

**Controlled mechanical coolant pump**

Frankfurt, September 2013 – Reaching the optimal operating temperature of a combustion engine more quickly is one of the remaining levers for further reducing CO<sub>2</sub> emissions in vehicles. Keeping the coolant flow at a standstill after cold-starting the engine supports an effective warm-up phase, as the coolant in the engine will not immediately dissipate any heat generated by the engine. MAHLE has developed a hydraulically controlled coolant pump, a system that is attractive due to its simple design.

Shortening the engine warm-up phase by keeping the coolant still leads to direct fuel savings and thus to reduced CO<sub>2</sub> emissions. The simply constructed, robust coolant pump from MAHLE has a low system weight and can be adapted to existing engine cooling circuits.

The coolant can be kept still in various ways with a mechanically driven coolant pump, depending on the installation space conditions for the pump on the engine. With the patented MAHLE valve control, a bell-shaped slider closes the impeller outlet of the pump on demand and completely prevents the flow of coolant. The force required to move the slider is generated by the coolant pressure. For this purpose, the pump housing contains an additional positive displacement phase, which provides adequate pressure for moving the slider, even at low engine speeds. The positive displacement phase is designed as a centrifugal impeller pump and is characterized by a single-piece, robust design. A solenoid valve controls the generation of hydraulic pressure. In normal driving operation with a warm engine, the solenoid valve on the centrifugal impeller pump engages a direct permanent bypass from the pressure side to the suction side, preventing the buildup of pressure for shifting the slider. When the engine is cold, such as after cold-starting the engine, the solenoid valve receives an electrical signal from

the engine control unit and closes the permanent bypass. The centrifugal impeller now generates a hydraulic pressure that acts directly on the valve slider and causes the impeller to be covered. The use of coolant as the auxiliary medium eliminates additional dynamic seals in the coolant pump.

In tests on the component test bench and in the combustion engine, MAHLE has successfully demonstrated the function of the hydraulic valve control. Above a pump speed of 800 rpm, the impeller provides sufficiently high coolant pressure to shift the slider. The measured volume flow rates of less than 0.5 L/min with a fully covered impeller lead to a significant shortening of the engine warm-up phase, thus representing an important contribution to further reductions in CO<sub>2</sub> emissions in passenger cars.

### **About MAHLE**

The MAHLE Group is one of the 30 largest companies in the automotive supply industry worldwide. With its two business units Engine Systems and Components as well as Filtration and Engine Peripherals, MAHLE ranks among the top three systems suppliers worldwide for piston systems, cylinder components, as well as valve train, air management, and liquid management systems. The Industry business unit bundles the MAHLE Group's industrial activities. These include the areas of large engines, industrial filtration, as well as cooling and air conditioning systems. The Aftermarket business unit serves the independent spare parts market with MAHLE products in OE quality.

In 2012, the MAHLE Group achieved sales of nearly EUR 6.2 billion (USD 7.9 billion); approximately 48,000 employees work at over 100 production plants and 7 research and development centers.

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