One for All

Catalytic converters for petrol and diesel engines

Petrol and diesel drive concepts, which have so far been fundamentally different, are steadily converging. The newly combined combustion engines have also become known as DiesOtto engines and work on the basis of homogeneous compression ignition (CAI/HCCI). Manufacturers have demonstrated that it is possible to use a single engine type for both drive concepts in their new four-cylinder models. Exhaust system components have been similarly harmonised for quite some time. A Sensorkat™ with a lambda sensor can be used as the main catalytic converter for petrol engines or, fitted with a temperature sensor, it can be used as an oxidation catalytic converter (DOC) for diesel engines.

Selective catalytic reduction (SCR) uses a catalytic converter to eliminate the pollutants. EMITEC Gesellschaft für Emissionstechnologie mbH from Lohmar supplies turbulence-generating catalytic converters for direct injection petrol engines as well as diesel engines.

Electrically heated catalytic converters (EHC), which were developed by EMITEC 20 years ago and brought into series production for use with petrol engines at that time, are now for the first time also available for diesel engines. Since diesel engines generally produce much lower exhaust gas temperatures the EHC has to maintain the catalytic converter operating temperature at an optimum level during certain driving cycles (e.g. start/stop phases). EHCs also reduce CO₂ emissions from both petrol and diesel engines.

In accordance with fluid dynamics most catalytic converters will always produce laminar flow because their long, thin cell walls rectify any turbulence that is present at the inlet. To counteract this, EMITEC’s engineers added turbulence-generating flow profiles to METALIT® catalytic converters. These converters, which are made from thin, corrugated stainless steel foils, contain differently shaped profiles, including channels with longitudinal or transverse structures (LS = longitudinal structure; TS = transverse structure), which break up the laminar boundary layer and so cause turbulence. The resulting higher rate of mass transfer helps to increase catalytic converter efficiency by up to 40%. Alternatively, catalytic converters can be made much smaller,
which not only saves space and reduces pressure loss but also leads to a corresponding saving in the amount of expensive precious metals.

Perforated metal foils with a PE-Design® (PE = perforated) for petrol engines have proven to be particularly innovative and highly effective in many series production applications. In addition to turbulent flow conditions, the PE structure also allows gas and mass transfer between adjacent channels for the first time. In practice, this makes it possible to build smaller and more efficient catalytic converters with less pressure loss (= better engine performance) and lower CO₂ emissions.

PE catalytic converters have, for example, been used in the Mercedes Gullwing SLS, the Audi RS4 and the Bugatti Veyron, VW’s high performance sports car. The 3-litre V6 turbo petrol engine of the new Maserati Ghibli is also going to have one main catalytic converter with a PE structure for each cylinder row. The VW Group takes advantage of the very small size of the LS structures and uses them as “turbulent” DOCs in all their four-cylinder common rail diesel engines for compacts and subcompacts. Turbulence-generating catalytic converters currently account for over 50% of Emitec’s deliveries and their share is steadily rising.