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“Rightsizing” A Strategic Customer Interest

Specific powers of 150 kW/l or more are possible with today's turbocharged spark ignition engines. The limit is not yet in sight. This is uninteresting for the majority of automobile customers, however the same technology allows the creation of engine concepts with minimal fuel consumptions of less than 200 g/kWh. Engine development has reached a turning point!

Opel's introduction of turbocharging for fuel consumption optimisation occurred unusually with a sports car, the Opel GT. By producing 194 kW und 353 Nm from a 2.0 l displacement, the GT's engine was catapulted among the leaders in specific power output in 2006. Thanks to the combination of exhaust gas turbocharging, direct injection and variable intake and exhaust camshafts all the technical features of a fuel-efficient contemporary engine were included. After consideration, the selection of the GT is not as curious as it may first appear. Such vehicles are often used to ensure new technologies are mature enough for high volume applications. These technologies have been introduced step-by-step by Opel in all segments down to the 1.0-l Ecotec Direct Injection Turbo three-cylinder engine and at the same time optimised and adapted for today's requirements with respect to exhaust regulations and CO₂ targets. The focus always remains on a broad customer use.

With the introduction of tightened CO₂ targets, increasing electrification, new emission limits and changes to the test cycles with relation to vehicle speed and ambient parameters, we are standing at the above mentioned turning point. The relevant operating points are pushed to higher loads; therefore efficiency improvements at middle and high mean pressures will be in focus for future developments. The deployed technology packages will be expanded. The development of knock resistant combustion processes and the use of integrated exhaust manifolds will win more importance. Combustion processes according to Miller and Atkinson will improve the fuel efficiency, and in parallel reduce the maximum possible mean pressure. In order to offer the same performance in the future either slightly increased displacements are necessary (Rightsizing), or additional technologies such as cooled exhaust gas recirculation, variable valve train systems or even systems to enable variable compression ratios will be required.

In the interests of the end user, the differences between certification and real-world fuel consumption will reduce in the future. After continuous “Downsizing” the Opel customer can now expect “Rightsizing”, which is about optimisation, not maximisation!