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# TURBOCHARGERS IN CHINA

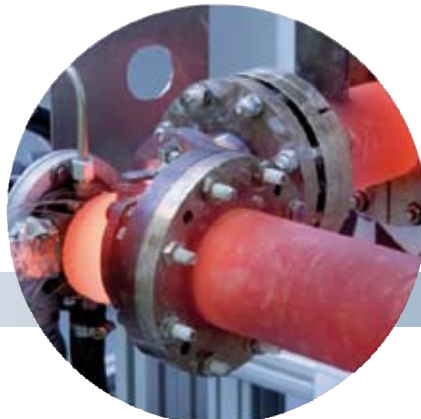
With the emphasis now on downsized engines, a leading Chinese Tier 1 supplier is bringing to market its own advanced turbos

■ **Turbocharger technology** was first used in China in the 1950s. These systems initially relied on technological expertise from Russian companies, but by the 1980s, when the manufacturing technologies of KKK and Holset were introduced, the turbocharger sector in China began to change. After more than 30 years, it had gone from having a military purpose to a commercial application. Nowadays, the gap between China's turbocharger enterprises and world-renowned enterprises such as Garrett, Holset, and BorgWarner is increasingly narrowing.

For mid- and low-end products, Chinese and foreign enterprises are almost on a level playing field – and this increasingly applies to high-end products as well. Chinese suppliers have made remarkable progress on key technological aspects, such as variable geometry systems, high-pressure ratio impeller manufacturing technology, sequential turbocharging, and two-stage turbocharging. All this is proof that Chinese suppliers are now, at the very least, keeping pace with modern development trends. The introduction during the early 1980s of

internationally famous OEMs such as Cummins, Deutz, Iveco, and Styer has served to greatly increase China's production of automotive components, and particularly of turbocharging technology.

With more of the world's leading companies establishing factories in China, the application of turbocharging technology has advanced at a rapid pace. This includes basic research focusing on backward bent design, the manufacture of compressor impellers, the technological application of silicon rubber molds, mathematical model building and the calculation of wheel-shape design and test and software development regarding the three-dimensional flow field, the critical shaft rotation speed, the natural



vibration frequency, and the oil whirl and shafting vibration.

As the emissions requirements for the engine increase, the development of variable geometry technology has also started in China. At present, its variable geometry technology is in its third-generation stage, and has been synchronously developed and designed in line with the development of engine technology, to optimize the matching.

Chinese OEMs and suppliers have already succeeded in developing other powertrain technologies such as ball bearing, titanium fusion casting of high-speed centrifugal impellers, and the creation of titanium-aluminum alloy turbine wheels.

According to preliminary statistics, China's turbocharger market reached three million units in 2008. This year, when the Chinese automotive industry marks its full-scale entrance into the EURO 3 legislation era, the total turbocharger sector in the country is scheduled to exceed four million units. The rise of independent Chinese turbocharger enterprises means there is likely to be fierce rivalry between local brands and foreign suppliers in this blossoming business area.

As a pioneering turbocharger enterprise in China, F-Diesel is one of the main players in this sector. Its engineers are carrying out synchronous development with multiple motor factories. It is estimated that the first electronic-control turbocharger with independent Chinese intellectual property rights will roll out of an F-Diesel factory by the end of 2009. As a company, F-Diesel is dedicated to the international promotion of Chinese turbocharger technologies, and to further research and development. **ETI**

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