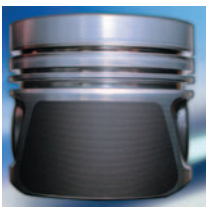


Engineering

As the transport world prepares for the IAA International Commercial Vehicle Show in Hannover, John Challen casts his eye over engineering developments due for lift-off



Federal-Mogul's EcoTough diesel piston skirt coating

Despite tough operating conditions in the transport industry and slumps in sales across the board, the commercial vehicle community remains strong, in terms of engineering innovation. Why? Primarily because transport operators, now more than ever, need to improve efficiency and economy – and that includes everything to do with their vehicles. They also need to respond to changing regulations and the green agenda.

So, for example, with looming Euro 6 emissions regulations on the one hand and gradual growth in the popularity of hybrid propulsion systems on the other, engine and vehicle manufacturers have been rising to the challenge. And much the same is behind recent developments with fleet management systems and diagnostic equipment. All of which makes the IAA International Motor Show for commercial vehicles – which opens its doors for a week starting on 20 September – all the more interesting.

Among the largest stands at the exhibition will be those of the vehicle OEMs and none more so than the big German manufacturers MAN and Mercedes-Benz – both of which are promising to showcase a wide range of developments across trucks, buses, coaches, engines and associated services.

Arguably the most compelling draw on MAN's stand will be its hitherto unseen Euro 6-compliant TG truck family (spanning TGL, TGM, TGS and TGX). A new truck design inside and outside, yes, but the real story is

under the skin, with its new Euro 6 common-rail diesel engines. In brief, for trucks and buses, MAN has unsurprisingly implemented a mix of EGR (exhaust gas recirculation) with exhaust after-treatment, in the form of SCR (selective catalytic reduction) integrated in a single-piece unit with continuously regenerating diesel particulate trap filter (DPF) technology. Electronic sensors continuously monitor the absorption capacity of the DPF to control regeneration automatically.

So, gone will be MAN UK's trumpeting of the value of no AdBlue tank – with the new development following its continental European EGR/SCR parentage. On the other hand, the manufacturer claims fuel consumption figures better than its existing Euro 5/EEV equivalent. It also suggests a "substantial" drop in AdBlue consumption to boot, as well as zero weight increase. That said, MAN is coy about the rest, so go to the stand for full details.

Coaches and hybrids

Meanwhile, PSV (passenger service vehicle) operators will have the first chance to see MAN's latest coach, the MAN Lion's EfficientLine – also claimed to offer better fuel economy than its previous incarnation. Powered by MAN's 440bhp D2676 engine, matched to a TipMatic gearbox, the coach's drivetrain is completed by an eco-hypoid driven axle. It's all about efficiency, says the OEM, and operators running the new coaches will also get MAN's tyre pressure monitoring technology and low rolling resistance tyres, mounted on lightweight aluminium rims. Incidentally, the price of this vehicle includes driver instruction by MAN ProfiDrive.

Away from diesel-engined vehicles, MAN says it will also bring an experimental heavy hybrid to IAA. Its so-called Metropolis truck is "designed to handle heavy transport duties in the city without emissions", including noise. Power is provided by a lithium-ion battery, mounted below the cab to maximise space and optimise weight distribution. The battery – charged via the mains – is supported by a down-sized diesel engine from the Volkswagen car division, acting as a range-extender. MAN says this vehicle will enter two years of trials later this year.



excellence

Like MAN, Daimler appears to have plenty to talk about at the Hannover show, too. With arguably its biggest news in 2011 being the unveiling of its Euro 6 engines, at IAA this year Daimler will be demonstrating its new Euro 6 trucks, as well as some additions to its powertrains.

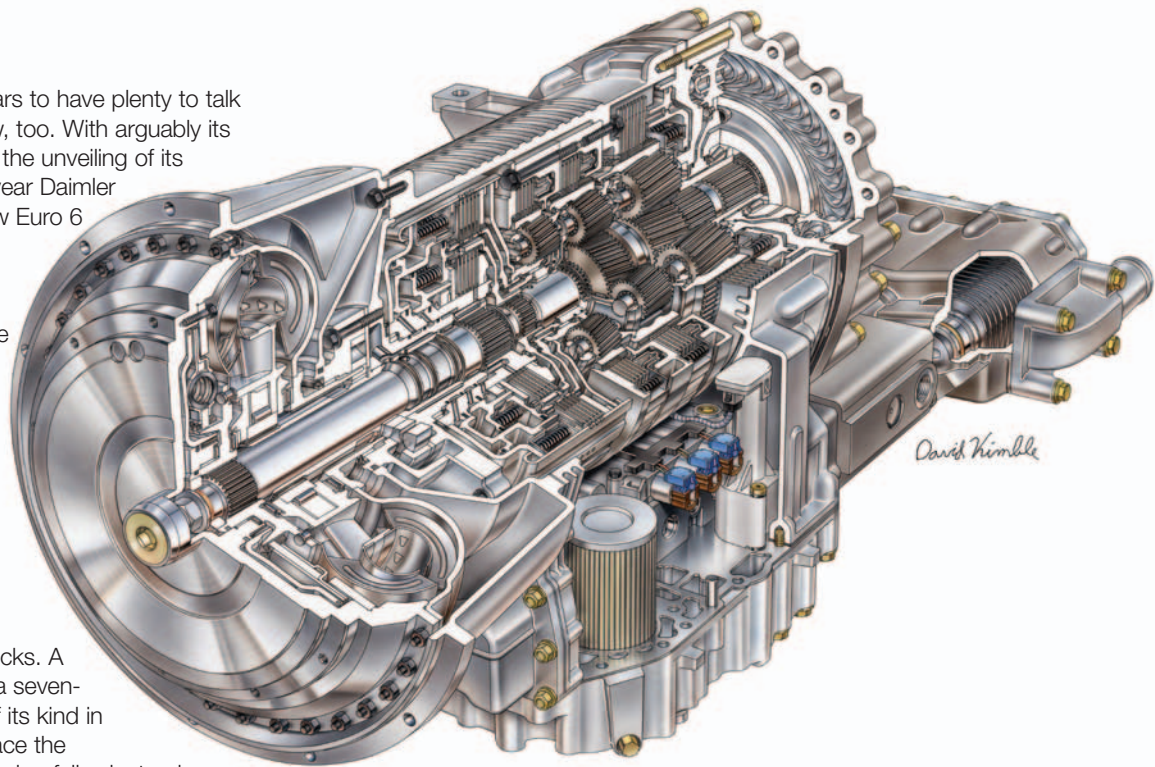
For example, making its debut at the show will be the new Euro 6-compliant Mercedes-Benz Antos. The first truck from this manufacturer designed specifically for heavy-duty, short-radius distribution work, Antos' Volumer and Loader versions are claimed to offer record payload and loading height respectively.

And it's not just about trucks. A Sprinter van equipped with a seven-speed auto box – the first of its kind in the LCV world – will also grace the Mercedes-Benz stand. Featuring fully electronic control, its close transmission ratio in first gear means instant response when pulling away, according to the company. Further, the gearbox's gear ratios also allow the van to operate at low engine speeds during fast driving – hence saving fuel, cutting emissions and reducing noise.

Parts presentations

Looking at vehicle components now, Federal-Mogul is promising a range of technologies to help operators improve vehicle efficiency, and reduce emissions and fuel consumption. One innovation worth looking at is the company's low-friction EcoTough diesel piston skirt coating. Suitable for both light and commercial vehicle applications, this product is based upon the firm's award-winning EcoTough gasoline piston coating, but formulated to meet the demands of heavy-duty and highly charged diesel engines.

Essentially, it's a solid lubricant coating, said to increase a piston skirt's wear resistance, so allowing powertrain engineers to slightly increase the clearance between the skirt and liner, reducing friction and hence also fuel consumption. Currently undergoing trials and development with two engine



manufacturers, the skirt coating is expected to enter production next year.

Elsewhere on the stand, visitors can expect to learn more about Federal-Mogul's latest bearing technology, as well as a hybrid steel-elastomer cylinder head gasket, valve seat and guide material advances, and new friction materials for CV air disc brake pads.

Meanwhile, Continental is promising to bring "the most comprehensive range of truck and bus tyres in its history" to IAA, including its next generation of truck tyres. Again, the company's presence promises

**Allison's H 3000
parallel hybrid**



**MAN's Metropolis
heavy hybrid truck**



Show visitors can learn about the new seven-speed automatic Sprinter, from Mercedes

to major on efficiency and, as well as the products, several services for transport operators are set to be introduced. Continental cites its Conti360° Fleet Services management system and the ContiLifeCycle retreading programme, which includes both hot and cold retreading in ContiRe and ContiTread.

Moving on to tachographs, Stoneridge will be displaying its One Minute Rule digital device, the SE5000 Exakt Duo. Duo technology comes as standard in the new model, giving drivers real-time updates, including drive and rest time countdowns, and warnings when nearing driving limits, helping them to stay legal.

Visitors will also be able to discover more about Stoneridge's OPTAC3 tacho analysis software, already used by enforcement agencies throughout Europe. OPTAC3 is flexible and straightforward, and suitable for both analogue and digital devices.

Drivetrain debuts

If drivetrains are your interest, then Allison Transmission's patented TC10 twin countershaft/torque converter is a must. The firm explains that it delivers the benefits of automation and uninterrupted power to tractor units. Incidentally,

look out for the company's next-generation transmission control system, which promises fuel economy and productivity improvements.

Beyond that, Allison's H 3000, a parallel hybrid system for trucks, will also be introduced. Having been involved in hybrid systems for buses since the 1990s (its H 40/50 EP hybrid operates in more than 230 cities around the world), Allison says it is now keen to see the technology in trucks.

In a similar vein, Eaton Automotive is to feature its latest clutch technology for heavy-duty applications. The firm's patented, cushioned clutch discs for manual transmissions use a ceramic facing, instead of traditional organic materials, making them more heat- and wear-resistant than conventional clutches, according to the firm's trials.

Shifting gears in commercial vehicles that are fully loaded or operating on steep hills, or in other demanding driving conditions can generate extremely high temperatures in the coupling. Eaton's design is said to enhance the friction coefficient, particularly at high temperatures, helping to enable easier shifting and better vehicle control.

The October issue of Transport Engineer will also feature an IAA review, highlighting more of the show's stars as we find them. **TE**

Five of the best from Cummins

Cummins Turbo Technologies (CTT) says innovations on its stand at the IAA show in Hannover are driven by the quest for greater fuel economy, rather than lower emissions, says TE's Keith Read. Many of this manufacturer's products are designed to improve the contribution its Holset range of turbochargers brings to engine efficiency. One even offers the prospect of truck engines without generators, thanks to waste heat being recovered and turned in to electricity.

Five are being prepared for their German debut. Categorized by Jonathan Wood, CTT's executive director of research and engineering, as "all about fuel efficiency", they are: an inverse impeller design; a super map width enhancement collar; roller element bearings; next-generation VGT (variable geometry turbocharger); and a waste heat turbine expander.

Probably the most significant is the latter, which can reduce CO₂ emissions and deliver a 5–6% fuel efficiency benefit – saving an estimated £3,500 a year and offering payback in less than two years. Based on the Rankine Cycle principle (drawing energy from available waste heat), prototype expanders are under development in a £650,000 in-house test cell at CTT. According to Wood, up to 25kW of mechanical power, or 5kW in electrical power, can be recovered from waste heat, with the latter offering the tantalising prospect of more electrical auxiliaries and fewer belts on trucks and/or no generators in the future.

As for the inverse impeller, this has been developed to help meet Euro 6 targets, says Wood. Designed using flow-optimisation software, the impeller is said to improve compressor stage efficiency by 1%. Traditionally, impeller blade geometry has been designed to give required flow conditions. However, with this method the software develops the blade shape, using an optimisation process.

Meanwhile, for post-Euro 6 applications, CTT has developed its next-generation Holset VGT turbocharger for tailoring to customer requirements without re-engineering. The device is also 2kg lighter than its predecessor and has a substantially lower initial cost. Other features include a high-efficiency compressor stage, a new actuator for reduced package space and plumbing, improved sealing and cooling, and a re-optimised variable-geometry mechanism.

It is also compatible with the fourth of CTT's future developments – roller element bearings. By replacing floating bearings with high durability ball bearings, engineers say they have reduced frictional losses, resulting in lower fuel consumption, a 1% improvement in turbocharger efficiency and – important for driveability – enhanced transient response.

The fifth CTT innovation for Hannover is a super map width enhancement collar that improves map width by up to 15%, so enabling engine and vehicle makers to downsize. It is also said to enhance driveability, delay onset of the phenomenon known as 'chattering' and improve fuel economy (and, so reduce CO₂ emissions).