

THE SAVALL SINGLE DRUM CABLEWAY

Introduction

This Information Note has been published as part of a series produced for a Technical Development Branch (TDB) Outdoor Workshop (ODW). It is a guide to part of a small scale harvesting system suitable for use in small broadleaved woodlands. ODWs are a TDB initiative designed to offer practical advice to practical people through presentation, demonstration and user guidance. The ODW programme will involve repeating trials and introducing new systems around Great Britain, so that a wide range of sites, systems and practitioners can be included.

Information has been gathered from equipment and method trials based at a number of locations. This information therefore must be taken as indicative only. Variation could be expected for other operations where factors such as terrain, crop specification, product specification, operating distances or operator efficiency differ.

The System

The Savall Cableway system was first identified by Technical Development Branch (TDB) during a visit to the Elmia 97 Forestry Show in Sweden. The winch is manufactured in Austria and supplied by Interforst G.m.b.H, Zeltweg. Following a training session by the manufacturer's technical staff at Llysfasi Agricultural College, Ruthin a short trial was carried out at Llanwrst Forest District in Wales (1999) to evaluate the machines potential.

The cableway system (Figure 1) is a method of extracting timber uphill to roadside by cables over distances up to c. 250 m.

The skyline rope is suspended above ground by spar trees (towers) and pulley blocks and supports a carriage. The carriage travels into the forest by gravity and its speed is controlled by a brake on the winch to which the haul in rope is attached. The system can only be used for uphill extraction on concave or undulating slopes provided the overall gradient is downhill.



The system has the following attributes:

- The tractor is offset to allow the produce to be positioned at the roadside and gives greater stacking space.
- Two lever action, one for the haul in of timber, one for the winch brake.
- Fast and controlled return of the carriage into the wood.
- Self locking and release of the winch rope on the carriage.
- Products can be pre-choked as the load is being winched in.

The skyline rope is not tensioned using the winch or tractor but is tensioned and secured using a combination of a hand winch (Tirfor) and clamps. The only rope under tension is the 'haul in' when hauling timber to the winch.

The tractor can be positioned at any point adjacent to the landing area with the operator positioned well way from the skyline and the carriage.

Winch Components

The Savall winch system consists of:

- A 5 tonne capacity winch with 2 lever control, attached by three point linkage and powered by the pto shaft on the tractor (the winch rope drum was adapted to hold a larger capacity than standard).
- A separate skyline drum bolted onto the butt plate of the winch which incorporates an ancillary drum for skyline rope recovery.
- 300 m x 14 mm or a shorter length of 16 mm, wire core, skyline wire rope (depends on rack length and load size required).
- 300 m x 8 mm, wire core, 'Haul in' wire rope.
- Savall 1500 self locking carriage with mechanical payout. Weight 80 kg. Maximum Working Load 1000 kg (suspended). Single drop line with multiple choker system.
- Savall 'patented' carriage stopping systems, one for the landing area one for the chokering point. These are locked on o the skyline by hand operated hydraulic pumps.
- A range of ancillary equipment - Pulley blocks, hand operated winch, webbing straps, guy ropes, choker chains and 2 skyline support arms.
- Closed frequency, 2 way radio system.

Power Source

The Savall cableway winch system can be driven by a c. 40 hp, 4 wheeled agricultural tractor with a three point linkage system and power take off.

Comments on System

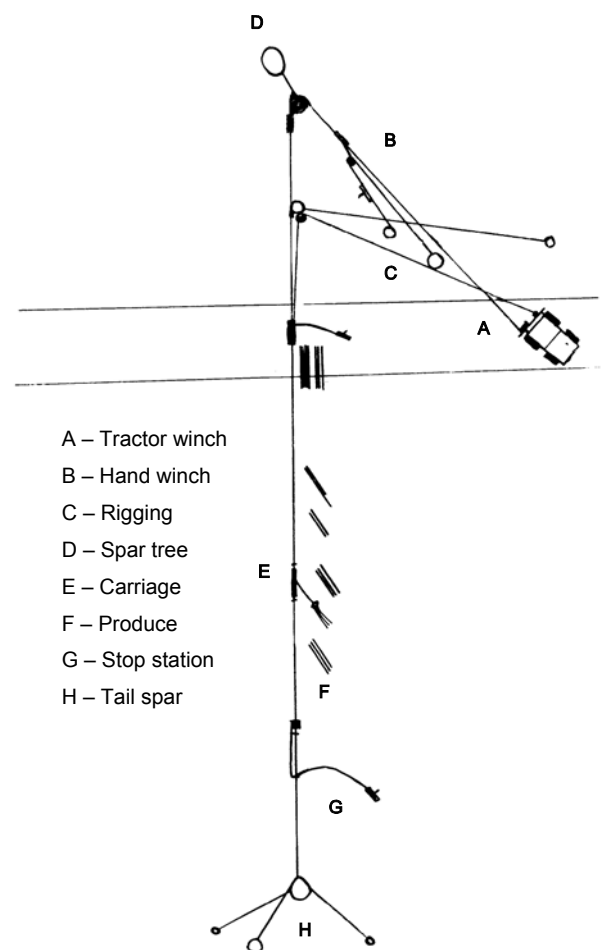
Safety: All forest operations require an assessment of risk and operational training to ensure safety and efficient working. The Savall winch system should only be used by trained operators and should not be used by untrained personnel. Training in the operation and set up technique is essential.

Good pre-planning is required to identify the spar trees, product specification and landing areas. Two man operation with good communication and understanding of each operator's task is a necessity. This is particularly important during the descent of the carriage back into the wood, as the winch man cannot judge the position of the carriage.

The rigging equipment supplied should be used when setting up the cableway, no other materials should be used. The equipment used such as the webbing straps, pulley blocks etc should be regularly checked and any damaged or worn parts replaced.

Figure 1

Savall Cableway



Product Presentation

Small shortwood products should be placed on bearers to assist in the chokering of the load. Depending on the product size, the stacks should not exceed 0.50 m³.

On thinning sites the produce should be placed at an angle to the skyline. The stack will need to be placed in a position that does not cause damage to the standing tree or prevent the load being pulled into the rack.

The landing area should be large enough to enable a range of shortwood products to be stacked at the side of the road. If extracting whole trees, the winch operator should be outwith the exclusion zone of roadside processing.

Winch Operation

The operation of the Savall cableway winch requires 2 men, one on the winch and the other as the chokerman.

The winch operation is relatively straightforward with 2 levers, one for the winch, the other for the brake. The tractor and winch are offset from the skyline and the operator is unable to monitor the speed or position of the empty carriage when returning it to the chokerman.

A landing area 'carriage stop' can be placed on the skyline at the desired position by the winchman. This will assist in the positioning of the longer produce extracted. For the extraction of small shortwood the 'carriage stop' can be placed on the skyline to allow the produce to land on the timber stack.

On racks where a large volume of timber is to be extracted to roadside, secondary extraction and handling may be required to prevent the landing site being blocked by produce.

Chokerman

The position and presentation of produce on the forest floor can assist the chokerman when pre-chokering the loads to prevent any delays. The bottom 'carriage stop' can be positioned at the desired point by the chokerman to assist in releasing the 'haul in' rope which is then pulled out to choker the load.

The chokerman uses the 2 way radio system to relay information and guidance to the winchman as the carriage is being sent back into the wood. This information allows the winchman to control the carriage speed and slow the carriage as it approaches any supports and the carriage stop.

Supplier and Cost

The Savall system can be purchased for c. £12 000 (ex works), this includes all set up equipment which includes, hand winch, pulley blocks, webbing straps, carriage, carriage stops and chokers. A new Valmet 6400 which was used on the trial is estimated to cost c. £10 000 while a second hand tractor would cost an additional £1 000.

The supplier is Grant R Smith, Forestry Services, Lockerbie, Dumfries DG11 2NE.

Tel/Fax: 01576 204346

Outputs and Costs

The working cost for a new Savall system with 2 operators is estimated to be £31.37/hr (Table 1).

Table 1

Machine Equipment/Description and Costs

Item	Specification	Capital Cost (£)	Cost (£/hr)	
			New	Sec. Hand
Valmet 6400	4 Wheeled tractor, 4 cylinder	10 000	6.70	
Tractor	Second hand	1 000		4.70
Savall Winch System	Savall 1200 winch and ancillary equipment	12 000	4.67	
Savall Winch System	Second hand	6 000		3.39
Operators	2 Operators @ ,160/day – 8 hour/day		20.00	20.00
Total Cost			31.37	28.09

The winch was evaluated extracting 2.9 m shortwood from a Sitka spruce subsequent thinning operation (Table 2).

Table 2

Site Details

Age (yrs)	32
Yield class	16
Average tree volume - thinned (m ³)	0.14
Volume/ha - thinned (m ³)	23.5
Terrain class	3:2:4(5)
Slope (%)	42 - 57

Two racks 20 m apart (centre to centre) were felled

within a thinning matrix. The maximum side haul was 10 m and the 2.9 m chipwood was grouped in stacks not exceeding 0.5 m³, placed on bearers and angled at c. 45° uphill towards the rack. The landing area was large enough to enable the shortwood products to be stacked at the side of the road, particularly as both sides of the road could be used due to the 'off set' position of the tractor.

Indicative outputs and costs derived from the trial data are given in Table 3.

Table 3

Output and Costs

Average Volume/ha Removed (m ³ /ha)	Average Extraction Distance (m)	Output (m ³ /shr)	Set Up Cost (£/m ³)	Extraction Cost (£/m ³)		Total Cost (£/m ³)	
				New	Sec. Hand	New	Sec. Hand
23.5	43	3.21	7.12	9.77	8.75	16.89	15.87
23.5	90	2.98	7.12	10.52	9.42	17.64	16.54

Factors Affecting Output

Cableway systems are labour intensive, requiring 2 operators (winchman and chokerman). With this high labour cost it is essential to maximise output where possible. The main variables affecting output are the thinning density, volume per rack and the average

load size. The load size is likely to be greater extracting pole length compared to shortwood but the conversion at roadside requires to be considered.

An illustration of the effect of different elements based on an Igländ cableway is given in Table 2.

Table 2

Variation of Output and Cost

Rack Length (m)	Average Ext. Dist. (m)	Volume/Rack (m ³)	Load Size (m ³)	Time (SM/ m ³)			Output (m ³ /shr)	Labour Cost/hr (£)	Machine Cost/hr (£)	Cost (£/m ³)
				Set Up	Extract	Total				
100	50	10	0.3	37.5	33.26	70.76	1.7	20	11.37	18.45
250	125	50	0.3	12.0	40.18	52.18	2.3	20	11.37	13.64
100	50	50	0.8	7.5	16.34	23.84	5.04	20	11.37	6.22
250	125	100	0.8	6.0	18.93	24.93	4.82	20	11.37	6.51

Standard Minutes (SM) and Output per standard hour (shr) include an allowance of 27% for Rest and 16% for Other Work

These figures clearly indicate the effect of:

Load size
Rack length
Volume per rack
Set up time

Set up time is a major cost element which can be very high if only a small volume of timber is extracted per rack. In the example illustrated the set up time for a 2 man team is estimated to be 3 hours for a 100 m rack and 5 hours for a 250 m rack (including 2 supports). For shortest rack, lowest volume and smallest load quoted set up time is over 50% of total extraction cost. This reduces to less than 25% for the longest rack with the highest volume and largest load.

With the Savall it has been suggested that set up time may be significantly lower due to fewer ropes and equipment to be rigged. This should be a major benefit.

Load size extracted is also a major factor on output and in the example quoted is approximately halved for a 0.8 m³ load compared to a 0.3 m³ load.

The length of rack has a fairly small effect on time as the major extraction element is the time taken to choker and stack at each end of the cableway.

Conclusions

Cableways are expensive methods of extraction particularly where low volumes of timber are to be extracted and load volumes are small.

They may be justified in sensitive areas where soil damage has to be avoided and in areas where other extraction methods are not suitable.

Associated TDB Publications

Associated publications available are:

- Technical Note 20/96 - Using Farm Tractors and Machinery in Woodlands.
- Technical Note 21/96 - Adding Value to Farm Woods.
- Technical Note 25/96 - Harvesting, Extracting and Processing of Low Grade Broadleaves.

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