

TYRE RE-GROOVING

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Introduction

Tyres are a significant running cost of operating a heavy commercial vehicle. This is despite increased technology and improved designs which have extended tyre life over the years. On average, a truck covers nearly 80,000 km a year and tyres contribute to at least 3% of the total expenditure¹. An average on-highway vehicle can have anywhere between 18 and 28 tyres, not to mention those configurations using tri-axle drives and the spares which are carried. Log trucks are also in the unenviable position of trying to find a tyre that will deal with the rough off-highway conditions as well as the smoother highway conditions. Despite the general trend to better tyre performance, there are still many decisions to be made about what tyre to buy and how often it should (or can) be given a re-cap.

Re-grooving Technology

Re-grooving tyres is not new technology. However, it has not been widely used in New Zealand. The technology originated in America and is encouraged by some of the major tyre manufactures and suppliers throughout Europe, USA and to a lesser extent in Australia.

Tyre re-grooving is not an alternative to a retread tyre, but more of an interim step which utilises the existing rubber above the tyre belt. Once the tread depth has been worn down to the legal depth (1.5mm), and providing the tyre is in a structurally sound condition, it can be re-grooved using a re-grooving machine (Figure 1) or other re-grooving tool. The re-grooving process will provide a new tread up to 7-8 mm in depth.



Figure 1 - Tyre re-grooving machine

New Zealand Standards

Standards Association of New Zealand has several standards relating to pneumatic tyres for trucks and passenger vehicles. Of particular interest for re-groovable tyres is *NZS 5464 - 1990 Pneumatic tyres - light truck and truck/bus - New*. This standard states that new tyres must show the following markings if they are designed for re-grooving:

The words "RE-GROOVABLE" or the symbol "PT", or the international re-groovable symbol (Figure 2) not smaller than 20mm in diameter.

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¹"Road Transport Facts" New Zealand Road Transport Forum, Wellington 1998

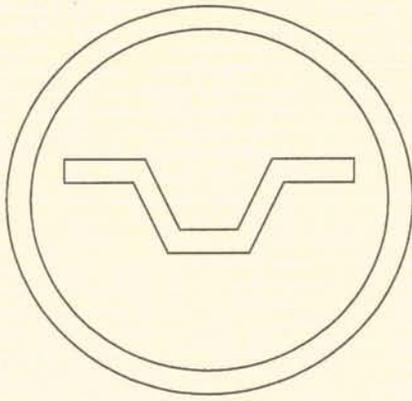


Figure 2 - International Re-groovable Symbol

Legal Position

At the time this Technical Note was published, the Land Transport Safety Authority (LTSA) was converting much of the existing land transport legislation into rules. The Tyre and Wheel Rule had just passed the first consultation phase which has given registered interest groups the chance to comment on the rule. In the proposed rule, it states that *a vehicle with tyres which have been re-grooved must be operated at a speed below 50km/hr, unless the re-grooving process has been carried out safely, having regard to the tyre manufacturer's specifications.* The LTSA indicated that the 50km/hr requirement is to be removed and the requirements are to be "refined". The rule has another two consultation phases before it will be presented to the Minister of Transport and it is expected to come into force on 1 January 2000.

Basically this will mean that providing the re-grooving process maintains the tolerances, as defined by the tyre manufacture, the tyre can be used in normal operations.

Re-grooving Process

Tyre re-grooving is a simple and quick operation which can be completed at the transport operator's yard with a portable re-grooving machine. The two types of re-grooving are straight grooving and zig zag grooving. The tyre re-groover investigated by Liro operates on 120volts A/C single phase and compressed air to operate the top guiding ram, to produce a zig zag groove.

The tyres are removed from the vehicle, checked for any foreign objects or large chunks of rubber missing from the tyre, rendering it unusable. The depth of rubber material to re-groove is checked by inserting a small chisel like tool into the tyre and measuring the depth to the metal belt. This is completed near the centre and edges of the tyre. A tyre will naturally wear unevenly and

the centre of the tyre may have less material available than the edges. The tyre pressure is checked to ensure it is inflated to 100-110 psi so that the tyre maintains its shape during the re-grooving process. The tyre is placed in the machine and the knives (Figure 3) are positioned at the required depth. Grooves are cut by the knives which are heated to enable a smooth uniform cut (Figure 4).



Figure 3 - Cutting Knives



Figure 4 - Cutting Knives in action

One to four zig zag grooves can be cut at the one time so the tyre only has to rotate once which takes approximately 2 minutes, depending on the diameter size and associated tyre circumference. The depth of grooves can be completed up to 7-8 mm in depth, and the spacing of the grooves can be positioned anywhere across the width of the tyre. Any type of tyre can be re-grooved² including, low profile tyres to 11R tyres, tubeless and inner-tube tyres. The tyres can be given a retread once the re-groove tread

²Providing the manufacturers intend the tyre to be re-grooved after manufacture. See "Legal Position"

is worn down and providing the tyre is still structurally sound the retread can be re-grooved. This essentially gives the tyre four lives.

Advantages

- Lower cost than a retread (\$30.00 per tyre)
- Tyre can be given a retread after re-grooving
- No removal of tyre from wheel
- Relatively quick operation

Discussion with operators who have used re-grooved tyres indicated that re-grooving the tyres could increase tyre mileage by up to an extra 10,000 to 15,000 km. This is, of course, dependent on the pavement condition which the truck is running on and the tyre position on the truck/trailer (drive axles vs trailer axles). Goodyear recommends that front tyres should be re-grooved and moved to trailers. Drive tyres should ideally be taken off when they are approximately 80% worn, the tread depth should be increased by grooving and then reapplied to the drives. (Source: Goodyear Tyre Manual, section XVI - USA).



Figure 5 - Re-grooved tyre tread

Other tyre manufacturers support the use of tyre re-grooving and indicate that the process can increase tyre life up to 1/4. Most tyres currently supplied in New Zealand are designed to be regroovable. There is no added cost to purchasing re-groovable tyres.

Conclusion

Although the technology of re-grooving tyres does not replace the use of retread tyres, it is a valuable intermediate step between the new tyre and a retread which can extend the life of the tyre significantly.

