

Title	Explain fundamentals of mechanical wood pulps and pulping processes		
Level	4	Credits	10

Purpose	People credited with this unit standard are able to explain: mechanical pulps and their characteristics; refiner mechanical pulping processes and their advantages; the stone groundwood process; pulp latency and pulp thickening as they relate to mechanical pulps; the pulp screening and cleaning stages that follow the refining stage; and the principles and operation of mechanical pulp bleaching.
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Classification	Wood Fibre Manufacturing > Pulp and Paper Technology
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Available grade	Achieved
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Explanatory notes

All evidence requirements must be demonstrated and assessed in accordance with the reference text: *Explain fundamentals of mechanical wood pulps and pulping processes* published by Competenz and available from Competenz at <http://www.competenz.org.nz/>, or Competenz, PO Box 9005, Newmarket, Auckland 1149.

Outcomes and evidence requirements

Outcome 1

Explain mechanical pulps and their characteristics.

Range groundwood pulp, refiner mechanical pulp.

Evidence requirements

- 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 opacity, strength, stiffness, permanence, brightness, absorption.
- 1.4 Advantages of mechanical pulps are identified and explained in terms of yield, cost, opacity, bulk, stiffness, and absorption.

- 1.5 Disadvantages of mechanical pulps are identified and explained in terms of 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

Explain refiner mechanical pulping processes and their advantages.

Evidence requirements

- 2.1 Advantages of refiner based pulping systems are identified and explained.
- Range raw materials, quality, yield, labour, handling.
- 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 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 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

Explain the stone groundwood process.

Evidence requirements

3.1 Components of a stone groundwood mill are identified and their functions are explained.

Range slash deck, debarker, grinder, coarse screen, fine screen, cleaners, reject refiner, thickener.

3.2 Equipment used in stone groundwood pulping is identified and its operation described.

Range stone, wood magazine, finger bars, showers, lathe, pit weir.

3.3 Mechanism of fibre separation is explained in terms of temperature, compression, lignin softening, and moisture content.

3.4 Factors affecting groundwood pulp quality are identified and explained.

Range stone sharpness, motor load, temperature, grit size.

Outcome 4

Explain pulp latency and pulp thickening as they relate to mechanical pulps.

Evidence requirements

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

Range effects – freeness, strength, bonding.

4.2 Latency removal is described.

Range agitation, consistency, time, temperature.

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

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

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

Range gravity decker, rotary drum, disc filter, screw press, twin wire, twin roll press.

Outcome 5

Explain the pulp screening and cleaning stages that follow the refining stage.

Evidence requirements

- 5.1 Screen types are identified and their operations are explained.
Range types – vibratory, centrifugal, pressure, size separation.
- 5.2 Accept and reject flows around a pulp screen floor are explained.
Range screens – primary, secondary, tertiary.
- 5.3 Factors affecting screening efficiency are identified and explained.
Range perforation, consistency, capacity, reject rate, pressure drop.
- 5.4 Components of centrifugal cleaners are described and their operation is explained.
Range components – conical shell, inlet, accepts and rejects outlets; operation – vortex, pressure drop.
- 5.5 Factors affecting centrifugal cleaner performance are identified.

Outcome 6

Explain the principles and operation of mechanical pulp bleaching.

Evidence requirements

- 6.1 Effects of the mechanical pulp bleaching processes on lignin are explained in terms of oxidation, reduction, decolourisation, and reversion.
- 6.2 Mechanical pulp bleaching chemicals are identified and their uses and effects are explained.
Range peroxide, hydrosulphite, sodium silicate, diethylene triamine pentacetic acid, sodium hydroxide, sulphuric acid.

Planned review date	31 December 2019
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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	N/A
Review	2	18 December 2006	N/A
Review	3	24 October 2014	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>.

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.