



Retreaded Tyres

I recently met Matt Backhouse, the Manager of Ron Finemore Tyres in Laverton. Matt is an expert on retreating tyres. It's part of his job running this Michelin accredited retail outlet and retreading facility. I learnt a lot from Matt.

Retreaded tyres are routinely used on drive axles and on trailers. A worn tyre can be retreaded for about a quarter of the new tyre price. A good quality tyre carcass can be retreaded four times so the value of a worn tyre first time around is about the same as a new tyre. A good-quality worn tyre has intrinsic value and it needs to be protected.

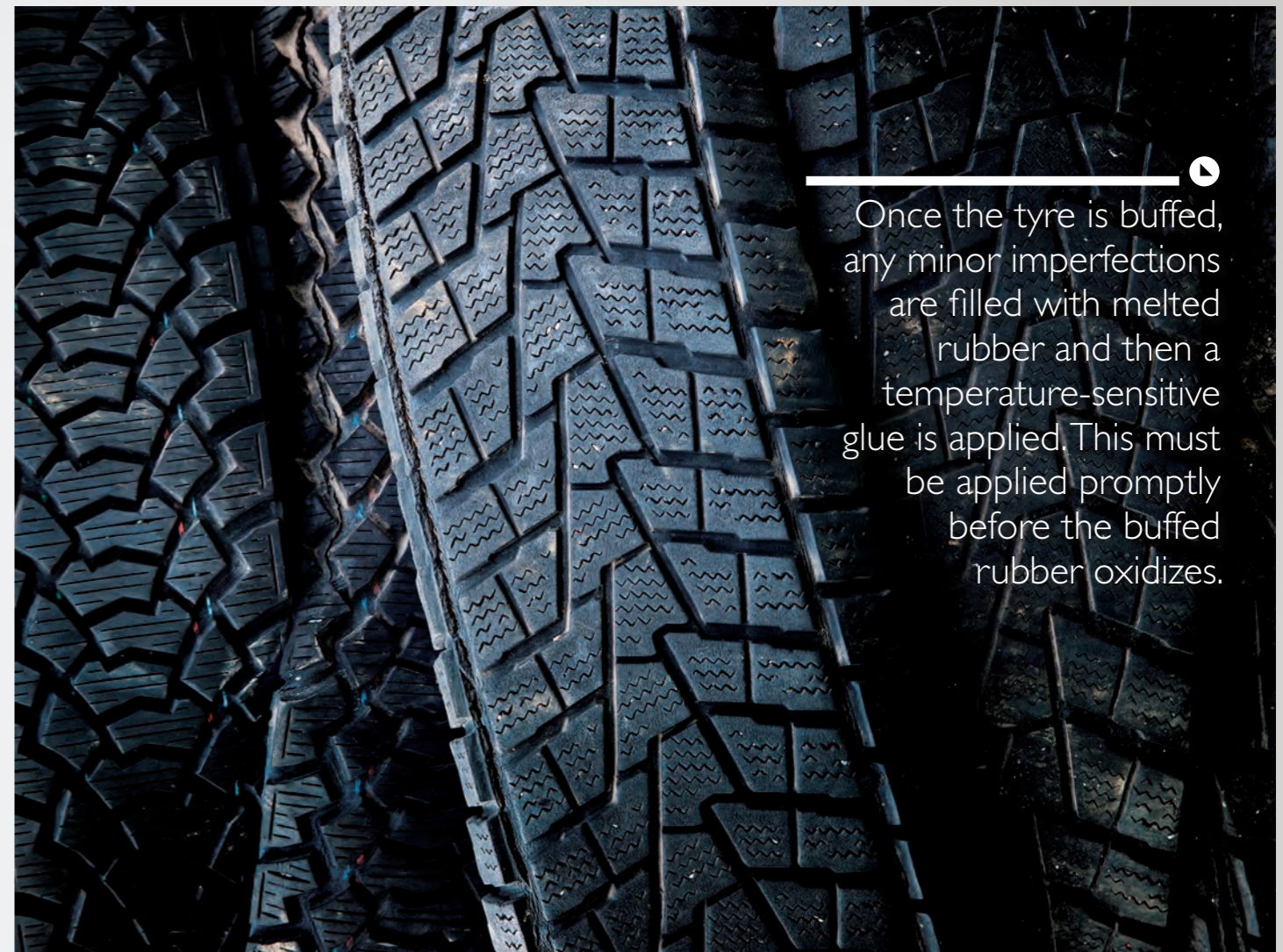
A worn tyre cannot be retreaded if the sidewall bulges or the steel belts are torn, the bead is damaged (gouged), if the crown is bruised due to having been run flat or if a stone has drilled through and damaged the steel belt. A roadworthy tread depth is 1.5mm over a continuous band that covers at least 75 per cent of the tread area around the full circumference of the tyre. However, the risk of the tyre being "drilled" by a stone increases considerably when the tread is less than 3 mm. So, running a tyre until it is bald risks destroying the intrinsic value. Having flat spots also increases the risk. The quality of the tyre carcass is a key factor. Cheaper tyres can have relatively thin beads because less rubber is used. They also have less steel in the belt. Some tyres use recycled steel which has low strength and this makes the belt weak.



Low initial cost can mean low intrinsic value because they might be retreadable only once.

A successful retread requires very tight production control. Firstly, the tyre must be buffed to remove the remnant tread and produce a round and shaped tyre. If the tyre is mounted slightly off centre when it is buffed, it will become unbalanced. This can cause ride vibration as discussed below. Once the tyre is buffed, any minor imperfections are filled with melted rubber and then a temperature-sensitive glue is applied. This must be applied promptly before

the buffed rubber oxidizes. Once the new tread is rolled on, the tyre is baked for several hours to set the bond. Baking time depends upon the temperature so there is a temptation to run the oven hot and lessen the baking time. Rubber chemistry starts to change about 119°C and as a consequence, the sidewall strength degrades. The tyres should be baked in pure nitrogen to stop oxidation during curing. Poor sidewall strength can result in 'zippering' if the degradation goes too far. So, a poorly controlled retreading process will reduce the intrinsic value and produce treats that come off or sidewalls that zipper; both of which are safety hazards. A detached tread on the roadside indicates a poor retreading process. Brands like Michelin limit the number of retreads to four and the age of the retread carcass to less than eight years. The date of manufacture is printed as four characters under "DOT". When a tyre is retreaded, by convention one of the characters in the make name is buffed off. This is done so that the number of times a tyre has been retreaded can be counted. Matt Backhouse can select from twelve tread patterns. The choice is between traction vs. smooth running, on road vs. off-road, hot surfaces vs. cooler surfaces and wet vs. dry. The key differences are block size, channels to the outside to throw off mud, narrow grooves vs. wide grooves, total rubber contact area and radial grooving for stability and centring. Tyre out-of-balance can be a problem



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if the preparation of the tyre is not well controlled. The international ISO standard for heavy truck tyres specifies a maximum out-of-balance weight (measured statically) of 455 grams for a steer tyre and 570 grams for a drive or trailer tyre. The maximum radial run out and maximum lateral run out is 2.4mm for a steer tyre and 3.2 mm for a drive / trailer tyre. A new ('cleanskin') tyre will easily meet these limits. For example, a new tyre typically has an out-of-balance that is less than 200 grams. It is much harder to meet these limits on a retreaded tyre. So does it matter? Yes. Imagine a tyre that is perfectly balanced. Then push 570 grams of plasticine into the tread at one location. The wheel and the tyre probably weighs about 80 kg so the 570 grams is only 0.7 per cent of the static wheel weight. At 85 km/h a 295/80R22.5 tyre turns at

7.4 times per second. The 570 grams now gets flung off with 65 kg force. Poorly manufactured retreaded tyres can have out-of-balance levels exceeding one kg. Imagine having a few 100kg of out-of-balance weight rotating on the axles in an uncoordinated way on the rear axles! Imagine what it will do to the bearings and suspension bushes. A dual pair of tyres can be balanced to some extent if the out-of-balance point is located, which can be easily done on a tyre balancing machine. The two out-of-balance points can be positioned one half turn apart so that some balancing-out occurs. This simple technique, which costs nothing, will help greatly. But retreaded tyres should not be out-of-balance by more than 400 grams to start. There is another potential problem. The 'beaming' frequency is often 8 - 10 Hz. This is the frequency at which the chassis

rails between the steer axle and first drive axle will vibrate. If the tyre out-of-balance is substantial, a ride vibration will be experienced at some speed in the range 70 - 90 km/h. This vibration is likely to get into the cabin where it makes the driving experience uncomfortable. The vibration is likely to be more pronounced when the rear cabin suspensions are mounted directly onto the chassis rails, particularly if the cab suspension has coil springs. Cab suspension dampers can't get rid of this vibration because its frequency is too high. The shock absorber mechanism can't move that fast. Retreading tyres saves money and greenhouse gases. But there is really no alternative to buying good quality tyres at the start and using an experienced and capable retreader thereafter.

Dr Peter Hart, Chairman