The Battle Against Crowded Engine Compartments

Compact catalytic converters allow engineers to build smaller powertrains

There may be room in the smallest cottage but in modern vehicles there is little space left under the bonnet. Often this is not only a thermal issue but it also makes servicing and maintenance difficult. If you have to take out the entire engine to change a headlamp bulb or LED light, you’ve got a big problem.

EMITEC Gesellschaft für Emissionstechnologie mbH from Lohmar near Cologne has been advancing the construction of particularly compact yet powerful catalytic converters and other exhaust system components since it was founded. The company’s METALIT® metal substrate catalytic converters have always outperformed ceramic models in terms of efficiency, size, robustness and often also system costs. Because ceramic catalytic converters have to be extruded in a complex process while metal catalytic converters “only” have to be wound and brazed, the latter offer far more design freedom. A particularly small catalytic converter had to be developed for a major car manufacturer and the design freedom ultimately led to the construction of the compact catalytic converter.

Compact catalytic converters are conventional cascade metal substrate catalytic converters. The exhaust gas first passes through the converter before the clean gas flows around its outside. The advantage of this design is that the inlet and outlet can be positioned on the same side and virtually in one plane. Unlike conventional systems, the exhaust gas no longer has to flow through the catalytic converter and the pipes to the underbody and then the rear silencer at the back of the vehicle. Since the inlet and outlet are on the same side, the additional length of the catalytic converter does not have to be factored into the layout of the exhaust system. The catalytic converter can be installed in any position. In a well-designed system compact catalytic converters cause even less pressure loss than conventional solutions.

The system’s great installation advantages are surpassed only by its flow and thermal properties. The hot exhaust gases flow around the catalytic converter jacket, heating the edge more quickly and keeping the areas near the edge at a constant temperature under any
conditions. Modern diesel engines produce very low exhaust gas temperatures. However, temperatures must not be allowed to drop below the light-off point of the catalytic converter. Compact catalytic converters are ideal for these applications because they substantially reduce the big temperature difference between the centre and the edge of the catalytic converter, which can be 30 °C or more in conventional systems. It also prevents the catalytic converter from cooling too much during deceleration and so provides for particularly effective emission reduction at all times.

Compact catalytic converters include turbulence-generating METALIT® catalytic converters, which are up to 30% more efficient than conventional smooth metal or ceramic catalytic converters. As a result, the size of the catalytic converter can be reduced, in some cases by a significant extent. Compact catalytic converters are an ideal solution, especially for diesel engines where the catalytic converter should or must be flanged directly onto the turbocharger. This innovation is also likely to be very useful for other close-coupled applications because there is usually very little space in the engine compartment. Many well-known car manufacturers, including Volvo and VW, are already fitting compact catalytic converters to their vehicles as standard and many others have made firm plans to use them in future applications.