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LOG PROCESSOR AND STACKER

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Fig. 1 - 640 HD International fitted with delimber boom and grapple shear.

INTRODUCTION

S. & R. Hunt Ltd. has had contracts with "Canterbury Timber Products Ltd." logging pulpwood and saw logs, with skidders for a number of years in Canterbury.

S. & R. Hunt Ltd. were offered a contract by CTP to log a large quantity of P. ponderosa v. scopulorum for pulpwood on very steep country, mostly exceeding 30°, in Hanmer State Forest. "Scop" is a very poor limby tree, with volumes of approximately 200 m^3 per hectare. The wood had to be extracted with a hauler and the system was restricted to small roadside landings. To overcome this, it was decided that we had to develop a machine that would remove the trees from in front of the hauler, delimb them, cut them to short lengths and then stack them on the road for loadout by self-loading trucks.

Having built and had experience with a log shear grapple and a hydraulically controlled wrap-around knife-delimber in the past, it was then decided to use these components for this machine. A delimber head was mounted on to the end of an eight metre beam which was attached to the front of the track frame of a 1702 Atlas Hydraulic Excavator (later replaced by a 640 HD International). The dipper arm was fitted with a heeling attachment with the log shear grapple on the front end and a log grapple on the back end (Fig. 2).

APPLICATION

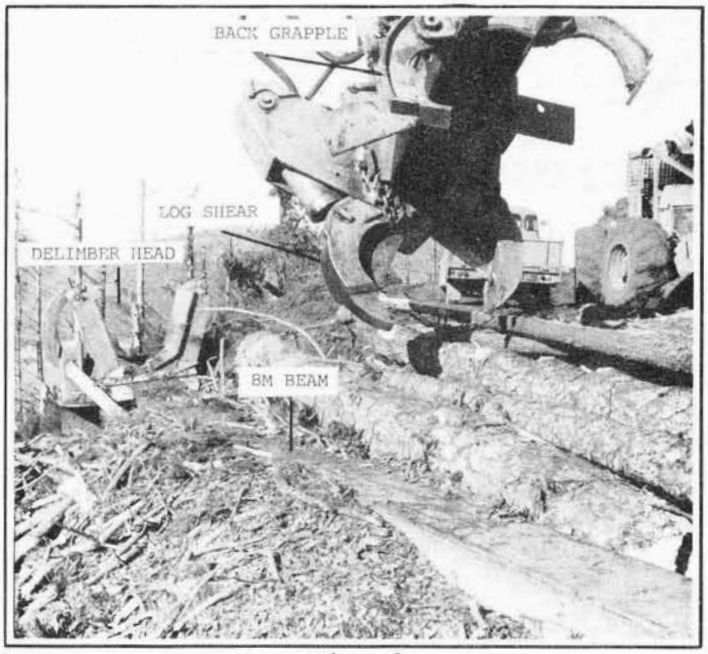

Fig. 2

The trees, which lie on steeply sloped land in front of the hauler, are picked up by the butt with the shear grapple about one metre from the butt, then swung around, and placed in the delimber (Figs. 3 and 4). The tree is pulled through the delimber by the crowd action of the boom. It is then re-grabbed further along the delimbed stem by the shear and back grapple, sheared off, and stacked in a stockpile in front of the excavator on the road (Fig. 5). The same procedure is repeated until the whole tree is trimmed and stacked.

Periodically, the heads are cut off with a chainsaw and pushed out of the way by a skidder. Initially, the tree was headed in the bush. This was difficult on the very steep slopes. Tops were in the way of the breaker out, and often came up on drags. So it was found to be better to leave them on and haul whole trees to the landing.

Delimber production rate has been about 50 m^3 a day when the processor has been working alongside the hauler. The hauler is deinitely limiting production at present, as when pulling to the delimber with a skidder, we have been able to process about 100 m^3 a day.

Because of the wide variation in tree size, at times there are trees too big to handle. In this case the butt log is cut off. As most of the limbs on the butt are dry and brittle, they can be knocked off by the grapple shear. The log is then stacked. Oversize logs have to be kept separate as they cannot go directly to the mill chipper, but this is not a problem.

Fig. 3

Fig. 4

Fig. 5

After about three months, it was decided that a bigger and more reliable excavator was needed. A new 640 HD International was purchased and the delimber and shear grapple fitted to this unit. Thus, current specifications are :-

Excavator 640 HD International

Weight - 22 tonnes, without attachments
Motor - DT 385, producing 98 Kw

Hydraulic systems

Main pump, two variable displacement piston pumps
Maximum lift out 4 metres at ground level : 7,295 Kgf
Maximum pressure : 27,000 kPa (3,860 psi)
Flow per pump : 80-180 L/min (24-48 gpm)
Control valves are servo hydraulically controlled.

Log shear

Operated with two 150 mm rams, with 450 mm stroke. The shear jaws are made out of four pieces of 50 mm mild steel plate, welded together with 16 mm wear-alloy cutters on the shear. The body is 16 mm mild steel plate.

Back grapple

Operated with two 62 mm x 300 mm stroke rams.

Delimber

Operated with two 62 mm x 300 mm stroke rams.
Body - 9 mm mild steel plate and 16 mm wear-alloy knives.

The 640 HD excavator cost $99,000 (new 1983). No cost could be put on the shear and delimber parts, as they were not built recently. If they were built up on today's costs, they would probably cost between $25,000 - $30,000.

COMMENTS

The 640 HD was chosen because of weight (which gave increased stability), cost and the layout of the controls. A two-way directional flow valve was installed to divert oil flow from the track drive motors to the shear and delimber cylinders. The foot controls for the track drive motors were converted to operate the shear and delimber.

The only drawback with the 640 HD was that it did not have a compressor. One had to be fitted as the control on the back grapple is air over hydraulic.

The processor's operational advantages are :

- costly skid sites are not necessary. The system can work off the road.
- no limbs are mixed in with the logs.
- a fair proportion of the bark is removed, reducing cartage costs.
- it has potential for high productivity.

This system, built on a smaller excavator, could have a place in thinning of new crop radiata. Working in conjunction with a small hauler off road sides :

- it eliminates manual delimbing, which would be dangerous and difficult on the steep slopes or interfere with other operations on the landing.
- one single unit removes logs from in front of the hauler, delimbs, crosscuts and stacks.

After operating this system for about six months and the new excavator for two months, we are very pleased with the machine and the system.

The estimated cost of extraction and processing is approximately $23 per m^3 with the present system. We hope to bring in a new improved hauler with a gravity return carriage which should increase productivity and reduce costs.

LIRA NOTE : This is the first application of a roadside processing unit on steep terrain in conjunction with a hauler in New Zealand. LIRA is currently carrying out studies on this unit which show it has the potential to operate at higher productivity levels than presently possible. The study is aimed at assessing the potential of such systems in New Zealand.

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