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New BMTS exhaust gas turbocharger for gasoline engines in series production at Volkswagen

Frankfurt, September 2013 – The first exhaust gas turbocharger developed by Bosch Mahle Turbo Systems (BMTS) for passenger car gasoline engines has been successfully launched in the market. The turbocharger is part of the new 1.2-liter four-cylinder TSI engine from Volkswagen—and thus in a typical downsizing engine that has a high production volume due its use in the modular transverse matrix in many brands within the Volkswagen Group.

With this order, the successful launch of the turbocharger with variable turbine geometry (VTG) from BMTS in one of the most important diesel engines of the Volkswagen Group, the 2.0 TDI, is followed by a high-volume engine in the segment of highly efficient gasoline engines.

The efficiency of conventional combustion engines will be crucial in determining energy consumption and thus CO₂ emissions in transportation well into the next decade. This means that more and more compact engines where high tech compensates for lower displacement and a reduced number of cylinders will permeate the market to a significant degree. Turbocharging is one of the key technologies of the modern combustion engine for reducing consumption and emissions values and thereby staying below the strict limits for fleet fuel efficiency. At the same time, it represents a critical technology to continue improving the performance and characteristic of the engine. Only with its contribution can engines with lower displacement or a reduced number of cylinders efficiently reach higher specific output levels while simultaneously meeting the elevated requirements for comfort and performance.

With the identical design, the turbocharger covers two engine applications and is used in both the 63 kW and 77 kW power level variants. In the 1.2-liter TSI engine, the exhaust manifold is integrated in the cylinder head; the turbocharger is thus flange-mounted directly on the cylinder head. The exhaust flow measures up to 950°C when it strikes the turbine wheel, which is

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made of the heat-resistant material Inconel. A water-cooled bearing housing moreover ensures that the turbocharger continuously withstands the high stresses.

In addition to durability, the responsiveness of the turbocharger is of particular importance. Only if it can put to efficient use even the low exhaust volume flow at low speeds, can the engine get enough air to raise the torque at an early stage. This so-called low-end torque enables the engine operating points with lower consumption in the lower speed range to be used more frequently in actual operation and allows earlier shifting to the next gear. The average engine speed and consumption is thus reduced in actual driving operation. For example, for the 63 kW variant of the 1.2 TSI engine, the maximum torque of 160 Nm is available as low as at 1,400 rpm.

The good responsiveness of the new BMTS turbocharger for gasoline engines is determined partly by design solutions, such as low-friction floating bush bearings and the design of the turbine blade geometry, which yields particularly high efficiency. However, simulations in the early phases of development are also critical. In addition to efficiency and durability, other significant aspects are calculated and tested in advance, such as the acoustic behavior of the turbocharger.

Its precise function and highest quality level can be achieved only with high-precision, modern production. At its St. Michael/Austria location, BMTS has constructed new production facilities. Many innovations were introduced here to contribute to a new benchmark in terms of quality and technology. For example, the impeller is milled, thus considerably reducing the inherent imbalance. This effectively reduces pulsation noise from the turbocharger and produces a high level of comfort. Such precise manufacturing also forms the cornerstone for outstanding long-term quality.

The end-of-line test is a world first. At the end of the production line, production parameters and balancing values are verified via a fully automated process and the functional capabilities of each individual exhaust gas turbocharger are confirmed. All data is stored separately for each component. In case of tool failure in the production process, the reaction is immediate and the affected parts can be traced back and quarantined, which allows the reliable processing of complaints.

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About BMTS

Bosch Mahle Turbo Systems is the joint venture of Bosch and MAHLE, with a strong understanding of the complete system for combustion engines and outstanding know-how in development and large-volume production of engine parts and components. Founded in 2008, the joint venture between Robert Bosch GmbH and MAHLE GmbH currently has 400 employees at the locations of Stuttgart and Blaichach in Germany, and St. Michael in Austria.

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