

CONTROL SOFTWARE

## Energy management system for electric commercial vehicles

ZF presented its latest energy management system. The software controls the energy allocation for both the driveline and auxiliary units in electric buses and truck units. This is realized via CAN interfaces.



An electric bus used for testing of the EMS software solution (Source: ZF)

Energy management systems (EMS) control the entire flow of energy in the electrified commercial vehicle. Taking a central role in the electric or electrified driveline, the EMS software solution can control all auxiliary units such as air compressors, steering pumps, and thermal management as well as coordinating the energy requirements of the driveline. This integrated approach can help make electrically driven commercial vehicles more efficient, explained the company: Energy consumption per kilometer can be reduced, resulting in a corresponding increase in range as well as a potentially positive influence on the battery's service life, they added. In addition, according to the company, there are further advantages for maintenance, diagnosis and reduced battery costs. ZF offers the EMS as an add-on to commercial vehicle electric drive systems already in volume production.

The EMS coordinates the correct start-up and availability and interaction of all components in the vehicle relevant for the flow of energy. This ranges from the battery's state of charge to the electric drive and all auxiliary units such as the compressor, DC/DC converter, and heating. Manufacturers also benefit from reduced functional integration efforts, said the company. The EMS uses the electric drive control unit, no additional control units are required. The software controls the units via CAN interfaces. The interaction of the drive and energy management software is perfectly aligned.

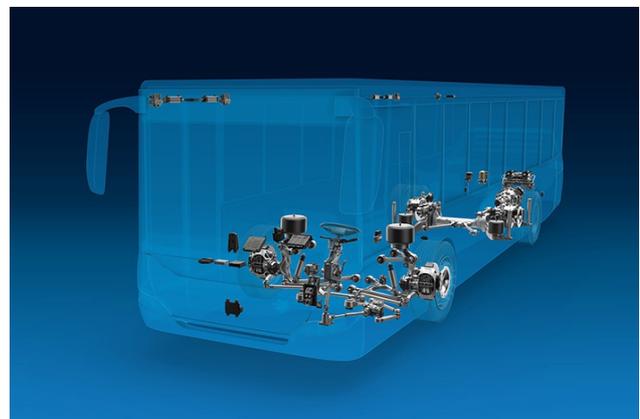
### Systematic overview yields efficiency

"Only such an integrative approach makes it possible to further increase the efficiency of electric vehicles," explained Winfried Gründler, who is responsible for e-mobility in ZF's Commercial Vehicle Technology Division. "This illustrates the strategic importance that software expertise has for our Group strategy: Next Generation Mobility."

Due to the predictive Eprevision function, the software takes the topographical profile of the route into account to coordinate the energy requirements of the consumables. For example, during predictable, long downhill runs, the compressor can operate on recuperated electrical energy. The EMS can also take over charging management at the depot where there are also advantages to predictive functions: If a vehicle is routed via a long downhill run in the first trip after leaving the depot, the batteries are not fully charged - as this recuperation phase has been predicted and taken into consideration.

Should the charging state of the battery decrease during a long journey, the EMS can lower the energy requirement priority of the auxiliary units to extend the range. Since the EMS continuously checks the functional status of all consumables, it enables diagnostics.

"With our system, we are targeting bus and truck manufacturers unable to develop their own EMS or want to use them differently," said Gründler. "Fleet owners such as transport authorities also benefit when only one partner assumes overall responsibility for the energy management of a vehicle."



Benefits of the control software include energy efficiency, battery life, and system integration (Source: ZF)

[CW](#)