

Battery boost

Fitting an electric axle to a semi-trailer to provide the tractor unit with a power boost when necessary is not a new idea, but its time might have come, reports Steve Banner

Nearly four years ago, SDC unveiled a curtainsider equipped with a KERS (kinetic energy recovery system) under the UltraBoost ST banner developed by French technology company Adgero. It consisted of an electrically driven axle with a YASA motor/generator plus a bank of graphene-based ultracapacitors sourced from Skeleton Technologies (pictured, opposite).

The motor became a generator under braking, recovering kinetic energy which was stored in the ultracapacitors. The energy could then be released to power the axle, leading to a claimed 25% reduction in fuel consumption.

A Schmitz Cargobull semi-trailer deployed in the €7.9m European Commission-backed Transformers project (see also www.is.gd/qimolo) was equipped with a hybrid drive system with an electric motor and a 22kWh lithium-ion battery. Relying on energy recuperated from the rearmost axle which could be stored and used to drive one of the trailer's axles when needed, it could deliver 200Nm of torque.

Claimed potential fuel saving was anywhere from 4% to 18%, depending

on the terrain the tractor/trailer combination was travelling through, according to Transformers' final report. On the downside, Schmitz Cargobull conceded that at 1.14 tonnes, the weight of the package was a drawback.

Not to be outdone, Montracon came up with a temperature-controlled semi-trailer built in conjunction with International Refrigeration Cooling with a single-axle KERS system used to power a Thermo King fridge (pictured below). CO₂ emissions were said to be down by 50% when compared with a conventional refrigerated trailer.

Such systems can cut noise levels as

well as CO₂ emissions, if they are used to power an electric fridge unit which has replaced a diesel unit, points out Bosch. It has developed a package for trailers which employs regenerative energy from an axle that is fed into a battery used to drive two SMG180 electric motors to give the vehicle extra impetus when travelling uphill. The energy can also be used by the fridge.

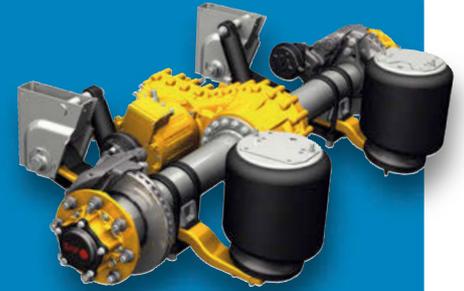
The same motors are already installed in the German postal service's StreetScooter delivery vans and in electric and hybrid cars worldwide, says Bosch. That should help cut costs.

Front-end cost is clearly an issue with systems of this type, which may



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A NEW ALTERNATIVE

In May 2019, SAF-Holland and French car transporter bodybuilder Lohr Industrie formed a partnership to jointly develop AXEAL (AXLe Electric Assist Lohr), which works independently of the tractor’s main drive and supports this during acceleration and braking with energy recuperation. They claim fuel savings of up to 15%. The system includes a differential, a reduction gear and a power take-off coupled to a peripheral, such as a hydraulic pump, which it can drive when the truck has halted.

explain why they have not been more widely adopted. Bosch contends, however, that if its package (pictured opposite) is fitted to a refrigerated semi-trailer then it ought to be able to pay for itself with two years. A diesel fridge unit consumes up to 9,000 litres of fuel annually, it says, which would be saved if the fridge unit went electric. Rebated diesel costs 60.5p a litre in the UK at the time of writing, which would lead to a saving of almost £11,000 over 24 months, plus reduced maintenance costs. Making further use of the power to assist the truck when accelerating away from rest and climbing hills could lead to a 4% fuel saving, Bosch adds.

MAKES SENSE

“Our electrification solution makes economic sense,” argues Dr Markus Heyn, board of management member. “In addition, the electric axle is an important step towards automated trailer parking on logistics companies’ parking lots,” he says. “Adding a powertrain to the axle means that the trailer can be shunted around the parking lot without a tractor.”

Cutting noise levels during loading and unloading is one reason why car transporter builder Lohr has joined forces with SAF-Holland to develop a trailer e-axle. As well as cutting fuel usage by a claimed maximum of 15% thanks to the extra traction it provides, its electric motor can be used to power the trailer’s ancillary systems when the truck is stationary.

This means that cars can be delivered to a dealership early in the morning and late at night without disturbing slumbering householders in nearby residential streets; householders who may also be the dealership’s customers.

Another retarder system on the market helps to safeguard service brakes. An electric retarder manufactured by Spanish firm

Frenelsa, which sells direct to the UK, the system uses a rotor and stator to generate eddy currents opposing motion. Available for truck, coach and bus, the unpowered system is claimed to extend the life of brakes by up to seven times. It can be fitted in chassis, transmission or in trailer axles. However, the system does not store the energy it captures; instead, it is dissipated as heat by the rotor vanes.

Meanwhile, another expert – Lionel Curtis – is aware of the potential of the sort of system outlined above and has come up with some ideas of his own. Still Cartwright Group’s technical director, he has been working part-time for the trailer maker and bodybuilder since the start of 2019. That has allowed him to devote more attention to the independent vehicle engineering consultancy he has set up under the Clairvaux banner. He is busy developing a 200kW electric drive axle for an urban artic semi-trailer, called ZERAUD.

He has also come up with a system called Regen for All that harvests regenerative braking energy from a trailer’s axle to charge a battery pack. Like the system Montracon has installed, it can then be used to run a

fridge or ancillary equipment.

His aim is for the system to be supplied to trailer builders as a complete module including the axle; “it could be offered as an electric steer axle,” he says – brakes and suspension. Both projects are being supported by Innovate UK. Curtis hopes to have prototypes of each by the end of 2020 with the aim of exhibiting them at the 2021 Commercial Vehicle Show.

Innovate expects Clairvaux to match its funding, however. “It will cost £250,000 to get them to the prototype stage,” he observes. He is talking to a number of potential backers. **TE**

