

**Coming soon: exhaust gas turbochargers from MAHLE**

Stuttgart, Germany, September 2007 — At the International Motor Show in Frankfurt, MAHLE, the automotive supplier headquartered in Stuttgart, Germany, announces the development and production of exhaust gas turbochargers for gasoline and diesel engines. Series production is scheduled to start in 2010. For MAHLE, one of the globally leading suppliers and systems developers of internal combustion engines, this step constitutes the consequential expansion and complement of its product portfolio. MAHLE will thus offer highly integrated solutions, from intake systems to charge exchange control all the way to exhaust gas turbochargers.

Exhaust gas turbochargers are a fundamental component toward the further development of internal combustion engines with drastically reduced fuel consumption. With such turbochargers, the energy of the exhaust gas is used to supercharge the intake air and supply the engine with a larger volume of air. This technology is a prerequisite for engine downsizing concepts, because, in relation to their performance, turbocharged engines have a lower weight, lower friction, and, particularly in gasoline engines, lower charge exchange losses.

MAHLE has long-standing experience in the development and production of high-load turbocharger components. The subsidiary MAHLE Powertrain even specializes in the development, design, and application of turbocharged engines. MAHLE is presently developing wastegate exhaust gas turbochargers in the engine power class up to 200 kilowatt for gasoline engines and Variable Flow Turbine (VFT) turbochargers for diesel engines with a maximum engine power up to 150 kilowatt. For each application, a variety of sizes is developed to offer the customer turbochargers with maximum efficiency for the respective application.

The new, innovative turbochargers for gasoline engines with exhaust gas temperatures up to 1,050 degrees Celsius in modern engine concepts require heat-resistant materials to operate under these extreme conditions. Such materials include cast steel for the turbine housing and the exhaust gas manifold module, or super alloys based on nickel for the turbine wheel. To meet the increasing demands placed on exhaust gas turbochargers, MAHLE also investigates technologies for the optimization of the overall system. For example, MAHLE has succeeded in considerably lowering fuel consumption at full load as a result of the exhaust gas recirculation technology developed in-house, achieving besides a reduction of nitrogen oxide emissions also fuel savings of up to 15 percent.

MAHLE turbochargers for diesel engines are characterized by the variable flow turbine. The variable turbine geometry of these turbochargers increases the charge-air pressure of the turbocharger even at low rotational speeds and provides higher torque and improved responsiveness of the engine. MAHLE integrates its electric wastegate and VFT actuators in the turbocharger systems as early as in the development phase.

MAHLE employs state-of-the-art simulation tools in the development of its exhaust gas turbochargers, including 1D charge exchange computations, 3D Computational Fluid Dynamics (CFD) calculations, and most recently a combination of the Finite Element Method (FEM) with 3D CFD computation.

The MAHLE Group is one of the 30 largest automotive suppliers worldwide. As the leading manufacturer of components and systems for the internal combustion engine and its peripherals, MAHLE is among the top 3 systems suppliers for piston systems, cylinder components, valve train systems, air management systems, and liquid management systems. With more than 40,000 employees in 110 production plants and seven research and development centers, MAHLE generated sales in excess of EUR 4.3 billion (USD 5.8 billion) in 2006.

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