

RESTING ON PILLOWS

Air suspension provides support for a vehicle and its load, maintains stability and control, and ensures a smooth ride. Proper inspection and maintenance of the system - and particularly the rubber airbags which act as springs - is essential to avoid costly repairs and downtime, finds Toby Clark

Airbags are usually given pretty cursory attention during a normal maintenance cycle, according to Owen Jenkins, engineering manager at component manufacturer BPW, one of the biggest suppliers of air suspension systems. However, he adds: "Fundamentally there isn't any [particular] thing that goes wrong with them, because over the years firms have designed [problems] out - anything that evolves or develops through generational changes becomes far more reliable."

Airbags must be checked at every statutory inspection, looking for leaks, visible damage and perishing: one of the anti-ageing compounds used in rubber was removed due to changing legislation some years ago, so "perishing does now become more evident sooner," says Jenkins. "Any sign of external damage is going to cause problems, and any sign of perishing, particularly where the rubber folds or rolls under." An airbag, he adds, "is a pretty robust bit of rubber, but keep an eye on those joins and folds".

The piston itself should be inspected and the shock absorbers checked for leaks or damage. If they are defective, the airbags could be overly stretched or squashed on to their bump stops.

Jenkins is understandably reluctant

to quote a specific lifespan for airbags; when pushed, he says, "at the very minimum you'd expect them to last three years, but six to eight years is also perfectly normal". He adds that even after 10 years, airbags may still be serviceable - condition is far more important than age, so inspection is vital.

"It's really difficult to say what the typical life expectancy is because so much of it depends on the application that it's in - the load cycle that it sees, and the environment it is used in." A number of factors affect the rubber, for instance, "the heat cycling it would encounter, say in North America compared with here," says Jenkins.

LOADING CONDITIONS

"A lot will depend on what the loading conditions are like. If it's operating off-road - and that doesn't have to be a quarry truck, but could be a brick and block carrier - it will suffer much heavier use than the same weight on a nice paved motorway." While, obviously, tipper applications can be very aggressive, other installations can be surprisingly hard on their suspension: "Double-deck trailers have a high centre of gravity, so any type of cornering or swaying causes more deterioration than, say, a curtainsider or a low-loader."

Jenkins also notes that, recently, with the adoption of dockside cranes that



HENDRICKSON ZMD

In North America, Hendrickson offers its ZMD (zero maintenance damping) air suspension system, which eliminates the shock absorber altogether. This provides damping within the air spring itself, by bleeding a controlled amount of air through channels between the main chamber of the airbag and a smaller chamber within the piston.

The system needs no additional maintenance, and is claimed to give better ride quality - in part because the damping force is directly in line with the spring forces, rather than offset and at an angle, as with a conventional setup. The separate shock absorber is replaced by a simple strut which limits extension.

lift whole trailers, "we have seen failure modes where people haven't strapped the axle up properly, and the weight of the axle stretches the airbag".

Other circumstances can also overextend the airbags: "Depending on the breakover and how the customers have specced the trailer, there are particularly steep ferry ramps where the first or last axle can degrade, but that's usually for a very short period."

BPW stresses the importance of the axle beam, saying that the airbags contribute only around 7% to roll stability: "Stability is mainly provided by the axle beam and the two trailing arms which combine to form a large



SAFETY PRECAUTIONS

The Health and Safety Executive (HSE) published a bulletin in 2020 on the risks of working on air suspension systems. It established that the two main causes of incidents are "collapse of inadequately supported vehicles and unintended rupture or release of components from the air suspension system".

In particular, it found the most common hazards included clearances suddenly changing, presenting a crushing hazard. This can be due to a drop in air pressure, automatic movements (for example from lift axles) or air bellows rupturing or deflating. Parts can also be violently ejected

under pressure or when they fail. HSE's specific recommendations were to:

- "Undertake minimal repair work at the roadside or third-party premises" and instead use an adequately equipped vehicle repair facility.
- Prevent movement of the suspension by deflating the system or using suitably rated props or stands to prevent the chassis lowering.
- When leak testing, visually inspect the system while empty, then inflate it and raise the suspension to full travel. Leave a short time before inspecting for leaks.
- Exhaust the air from the system before working on it, and make sure that any stored pressure has dissipated.
- Isolate the air suspension system by physically disconnecting the air supply. Clamping the air suspension pipework is NOT a suitable means of isolation.

Owen Jenkins of BPW adds that you must ensure that if the brakes are released the trailer can't move, and points out that PPE is important, and "especially bump caps".

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U-shaped anti-roll bar." So the condition of the U-bolts which join them together is critical: visible corrosion may indicate that the assembly is loose.

TORQUE TELLS

Jenkins emphasises that you must tighten up suspension fittings to the correct torque (or torque-plus-angle) setting using a calibrated torque wrench - "certainly not an air gun!" - and be aware of the precise type of fastener. "We use two different types [of U-bolt] depending on the type of suspension. One of them is a dry torque-to-yield U-bolt - which can't be re-torqued - and the other is a lubricated bolt which can be reused."

What else should you look at? "Any fasteners and any air connections," says Jenkins, and "ensuring that any leaks are addressed sooner rather than later."

Like airbags, compressors have been developed to the point where they are unlikely to fail in normal service. However, they are not designed for a 100% duty cycle, so the cause of failure may be indirect: perhaps a relay has failed, keeping the compressor switched on, or a significant leak in the system

creates too much demand.

In addition, as with other pneumatic components, the enemy of compressors is moisture. Air driers and filters must be kept in good shape, but most importantly the system should be drained periodically: "If a trailer's been left standing, then drain the tanks, build up the pressure, listen for any air leaks, and check rubber seals and pipe fittings."

It's important to keep the suspension components clean, for ease of inspection and so that debris does not build up. Jenkins says: "The best thing is just using normal soap and water, making sure you don't use anything corrosive or abrasive." Direct pressure-washing should be avoided and steam cleaning done with care. Jenkins adds that isopropyl alcohol (IPA) might be suitable for cleaning the airbags, but he wouldn't recommend stronger solvents - certainly nothing like acetone, brake fluid or diesel fuel. **TE**