



COMPACT TRACTOR SKIDDER

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 program 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 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.

Compact tractors were first used in UK forestry for the extraction of early conifer thinnings during the 1970s. However, high capital cost and changes in thinning practice limited their popularity.

Recently, a number of new compact tractors have appeared on the UK market. These are competitively priced, costing much less in real terms than the early models. Italy and Eastern European countries are the main exporters of these machines.

Although many designs are only suitable for horticulture 'type' work, others appear well suited to forestry and are being used for this in other countries.

Compact Tractor Concept

TDB has not undertaken extensive trials to determine the suitability of 'new' compact tractors for small woodland harvesting situations in the UK. However, their main characteristics are consistent with those identified as desirable for this type of work:

- Low capital cost compared to agricultural tractors; less than £8 000 for some models.



- Potential for high outputs and low harvesting unit costs consistent with those achieved by small agricultural tractor units.
- Not limited to specific tasks unlike many specialised small scale machines. PTO, 3 point linkage and tow hitches allow a range of operations to be undertaken consistent with agricultural tractors. However, power is likely to be a limiting factor.
- Low weight, allowing easy transport between sites on a trailer pulled by a 4wd or similar.
- Small size and low ground pressure allowing access to areas normally inaccessible to larger machines. Lower site impact than larger machines.
- Relatively easy to operate and use.

Compact Tractor Skidder

The compact tractor skidder comprises a compact tractor and a single drum 3 point linkage winch of appropriate size. Forestry guarding and 4wd is beneficial if the tractor is to be used in the wood for winching and skidding. However, this may not be necessary if timber is winched to prepared 'key' routes.

Skidders are suitable for working steep and wet areas so long as there is access from key routes.

Existing data indicate that the output for a compact tractor extracting 0.154 m³ thinnings is likely to be approximately 2.90 m³/shr. This assumes an average load size of 1.25 m³ and an extraction distance of 100 m 'in wood' and 25 m 'on road'. The cost would be £3.62/m³. This would rise to £13.12/m³ if felling and crosscutting are included.

The main advantages of the system are:

- Low capital cost and potential for low harvesting unit costs.
- The winch can be easily fitted and removed.

- Relatively easy to operate and understand the working principle.
- Single person operation.

A description of a typical compact tractor skidder is given in Table 1. Capital cost and estimated hourly charges are also given.

Costing Options

There are various options for costing operating systems (Table 1) but it is possible to get combinations of these costings.

The highest costing (option A) assumes all equipment has been purchased new and all labour has been fully charged to the operation.

The lowest costing (option B) assumes that certain elements of the cost e.g. labour may not be charged.

Table 1

Machine Description and Costing

Item	Make/Model	Specification	Capital Cost	Hourly Charge	
				A	B
Tractor	Agritrax AGT 835	3 cylinder water cooled Lombardini diesel, 35 hp. 4wd with high & low ratio gear boxes giving 6 forward & 3 reverse gears. Weight = 1 050 kg. Fitted with logging blade.	£7 900 (new)	£2.11	£2.11
Winch	'Tajfun' timber winch 40A	Single drum 3 point linkage winch - pto driven. 4 000 kg pull, 0.6 - 1.8 m/sec. 100 m of wire rope @ 10 mm diameter	£1 320 (new)	£0.39	£0.39
Labour		1 operator	-	£8.00	-
Total Cost for Extraction				£10.50	£2.50

Outputs and Cost

Existing data taken from time studies on a Holder A55F compact tractor with an Iglan Compact 3 tonne winch has been used to calculate outputs for compact tractor skidders. This data is indicative only. Outputs will vary depending on such things as individual machine specification, terrain and crop.

The outputs in Table 2 are expressed as m³ per standard hour (m³/shr). A standard hour includes allowances for rest and other work. In this case 15% for rest and 15–22% for other work depending on the operation.

The outputs are for a compact tractor skidder extracting pole length material uphill from a selective thinning. An average load size of 1.25 m³ has been assumed and an on road extraction distance of 25 m allowed for. Outputs will vary depending on the exact value of these 2

measurements. Additional time has been allowed for stacking poles at roadside with the logging blade.

Table 2

Compact Tractor Skidder Outputs - m³/shr for Various In Wood Extraction Distances

Pole Volume (m ³)	Mean In Wood Extraction Distance (m)			
	50	100	150	200
	Outputs (m ³ /shr)			
0.05	2.42	2.27	2.04	1.89
0.10	3.03	2.70	2.46	2.25
0.15	3.28	2.90	2.62	2.39
0.20	3.40	3.00	2.70	2.45

Unit costs are given in Table 3. These have been calculated based on the hourly charges given in Table 1.

Table 3

Compact Tractor Skidder Costs - £/m³ for Various In Wood Extraction Distances

Pole Volume (m ³)	Cost Option	Mean In Wood Extraction Distance (m)			
		50	100	150	200
		Costs (£/m ³)			
0.05	A	4.34	4.63	5.15	5.56
	B	1.03	1.10	1.23	1.32
0.10	A	3.47	3.89	4.27	4.67
	B	0.83	0.93	1.02	1.11
0.15	A	3.20	3.62	4.01	4.39
	B	0.76	0.86	0.95	1.05
0.20	A	3.09	3.50	3.89	4.29
	B	0.74	0.83	0.93	1.02

The total harvesting cost can be calculated by adding in the cost of felling and crosscutting. At Looseall the felling cost for an average pole size of 0.154 m³ was approximately £8/m³. From Table 2 the cost of extracting this pole size for an extraction distance of 100 m is approximately £3.62/m³. Crosscutting is likely to cost £1.50/m³. This gives a total harvesting cost of £13.12/m³.

Associated TDB Publications

Information from ODWs will be published by TDB. Associated publications available now are:

- Report 19/90 - Skidding Winches for Farm Tractors in Broadleaved Woodlands.
- Skidding 3 (1979) Standard Time Table - Extraction of Systematic Thinnings Using Holder A55F Winch Skidder.
- Report 25/93 - The Gorge Trials - A Case Study of Small Scale Extraction Techniques.

- Technical Note 25/96, Harvesting, Extraction & Processing of Low Grade Broadleaves: Case Study.

Suppliers

Item	Supplier
Compact Tractor - Agritrax AGT 835	Riko UK Ltd. PO Box 144, Farnham, Surrey, GU10 4YY. Tel: 01420 479536.
Winch - Tajfun Timber Winch 40A	

Acknowledgements

I would like to acknowledge the assistance of Stephen Cabrol of Riko UK Ltd for providing and operating equipment.

Greg Vickers
Forestry Commission
Technical Development Branch
Rydal House
Colton Road
Rugeley
Staffordshire WS15 3HF

Tel: 01889 586844
Fax: 01889 585225
e-mail: tdb.ae@forestry.gov.uk

Technical Development Branch

Develops, evaluates and promotes safe and efficient equipment and methods of work, maintains output information and provides advice on forest operations.

Technical Development Branch publications are available from:

**Forestry Commission
Technical Development Branch
Ae Village
Dumfries
DG1 1QB
Tel: 01387 860264
Fax: 01387 860386
e-mail: tdb.ae@forestry.gov.uk**

Please telephone for current prices