Press Release **64th IAA September 2011**

Heated catalysts, the solution to future emission problems

Hybrid vehicles, electric cars using combustion engines as range extenders, state-of-the-art diesel and direct injection petrol engines have one thing in common, they all produce increasingly lower exhaust gas temperatures. These modern vehicle and engine designs will have to rely on electrically heated catalysts in future. Catalyst temperatures often drop below the light-off range because of start/stop systems, the intermittent operation of compact combustion engines or the more effective conversion of combustion energy into mechanical driving power. Separately activated heated catalysts are able to dramatically reduce emissions during the start phase and during normal (intermittent) operation.

By the mid-nineties, the Emicat had already been developed ready for series production as part of a joint project between EMITEC Gesellschaft für Emissionstechnologie mbH in Lohmar near Cologne and the German automotive industry. Emitec was the world's first, and is still the only, manufacturer of catalytic converters, who was able to mass-produce an electrically heated catalyst back then. This innovative technology was first used in the Alpina B12 5.7. BMW AG soon followed suit and fitted its 12-cylinder engines with heated catalysts as standard. This enabled both manufacturers to cut emissions to well below the limits that applied in Europe, Japan and the US in 1996. Since then, the Emicat has been continuously refined, making it available immediately for future applications.

A comparison between widely used engine-based catalyst heating and electrically heated catalysts turns out very much in favour of the Emicat, which makes more efficient use of fuel and reduces raw emissions. The heated catalyst is installed directly in front of the main catalyst to avoid long flow paths and the resulting heat loss. The Emicat is able to save up to 65 percent of fuel and a corresponding amount of CO_2 emissions at individual operating points.

The additional costs for heated catalysts can be more than offset. The greater efficiency of systems consisting of a heated catalyst and a downstream main catalyst allows the volume, and the precious metal loading of the catalyst, to be substantially reduced. The Emicat has little impact on the electrical system of modern vehicles with their innovative electronics and, where applicable, recovery systems (e.g. brake energy recovery). A recent Emitec development, the thermoelectric generator (TEG), actually produces excess electric power. The E-catalyst is able to convert the CO_2-neutral energy that is available during deceleration into usable heat. A combination of heated catalysts and start/stop systems is particularly advantageous because it prevents the catalyst from cooling. As a result, there is no longer any need for fuel-consuming engine-based heating during idling phases.

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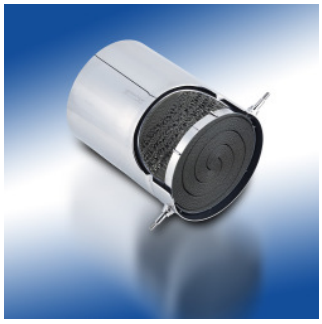
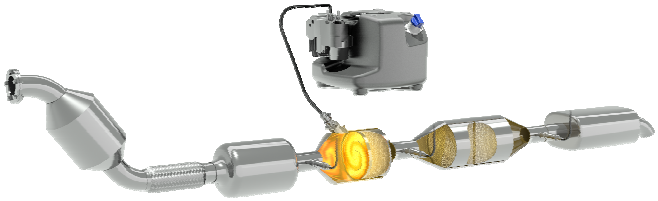
Petrol engines produce very small, mostly invisible particles. Direct-injection petrol engines emit more of these particles during cold starts because the engine burns more fuel to heat the catalytic converter more quickly. Heated catalysts obviate the need for engine-based heating and also substantially reduce soot emissions. So emissions and fuel economy are improved at the same time. In SCR systems, the Emicat ensures optimum evaporation of the injected urea thus increasing the effectiveness of the SCR catalyst. Heated metal catalysts, with a power rating between 1 and 3 kW, not only raise the operating temperature in passenger cars by up to 100 °C (or a crucial 20 to 30 °C in commercial vehicles), but also initiate NO_x conversion at a much earlier stage by injecting the AdBlue urea solution onto the hot E-catalyst. Emitec's electrically heated catalyst will be an indispensable addition to diesel engines because of stricter future emission limits.



Heated catalyst



E-SCR system

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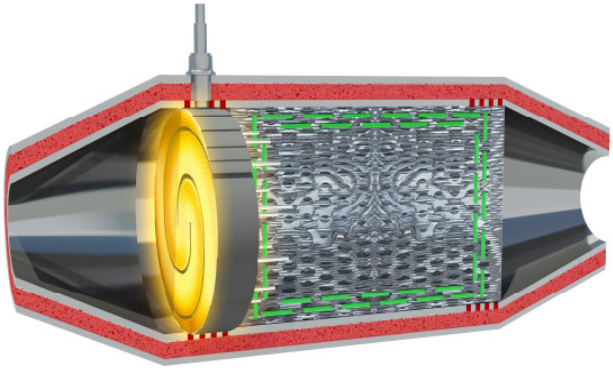

Range extender

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