

**The future is in downsizing**

Stuttgart, Germany, October 2007 — At this year's Tokyo Motor Show, MAHLE, the automotive supplier headquartered in Stuttgart, Germany, will show a new engine downsizing concept as a technology demonstrator. With the new 1.2-liter unit, MAHLE demonstrates its systems competence — and sets standards in downsizing concepts.

In the future, a 3-cylinder gasoline engine of this type will be able to sufficiently power modern mid-range cars weighing approximately 1.6 tons. Compared to 2.5-liter displacement engines common today, this represents downsizing by 50 percent. By cutting the displacement in half, fuel consumption is lowered by more than 20 percent. The advantage of downsizing is that small-displacement engines are operated mainly in upper load ranges, where the engine's efficiency is high.

In its variant with double supercharging, this power unit developed by MAHLE Powertrain in Northampton, UK, achieves 120 kilowatt, or 163 horsepower per liter. "The high power output per liter was, among other things, made possible due to the contribution of innovative components by all MAHLE product lines. As a result, this engine is state of the art in all respects," explains Prof. Dr. Heinz K. Junker, Chairman of the Management Board. MAHLE is therefore able to offer its customers individual solutions for every conceivable application.

The unit was presented at the recent IAA in two different supercharging models (single and double supercharging). In addition, the cutting-edge technology includes forged pistons, two overhead composite camshafts, four valves per cylinder, direct injection, air-water charge cooling, exhaust gas recirculation cooling, which reduces fuel consumption at full load, injector tip cooling, dual camshaft adjustment, and cooled lightweight valves. Another

technological highlight is the fully integrated intake module, which accommodates the oil mist separator, air filter, noise damping, and exhaust gas recirculation.

To consistently minimize fuel consumption, frictional loss was also drastically reduced. The engine concept, for example, uses DLC-coated (DiamondLikeCarbon) piston pins, cylinder running surfaces coated with NIKASIL<sup>®</sup>, and PVD coated (Physical Vapor Deposition) piston rings.

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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