LOGGING INDUSTRY RESEARCH ASSOCIATION
NEW ZEALAND

ISSN 0111-4743

TECHNICAL RELEASE

Vol. 6 No. 1 1984

MODIFYING SMALL CRAWLER TRACTORS FOR THINNING

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Fig. 1 - Caterpillar D3B ready for skidding

INTRODUCTION

Recently in the Hawke's Bay region, four small crawler tractors have been purchased to extract thinnings material from radiata pine stands. These stands are located on steep country. The decision to thin required a choice between small haulers and small crawler tractors. Crawler tractors were chosen because of :

(a) availability and close proximity of servicing agents

(b) availability of local experienced operators

(c) flexibility of tractors compared with haulers

These units - two Caterpillar D3B's and two Komatsu D31A's - were all modified to varying degrees before being put into service. The modifications include canopies for roll-over protection, improved guarding and fairlead installations.

This technical release describes the modifications and outlines the considerations made when preparing these machines.

MODIFICATIONS

Fig. 2

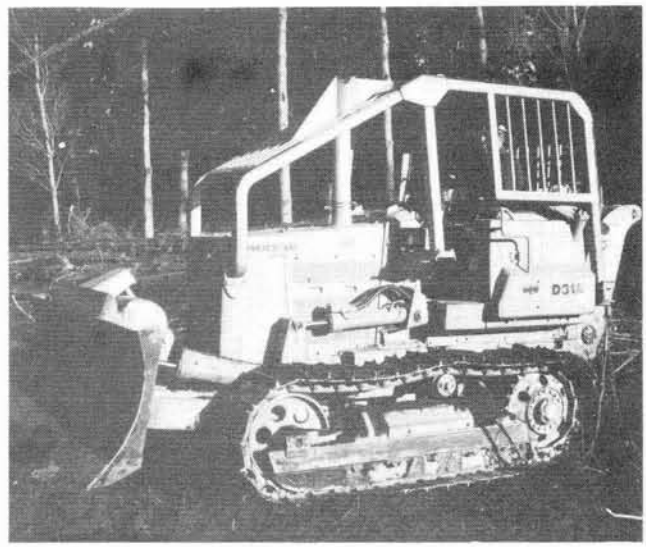

Fig. 3

In modifying these machines, the operators involved concentrated on different areas for increasing protection, based on personal experience.

Fig. 2 illustrates extensive modifications to protect important machine components. The changes carried out to this machine include :-

(a) blade endplates welded on to assist in fleeting logs.

(b) guard/push plate built on top of blade to protect blade tilt cylinder and increase blade height (which reduces the likelihood of logs rolling over blade during fleeting).

(c) radiator guard double-skinned.

(d) blade angle cylinder ports and hoses completely covered.

(e) track shoe grousers built up by welding (in anticipation of wear).

(f) exhaust pipe protection bracket

(g) cross brace added to engine cover between front canopy mounts.

(h) undercarriage guarding extended and double-skinned in places.

Fig. 3 shows a different approach to machine modification. Here a minimum of changes were made over and above the ROPS canopy requirement.

The cost of modifications to the machine in Fig. 2 was 8% of the capital cost, while that of Fig. 3 was only 4%.

WINCH AND FAIRLEAD INSTALLATIONS

Fig. 4 - Timberjack fairlead

Fig. 5 - Komatsu fairlead

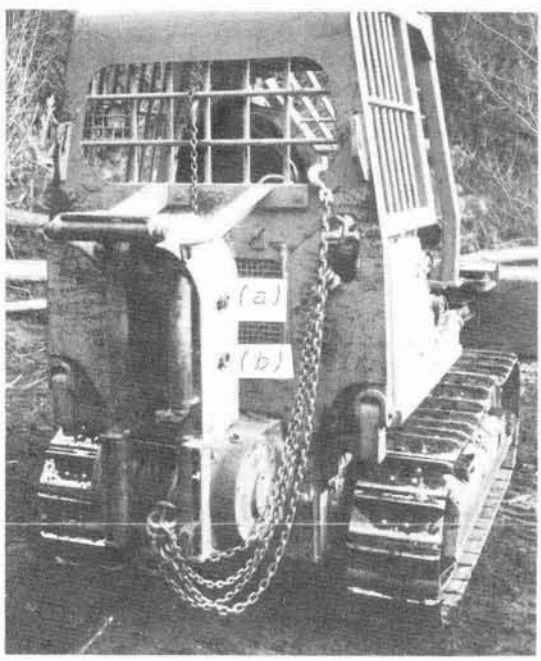

Fig. 6 - Fairlead made by Carter Holt Central Limited, Napier

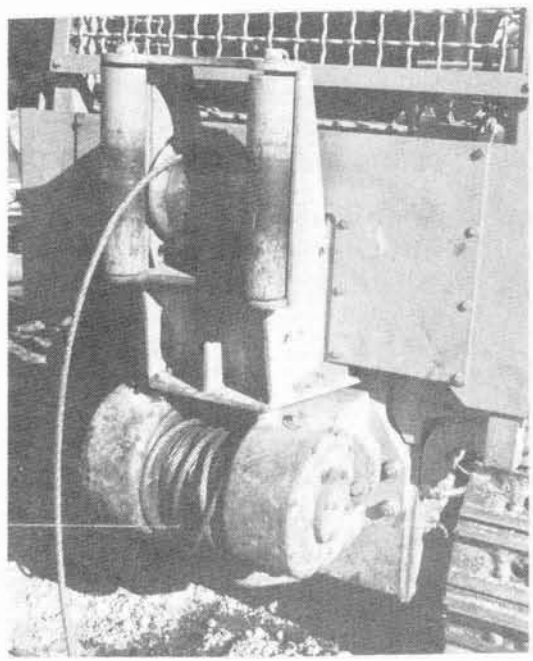

Fig. 7 - Clark fairlead

Pictured above are four concepts of fairlead configurations. Each one highlights different considerations which were taken into account. They are as follows :

Fig. 4 shows a standard Timberjack fairlead which includes a top horizontal roller. The bottom horizontal roller is located high to keep strops off the ground to reduce tangling when reversing. The vertical rollers are tilted in and allow the mainrope endring to pass between them. Notice the extensive cab guard also.

The unit pictured in Fig. 5 has tall,100 mm (4") diameter rollers mounted parallel to each other. They do not have sufficient clearance to allow the use of normal size logging rings. However, replacing them with 75 mm (3") diameter side rollers would alleviate the problem.

The fairlead in Fig. 6 is similar to Fig. 5 with the high rear roller. The fairlead has been braced at the top to the cab guard. For pulling directly off the winch, a secondary fairlead has been installed directly behind it. This provides a lower centre of gravity when extracting uphill. It protects the winch rope and reduces wear on drive sprockets. The front horizontal roller has two possible positions (a) and (b).

In Fig. 7 the fairlead has been built low and close to the back of the machine to reduce the tipping movement when pulling in a drag. The concave horizontal roller (standard on a Clark fairlead) improves the fleet angle on to the winch.

The closer the fairlead can be mounted behind the cab the better. This helps prevent the tractor from sitting up on its back idlers. On the Timberjack fairlead (Fig. 4) not enough room was left for the logging rings to go between the top main roller and the cab.

For steep uphill pulling it is better to remove the fairleads altogether and use an arch, but with it crop damage is more prevalent.

Most units had skidder fairleads fitted to the machine with slight modifications carried out to obtain desired roller dimensions and locations. In all cases, the operator was limited in choice of fairlead by availability at the time of purchase. While all configurations allow the mainrope to be pulled directly off the winch, only the machine in Fig. 6 has rollers mounted directly behind it.

CAB GUARDS

Each machine featured in this technical release has a slightly different cab guard. They range from the basic structural protection, such as that in Fig. 3, to fully enclosing side and back plate guards being added (Fig. 2). Over and above the basic structural requirement, the amount of guarding added was a function of operator preference and the amount of money available to spend on modifications.

CONCLUSION

These small units are proving to be valuable and flexible in thinnings operations. Where necessary they can do their own tracking, which eliminates the need for a separate machine. The production target is 25 tonnes per day, pulling an average piece size of 0.25 m^3 over a 300 m maximum haul distance. Fuel consumption averages 5-6 litres per hour, depending on job conditions.

Attention to detail is important when modifying machines prior to service. The modifications outlined in this report are some options available for small crawler tractors. The final decision will often depend on finance and component availability.

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