

THE POTENTIAL OF USING AN FMC SKIDDER ON CLAY SOILS
IN STEEP TERRAIN

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INTRODUCTION

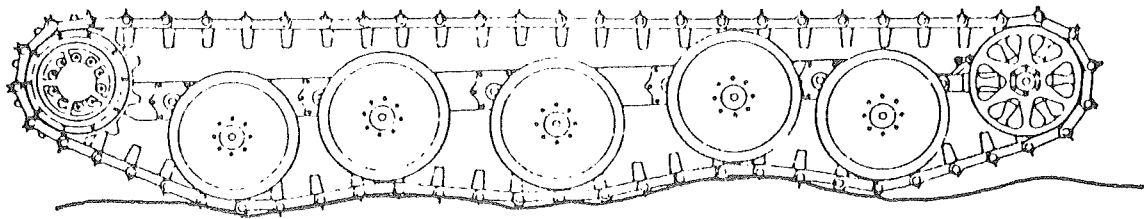
I started logging for the Forest Service in Woodhill Forest with a rubber tyred skidder and a loader. Woodhill is established on sand dunes on the peninsula at the base of the Kaipara Harbour. The unique thing about sand is that, unlike most logging environments, the performance of rubber tyred equipment is vastly improved when it is wet. The sand actually compacts hard and improves traction in wet conditions.

A few years ago I secured a contract with the N.Z. Forest Service to log in Ngaumu Forest. The contract called for a low ground pressure machine to minimise the disturbance to the clay soils found in the Masterton area. The terrain varies a lot ranging from flat ground with soft wet soils, to very steep areas and sharp gullies. The clay soils were originally sea bed so when they are dry, they get very hard and turn to dust when traversed by machines. When it rains however, the moisture quickly soaks in and the soils get very greasy and loose the ability to support any weight. This means that conventional equipment such as skidders and tractors cannot work in the winter. To satisfy the needs for a low ground pressure machine, and to enable us to work all year round, we purchased an FMC tracked skidder for the Ngaumu contract.

THE MACHINE

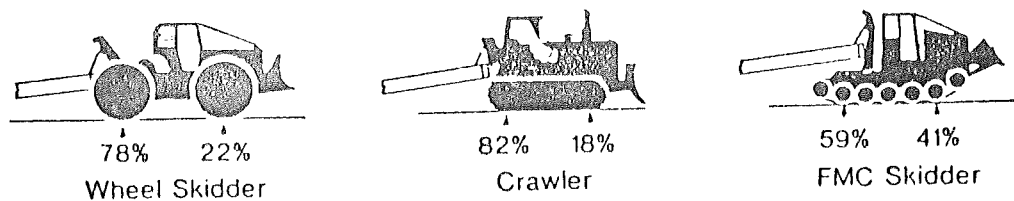
The FMC 220 CA skidder is powered by a 149kw GM V6 diesel through a four speed Clark powershift transmission. While these components are common with other skidders, that's about where the similarity ends. The FMC has a flexible track undercarriage which is driven from the front and supported by ten roadwheels. These roadwheels are torsion bar sprung which, through the design of the tracks, allows the undercarriage to mold itself to the shape of the terrain underneath (see fig. 1). The track grousers are linked together by rubber bushed hinge pins.

Figure 1 - FMC Track and Suspension Molds to Uneven Terrain and Ground Obstacles



This flexible track system allows a travel speed of up to 12 km/h in 3rd, and nearly 24 km/hr in 4th. A conventional crawler tractor by comparison is limited to between 7 and 10 km/h. The operating weight of the FMC is about 14 tonnes and the machine has the ability to haul its own weight. With the hydraulically powered extendable arch, most of the weight of a drag can be lifted up off the ground and carried on the back of the machine which gives a balanced weight distribution when loaded (see fig. 2).

Figure 2 - Comparison Of Weight Distribution With Typical Load



OPERATIONAL ASPECTS

We use the FMC predominantly in a downhill pulling situation, although it is not uncommon for us to have to cross a wet gut and pull up the other side to where trucks can get access. In these situations, we have found that the FMC can haul over the same track again and again without cutting down through the top surface layer of the ground. This of course makes the approaches to the skid area and also the skid site last a lot longer. The controlled steering differential helps this too because it stops you from locking up one track and screwing around on the skid.

Wherever possible, we aim to fell the wood for a butt pull so that means in a downhill hauling situation we are dropping the trees across slope, or where we can, uphill. In Ngaumu, the tree form and predominant lean quite often let us fall uphill, but between 60 and 70% of the trees have to be wedged. Good falling is the key to efficient operation so it is usually worth putting that little extra effort into it.

We use roughly 45 m of 22 mm mainrope on the machine with five or six 16 mm strops, and we get about 4000 tonnes out of each rope.

I have recently tried the new Dyform rope and found that the outer strands certainly lasted longer but the core came out of the centre. I have not formed an opinion yet as to whether it warrants the extra cost. With the ability to haul its own weight of 14 tonnes, I would imagine that we are probably overloading the rope a bit, but if we use a bigger rope, everything gets heavier and more difficult to handle making it too hard on the operator. The freewheeling of the machine's Hyster winch is not the easiest for one man to pull out, especially when we have six strops on, so we have someone breaking out if the going gets difficult.

The FMC does have the ability to bulldoze side cuts and short tracks to provide access to difficult corners, but the manufacturers do not recommend their use as a bulldozer. Generally we don't require any tracking over reasonable terrain, but I think that the production of the machine can be greatly increased if extraction tracks are stumped. This would also extend considerably the life of the torsion bars and track gear in general.

PRODUCTION

At the moment we are using the FMC to haul 30 year old p. radiata at a rate of 150 tonnes per day. While you may think that our target is very low, you must remember that our production is controlled by market demands, i.e. mills, and while other ground based machines could easily achieve this in summer, I've yet to be convinced that they could sustain it through the winter. It is unfortunate that the full potential of the Wide Tyred Skidder was not established when it was down here last year because it may have offered an alternative. Somehow I have my doubts that it would have been able to handle the real difficult stuff. It should also be noted that our haul distance can be anything up to 600 m at times, and yet we find that we have no trouble maintaining production in these circumstances.

We use an Hitachi UH083 excavator loader fitted with a grapple of my own design (ref 1.) to segregate the logs. There are six different log types from pruned butt logs through to post material (if there is a market for it). We have no outlet for pulp. The excavator is an ideal loading system and it fits in well with the FMC as there is very little skidsite disturbance.

MAINTENANCE

Generally FMC's have a reputation for requiring high maintenance (ref. 2), and I have to agree that my machine is no exception, the track gear and undercarriage on the componentry requiring the most attention. In our experience the rubber bushes in the tracks start to fail after about 1000 hrs and I have found the most economical way to maintain them is to have half a dozen reconditioned track shoes on hand. Every couple of days I just run my eye over the track system and any that need replacing are done as soon as possible. I should make the point that the

rubber bushes on only one side of the track plate give any trouble for the first 2000 - 3000 hours, so it pays to be selective about what is replaced. By turning the track chains and sprockets before maximum wear tolerances are reached, we can get a longer track life. I have also found it worthwhile to build up the wear surfaces on the track plates.

Torsion bars are the other thing that requires a lot of attention, and they virtually need to be checked daily. If one fails, the load has to be carried by the other four and if that continues for any length of time, their life expectancy is considerably shortened. These torsion bars are stressed for either left or right hand mounting, but unfortunately the markings to identify their correct location and alignment is not always clear. A mistake when installing these will result in early failure and unnecessary downtime.

Sprockets, roadwheels and rear idlers can be rebuilt several times which enhances their usable life. You must be careful though to ensure that the outside lip of the roadwheel has not worn too much otherwise they will crack behind the rebuilding. Once rebuilt you can use these parts with new track chain.

COMMENT

In my opinion, the FMC is not a good machine for a large company operation because of the amount of attention required to keep it going. Unless the operator has a vested interest in the machine, he is not going to have the incentive to spend the time keeping the maintenance up to it and the result will be downtime. From my own experience, I know that the FMC is a high cost machine and I know it requires a lot more maintenance than other gear, but it does have high production capabilities, and apart from cable systems, it is the only machine I know of that will work in my area all year round.

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- Ref 1. Langsford J.F. "Hydraulic Excavators as Log Loaders - A Review of the New Zealand Situation", LIRA Project Report 25, 1985.
- Ref 2. Simpson J.W. "FMC 220 CA Tracked Skidder" LIRA Report Vol. 9, No. 1, 1984.