MAHLE

Driven by performance

PRESSRELEASE

Optimization of the combustion engine reduces CO_2 emissions by up to six percent

- Less CO_2, lower emissions—the optimization of the combustion engine benefits footprint and actual operation
- Sustainable impact: improved economic efficiency and carbon footprint thanks to lower particulate emissions

Tokyo, October 2017 – MAHLE proves its holistic systems competence by further tapping the potential of the internal combustion engine. Two approaches for the basic engine are optimizing friction and preventing oil from entering the combustion chamber. CO_2 emissions can be reduced by up to six percent (WLTC) with MAHLE technologies for optimized mechanics and lubrication in gasoline engines. These measures also demonstrate a sustainable impact on emissions and consumption in actual driving operation. MAHLE will showcase specific solutions for the optimization of the combustion engine at TMS2017..

The combustion engine has already developed into a highly efficient and clean drive, especially in the past few years. As a result of this development, the complete system, comprising the powertrain and its peripherals, has become substantially more complex. Therefore, in order to achieve greater efficiency and lower emissions in this system, more and more interactions and relationships need to be taken into account. In many cases, inherently contradictory problems have to be overcome. Thanks to its comprehensive systems expertise, MAHLE has developed technologies that sustainably reduce consumption and emissions.

Reducing friction—less CO_2 in every driving situation

Like waste heat, friction adversely impacts the performance of combustion engines. A decrease in friction has a noticeable effect at every operating point and in every driving situation, i.e., a drop

in fuel consumption. The heart of the engine, the power cell unit (PCU) from MAHLE consisting of piston, piston rings, and piston pin, achieves a direct decrease in friction thanks to optimized clearance design, low-friction surfaces, and a decrease in friction contact surfaces. An increase in specific output with no change to the basic geometric dimensions leads to an improvement in specific frictional loss. However, this requires the PCU components to have a more robust design. The latter consideration conflicts directly with the requirement for low component weight, which also contributes to efficiency. A key element of piston development is therefore topography analysis, which is used to determine at which points less material can be used without jeopardizing robustness. With the direct friction reduction in the PCU, MAHLE can reduce CO_2 emissions by up to 2.5 percent (WLTC). At the same time, MAHLE has designed the new engine components to allow the use of low-viscosity oils and reduce the load on the oil circuit as the pistons require less cooling oil. As a result, the oil pump can be controlled on demand at every operating point. This saves additional fuel, particularly under real operating conditions. Overall, this results in up to six percent less CO_2 emissions.

Fewer particles—sustainable impact

If oil enters the combustion chamber via the piston ring group, oil ash or particulate emissions are produced. With its new generation of oil control rings, U-flex, MAHLE counters this phenomenon in a highly efficient and effective way. The result is a significant reduction in particulate emissions and oil ash, causing the number of particles and particulate mass to decrease. With a particulate filter, fewer regeneration phases are required and less back pressure builds up in the exhaust gas system, thereby improving the carbon footprint over the service life. Motorists also save money as the particulate filter rarely requires maintenance, or can even be operated maintenance free.

Holistic approach, sustainable impact

Thanks to the holistic approach toward the further optimization of the combustion engine, the developers at MAHLE have succeeded in directly reducing fuel consumption and emissions through the use of new engine components. Overall, this results in up to six percent less CO_2 emissions in the WLTC. The reduction in the load on the oil circuit and the opportunity to use low-viscosity oils has a particularly sustainable impact on exhaust gas aftertreatment. In conclusion, vehicles are more economical and their carbon footprint improves over their service life.

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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