and cleaning, latency.
- 2.3 Refiner types are described and the operating principles of each are explained.
- Range refiner types may include but are not limited to – single disc, double disc, twin, plate design, refining action.
- 2.4 Variables influencing refiner operation are identified and their effects on pulp quality are explained.
- Range variables – wood, plates, consistency, energy, temperature, load stability;
pulp quality may include but is not limited to – strength, freeness, fibre length, opacity.

2.5 Refiner based mechanical pulping processes are identified and explained.

Range pulping processes may include but are not limited to – refiner mechanical pulp (RMP), thermo-mechanical pulp (TMP), chemi-mechanical pulp (CMP), chemi-thermomechanical pulp (CTMP), bleached chemi-thermomechanical pulp (BCTMP).

2.6 Refiner plates are explained in terms of breaker zone, defibring zone, bar width, bar spacing, and function.

Outcome 3

Demonstrate knowledge of pulp latency and pulp thickening as they relate to mechanical pulps.

Performance criteria

3.1 Latency is explained in terms of fibre curl and kink and roll and its causes and effects are explained.

Range effects – freeness, strength, bonding.

3.2 Latency removal is described.

Range agitation, consistency, time, temperature.

3.3 Reasons for pulp thickening are described and the whitewater system is explained.

Range storage, blending, whitewater re-use, saveall.

3.4 Methods of thickening are identified and the operation of each method is explained.

Range methods may include but are not limited to – gravity decker, rotary drum, disc filter, screw press, twin wire, twin roll press.

Outcome 4

Demonstrate knowledge of the pulp screening and cleaning stages that follow the refining stage.

Performance criteria

4.1 Screen types are identified and their operations are explained.

Range types of screens may include but are not limited to – vibratory, centrifugal, pressure.

4.2 Accept and reject flows around a pulp screen floor are explained.

Range screens may include but are not limited to – primary, secondary, tertiary.

4.3 Factors affecting screening efficiency are identified and explained.

Range factors may include but are not limited to – perforation, consistency, capacity, reject rate, pressure drop.

4.4 Components of centrifugal cleaners are described and their operation is explained.

Range components may include but are not limited to – conical shell, inlet, accepts and rejects outlets; operation may include but is not limited to – vortex, pressure drop.

4.5 Factors affecting centrifugal cleaner performance are identified.

Planned review date	31 December 2028
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 November 2000	31 December 2024
Review	2	18 December 2006	31 December 2024
Review	3	24 October 2014	31 December 2025
Review	4	30 November 2023	N/A

Consent and Moderation Requirements (CMR) reference	0173
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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 Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council qualifications@hangaarorau.nz if you wish to suggest changes to the content of this unit standard.