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FMC 220 CA TRACKED SKIDDER

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INTRODUCTION

When the first of the FMC 220 CA tracked skidders were introduced into Australasia, they showed promise as high production machines but overseas experience had indicated that associated with high productivity were high track maintenance costs. The Harvesting Research Division of CSIRO, Australia, in association with LIRA, initiated a regular survey of FMC owners to collect information on track life, maintenance problems and productivity. The survey involved eleven machines in Australia, and seven in New Zealand, most of which were working in different terrain, soil and stand conditions. The results were summarised and reported back to the participants.

This report reviews some of the maintenance and operational findings of the survey.

TRACK SYSTEM

The majority of reported maintenance problems with the FMC have been with the track system and its components.

The FMC has a unique track design. The torsion bar suspension allows independent movement of the road wheels within a flexible track. The flexible track can conform to the contour of the ground, which increases both the traction and potential travel speed of the machine, while its low and balanced weight distribution gives a better power to weight ratio, than most other skidding machines.

The operating limits of this track design are not widely understood. When there has been a combination of fast travel speeds, and heavy loads, in rough ground conditions, track component failures have occurred.

TRACK LIFE

Track life has been one of the major uncertainties in the FMC's performance and the study, with a range of 1100 - 3000 machine hours, has given no clear indication of what is a realistic value. It should be expected to vary with operating conditions, yet the study data has shown no significant correlation between terrain, ground conditions and track life. It has shown that machines owned and operated by contractors have a significantly better track life than company machines.

Track life can be extended by reversing the track chains and sprockets. This has been undertaken between 700 and 2300 hours and has usually included rebuilding the road and idler wheels, replacing worn track bushings, and building up the wear surfaces on the track plates. Providing the track chains and sprockets are turned before the maximum wear tolerances are reached, a 50% increase in track life can be expected. The road and idler wheels can be built up and used with a new track chain, providing the outside lip of the wheel has a material thickness greater than 3 mm. Any less than this and they may be too thin to build up and will crack. The track plates can also be used with a new chain but the wear areas on the peg and platform would need building up.

During the study, an improved track shoe and sprocket design was introduced which was expected to increase the life by up to 50%. Recently the FMC Corporation have also increased their track warranty to 2000 hours or two years. Both of these changes have made the data from the study of historical interest only.

TORSION BARS

The torsion bars in the track system have been the source of the most consistent mechanical problems, and adverse comment on the mechanical reliability of the FMC. From the data collected, it has not been possible to assess whether the failures have been operator, mechanic or component related. Inconsistency of the reported failures, in terms of physical numbers, time span and machine identity, does indicate that most have been either operator or mechanic related. Most of the torsion bar failures can be attributed to one or more of the following factors :

- an inadequate maintenance training programme.
- operators continuing to use machines with broken torsion bars. This increases the load on the remaining bars and shortens their life. It has not been unusual for machines with two or more broken torsion bars to continue being used as the operator did not know, or could not recognise that bars had broken.
- a combination of heavy loads together with high speed travel over rough surfaces. In pine plantations, it is suspected that fast travel over stumps is a major contributor.
- the markings on the bar are not sufficient for ready and accurate identifications of left and right, nor are the markings on the bar and road arm bracket sufficiently bold for accurate identification, and torsion bar alignment.
- the bars are torsionally stressed for either left, or right hand mounting and must be mounted in the direction they are stressed. The correct alignment of replacement bars is also critical.

It has not been possible to identify any single factor with regard to torsion bar failures but all of the above are known to have contributed to past problems.

OTHER TRACK COMPONENTS

Mechanical problems with other components of the track system have also occurred but these cannot be considered to be a particular problem. Changes and improvements in the track design have eliminated some, while others have been mechanic or operator related.

OTHER COMPONENTS

Major failures have occurred with the final drives, transmission, torque convertor, engine and differentials. There is no consistency in the type of failure so it has not been possible to determine whether they are operator, mechanic or design related. These problems are by no means unique to FMC's. The componentry is the same as that used in a variety of other machines, all of which experience similar problems.

MACHINE MODIFICATIONS

Although the FMC skidder is a purpose-built machine, it has not been sufficiently robust to withstand New Zealand operators, particularly in operations where the owner is not part of the crew. The most common modifications have been :

- protective guards for the hydraulic reservoir and the winch.
- a thicker guard plate for the radiator.
- reinforcing of the blade, blade ram guards and the arch.
- strengthening of the side panels and belly guard.
- extensions to the exhaust pipes to vent the exhaust gases skyward, instead of into the faces of those breaking out.

OPERATIONAL ASPECTS

At the time the FMC was first introduced to the Australasian market, their reputation was that of being the answer to all difficult logging conditions.

Production and/or operational data gathered during the study was limited, but studies in New Zealand have shown that in ideal conditions in old crop P. radiata with a piece size of 3.5 m^3, it can produce up to 600 m^3 - 650 m^3 per day in typical tractor or skidder country, with an average haul distance of 200 metres.

The indications are that the FMC will not be competitive in all applications, nor is it reasonable to suggest that it should be. The available data has shown the FMC to be superior to other ground based equipment in wet swampy areas, and marginal hauler country. It also has advantages where the requirement to minimise environmental damage is paramount. Some of the factors that have an important influence on the productivity of an FMC are :

- the FMC is a skidder, not a tractor, and should be used as such. The blade has been designed for utility use and not for heavy pushing and excessive use of it should be avoided wherever possible. The machine operates best when butt pulling directionally felled timber downhill with a minimum of winching.
- operator training is critical. The best operators are often those who have had no previous tractor experience. "Tractor attitudes" in particularly are hard to overcome.
- a preventative maintenance programme is important. This requires a greater degree of operator commitment and knowledge than most other ground based equipment.

- pre-tracking, if permitted, allows better utilisation of the FMC's potential travel speed.

Planning for an FMC operation can be more innovative than for most other ground based equipment. It is essential that the planner be able to recognise both the abilities and limitations of the machine if it is to be used to best effect. The FMC will not be cost competitive against tractors or skidders on easy country, or short haul operations, but can be used to good effect in marginal hauler or difficult terrain where other ground based options are limited. The faster travel speeds can be used to offset a longer haul distance, with a corresponding decrease in road density. It can also be used to scout haul to a larger extraction unit, or to reduce roading density by using it as a secondary extraction machine.

CONCLUSION

The FMC has proved to be a high maintenance cost machine when compared to tractors and skidders, but this cost should not be considered in isolation. Some of the factors that have contributed to this reputation have been:

- the FMC's "go anywhere, do anything" reputation has been interpreted too literally in many cases.
- like all machines that have a high capital cost, planning must be of a high standard to achieve the extra production potential, and must recognise both the ability and limitations of the machine.
- the FMC is a high speed skidder, not a tractor, and should be used as such.
- the track system, although outwardly resembling that of a tractor, is unique and requires different operating and maintenance skills.
- regular maintenance, particularly to the track system, is critical.

There is some justification that the FMC skidder is a high cost machine (NZ$292,000 December 1983) but this must be balanced against the high production capabilities, and the maintenance costs that have been incurred through a lack of knowledge and understanding of the track system.

The prevailing attitude of most FMC operators is "yes, it is a high maintenance cost machine, but it is also a high producer so we can live with the cost".

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