

# SUSPENDED JUDGEMENT

Operating efficiency doesn't end with engines and transmissions. Axles, steering and suspension are parts of the equation. Ian Norwell looks at where designs are heading

The attention of fleet engineers is naturally biased towards heavy-duty diesel engines – the heart of fuel efficiency and for so long under the spotlight of progressive emissions reductions. More recently, attention has been lured away by innovations with automatic transmissions, including the sophisticated topographically-aware add-ons that claim to shave even more off fuel consumption by optimising power and gear management. But axles, steering and suspensions have been quietly morphing, too.

Some of the most recent developments have been in response to the strictures of Euro 6 – with, for example, engineers turning a requirement to re-tune chassis design into a positive improvement. “There’s been a degree of knock-on effect from the increased cooling requirements of Euro 6,” explains Phil Moon, marketing manager for DAF Trucks in the UK. “Our ‘Y’ shaped chassis frame, widened to accommodate larger radiators, has led to an increase in the track and spring base on the front suspension, to the benefit of ride and handling.”

So let’s look at the detail. First, the contribution to reducing steering effort and improving control afforded by power-assisted pumps appears to have reached a new climax in Volvo’s patented dynamic steering. Gothenburg’s latest YouTube hits, with Charlie the hamster steering a tridem tipper and Jean-Claude Van Damme doing the splits between two FMs, may be entertaining – and the digital electric motor control technology is impressive – but there may be an underlying issue.

As with Mercedes-Benz’s electro-hydraulic power steering, introduced with its new Arocs construction chassis, it offers drivers undeniably improved comfort and control, with incredibly light steering effort. But, especially for new drivers, it can divorce them from the realities of, for example, tyre wear. So it could lead to increased rubber costs, with extra workshop hours wasted replacing prematurely worn bushes.

Nick Blake, head of product engineering at Mercedes-Benz UK, counters by pointing out that new steering systems need almost no directional correction on the highway, so are expected to generate less tyre wear than earlier designs that needed constant, if only minimal, corrections. It’s also true that newer, exceptionally lightweight steer systems are primarily designed for the rigours of heavy off-road operation – but the penalties of such environments’ poor surfaces are also greater.

Static laden manoeuvring with lesser-powered assistance sends its own message to the driver about the forces at ground level. Moving steering boxes to a direct mounting on the chassis frame to give a better feel, and making a modest increase in the steering system pressure (from 175 bar to 185 bar, as DAF has done) is probably more conservative, and workshop friendly.

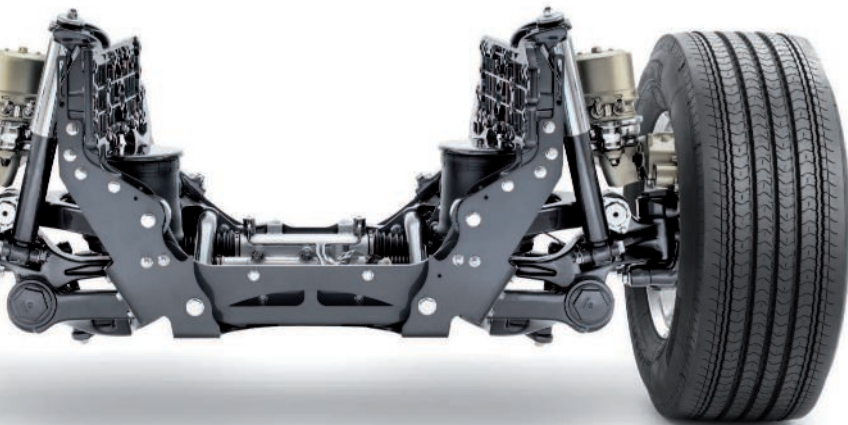
## Cinderella steering

But the steering systems on tractors and rigids are largely what come with the chassis, with occasional options as outlined. How about the Cinderella of the industry, trailers? This is far more of a user-chooser market, with trailer manufacturers keen to supply in line with changing trends.

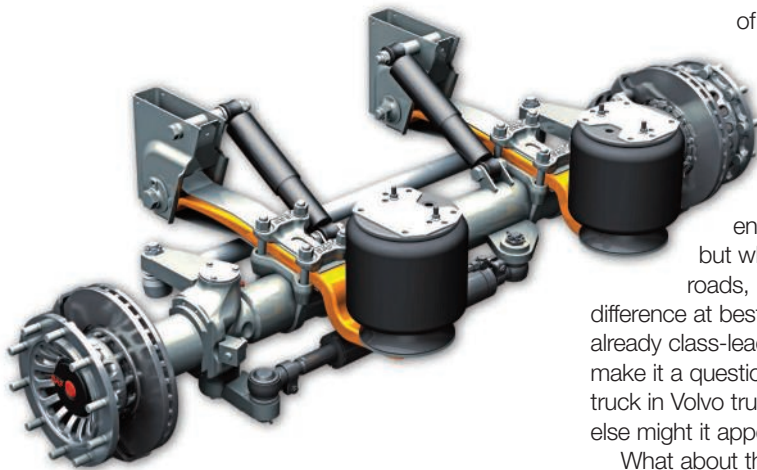
Demand for intelligent steering systems is slowly increasing, mainly following interest in longer semi-trailers. With self-steer axles essentially dumb affairs that go where they are sent, many see them as little more than shopping trolley technology. More sophisticated active steer systems that use a turntable and rod or cable to effect steering are a step ahead, but true intelligence removes the rods and cables – particularly cumbersome on step-frame trailers – and replaces them with electronics.

Arran Leatherland, sales and marketing manager at SAF and VSE distributor IMS, explains that its intelligent steering system, ETS (electronic truck/trailer steering), has a couple of major advantages over





From top clockwise:  
Volvo's new FH front axle;  
SAF axle with VSE ETS  
preparation and cylinder;  
Arocs electro-hydraulic  
steering; and DAF XF with  
stabilink



the potential savings on tyre wear, or the improved manoeuvrability. For many, the answer is still 'no'."

Moving on to axles and suspensions, it's ironic that, because Euro 6 has made engines thirstier and heavier, these workhorses have been called upon to deliver savings. But so it is: engineering innovations with running gear aimed at clawing back litres and kilos are visible with most of the OEMs' trucks. DAF, for example, has been as creative as any with its XF and the new stabilink four-bag rear suspension, which combines anti-roll bars and reaction rods to shed 60kg and improve handling in the process. Close by, a new 13-tonne rear axle makes a further 40kg contribution to the weight-watching, while a lower volume of higher spec oil (which also cuts churning losses) further boosts fuel gains. Incidentally, new fast rear axle ratios (up to 2.38) take advantage

of improved engine torque values (worth taking advice on that one).

Meanwhile, Volvo's independent front truck suspension, a £4,500 option on its new FH series tractors, had a mixed reception at launch. An engineering tour-de-force it may be, but when driving it on mixed Swedish roads, it appeared to make only a marginal difference at best. With its standard suspension already class-leading, the added weight and expense make it a questionable option. But the FH is the top truck in Volvo truck group's premium brand, so where else might it appear?

What about the offerings for occasional extra traction? Mercedes is experimenting with an additional hydraulic auxiliary drive (HAD) in the front axle for tractors and rigids – along much the same lines as options already available from Renault and MAN. If your fleet spends the vast majority of its life on the highway, with only the odd excursion on site, HAD may be worth a look.

Uwe Mierisch, Mercedes' chief engineer for heavy-duty, cab-over-engine trucks, agrees it will be expensive at €9,000, but reckons it could pay its way by boosting payload. "There's a 500kg saving, compared to the conventional mechanical drive shaft versions, and we've engineered the pipework from steel, not rubber hoses, for robustness," he says. It looks complex, with a 30-litre oil tank and cooler, hydraulic motors and plenty of plumbing, but this Daimler innovation is still about a year away.

Other part-time drive versions certainly work well when you need that extra traction for 100 metres or so. They have yet to justify the investment truck makers have ploughed in, with Renault's OptiTrack still trying to gain traction in the market. Now that Mercedes is putting its shoulder to the wheel, maybe the device will move. Cautious fleet buyers with an eye to the residual values of something unusual are probably the sticking point. **TE**

mechanical versions. "Much of the paraphernalia of linkages is dispensed with, as are any turntables, taking weight and maintenance with them. On a tractor, the kingpin is machined out to accept a sensor, which conveys steering information to an ECU and control box at the rear of the trailer, where a hydraulic-electric motor does the work."

### Cost benefit?

Leatherland adds that the hydraulic motor can be positioned anywhere on the trailer rear end, and that, unlike conventional systems, it can be re-programmed to accept new set-ups. At greater than 55kph, the device locks up and provides an extra safety margin, avoiding exacerbating critical situations – for example, with evasive manoeuvres.

But don't run away with the idea that there are tens of thousands of steering axles (new or old) out there. They are still in a very small minority. Derek Skinner, technical director at Schmitz Cargobull trailers in the UK, says that of the 40,000 trailers it builds a year for Europe, 70% take its own Rotos axles and only 1–3% of those have a steering axle. "Fleet engineers have to ask themselves the straight question: does the extra cost and weight justify either