Press Information

The new Horex engine

Sovereign power from a VR6

An exceptional motorcycle demands an exceptional engine. The new Horex delivers smooth acceleration powered by a 1200 cc supercharged six-cylinder. Thanks to the VR cylinder layout patented exclusively by Horex for two-wheeled vehicles, the powerhouse is extremely compact measuring a mere 429 mm width at the cylinder head. At the same time, the VR6 offers a remarkably wide engine speed range with plenty of power well below the redline.

The radically new design of the new Horex six-cylinder VR engine can be described quite rightly as a milestone in modern motorcycle engineering. The Horex VR6 was developed based on a patent held by company founder Clemens Neese for implementing this engine concept in a two-wheel vehicle. The new Horex is currently the world's only motorcycle engine that uses this space-saving cylinder configuration. Horex is also ahead of the game when it comes to supercharging. There is no other series production motorcycle on the market today equipped with a direct-driven radial supercharger.

Compact and powerful

Foremost among the new Horex technological innovations is the VR6 cylinder arrangement, something that in the past was only available with car engines. Basically, the VR concept combines

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the advantages of a 'Vee' formation and an inline engine with cylinders arranged in a row (hence "VR"). The VR is similar to a Vee engine with two cylinder banks placed very close together in a staggered and offset arrangement. The very narrow cylinder angle (15° for the Horex VR) and the mirrored offset make the engine almost as narrow as a conventional in-line engine (but much shorter).

The Horex engine designers were right: With a width of only 429 millimeters measured at the cylinder head, the VR6 is as narrow and compact as many four-cylinder motorcycle engines. The small dimensions of the VR engine enable Horex to build a bike that is extremely compact, while delivering a very wide torque range and power band with remarkably smooth acceleration. In other words, all the advantages of a six-cylinder engine.

Optimized down to the finest details

Designing a VR engine capable of meeting the demands of motorcycle engineering involved several years of development work. This took place in close cooperation between the Horex team and the University of Munich. "We have been working on the VR6 engine under a contract with Horex since 2005," says Prof. Dr. Martin Doll, Director of the Institute for Internal Combustion Engines and Vehicle Drivelines at the University of Munich. "We started out with simulations and single-cylinder test engines to establish the ideal parameters for cylinder angle, degree of offset, porting and other factors. It soon became obvious that we would have to design this type of a motorcycle engine virtually from scratch to get an optimum result in terms of power efficiency and compactness. Consequently, only the basic principle of the new Horex engine is comparable with the well-known automotive engines developed by Volkswagen." A lot of engineering knowledge went into designing the cylinder head.

This is because the ports had to be symmetrical and as straight as possible to ensure maximum power output. At the same time, the specifications for engine height and width were extremely tight. Initial dynamometer testing demonstrated the value of the overall engine layout. "Even we were surprised by its performance and torque potential," Doll explains.

Triple overhead cams

The solution developed for the cylinder head features intricate details and a clear basic construction. Due to the Vee formation of the cylinders, the pistons for the Horex engine are designed with slant heads. This allows for an arrangement of all six combustion chambers on a single plane. Two intake valves and one exhaust valve are positioned in a radial array around the central spark plug. This design maximizes power output. The valves are operated by three parallel camshafts mounted in the head. The center camshaft operates the exhaust valves in the rear cylinder bank as well as the intake valves in the front row of cylinders. The Horex TOHC (Triple Overhead Camshaft) concept is absolutely unique in modern motorcycle engineering.

The symmetrical port configuration between the cylinder banks positions all six intake ports in straight, parallel rows. Air is supplied through an air box centrally mounted above the engine. The air flows through a supercharger located behind the cylinder banks. This efficient and aesthetically compelling solution requires no additional airflow elements. The precisely controlled charge air is regulated by a central throttle on the airbox input. This eliminates the need for the complicated and troublesome synchronization of six separate air intakes.

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Air power: The supercharger

Ultra-modern and extremely compact, the radial supercharger handles "respiration" chores for the new VR6 engine – and adds more power and torque. Its basic functioning is similar to a turbocharger, with the main difference being that the radial supercharger is driven by a gear/belt combination connected to the crankshaft instead of forced air through the exhaust system. This means that the supercharger is always ready to provide the required boost without a trace of "turbo lag." The intercooler integrated into the engine's cooling system assembly on the new Horex provides a cool mixture for maximum performance. This is an ideal solution when it comes to aesthetics and space-saving design.

Combining a compact VR engine design with a supercharger gives the new Horex a power unit that is unlike any other in today's motorcycle world. It merges an extremely wide RPM range with efficient combustion and exceptional power to deliver outstanding performance at relatively low engine speeds – an ideal way to enjoy the ultimate in riding pleasure with the new VR six-cylinder bike made in Germany.

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