Title	**Demonstrate knowledge of a cable-assisted forestry machine operation**		
Level	**4**	**Credits**	**10**

Purpose	This unit standard is intended for workers in a forestry operation who are training to become cable-assisted machine operators. People credited with this unit standard are able to: demonstrate knowledge of the operating principles of a cable-assisted system; explain how terrain and ground conditions affect cable-assisted machine operation; identify and explain factors affecting operator capability; explain forces acting on the machine and describe strategies for maintaining machine stability; explain procedures for assessing and controlling risk; demonstrate knowledge of factors affecting rope performance and durability; and of good rope management.

Classification	Forestry > Forest Mechanised Harvesting

Available grade	Achieved

Guidance Information

1 It is recommended that candidates complete Unit 30583, *Establish an anchor for a cable-assisted forestry machine* prior to assessment of this unit standard.

2 Reference
Approved Code of Practice (ACOP) for Safety and Health in Forestry Operations, December 2012, available from www.worksafe.govt.nz.

3 Definitions
Accepted industry practice – approved codes of practice and standardised procedures accepted by the wider forestry industry as examples of best practice.
Manufacturer's instructions – training or documentation supplied by the manufacturer of the equipment including specifications from a certifying engineer.
Workplace procedures – 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, site safety procedures, equipment operating procedures, codes of practice, quality management practices and standards, procedures to comply with legislative and local body requirements.

4 All activities and performance criteria must be carried out in accordance with accepted industry practice and workplace procedures.

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Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of the operating principles of a cable-assisted system.

Performance criteria

1.1 The key components of a cable-assisted system are identified, and their overall operation and interaction are described.

1.2 The operational capacity of a cable-assisted machine and winch is described.

1.3 The function of the cable-assist controls, screens, displays, monitoring systems, tension monitors, and on-board navigation systems are explained in accordance with the manufacturers' instructions.

1.4 Manufacturers' instructions relevant to the operation of the cable-assisted system are identified.

Range may include but is not limited to – maximum slope, operating procedures, rigging, and rope type and size.

1.5 ACOP rules applicable to cable-assisted machines are identified and explained.

1.6 The range of slopes defined as acceptable for mechanised operations with and without cable assistance is identified.

1.7 Factors which must be considered alongside slope when deciding to use cable-assisted machines are listed, and the importance of assessing all factors rather than simply focusing on slope is explained.

Range evidence of three factors is required.

Outcome 2

Explain how terrain and ground conditions affect cable-assisted machine operation.

Performance criteria

2.1 The impact of terrain on a cable-assisted machine operation, safe working slope and machine stability is explained.

Range slope and slope length, convex and concave slopes, bluffs, gulleys, tomos and/or holes, rootball holes, benches, old forestry tracks.

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2.2 The impact of ground conditions on a cable-assisted machine operation, safe working slope and machine stability is explained.

Range soil moisture-content, soil type, soil depth, sub-surface material (substrate), rock, surface roughness.

2.3 The impact of surface cover on a cable-assisted machine operation, safe working slope, and machine stability is explained.

Range snow cover, slash, windthrow, vegetation, hidden holes, obstacles, stumps.

2.4 Dominant slope is explained and rise over run is calculated from a contour map.

2.5 Transitions are explained, and the way maximum slope may be exceeded when moving through a transition is described.

Outcome 3

Identify and explain factors affecting operator capability.

Performance criteria

3.1 Workplace training and experience requirements for cable-assisted machine operators are identified and the reasons for these are explained.

3.2 Human factors which affect safety are identified, and the impact of these when working on flat land and steep slopes are compared.

Outcome 4

Explain forces acting on the machine and describe strategies for maintaining machine stability.

Performance criteria

4.1 Forces acting on the machine, and how they interact with the machine’s centre of gravity and slope to affect stability are explained.

Range forces include traction and gravity.

4.2 Features of machine construction which affect traction and stability on a slope are identified, and their effect on traction and stability as slope increases is explained.

4.3 Main causes of rollover are identified, and ways to mitigate these are explained.

4.4 The effect of rope tension and angle on the steering dynamics of a cable-assisted machine is explained.

4.5 Reasons why moving from a steep slope to a flatter slope can increase risk of rollover are explained.

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4.6 The difference between terrain slope and machine slope, and operator actions which can affect machine slope are explained.

4.7 The effects of load transfer on machine stability is explained.

4.8 The reasons why correct track tension is critical when working on slopes are explained.

4.9 Operating techniques which improve machine stability and two techniques for increasing traction are described.

4.10 The importance of cautious, methodical, and slow movement when walking the machine on a slope is explained.

Outcome 5

Explain procedures for assessing and controlling risk.

Performance criteria

5.1 The risk assessment process used on site is explained in accordance with workplace procedures.

Range hazard identification, assessment of risk level, development and maintenance of effective controls, daily risk assessment, record keeping.

5.2 The importance of initial and ongoing hazard identification, and pre-planning is explained.

5.3 The working alone policy and procedures including check in times and call-up procedure are stated, and the reasons for these are explained.

5.4 Procedures for starting up, shutting down and exiting while on the slope and the reasons for these are explained.

5.5 Operator response to an emergency on the slope is described.

Range includes but is not limited to – mechanical breakdown, fire, anchor alarm, anchor failure, cable failure, slide, rollover.

5.6 Procedures to be followed when working near trees designated for manual felling are explained.

5.7 Operator involvement in the development of operational and risk control plans is described.

Outcome 6

Demonstrate knowledge of factors affecting rope performance and durability.

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Performance criteria

6.1 Accepted industry terminology is used to describe rope construction.

Range strand type, core, lay, lay length, filler, nomenclature.

6.2 The reason why rope safe working load is limited to 33% of breaking load is explained with reference to rated breaking load, endurance limit, and plastic/elastic limit.

6.3 The causes of rope failure are explained, and the nature of the damage to the rope is described.

Range causes – bending, abrasion, corrosion, tensile overload, machine damage.

6.4 The main causes of rope failure in cable-assisted systems are identified and the reason why failure may not happen immediately after damage occurs is explained.

6.5 Cable end connectors are identified, and compared with reference to field serviceability, relative strength, advantages and disadvantages.

6.6 Rope wear when the rope is led around stumps is described.

6.7 Signs of rope damage are identified, and their impact on the structural integrity and strength of the rope is explained.

6.8 The specified level of damage which will require rope to be inspected by a ‘competent person’ is stated.

6.9 The causes and effects of shock loading on rope and techniques for minimising this are described.

Outcome 7

Demonstrate knowledge of good rope management.

Performance criteria

7.1 The optimal horizontal cable-departure angle and specified limits for the anchor and cable-assisted machine are stated in accordance with manufacturer’s instructions and the potential consequences of exceeding these are described.

7.2 Cable tension settings and factors affecting the choice of setting are explained, and the consequences of getting this wrong are described.

7.3 The importance of using the minimum tension setting required is explained.

7.4 The practice of leading rope around trees or stumps to extend the work area is described and the accepted practice for doing this is explained.

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7.5 The effect on tension readings when rope is led around stumps, how this is affected by wrap angle, and impact on machine operation are explained.

Planned review date	31 December 2028

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	26 October 2017	N/A
Review	2	25 June 2020	N/A
Rollover	3	26 April 2024	N/A

Consent and Moderation Requirements (CMR) reference	0173

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact Muka Tangata - People, Food and Fibre Workforce Development Council qualifications@mukatangata.nz if you wish to suggest changes to the content of this unit standard.

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