

Controlled cooling system for heavy-duty commercial vehicles: two percent less fuel consumption.

Tokyo, October 2017 – Thermal management on the coolant side is currently a significant measure for reducing fuel consumption and CO₂ emissions. Such systems, however, have not yet been systematically implemented in series production for heavy-duty commercial vehicles. Thanks to new developments, such as continuous control of the coolant mass flow with a controlled Visco® coolant pump or new possibilities with predictive controls, MAHLE paves the way for new approaches toward efficient, controlled thermal management in commercial vehicles.

Modern fan and pump drives must be controllable

Any unnecessary air delivery leads to increased fuel consumption. The demand-based, E-Visco® fan control—already widely used—supplies only the exact volume of air required at any point in time—and that saves fuel. MAHLE applied this principle to the coolant pump back in 2011, achieving up to one percent of fuel savings, depending on the application.

Map-controlled thermostat

One essential function of the controllable cooling system is electronic control of the coolant temperature using a map-controlled thermostat. The goal is to increase the engine efficiency by optimally adapting the temperature of the coolant to every driving situation. Map-controlled thermostats from MAHLE can be switched very quickly and at low temperatures. Depending on the operating point, such thermostats can achieve fuel savings of up to half a percent in long-haul applications and are scheduled for series production by 2018.

Control strategy

New control strategies can be implemented in conjunction with the map-controlled thermostat, controlled E-Visco® coolant

pump, and E-Visco[®] cooler in order to minimize the power consumed by the cooling system. An intelligent control strategy that covers the integration of these components provides a way to reduce the power consumed by the cooling system over a wide operating range and to lower CO₂ emissions by a total of up to two percent.

Outlook

Another promising approach is to supplement the direct cooling system with an indirect system, where an additional low-temperature coolant circuit handles the recooling of the indirect charge air cooling system. Such a measure can achieve an additional one percent of fuel savings. This circuit can also take over the recooling of the indirect condenser, electric powertrain components, or a two-stage EGR in more complex systems.

With the newly developed Visco[®] hybrid drive, a combination of electric and Visco[®] drive provides optimal coverage of speed ranges in which an electric drive works more efficiently and those where the mechanical drive offers benefits. In transition speed ranges, the electric drive can be used to further accelerate or decelerate the Visco[®] fan. The expansion can also be used to electrically recuperate and store braking energy. Together with a predictive cooling function—a combination of active cooling temperature control and forward-looking cooling function using GPS topography data—another step can be achieved for increasing the efficiency of commercial vehicles.

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 2016, the group generated sales of approximately EUR 12.3 billion with about 77,000 employees and is represented in 34 countries with 170 production locations. At 16 major development centers in Germany, Great Britain, Luxembourg, Spain, Slovenia, the USA, Brazil, Japan, China, and India, 6,000 development engineers and technicians are working on innovative solutions for the mobility of the future.

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