

INFORMATION NOTE

ODW 7.12a



THE VIMEK 606D MINI-FORWARDER

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 single location. 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.

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 outputs compared to other small scale equipment such as ATC extraction systems.

Plate 1

Vimek 606D in Ash Thinnings



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 with existing mini-forwarders have identified the machines' capabilities, potential uses and indicative 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 Vimek 606D (Plate 1) is an example of a purpose built mini-forwarder manufactured on a large scale (170) in Sweden. Technical Development Branch carried out a brief evaluation on a Vimek extracting a broadleaf thinning at Chorley, Shropshire in early September 2000.

Machine Description

The Vimek is solely designed for timber extraction. 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 cab which has a frame to give roll-over protection (ROP). The rear section in the forwarder model carries the loader and timber carrying bunk.

The forwarder has 6 powered wheels and a maximum quoted load of 3 000 kg. The 2 front wheels are direct drive and the 4 rear wheels are driven by robson rollers which are engaged when six wheel drive is required.

The bunk (2.7 m long) was designed to carry a single product of an estimated maximum average length of 4.0 m.

The Vimek can be transported between sites on a suitable long flatbed, road trailer which can be towed by a 4 wheeled drive vehicle. A detailed machine description is given in Table 1.

Table 1

Machine Specification

Engine	Kubota D722-E 19.6hp
Variator	I.B.C. Powerblock
Gearbox	Mechanical, 4 in 4 modes (High-Medium-Low-Super low)
Speed	Maximum 16.5 km/hr
Drive	Completely mechanical
Wheel drive arrangement	Bogie, oil immersed chains
Brakes	Oil immersed acting on front axle transmission
Steering	Articulated frame steering
Tyre sizes and pressures	Front 12.4/11-24" or 405/0-24" Rear 12/16.5 Pressure front 2.0 bar Pressure rear 3.0 bar
Length (Max)	5.60 m
Width (Max)	1.78 m
Bunk	2.7 m
Maximum height	2.57 m
Weight base machine	1925 kg
Weight 420 loader	285 kg
Ground clearance	40 cm
Manufacturer's stated weight	1925 kg bare body 285 kg loader
Load capacity	3000 kg
Loader & reach	Vimek 420, 4.2 m reach
Lift power, full reach	300 kg
Turning angle	42 degrees
Grapple capacity	0.15 m ²

Supplier & Cost

The Vimek can be obtained directly from the UK agent:

Caledonian Forestry Services Ltd
West Third
Tullibardine
Auchterarder
Perthshire

Tel 01764 663798
Fax 01764 664299

The price quoted (2000) is c £28 500 (excluding VAT) for the base machine and c £30 000 when including band tracks and chains.

Site Description

The site was mixed broadleaf ASNW (Ancient Semi Natural Woodland) which has been designated a SSSI (Site of Special Scientific Interest). The terrain was flat with a wet clay soil where ponding was evident.

The area was lightly thinned to an estimated volume of 20 m³/ha and the crop was 30 to 40 year old, yield class 6 poorly formed Ash with a mean tree volume of 0.3 m³.

Machine Performance

The Vimek performed well on the trial considering the 2.7 m bunk configuration would only carry one bay of 2.0 m chipwood. Load sizes ranged from 1.74 m³ to 2.36 m³. With a longer product specification or longer bunk configuration load sizes could have been considerably higher.

Terrain impact was very noticeable on the site due to the evidence of rutting. This was caused by a combination of the wet clay soil and the lack of brash and band tracks for flotation. The relatively narrow tyres may also have contributed.

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

The 'Vimek 423' loader was a good match for the 'Nordic' 5 lever control system. Lifting capacity and stability were adequate but some dumping was noticed on downward movement of the crane. The engine was low revving during loading.

Safety & Ergonomics

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

A ROPS frame that conforms to ISO 8082 and SMS 2789 is fitted to the cab.

No seat belt was fitted on this machine as they were built prior to the seat belt conformity legislation. This safety issue was discussed with the agent prior to the trial and seat belts can be provided as an optional extra and fitted for UK use. Currently legislation requires a seat belt to be fitted.

The operator needs a protective helmet, safety boots and comfortable clothing not likely to get caught. Cab noise level is stated at 76 decibels by the agent and a fire extinguisher is fitted to the outside of the cab. A first aid kit will need to be fitted inside the cab.

Operating controls are well labelled and positioned and driver ergonomics good. Two lever as opposed to five lever crane control is preferable but this would make the machine more costly. All round vision in the cab is very good with wipers fitted front and back. 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 were made of the Vimek extracting the Ash thinnings and the results (Table 2) give an indication of outputs and costs.

Table 2

Outputs and Costs

Load	Mean Piece (m ³)	Mean Load (m ³)	Mean Extraction Distance (m)	Site Outputs (m ³ /shr*)	Output per 100 m Extracted (m ³ /shr*)	Cost+ per 100 m Extracted (£/m ³)
1	0.08	2.16	4.29	3.26	6.76	2.36
2	0.05	1.95	511	2.55	5.11	3.13
3	0.06	1.74	417	3.18	6.31	2.53
4	0.04	2.36	508	3.37	7.38	2.17
5	0.05	2.25	427	3.05	6.36	2.51
Average	0.06	2.09	458	3.07	6.38	2.50

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

+ Costs are based on an estimated £10.0/hr for operator and £6.0/hr for the machine.

General

Careful site planning and correct presentation of produce together with proper operator training are 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.

Higher outputs would also be achievable with a better formed product.

Outputs for extraction distances of 100 m ranged from 6.31 m³/shr to 7.38 m³/shr and costs from £2.17/m³ to £3.13/m³.

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

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

Conclusions

The Vimek performed well in this trial giving impressive outputs in this broadleaf thinning. It is considered to have more potential in conifer thinnings but this would require further evaluation.

Loads up to 2.36 m³ were extracted over 500 m with a poorly formed broadleaf 2.0 m product. If the bunk was configured for two bays of 2.0 m product then output would have increased on this trial.

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Technical Development Branch

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