

MAHLE is making engine components intelligent

- Intelligent engine components from MAHLE monitor operating conditions in real time
- Application as a development tool enables the precise design of cooling and engine components

Stuttgart/Germany, August 01, 2019 – Intelligent engine components are not just a valuable tool for engine developers but could in the future be used as “early warning systems” in engines for monitoring operating conditions and ensuring a long service life. Intelligent bearings from MAHLE keep track of operating conditions in real time, providing an accurate view of the temperature in the bearing. The same measurement method forms the basis for an innovative piston monitoring concept, in which measurement data is transmitted wirelessly and the energy consumption of the sensors covered by the motion of the piston via “energy harvesting.”

When used as a development tool, intelligent engine components from MAHLE facilitate the precise analysis of temperature and pressure conditions for moving components, such as pistons, valves, or bearings. The necessary lubricating oil supply and cooling of engine components can thereby be designed for specific operating points so that no damage results from excessively high temperatures or inadequate lubrication, while allowing the amount of cooling or lubricating oil to be set as low as possible. This avoids any unnecessary friction losses and increases the engine’s efficiency.

By measuring the relevant temperatures and pressures in situ—for example, in the bearing gap of the bearing or in the cooling gallery of the piston—not only can the operating limits of the components be determined more precisely under real conditions, but the engine can be adjusted and calibrated to operate reliably much

closer to its limits without any increase in risk. As a result, previously untapped potential can be used to improve thermodynamic and mechanical efficiency.

To prevent damage to the engine from external influences, such as fuel quality or intake air temperature, an increased safety factor must be maintained in the current design without intelligent sensors. By contrast, a piston with sensors would not only permit higher ongoing utilization, but also prevent a transient overload of the piston in the warm-up phase.

Intelligent engine components from MAHLE are currently used as development tools during engine development. After the successful transfer to large-scale production, use in mass-production engines is also under consideration—on the one hand to exploit the component limits in any engine, and on the other, to enable an emerging damage scenario to be recognized early on and a prompt response triggered.

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 2018, the group generated sales of approximately EUR 12.6 billion with more than 79,000 employees and is represented in over 30 countries with 160 production locations. At 16 major research and development centers in Germany, Great Britain, Luxembourg, Spain, Slovenia, the USA, Brazil, Japan, China, and India, more than 6,100 development engineers and technicians are working on innovative solutions for the mobility of the future.

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