

TYRE MAINTENANCE

Tyre technicians need more knowledge than many realise. Brian Tinham talks to Rob Burton and Steve Jones, from Michelin's truck technical team

For technicians, there's more to examining tyres than simple inspection and pressure checking. You're also expected to know: the relevant C&U (Road Vehicles Construction and Use 1986) regulations and their implications in terms of tyre ratings, applicability and what's road legal; the meaning of sidewall markings; health and safety considerations; and what different tyre wear and damage might be telling you about vehicle condition. You're also expected to know the dos and don'ts of tyre care.

C&U REGULATIONS

Technicians need to understand UK C&U regs: 24, which defines tyre types for the vehicle classes; 25, load and speed ratings; 26, tyre mixing; and 27, which outlines tyre condition (tread depth, pressures, cuts, bulges, exposed ply or cord, etc) requirements. Why? Because you have a responsibility to the operator to spot issues with tyres that could render a vehicle illegal.

For example, UK coaches are limited to 62mph, but by law must have tyres rated to 70mph. Meanwhile, vehicles registered as local service buses are entitled to run 10% above the tyre loading, because of their speed and distance restrictions. But the same

vehicles not registered as local service require higher rated tyres. On Michelins, that means local service buses can run on X InCity XZUs, while the others need higher-speed rated XZE2+s, which also bear a different tread pattern.

RIGHT TYRE TYPE

All premium tyre manufacturers produce ranges of tyres aimed at the variety of vehicles, duty cycles and environments. It's not just about steer, drive, trailer and winter tyres. Some are intended for long-haul, high average speed; others are for regional duties, urban applications, coach-

Detoriation of rubber

Change in the state of the rubber on the tread or sidewalls. Rubber becomes soft and sticky, and sipes might close up. The change may be accompanied by a strong smell of hydrocarbons. Caused by excessive contact with oil and/or diesel.



Dropped element

Isolated circumferential wear of one rib on the tread pattern. Caused by use on straight roads and motorways and/or incorrect pressures and/or inappropriate tyres for the application involved.



Eccentric wear

Diametrically opposed maximum and minimum tread wear rates, and severe scooped sidewall wear. Caused by imbalance in rotating assemblies, usually due to tyre eccentrically fitted to the rim or rim to the hub.



specific, mixed on/off-road, and off-road and military. So to get best traction, fuel consumption, comfort, stability and tyre longevity – and to stay legal – you need to know which to use.

What matters are tyre construction, materials and tread patterns. For urban tyres, a known issue is kerbing, so sidewalls have more reinforcement. Vehicles intended for long distance and high speed are best equipped with tyres having less aggressive tread patterns and higher silica content to reduce rolling resistance. As for winter, unless you're choosing tyres for the far north or for local authorities' gritters, modern regional-national tyres, such as Michelin's X MultiWay 3D, will do the job.

SIDEWALL MARKINGS

There's more to sidewall markings than meets the eye. Yes, there are the standard size codes, along with the load and speed indices (indicating maximum load carrying capacity and speed). And there are the now mandatory European tyre label classifications (fuel efficiency, wet grip and rolling noise). But there are also non-mandatory markings – in particular, all-season 3PMSF (three peak mountain snowflake), indicating a minimum performance on snow to UN ECE 117 – due to pass into law in 2017.

Further, most manufacturers also

Tramline

An area of circumferential wear affecting only part of tread width. Caused by use on straight roads and motorways. Sign of slow wear rate.



TYRE INSPECTION

To make inspections repeatable, technicians should follow set procedures. Best advice is to start in a set position – say nearside front on a 4x2 rigid – and work clockwise round the truck. Then, whether you're using a paper form or a PDA, record its position, inflation pressure, valve cap presence and remaining tread depth across the tyre. You should also check for cuts and damage to the tread area, and examine for signs of uneven wear. Similarly, you must check the sidewalls for cuts or other damage, including bulges.

Moving around the vehicle to the drive axles, you should also check that tyres are twinned correctly (where appropriate). There should be no more than 4mm difference in tread depth between the inner and outer twin, to ensure that neither runs in an overloaded condition.

Technicians must follow the same process from vehicle to vehicle, before generating a fleet report, if required. Specifically, anything in possible contravention of C&U regulations, or that might have safety implications (either associated with the tyre itself or likely problems with the vehicle), must be flagged to avoid risking a roadside prohibition by DVSA (Driver and Vehicle Standards Agency).

indicate intended use (long distance, hybrid, regional-national, etc) on the sidewall. Additionally, since most tyre manufacturers cover multiple markets, there may well be codes specific to other geographies – such as the North American four-digit DOT code, which indicates week and year of tyre manufacture. You may also find markings indicating maximum load and tyre pressure, again for the US market.

To avoid confusion, it's important to note that North American and other markings are grouped together and can be ignored. UK and European – which match those for Asia and Australasia – must comply with C&U regulations.

Feathering

Feathering at the edge of the tread blocks, more evident on one side than the other, is usually due to scuffing, caused by incorrect alignment of the wheels (toeing in or toeing out) or axle misalignment.



Heel and toe

Occurs mainly on tyres with block treads: leading edges well defined, trailing edges worn. Usually the result of frequent aggressive stopping and starting, and/or inappropriate inflation pressures for the load.



Shoulder wear

Circumferential wear to one shoulder, which may be partially or completely worn away. Caused by severe pitching of vehicle, perhaps due to high centre of gravity, or prolonged running at the wrong pressure.



✓ Checklist

- ✓ Consider health and safety
- ✓ Check tyre type against application
- ✓ Check inflation pressure
- ✓ Check remaining tread depth
- ✓ Check for cuts and damage to the tread area
- ✓ Check sidewalls for cuts, bulges and other damage
- ✓ Check drive axle tyres are twinned correctly: ensure no more than 4mm difference in tread depth
- ✓ Examine for uneven tyre wear
- ✓ Match observed wear to potential vehicle problems and advise accordingly
- ✓ Look for opportunities to extend tyre life

HEALTH AND SAFETY

For tyre technicians, this is about taking common sense precautions – such as using a steering wheel warning cover, placing a cone in front of the vehicle or locking the cab door when tyres are being inspected or changed, to prevent drivers moving off. This is particularly important when you are inspecting an inner twin.

You also need appropriate PPE (personal protective equipment), including hi-vis jacket or suit and protective gloves, particularly on vehicles carrying dangerous or harmful loads.

TYRE PRESSURES

Vehicle axles need to be weighed in the laden condition (or determined using a load base and wheelbase calculation for coach and bus operators), using calibrated weigh scales, to determine correct tyre inflation pressure. This matters not only in terms of safe vehicle handling, but also fuel economy and tyre life.

Pundits suggest that a 20% under-inflated tyre loses 18% of its working life through abnormal wear, as well as increasing rolling resistance and reducing fuel economy by 1.7% on trunking, 1.1% regional work and 0.5% for service buses. But over-inflation also causes problems, including increased risk of accidental damage, due to reduced flexibility.

However, vehicle duty plays a big part in correct tyre pressures. There are significant differences between pressures

on, for example, RCVs (refuse collection vehicles) and emergency service vehicles – which require excellent handling.

In general, if pressures are up or down by 0.5bar, then correct the problem and watch. If out by up to 1bar, then monitor for adverse wear. If more than 1bar, then remove the wheel and examine for causes of pressure loss. It might be the valve, the tyre-wheel interface, or the tyre itself.

TYRE WEAR

See illustrations. Increased wear in the centre of the tread indicates over-inflation. Wear to both tyre shoulders suggests under-inflation. Feathered tyre wear is indicative of misalignment on toe-in or toe-out settings. Sloped wear (camber wear) generally suggests problems with the vehicle camber settings. In both cases, check the vehicle manufacturer's recommendations.

Heel and toe wear – leading edge of tread block higher than trailing edge – is associated with over-loading and/or under-inflation. Generally, it's seen with block pattern drive axle tyres, particularly on higher-power vehicles with retarders, or those on start-stop operation. Remedial action might include changing to more appropriate tyres.

Wavy lumpy wear – oblique wear patches across the tyre – indicates worn or damaged suspension, or steering problems. It can also be caused by an imbalance in the wheel assembly or tyres that have not been fitted concentrically, or are incorrectly twinned.

TYRE DAMAGE

Technicians must periodically examine tyres for cuts in the tread and/or side walls, kerbing damage, braking flats, torn tread elements or blocks, bulges, etc. If any of the above is considered to contravene C&U regulation 27, then the tyre must be repaired or changed. Minor repairs, such as penetration through the tread, can be repaired on site. Major damage – say larger than 10mm in the sidewall – needs to be assessed by a specialist repairer.

However, excessive damage should prompt checking that the vehicle has the right tyres for the job. For example, tippers fitted with national-regional application tyres may do better with

on/off road types. Similarly, if you find excessive kerb damage, it might make sense to change to urban tyres.

TYRE HUSBANDRY

This is all about actively extending tyre life – not just re-grooving. If you find kerb damage on a non-directional nearside front tyre, for example, then turning it on the rim presents a fresh tyre wall.

Similarly, tyres can be exchanged side to side, but never swap steer for drive axle tyres, and only rotate tyres if wear is moderate.

As for re-grooving, most tyre manufacturers recommend this course of action when tread depth reaches 3–4mm (depending on vehicle application and where the tyre is labelled re-groovable). Generally, tyre life is extended by up to 25% – and just when the tyre is at its most fuel efficient. The process creates deeper grooves and sharper biting edges and tread blocks to optimise traction, water displacement and safety.

If appropriate, tyres can then be retreaded and subsequently also re-grooved. Hence the 'four lives' slogan. The only caveats: ensure that the tyre twinning rules are not broken and that the vehicle application merits the expense. **TE**

Wavy lumpy

Wavy wear affecting half or more of the tread. Caused by wear or play in the suspension or steering systems, imbalance, incorrect fitting, incorrect twinning, twins with different inflation pressures, severe pitching of the vehicle, or heavy loads and a high centre of gravity.

