

Hybridization in the commercial vehicle: scalable to every application

- Hybridization of the commercial vehicle powertrain as a flexible approach to CO₂ reduction
- Broad diversification: from the 48-volt mild hybrid to the high-voltage system—significant CO₂ reductions are possible
- Systems solutions from MAHLE for all hybrid architectures

Stuttgart, August 28, 2018 – Particularly in the commercial vehicle sector, new regulations concerning the reduction of CO₂ and emissions will be the technological driver in the ongoing development of the powertrain. Even more than in the passenger car segment, the broad spectrum of drive architectures and application areas will produce a rather heterogeneous environment. Hybridization in all its forms is therefore a highly promising avenue. MAHLE offers solutions to technological change, from thermal management to drive motors and power electronics.

The question of whether and in what form electrification will make its entry into the commercial vehicle sector depends, even more than with passenger cars, on the additional costs and net benefit for the relevant application, with legal CO₂ limits and fuel prices defining the framework. When it comes to commercial vehicles, the degree and nature of electrification will be heavily dependent on the actual application.

At the two extremes are purely electric fuel cell trucks and highly efficient vehicles driven by a combustion engine. Between the two is a whole spectrum of various forms of electrification or hybridization of the powertrain.

Hybrid technology offers considerable potential for CO₂ savings, with maximum flexibility in terms of applications: electrification of

auxiliary components, mild hybrid applications with 48-volt drive motors in parallel (recuperation/boosting), high-voltage or serial architectures, and plug-in hybrids (purely electric driving for long distances).

48-volt system: 10 percent less CO₂ in distribution transport

For light- and medium-weight commercial vehicles up to 12 metric tons in distribution transport, MAHLE offers a robust, compact 48-volt drive system with water cooling and integrated electronics, providing a power output of up to 30 kW. Because of the low level of waste heat from the electric drives (boosting/recuperation) connected in parallel, the cooling architecture used for vehicles with a combustion engine or battery can be adapted easily and effectively for this price-sensitive application area.

Consistent use of electrically driven, beltless auxiliary components—such as electric fans, electric air conditioning compressors, or electric main coolant pumps—can produce a total CO₂ savings potential of around 10 percent in urban distribution transport.

High-voltage full hybrid: 5 percent less CO₂ with heavy-duty commercial vehicles

At the other end of the hybrid spectrum, for heavy-duty commercial vehicles up to 40 metric tons, electrical drive outputs of approximately 50 to 100 kW are required, depending on the specific application. High-voltage systems in this segment can achieve a CO₂ reduction of up to 5 percent. Thermal management plays a crucial role in making optimal use of the CO₂ savings potential.

Demand-based soaking of the temperature-sensitive lithium-ion battery is essential. Air conditioning is therefore becoming part of the battery and electronics thermal management. The charge air cooling and air conditioning condenser can be re-cooled indirectly

via a low-temperature coolant cooler. This makes the design of the (two-level) cooling module significantly easier. Thanks to the improved aerodynamics, this also has a positive impact on fuel consumption.

With the Visco[®] hybrid fan drive, MAHLE offers a solution tailored specifically to this application. The MAHLE technology combines the advantages of the Visco[®] drive with the advantages of electric actuation:

- Fan performance controlled on demand
- Electric motor takes over in the event of reduced fan engagement, improving fan efficiency
- Possibility of energy recuperation from the fan
- Possibility of purely electric operation
- Generally improved control behavior thanks to the combination of Visco[®] and electric motor

MAHLE is ready for all hybrid levels

The hybrid drive will be used in all its forms due to the variety of weight classes and load profiles in the commercial vehicles segment—from the mild hybrid with a 48-volt drive to the powerful high-voltage system. One of the main drivers is CO₂ legislation. With its comprehensive product portfolio, MAHLE covers all hybrid systems in the commercial vehicles segment and offers tailored solutions to achieve maximum CO₂ savings.

About MAHLE

MAHLE is a leading international development partner and supplier to the automotive industry as well as a pioneer for the mobility of the future. The MAHLE Group is committed to making transportation more efficient, more environmentally friendly, and more comfortable by continuously optimizing the combustion engine, driving forward the use of alternative fuels, and laying the foundation for the worldwide introduction of e-mobility. The group's product portfolio addresses all the crucial issues relating to the powertrain and air conditioning technology—both for drives with combustion engines and for e-mobility. MAHLE products are fitted in at least every second vehicle worldwide. Components and systems from MAHLE are also used off the road—in stationary applications, for mobile machinery, rail transport, as well as marine applications.

In 2017, the group generated sales of approximately EUR 12.8 billion with about 78,000 employees and is represented in more than 30 countries with 170 production locations. At 16 major research and development centers in Germany, Great Britain, Luxembourg, Spain, Slovenia, the USA, Brazil, Japan, China, and India, around 6,100 development engineers and technicians are working on innovative solutions for the mobility of the future.

For further information, contact:

MAHLE GmbH

Christopher Rimmele

Corporate Communications/Public Relations

Pragstraße 26–46

70376 Stuttgart/Germany

Phone: +49 711 501-12374

Fax: +49 711 501-13700

christopher.rimmele@mahle.com