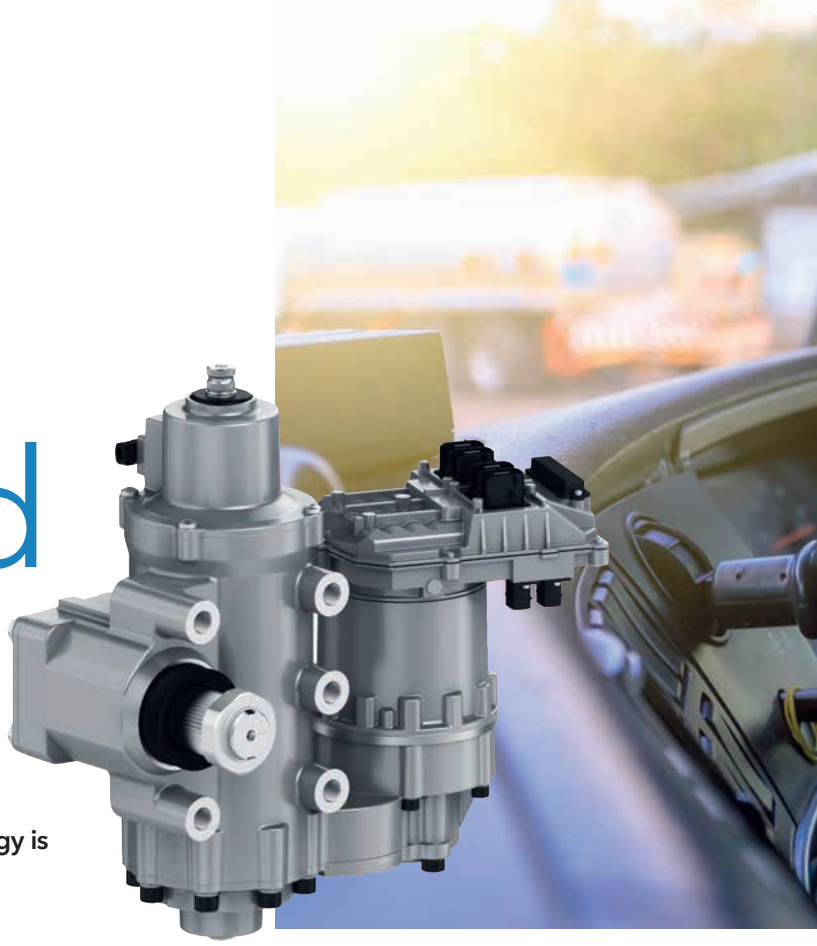
Power and precision



As the commercial vehicle sector moves increasingly towards electrification, electric power steering technology is going to become more important, as was seen at IAA Transportation, writes Dan Parton

At the recent IAA Transportation exhibition in Hanover (see pp22-30) there was much interest in the ZF stand. There, the manufacturer unveiled its advanced electric power steering (EPS) system for trucks, coaches and city buses (pictured above, inset).

EPS provides a cornerstone technology for the commercial vehicle industry's transformation towards electrification, according to ZF. Building on the group's extensive passenger car experience, the EPS is suitable for a broad range of medium- and heavy-duty trucks as well as coaches and city buses. It also provides a building block for the next-generation advanced driver assistance systems (ADAS), which supports the commercial vehicle industry's ambitions towards eventually moving towards autonomous driving.

One key difference of ZF's system to more traditional models of power steering is that it replaces the hydraulic pump with an integrated e-motor, which makes the steering system independent of the vehicle's drivetrain and removes the need for hydraulic fluid and the pump to pressurise it.

ZF's EPS is currently ready for steer-by-wire and, with a redundant architecture, can accommodate future autonomous driving functions up to Level 5, which is full driving automation where no human attention is required. As an active steering system, EPS can integrate with ADAS to support safety functions including, for example, continuous lane keeping.

EPS FOR SERIES PRODUCTION

ZF wasn't the only manufacturer showcasing its EPS system at IAA Transportation. Knorr-Bremse was also present with its own all-electric EPS system. The commercial interest in this system has already been established; in February, it announced a contract to develop EPS systems for series production – a first for the group. Starting in 2025, Knorr-Bremse will supply EPS systems for the entire commercial vehicle fleet of an as-yet-unnamed leading truck manufacturer. The order was said to be worth more than €300 million.

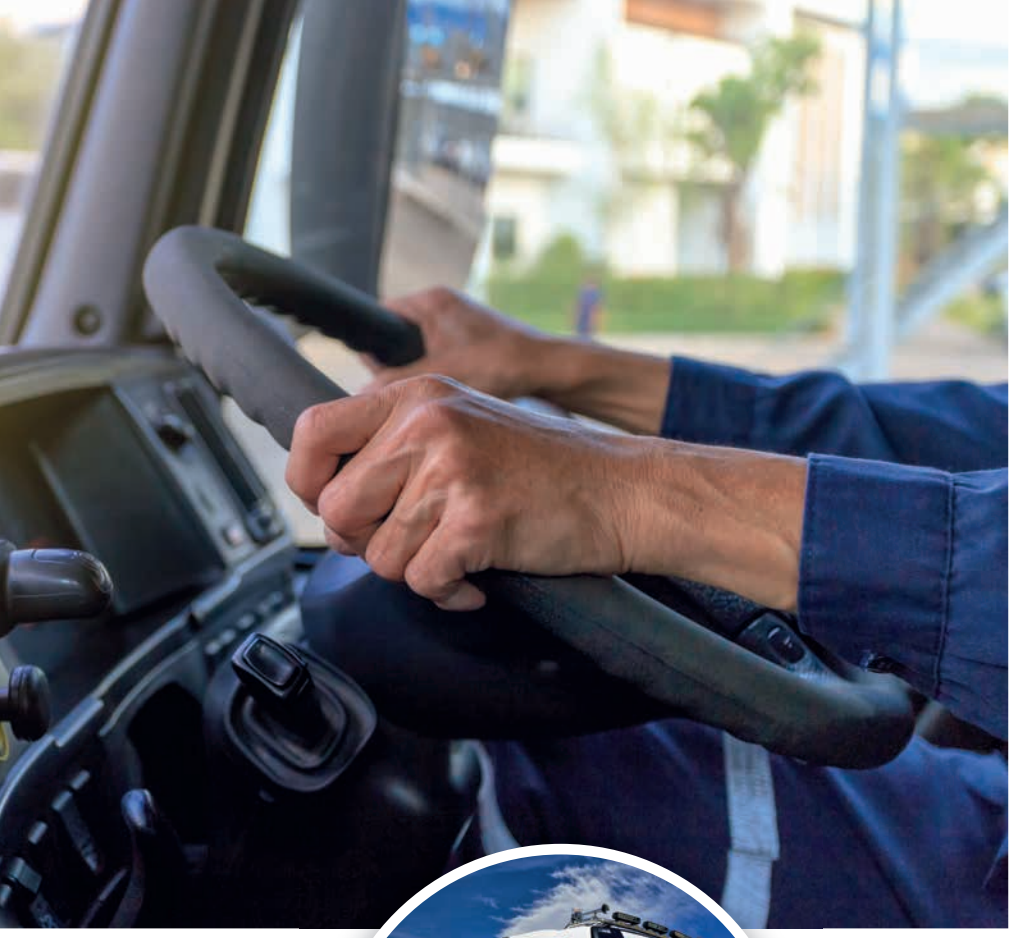
Knorr-Bremse's EPS system is redundant and fail-safe, which helps to enable e-mobility, ADAS and highly automated driving. Similar to ZF, Knorr-Bremse has taken a modular approach for ease of integration and installation.

Knorr-Bremse enhances road safety and driver comfort by including numerous driver assistance functions such as speed-dependent power steering, active lane-keeping assistance and steering-wheel recentring, as well as exceptional – and individually adjustable – steering feedback.

Because EPS works on a power-on-demand principle, the system is said to be capable of significantly reducing fuel consumption and carbon emissions, which makes it attractive to electric and diesel trucks alike. The EPS system also benefits from having core components that have been field-tested many millions of times and meet all the relevant safety and cybersecurity standards.

"Electric power steering is a key enabling technology in two senses: first, as the foundation for advanced driver assistance systems and automated driving, and second, because its power-on-demand principle also enables customers to significantly reduce fuel consumption and carbon emissions," says Dr Jan Mrosik, CEO of Knorr-Bremse AG and interim head of the commercial vehicle systems division. "By specialising in EPS, we're helping our customers achieve the new European CO_2 targets that will come into force in 2025."

Bernd Spies, chairman of the management board of Knorr-Bremse Commercial Vehicle Systems, adds: "We'll start supplying EPS systems



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ANOTHER CONTENDER

Among other developments, the joint venture Schaeffler Paravan Technologies is developing Space Drive, a steer-by-wire system said to open up new design possibilities for vehicle manufacturers. Schaeffler is developing this technology for use in large-series production vehicles with the aim of enabling both automation and remote control of trucks, buses, and freight transport and logistics vehicles. Stated benefits include efficiency, economy and safety. But it does not predict a launch date.

in 2025 as we continue to systematically develop our steering strategy, steadily raising our content per vehicle. Our state-of-the-art EPS will fundamentally change our customer's existing steering setup."

DYNAMIC SOLUTION

Volvo is another manufacturer that has developed its own EPS system, Volvo Dynamic Steering. Jon Comer, Volvo's head of product management at Volvo Trucks UK & Ireland, says there are several advantages of Volvo Dynamic Steering over more traditional solutions. Volvo's system is electrohydraulic, which means an electric motor is overlaid on the hydraulic steering box. "One is driver comfort, as there is less physical stress when load speed manoeuvring," he says. "It is also very useful with high front-axle loads, twin steer or single tyre with a wide single at 10 tonne. And it is ideal for reversing, too."

Comer adds that the dampening of the steering column over rough/undulating surfaces adds to the comfort for drivers. He also emphasises the safety element of the system, which is linked to the lane change system when specified.

Comer adds that Volvo Dynamic Steering is suited to all types of commercial vehicle applications. "However, construction and heavy haulage have more obvious benefits," he says.

Indeed, one fan of the system is Roddy Danabie, operations manager at West Coast Woodfuels, a woodchip fuel provider, who specified his Volvo FH 500 Globetrotter 8x2 tridem truck (pictured, inset) with Volvo Dynamic Steering to help maximise payload, while still being able to get into sites with very limited access.

"It's been specified to go into sites where we know 26-tonne refuse collection vehicles can struggle, yet we can comfortably get in on four axles thanks to careful chassis selection and the wonder of Volvo Dynamic Steering. My driver can literally turn the wheel with his little finger when manoeuvring; it's that easy and makes such a difference."

Volvo Dynamic Steering also has an external steering option. "The system is prepared and an external solution is fitted, which is worked in a similar way to a crane control," Comer says. One of the suppliers used for this is Drimote, a remote control specialist.

Comer adds that electric EPS systems will become standard on trucks across the marques in years to come. "It could be linked to lane departure, but today that is not a legal demand," he notes.

"Watch this space – the benefit of a full electric version is better steering control, less energy loss on vehicle movement, integration with other ADAS sensors leads to improved ADAS controls – automation leading to autonomy."

With increasing moves towards ADAS systems and, ultimately, autonomous driving, electric EPS systems seem set to become more of an industry standard in the future, especially given the stability they can give drivers when manoeuvring in tight spots.

Add in the electric element, which is important as the sector looks to decarbonise and meet stringent CO_2 targets, and these steer-by-wire systems could well be commonplace by mid-decade. TE