



Supporting act

Making a profit in the road haulage business has never been easy. Dan Gilkes investigates how a truck's axle choices could make a difference

With ever-rising fuel costs and increasingly demanding legislation, hauliers are exploring every avenue for savings to keep their operations working profitably. Volvo Trucks believes that, for many of today's European operators, profit margin can be as low as 2%. Hence any small savings, particularly in terms of truck and trailer weight, can be turned into useful returns, with valuable payload improvements.

The Swedes have calculated that, for every 1kg increase in a typical European long-haul truck's cargo weight, income potential improves by £1.80 to £2.65 per year. While that might not sound like a lot, make that a 200kg increase in payload, for an operation with 50 trucks on its fleet, and suddenly the figures rise to £18,300 to £26,500 a year.

Clearly, fleet engineers have a complex balancing act to perform, setting performance against payload and fuel consumption against hauling ability, to find the right truck for their needs. But, where possible,

all components really should be considered to find the ideal specification of a truck's components, whether it be engines, transmissions, axles or suspensions. Even the benefits of the latest economical yet powerful truck engines, for instance, can soon be lost by specifying the wrong axle ratio.

For a manufacturer, reducing weight is equally important, through the use of lighter materials and optimised design. However, any attempts to cut weight must be tested for durability and reliability. With that in mind, Volvo has built a full-scale test rig in Sweden, which allows engineers to test axle and suspension designs prior to production.

"Volvo has the world's largest test rig for axles and suspension systems," claims Goran Johansson, head of the firm's department for durability testing of axles, suspension, steering and brakes. Volvo takes readings from actual trucks in operation at its proving ground in Hallered, Sweden. These real-life readings are then used in simulations, programmed under test conditions.



Volvo has the world's largest test rig for axles and suspension systems

"We put the trucks through as many different operating environments as possible on our proving ground to replicate our customers' everyday operations around the world," explains Volvo test engineer Magnus Larsson. "There are potholes, hills, washboard surfaces, sharp bends, acceleration and braking sequences – everything that a truck might encounter. We record the vehicle's progress in the form of digital signals, which we later convert into a programme that we replicate on the rig."

The test rig allows Volvo to test axles and suspension systems very rapidly, rejecting or proving new concepts and materials, without wasting time in production and prototype work. Without the rig and the test track, the firm says it would take five to 10 years to test a lighter axle design on a customer truck. That process can be cut to just six to 12 months through testing on the track, or to just two months by using the rig.

While most truck manufacturers restrict major axle and suspension changes to complete model introductions, it is not always the case, with optional ratios and layouts. Comments Scania GB's technical specialist Phil Rootham. "We've been introducing changes to our core two-bag air suspension unit, with a new drop-arm set-up and cast cross member. Customers can save up to 120kg on some models, with direct mounting of fifth wheels."

The benefits are not just for tractors, however, as some rigid models can also save up to 100kg with this revised air suspension system and gain improved handling, thanks to the cast cross member, which increases chassis rigidity.

And multi-axle rigid users also have a new option from Scania — a choice of progressive parabolic spring layouts for drive bogies, rated at 21 tonnes and 26 tonnes. This spring is said to allow better

traction and a smoother ride when unladen, as it operates only on the first two leaves. As load increases, so the spring's compression brings into play the stiffer two leaves.

"We see so many tippers in this market that just don't need full off-road abilities," explains Rootham. "The progressive parabolic will probably become the standard fitment, with the option of the older set-up for those who need that real off-road use."

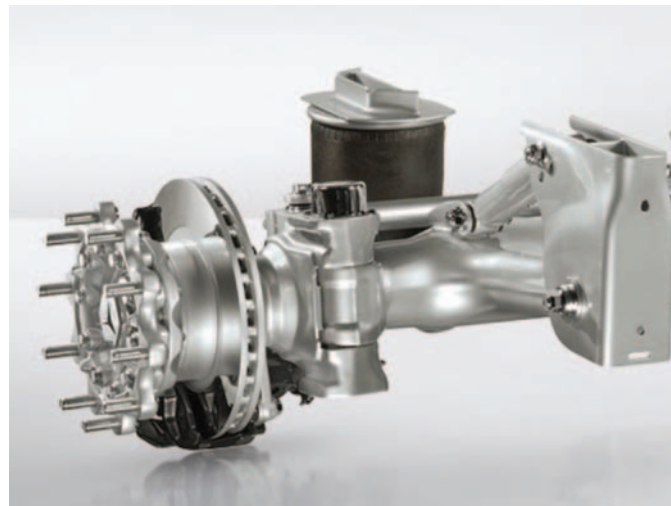
Scania is introducing the option of its AMA950, a 9-tonne front axle with air suspension, up from 8 tonnes on previous models. The company already offers a 9-tonne steel sprung front axle, but the AMA950 will be the first on air. Though quite a specialist option, it is felt that the 9-tonne front axle with air will appeal to operators mounting cranes and other heavy equipment at the front of their trucks. The axle will be available on trucks by March, though Scania dealers will be taking orders now.

Supplier dependence

For manufacturers who prefer to buy in axles, ArvinMeritor has a number of recent additions to its driveline range. These include the MX series of front drive steer axles, aimed mainly at heavy haulage and military applications. Available with a 13-tonne axle rating, the MX has ratios of 3.46–7.21 and is intended for 4x4, 6x6 and 8x6 use.

Companies looking for even greater hauling capacity could also try the ArvinMeritor 18X axle, targeted at the on-highway market for trucks with a gross weight of more than 65 tonnes. Capable of handling the latest 700bhp engines, the 18X uses a single reduction design. "We are responding to customers' needs for more efficient drivetrain solutions for heavy haul applications," says Marco Bassi, senior director of engineering at ArvinMeritor.

Meanwhile, although most truck manufacturers use their own in-house axles and suspension systems, the choice for trailer manufacturers is much wider. The 2010 Hannover Show provided



an opportunity for a number of axle manufacturers to show their latest options. These included trailer supplier BPW, which introduced an improved version of its 12 tonne capacity N-axle. Designed mainly for heavy low loader use, the new axle beam profile allows the 12-tonne load axle to be supplied with 120mm square hollow beams as standard, when used with air suspension.

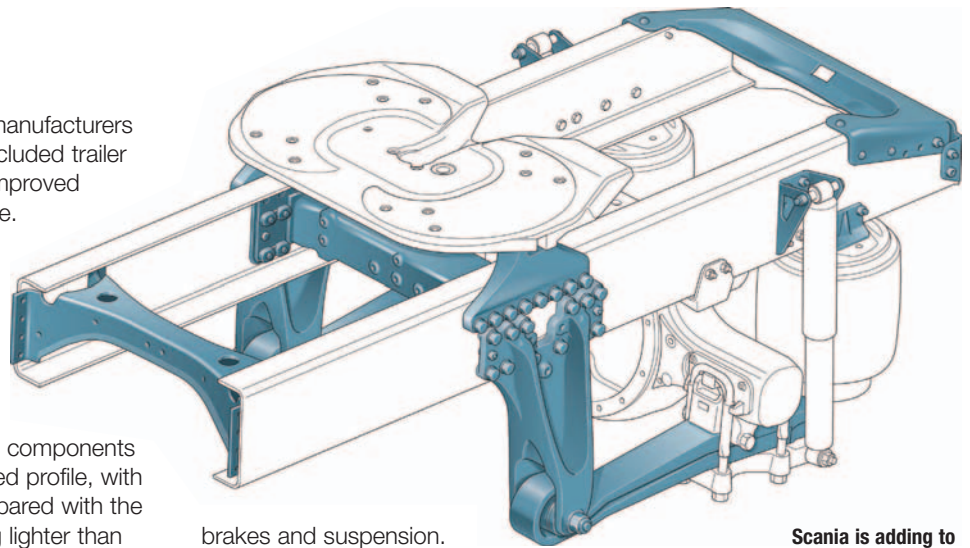
Replacing the firm's standard axle beam, the N-axle uses the same components for axle clamping. However, the revised profile, with thinner walls, saves up to 89kg, compared with the earlier solid square beam and is 33kg lighter than the firm's round tube versions.

Going Dutch

But perhaps the biggest news for the trailer axle market was the first showing for Dutch firm VALX at Hannover. A subsidiary of MCB, VALX intends to serve the European trailer market with a range of low-cost axles. The first on show was a 9 tonne trailer axle that can be supplied with disc or drum brakes, to fit either 19.5in or 22.5in wheels. VALX axles use proven components, including SKF seals, Wabco brakes and Timken bearings.

Elsewhere, one company that stands on both sides of the manufacturer and supplier fence is Mercedes-Benz. Though producing axles for its own trucks, the company also offers a wide range of axles and suspensions for trailer manufacturers. "We offer a disc brake axle, but only around 15% of the UK trailer market takes discs at present, as drums are cheap as chips," comments Mercedes-Benz's trailer axle systems sales and marketing manager for the UK, Richard Flackett. "We have been successful in high value products, though, such as petrochemical and powder tankers."

One reason for this success has been the offer of a trailer axle that doubles as the air vessel for the



Scania is adding to its range of axles with air suspension

brakes and suspension. While removing two 60-litre air tanks is not going to save a huge amount of weight, the additional chassis space is proving very popular with trailer builders.


Flackett also has high hopes for the firm's new Steermaster axle, which will be available in the UK from March. The benefits of a steered axle are reduced tyre wear and lower fuel consumption, as there is less drag from the trailer. The Steermaster provides up to 16° of steering angle, with compact axle housings that incorporate the fabricated trailing arms, axle tube, brake flange and axle journal. A Torpress air bellows offers adjustable control of return forces, depending on load.

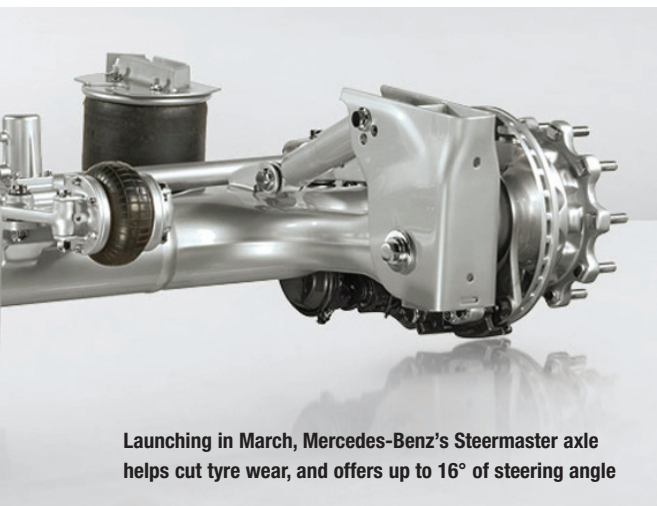
The future's light

Back at ArvinMeritor, 2011 will see the company introduce LogixDrive, a high efficiency axle system that actively monitors performance. Dubbed the first intelligent axle system, LogixDrive constantly senses temperature, speed, braking and torque within the axle, allowing it to optimise lubrication. This is said to address the two main areas of power loss within the axle – that of gear and bearing friction, and oil churning due to gear rotation.

"LogixDrive is another example of our company's focus on improving vehicle fuel efficiency to reduce greenhouse gas emissions and optimise vehicle operating costs," states ArvinMeritor COO Carsten Reinhardt.

"The system provides fuel savings of around 1%, without the need for a driver interface, as well as parasitic energy loss reductions of more than 30%, compared to previous axle generations," adds Joe Elbehairy, vice president of engineering.

LogixDrive will be available as an option on ArvinMeritor's axle systems from the beginning of 2012. All of which provides the fleet engineer with an even greater choice of systems and components for their vehicles. While this may increase the amount of head scratching when specifying new vehicles and trailers, the benefits, in terms of reduced fuel consumption and increased efficiency, are there to be taken. 



Launching in March, Mercedes-Benz's Steermaster axle helps cut tyre wear, and offers up to 16° of steering angle