

BELLIS BE60 SLACKLINE HAULER

Dave Palmer

Tony Evanson

Summary

The Bellis BE60 is a slackline hauler capable of being driven on public roads without any takedown¹. Liro Limited evaluated a BE60 extracting 41 year old Douglas fir in Otago's Berwick Forest[†] (Figure 1). Tree-lengths were extracted across a gully, over an average haul distance of 155 metres. Extracted tree size was estimated at 1.3m³. Production for an eight hour shift was estimated at 216m³ (Scab skyline) and 240m³ (North Bend).

Introduction

In the future, a greater proportion of the annual cut in New Zealand will come from woodlots and more remote satellite forests. Approximately 12% of planted forest ownership is made up of owners with less than 100 hectares, with many owners having less than 40 hectares (NZFOA, 1996).

Harvesting small scattered stands generally involves an increased number of equipment shifts, often using public roads and bridges. Often, the costs associated with these shifts can prohibit the best-suited machine being used.

Wenita Forest Products Limited (Otago) wanted a slackline hauler that could be legally driven along public roads without any takedown. Brightwater Forestry Equipment Limited (BFE) of Nelson, designed and built a hauler aimed at meeting these criteria. The resulting Bellis BE60 was delivered to Wenita contractor John Stanton in December, 1995.



Figure 1 - Bellis BE60 in Berwick Forest

 **Liro**
limited

PO BOX 2244, ROTORUA, NEW ZEALAND

TELEPHONE: 07 348 7168 FAX: 07 346 2886

Email: dave.p@xtra.co.nz

¹Registration class still to be finalised at time of print

Acknowledgments

Liro limited acknowledges the assistance of Stanton Logging Limited, Wenita Forest Products Limited, and Brightwater Forest Equipment Limited.

Hauler Dimensions

Total length (tower down)	12.07m (39'7")
Carrier length	7.8m (25'7")
Tower overhang from front axle	3.87m (12'8")
Tower overhang from rear axle	1.51m (5')
Total height (tower down)	4.1m (13'5")
Operating tower height (top of tailrope sheave)	18.31m (60')
Operating weight	32,400kg

Study Area

The evaluation was carried out in Wenita Forest Products Limited's Berwick Forest. A typical study ground profile is shown in Figure 2.

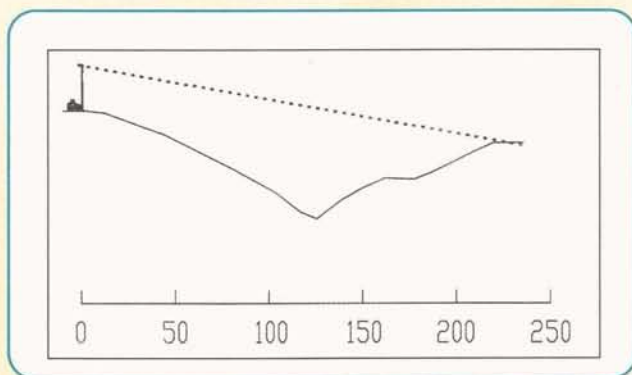


Figure 2 - Typical BE60 study profile (scale in metres)

Stand composition:

- 41 year old Douglas fir
- 550 stems/ha
- TRV (Total Recoverable Volume) of 592 m³/ha
- Extracted tree size was estimated at 1.3 m³.

Operational Description

- The Scab skyline system was used first, then the North Bend system as deflection increased.
- Stump anchors were used throughout.
- Two, and occasionally three breakerouts were used. Three eight metre chains were flown when scabbing; a fourth was added after observing North Bend rope tensions.
- The landing covered an area of approximately 0.32ha (Figure 3).

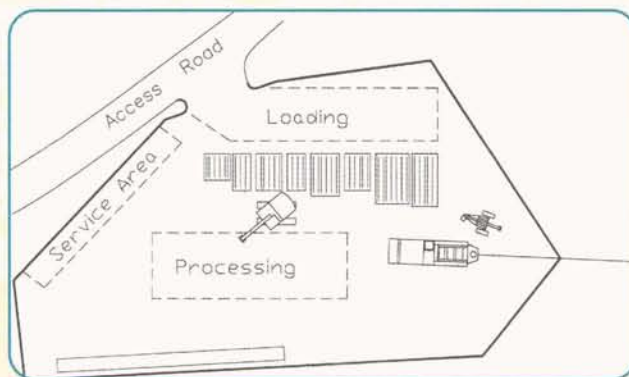


Figure 3 - Landing layout (approx. 70m*45m)

- A chaser unhooked drags, cut slovens and stacked them aside.
- The chute was cleared by a Bell Ultralogger, which also loaded bearers or stockpiled excess trees, cleared slash and often pre-sorted log lengths.
- A Hitachi EX200 sorted and stacked logs on one side of the landing. Trucks were loaded on the opposite side of the log stacks.
- A John Deere 640E skidder was used to extract trees near the hauler landing, where the terrain allowed, and also replaced the Bell when it rained.

Productivity Summary

The time study was carried out over three days, during which 168 cycles (72 Scab skyline and 96 North Bend) were recorded. A sample of butt pieces and top pieces were scaled at the landing.

Hourly productivity based on total cycle time (including delays such as smokos and ropeshifts) was 42 and 47 m³/PMH (Productive Machine Hour) for the Scab-skyline and North Bend rigging systems respectively (Table 1).

Table 1 - Estimated values for Scab skyline and North Bend corridors

	Scab skyline	North Bend
Average extracted piece sizes		
- butt pieces	1.3 m ³	1.3 m ³
- top pieces	0.24 m ³	0.24 m ³
Average drag volume	4.52 m ³ (4.0 tonne)	4.94 m ³ (4.37 tonne)
Productivity	42 m ³ /PMH	47 m ³ /PMH
Production (8 hours)	216 m ³	240 m ³

Work Cycles

Table 2 - Scab Skyline cycle time summary

Scab skyline			
Element (n=72)	Frequency (%)	Time per cycle (min)	Range (±)*
Raise Rigging	100	0.43	0.22
Outhaul	100	0.51	0.19
Position	36	0.13	0.11
Hook on (2 breaker outs, 3 chains)	100	3.23 (3.4 butt pieces, 0.4 top pieces)	0.41
Break out	-	-	-
Inhaul	100	0.95 (155 metres)	0.11
In slow	100	0.34	0.05
Unhook	100	0.78	0.28
Delay-free total		6.37	(0.73)**
Delays:			
Operational		2.79	
Mechanical		-	
Social		0.90	
Total Cycle time		10.06	

*Range for 95% confidence interval.

**Range for 6.37 min. (mean of recorded cycle times)

Table 3 - North Bend cycle time summary

North Bend			
Element (n=96)	Frequency (%)	Time per cycle (min)	Range (±)*
Raise Rigging	100	0.32	0.06
Outhaul	100	0.44	0.05
Position	85	0.27	0.09
Hook on (3 breaker outs, 4 chains)	100	2.94 (3.8 butt pieces, 0.1 top pieces)	0.31
Break out	84	0.38	0.10
Inhaul	100	0.70 (155 metres)	0.12
In slow	100	0.45	0.07
Unhook	100	0.82	0.18
Delay-free total		6.32	(0.42)**
Delays:			
Operational		2.41	
Mechanical		-	
Social		1.18	
Total Cycle time		9.91	

*Range for 95% confidence interval.

**Range for 6.32 min. (mean of recorded cycle times)

