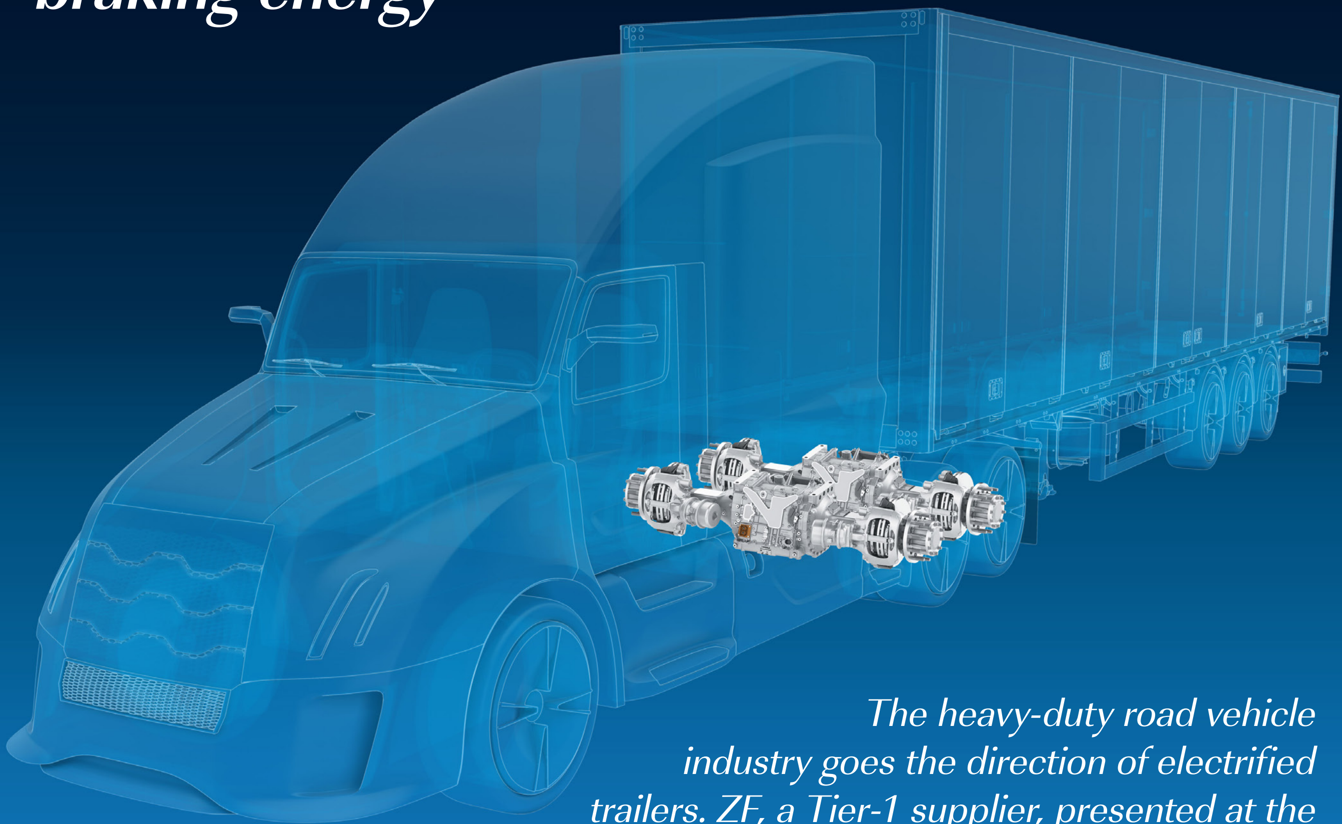
Electrified heavy-duty trailers can recuperate braking energy



The heavy-duty road vehicle industry goes the direction of electrified trailers. ZF, a Tier-1 supplier, presented at the IAA Transportation tradeshow CAN-connectable electronic control units and diagnostic tools for e-trailers.

(Source: ZF)

Integrating an Axtrax 2 electric axle by ZF with a battery and an energy management system in a trailer enables recuperating braking energy. The recovered power can support traction and ease the workload of the primary engine in the truck. This alone can reduce fuel consumption and emissions of a diesel truck by up to 16 percent, stated the German company. Through plug-in charging, these savings could even rise up to 40 percent. Trucks that already have an electric drive can use the additional electric drive on the trailer as a zero-emissions range extender.

The Trailtrax subsystem integrates the ZF 210-kW Axtrax 2 e-axle, the EBS trailer braking ECU (electronic control unit), and the battery system box. Trailer manufacturers such as Kässbohrer as well as Krone and trailer running gear and axle supplier BPW are adopting the subsystem. Kässbohrer presented an electrified trailer with Trailtrax integration at this year's IAA in Hanover (Germany). The system provides driving propulsion as well as brake energy recuperation, generating up to 16 percent in energy and CO_2 savings when combined with an ICE (internal combustion engine) powered truck. The system can also reduce CO_2 emissions up to 40 percent with plug-in charging, claimed the Tier-1 supplier.

Field tests of Kaessbohrer trailers are expected to commence from 2025 across Europe under the ZEFES (Zero Emissions flexible vehicle platforms with modular powertrains serving the long-haul Freight Eco System) project funded by EU. Markus Stegen explained: "At Krone, we believe in the importance of electrification in the context of the transformation of the transport sector and work with our industry partners to harness the potential of electrified trailers." Markus Schell from BPW said: “Every trailer needs a running gear, suspension, and braking technology that can be trusted. With our axles for 7,5-t trucks and ▷

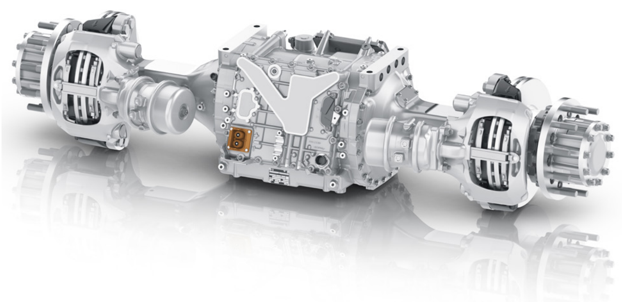


Figure: The Axtrax 2 e-drive platform is part of the Trailtrax subsystem for electrified trailers, which enables the reduction of energy consumption (Source: ZF)

CAN-based truck/trailer link needs to be enhanced

The ISO 11992 standard series specifies parameters for a CAN-based communication between towing and towed road vehicles. This includes parameters and parameter groups for braking, running gear, and other functionality. The application layer is J1939-21 based, but uses a specific transceiver specified in ISO 11992-1. The bit rate is limited to 125 kbit/s. Parameters for electrified trailers are currently not specified. But this is a new feature request, driven by ZF. The ISO/TC 23/SC 31/WG 4 experts are going to enhance the standard series in this direction. In the nonprofit SAE International association, a J1939 task force is evaluating and developing a CAN FD based solution (J1939-17/22) for the truck/trailer link. *hz*

the generator axles for reefers, we already have a lot of experience regarding the integration of electric drives. It therefore makes perfect sense that ZF, with expertise in drivelines, cooperates with BPW to offer a robust and highly engineered running gear solution with the Axtrax 2 axle for recuperation and traction support for semitrailers that can be easily assembled by trailer builders and is fully trusted by the fleets."

The Axtrax 2 platform is offered in two variants: Axtrax 2 with one e-drive and Axtrax 2 dual with two integrated e-drives. Both models are designed to replace the engine, transmission, drive shaft, differential and conventional axle to electrify a commercial vehicle. The platform is an axle-based, integrated system, featuring a compact design to help maximize the available space for batteries. It can be synchronized with other vehicle functions, including braking system, ADAS (advanced driver assistance systems), and automated driving systems. The product enables digital and telematics systems to communicate via CAN and to share e-axle system information.

Besides recuperation, e-trailers make truck drivers' lives easier and transportation more efficient: They enable 80 percent more traction force on slippery ground and improve the acceleration time by up to 50 percent (which is helpful when merging onto the highway or overtaking). When driving up-hill, up to 60 precent recuperation minimizes brake energy heat waste and brake particle emissions.

ZF's [pro]Diagnostics digital service ecosystem for the aftermarket addresses also commercial road vehicles, meaning truck and trailers. It enables independent workshops, tire centers, and fleets to diagnose and calibrate vehicles from different brands. The ecosystem comprises the Go-To tool, which includes the Multiscan trailer software packages, dedicated to diagnose towed vehicles. The integrated database ensures troubleshooting for many models. Equipped with latest communication technology, the ecosystem supports many diagnostic protocols, including diagnostics over CAN FD as specified in ISO 15765-5 and related standards. ◄

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