REPORT
ISSN 1174 - 1406
Volume 22 No. 20 1997

BELLIS BE85 CABLE HAULER

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Figure 1 - Bellis BE85 Hauler

Introduction

This report contains productivity information for a Bellis BE85 cable hauler. The hauler operated in a radiata pine clearfell operation using the Scab skyline cable system for extraction.

In addition, this report provides commentary on hauler design, manufacturer's service, and positive and negative features of this hauler model.

Acknowledgments

Liro Limited acknowledges Bellis Logging Limited, Fletcher Challenge Forests (Nelson) Limited, Brightwater Forest Equipment Limited, and the other contractors who commented, for their assistance with this report

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BE85 Hauler

This hauler differed from that earlier evaluated by Palmer (1995). This hauler was ordered with:

- a larger 338kW (450hp) Cummins power plant
- an Allison CRT transmission (six forward:one reverse)
- a hydraulically raised tower
- a hauler cab with conventional controls on a panel split into left and right sections, allowing floor-to-ceiling vision.

Study Area

The BE85 was studied working in Golden Downs Forest. A typical study profile is shown in Figure 2.

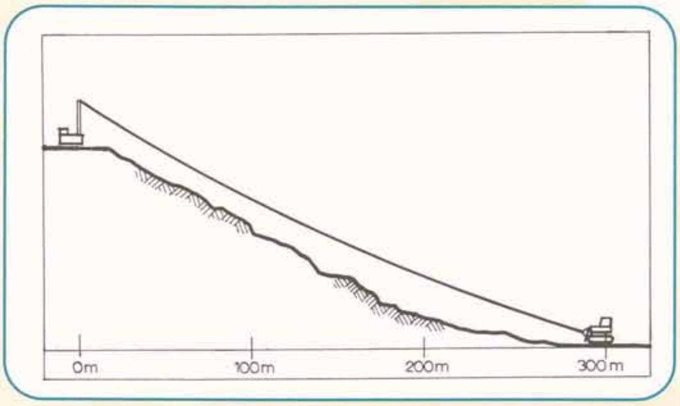

Figure 2 - BE85 study profile

The stand details were:

- Radiata pine, 26 years old
- Stocking - 432 stems/ha
- There was considerable wind damage throughout the setting
- Total recoverable volume - 392 m^3/ha
- Extracted tree size - 1.0 m^3

Operational Description

The total landing area was approximately 0.83ha, split over two locations (Figure 3).

The extraction and processing operations were based on the bottom landing, as were most of the log stacks. A Cat RTFEL also two-staged chip and pulp logs to stockpiles on the secondary pad.

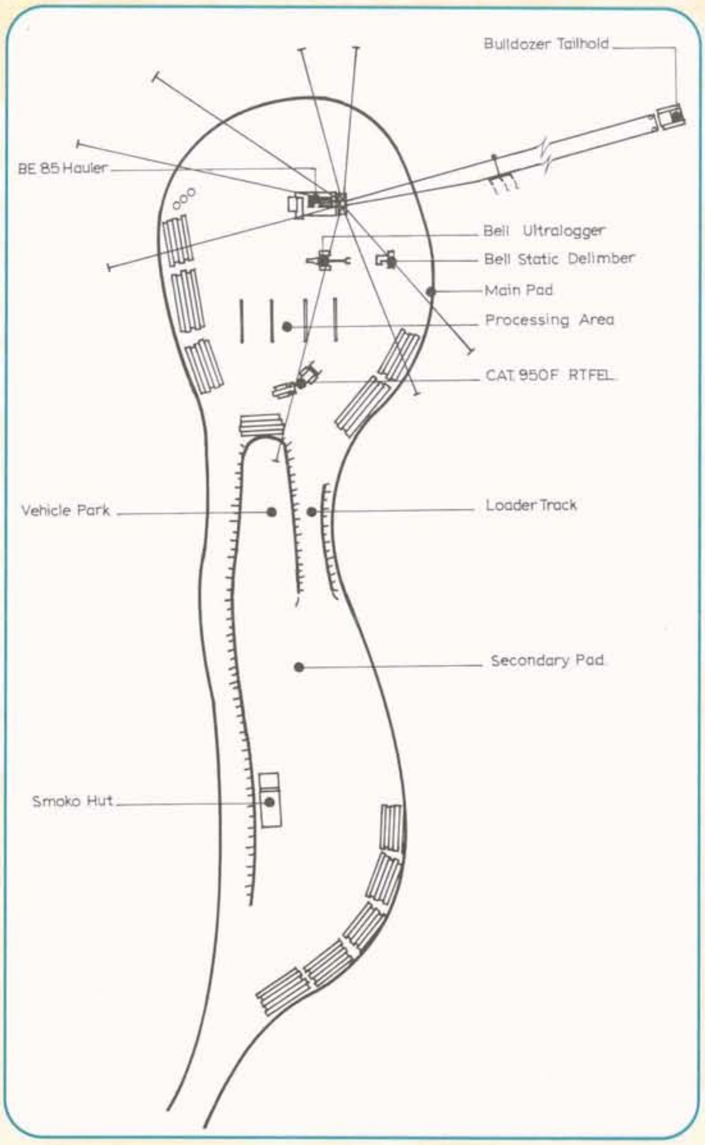

Figure 3 - Landing layout

The Scab skyline cable system was used during the study, with stumps or a Komatsu D65A bulldozer used as tailholds. Extraction was uphill. Two breakerouts and three chain strops were used during the study period.

A Bell Ultralogger cleared the chute, pulled stems through a Bell static delimber and loaded stems on to bearers for processing.

Results

Productivity

The time study was carried out over three days, during which 161 cycles were recorded. A sample of butt pieces and top pieces were scaled at the landing.

Hourly productivity based on delay-free cycle time (excluding delays such as smokos and ropeshifts) was 28 m^3/PMH (Productive Machine Hour) (Table 1).

Table 1 - Productivity results

Extracted piece size	1.01 m^3 butt piece
	0.16 m^3 top piece
Drag Volume	2.48 m^3
Productivity	28 m^3/PMH
Production	172m^3 (est. for 8 hours)

Work Cycle

The average total cycle time was 6.96 min over an average haul distance of 204 m (Table 2). The delay-free cycle time was 5.38 minutes. Hauler utilisation was 77.3% and availability was 99.3%.

On average, 2.3 butt pieces and 1.1 top pieces were hooked on per cycle, 27% of the butt pieces had root-balls attached, 6% of butt pieces and 4% of top pieces were lost during extraction. About half the recorded drags included at least one butt log with a rootball attached and in 7% of these cycles, those rootballs became fouled against stumps during inhaul.

Table 2 - Cycle time summary

Element (n=161)	Time (min)/cycle ±95% confidence	Frequency (%)
Raise rigging	0.15 ± 0.02	100
Outhaul	0.56 ± 0.05	100
Position	0.11 ± 0.03	71
Hook on	3.4 ± 0.3	100
Breakout	0.10 ± 0.1	16
Inhaul	1.31 ± 0.14	100
In slow	0.27 ±0.05	100
Unhook	0.57 ± 0.13	100
Delay-free total	5.38	
Delays		
- operational	0.35	
- mechanical	0.05	
- social	1.18	
Total cycle time	6.96	

Hauler

There were four Bellis BE85s operating in New Zealand at the time of writing, with approximate ages of 260hrs to 1800hrs. Contractor owners were asked to comment on the BE85 hauler; these comments are summarised below:

Design Input

- There was a choice of specification options.
- Design alterations could be tailored to suit specific requirements. For example;
  - -strengthened chassis (now incorporated into basic design)
  - -increased guarding around winch unit clutches and brakes (now incorporated into basic design)
  - -oversize winch unit drums
  - -provision for a fifth, slackpulling drum.

After Sales Service

- Brightwater Forestry Equipment (BFE) have good support staff and were keen and enthusiastic to help.
- Having the manufacturer in the same country meant problems could be quickly sorted out.

Operator training

- BFE assisted with operator and crew training.

"Good" Points

- Fast set-up time with crawler carrier, hydraulic tower raising and telescoping, plus 90m on each guyrope drum (rarely need guyline extensions).
- Two tower operation heights.
- Competitively priced machine.
- Input into design and construction.
- Strengthened chassis design.
- Good line-speed and drum-pull flexibility with the powerplant/transmission combinations.
- Familiar components in the running gear.

"Bad" Points

- More guarding needed (and now added to new models).
- Can't 'walk' the machine around with the tower up. This is possible (W. Gray, BFE, pers comm) but factors like terrain, shift distance etc, may require the tower to be either lowered to the 60 foot position or down on to its bed.

- Some instances of the hauler tower sinking into the ground. A 50% larger tower base-plate is now available.
- Sundry small teething troubles with the machines when delivered (such as small hydraulic leaks) - nothing major.

Discussion

Operation Productivity

Total hauler time as a proportion of delay free cycle time, was low at 46.5% (Table 2) as a result of:

- short average haul distance
- fast line speeds of the BE85
- simple, fast cable systems used

By contrast, the hook-on time accounted for 63.2% of delay-free cycle time. This is quite large (Evanson, 1991; Robinson, 1991 & 1992), and can be attributed to the physical difficulties breakerouts encounter in windthrow salvage operations (Kirk and Sullman, 1996).

Estimated daily production of 172 m^3 (8 hours) was also low (Robinson, 1991) and could be attributed to windthrow conditions resulting in:

- No directional felling presentation for extraction.
- Increased breakage compared to normal felling, creating more smaller pieces to extract.
- Faller unable to butt-off all windthrown trees safely, so many drags contained non-merchantable rootball material.
- Seven percent of drags containing rootballs fouled, requiring backpulling and were then either broken out or rehooked.

Hauler

Despite minimal deflection in this setting, the BE85 could break out and haul tree-lengths with rootballs attached. This alleviated pressure on the faller to butt-off all wind damaged trees, reducing faller hazard exposure.

There were no hauler shifts or position adjustments, as the eight guyline configuration gave a 90° (180° total) lead angle.

Bellis BE85 contractors were all enthusiastic about their haulers. Each commented that at this stage, they'd all get the same machine again, particularly given the price advantage over new North American haulers.

Finally, Brightwater Forest Equipment were said to provide a good service, both during the design stage and in after-sales backup.

References

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