

# THE ALSTOR MINI-FORWARDER

## Introduction

This Information Note is one of a series derived from a Technical Development Branch (TDB) Outdoor Workshop (ODW). It is produced as a guide to part of a harvesting system suitable for use in small scale 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 at a limited 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 distance or operator efficiency differ.*

## Mini-Forwarders

Developments in technology have allowed the production of a range of mini-forwarders which have the benefits of hydraulic loaders and all wheel drive.

This type of equipment is attractive because:

- It is well placed to work in woodlands where low impact systems are preferred.
- It is highly portable, being easily transported between sites using car drawn road trailers keeping relocation



costs low and improving machine security.

- It has terrain capability equal to larger purpose built units.
- It has higher work outputs compared to other small scale equipment such as ATC extraction systems.

Second hand agricultural tractor based forwarders could be purchased for the same cost as a new mini-forwarder.

However, agricultural tractor units do not have the same low impact or terrain capability as a purpose built mini-forwarder.

TDB trials (1999) with existing mini-forwarders have identified the machines' capabilities, potential uses and indicative work outputs and costs. This provides potential users with valuable information, allowing qualified management decisions on such matters as suitability and purchase.

Mini-forwarders are well placed to operate in the niche market serving small woods and sensitive sites where machine ground damage needs to be minimised. Demand for work in this woodland type is increasing. Opportunities in urban woodlands have also been identified.

The Alstor is an example of a mini-forwarder first seen by TDB at the 1997 Elmia Wood Forest Machinery Demonstration. One of these forwarders is now working in this country and has been studied in a number of locations.

## Machine Description

The Alstor, while designed primarily for small scale timber extraction, is sufficiently flexible for a range of other duties. It is constructed to the same basic design as large purpose built forwarders. Two chassis 'halves' are connected by a robust type of universal joint which allows hydraulic powered steering and vertical rotation to conform to undulating terrain. The front section carries the engine, main transmission components and the operator position which has a frame to give roll-over protection (ROP). The rear section in the forwarder model carries the loader and timber carrying bunk.

A detailed machine description is given in Table 1.

**Table 1**  
**Machine Specification**

Engine	Briggs & Stratton Vanguard 16 hp
Variator	I.B.C. Powerblock
Gearbox	Mechanical, 4 speed & reverse
Speed	Max. 25 km/hr
Drive	Completely mechanical
Wheel drive arrangement	Bogie, oil immersed chains
Brakes	Dual system, separate discs
Steering	Full servo, Orbitrol
Wheels and spacing	22x1200-8, Kenda 0.75 m on bogie
Length (Max)	5.25 m
Width (Max)	1.52 m
Track width	1.2 m
Maximum height	2.15 m
Length, rear axle to central pivot	2.35 m
Length, front axle to central pivot	1.0 m
Ground clearance	32 cm
Manufacturer's stated weight	780 kg bare body 319 kg loader
Load capacity	1 200 kg
Loader and reach	Farma, 3.2 m
Lift power, full reach	300 kg
Slewing moment	3.0 kNm, (twin rams)
Grapple capacity	0.12 m <sup>2</sup>

The forwarder has 8 powered wheels and a maximum quoted load of 1 200 kg. The 2 axles are at different distances from the centre pivot which means that the rear part of the machine does not follow in the same track as the front when turning corners.

The Alstor is readily transportable between sites on a 5 m long flatbed, road trailer which can be towed by a 4 wheeled vehicle.

## Supplier and Cost

The Swedish supplier is Bohus Tractor AB and the UK agent is:

Nathan Home  
Home Forestry  
Willowdene Farm  
Chorley  
Bridgenorth  
Shropshire      Tel 07966 365157  
WV16 6PP      Fax 01746 718658

The 2001 price quoted for the standard model is c. £19 550.

## Machine Performance

The Alstor performed well on both uphill and downhill extraction and had impressive slope capacity for such a small machine. Loads of up to 1.4 m<sup>3</sup> were carried on the easier sites. With load size reduced to c 0.8 m<sup>3</sup> on uphill slopes of 27% with pitches up to 35% and downhill slopes with pitches up to 38% were readily worked.

Terrain impact was very low even after repeated loaded runs over sensitive routes in damp conditions. Having asymmetrical axle distances helped to reduce ground damage at corners but required wider routes at these points.

Manoeuvrability with the frame-steering design and full 'orbitrol' hydraulic powered steering was much improved compared to a tractor/trailer layout.

The 'Farma' loader was a good match for the 'Nordic' 5 lever control system. Lifting capacity and stability were very adequate. The engine had to be set at fairly fast revs for good loader response.

## Safety and Ergonomics

The machine has a 'CE' mark and complies with European machinery regulations.

The ROPS frame is a minimal safety provision but is accepted for small tractors. The addition of a ROPS cab would increase the machine width, bulk and cost.

No seat belt was fitted during the trials carried out in October 1998 but a seat belt can be supplied as an optional extra. Legislation now introduced requires a seat belt to be fitted. There was a tendency for the operator to slip forward when descending steep slopes.

The operator needs a protective helmet with earmuffs, toe protected boots and comfortable clothing not likely to get caught, in the controls for example, when the seat turns. There is no protection against the weather and appropriate clothing will be needed in adverse conditions.

A low centre of gravity made the machine reassuringly stable. The Alstor is currently made for small 3 m and 4 m long products and any adaption to carry other

products should only be made with agreement of the manufacturer.

Operating controls are well labelled and positioned and driver ergonomics good. The ability of the seat to turn around allowed all operations to be made with the operator seated facing the controls with a good view.

## Outputs and Costs

Studies(1999) were made of the Alstor working on a range of sites and include extraction of thinnings, crownwood and coppice. Results are summarised in Table 2 and give an indication of outputs and costs.

Table 2

Outputs and Costs

Site	Mean Piece (m <sup>3</sup> )	Mean Load (m <sup>3</sup> )	Mean Extraction Distance (m)	Output (m <sup>3</sup> /shr*)	Cost (£/m <sup>3</sup> +) )
1. Thinning easy downhill up to 20% slope	0.044	1.17	193	3.35	4.35
2. Thinning downhill moderate to steep 38% slope	0.052	1.38	181	3.79	3.85
3. Thinning uphill moderate to steep at 35%. 10% side slope	0.050	1.32	262	3.14	4.65
4. Crownwood 25%-45% slope	0.063	0.90	200	2.12	6.89
5. Coppice easy up to 5% slope	0.038	1.14	95	3.27	4.46

\* Standard outputs include an allowance of 17% for Other Work and 15% for Rest.

+ Costs are based on an estimated £8.0/hr for operator and £6.60/hr for the machine.

### General

Careful site planning and correct presentation of produce together with proper operator training is essential to optimise output of the forwarder.

Other factors affecting output include extraction distance, ground steepness, load size and type of material carried.

In common with other small machines, proper maintenance is essential for efficient performance.

Terrain impact was very low which makes the machine very suitable for sensitive sites.

Loads up to 1.4 m<sup>3</sup> were carried on easy to moderately steep slopes while steeper slopes up to 38%, were worked with a reduced load of c 0.8 m<sup>3</sup>.

Outputs ranged from 2.12 m<sup>3</sup>/shr to 3.79 m<sup>3</sup>/shr and costs from £6.89/m<sup>3</sup> to £3.85/m<sup>3</sup>.

### Conclusions

The Alstor performed well on a range of sites and had impressive slope performance for a small machine.

Training of fellers and forwarder operators is essential to optimise output.

The Alstor can readily be carried between sites on a trailer pulled by a 4 wd vehicle.

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