

# Spare Tyres

For the past decade car makers have been trying to eradicate the spare wheel and tyre, with mixed levels of success. In the 4x4 world the spare will be with us for the foreseeable future.

Ours sits safely on a Kaymar spare wheel carrier that swings away to allow access to the tailgate. It's a much better solution than a door-mounted spare, because door-mounts put strain on door hinges when vehicles are driven on rough bush roads.

Vehicle makers hate having to fit spare wheels and tyres to their new 4x4s, because as wheels have become larger in diameter and tyres fatter, the spare takes up an increasing amount of space, as well as adding weight and cost.



The first effort to eradicate the spare wheel and tyre was the 'temporary spare', which didn't solve the space problem entirely, but greatly reduced size and cost. A temporary spare has no place on a 4x4, even for use on bitumen.

## Run-flats

The next significant effort to eradicate the spare wheel was the 'run-flat' tyre, of which there are several designs. Run-flats have been used successfully for many years on military vehicles, where their advantages are obvious: a shot-out tyre stays on the wheel and allows the vehicle to drive away from danger.



For passenger-carrying vehicle makers the main attraction of the run-flat tyre, apart from the aforesaid eradication of the spare wheel and tyre, is that the driver can head for a tyre repair shop on the deflated tyre, rather than risk changing a wheel on the side of a busy road.

The main run-flat designs are the stiff sidewall type and the ring-supported type. The former has stronger than normal sidewalls and heavier bead sections, so the tyre retains almost an inflated shape at zero pressure. The latter has an internal ring to support the tread of the deflated tyre and to fill the 'well' in the wheel rim, so the tyre can't run off the rim.

Because both run flat types look almost normal when deflated they're mounted only on new vehicles that come with on-board tyre pressure monitoring systems.

The door opened for run-flats in the USA when that country mandated tyre pressure monitoring on all new vehicles from 2007.

Temporary spares and run-flats can be driven for 80-160km at speeds up to 80km/h the makers claim. However, there's no guarantee that the tyre can be reused after being operated for even a short distance at zero pressure.

In the USA there are several court cases over run-flats, in which car owners are seeking compensation for the higher ownership cost of run-flats.

At first glance the run-flat tyre looks ideal for 4x4 applications, because it allows the vehicle to be driven without the driver's having to 'get out and get under' to replace a wheel and tyre.

However, the permitted driving speed and distance on a deflated run-flat shortens dramatically if the vehicle is heavily loaded or is being operated on unpaved surfaces. Another factor is that tyre dealers are scarce in the Outback, where an 80-160km range is little comfort.

Further run-flat complications are the need for special tyre handling equipment for the ring-supported type.

A reinforced-sidewall run-flat may have an advantage on a 4x4, because there should be inherently better sidewall strength than a conventional tyre has. However, there would still be the need for a spare wheel and tyre, to ensure the vehicle could reach a tyre specialist for proper repair.

## Airless Tyre

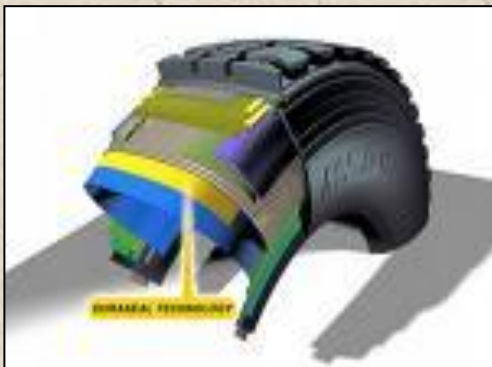
Michelin's 'airless' tyre and wheel concept caused a sensation two years ago, when it was previewed in the USA, but since then there's been little news about the Tweel.

Although a prototype was demonstrated on an Audi A4 passenger car at the time, Michelin said it would firstly develop Tweels for low-speed, personal mobility devices and some skid-steer machines.



The see-through Tweel combines a replaceable rubber tread layer and a central metal hub, joined together by polyurethane ribs. The ribs flex easily and allow the structure to absorb shock and comply with ground irregularities in the same way a pneumatic tyre does. Unfortunately, production Tweels for 4x4s are still many years away.

## Self-Sealing



The best short-term hope for a 4x4 with reduced spare-tyre dependence may come from tyres with a gel-like rubber compound layer between the casing plies. When an object penetrates the tyre the gel flows around the object, sealing the air gap between it and the tyre structure. If the object is pulled out the gel has the ability to flow into and seal small holes.

The gel layer runs underneath the tread and shoulder plies, meaning that it should seal multiple punctures anywhere around the tyre circumference, but not the sidewall area.

At present, these tyres are in large truck sizes only.