



HJS Product Training

Tuning catalysts - 2016

1. Catalyst - function

2. Catalyst - technology

3. Intergral - insulation

4. Summary

1. Catalyst - function

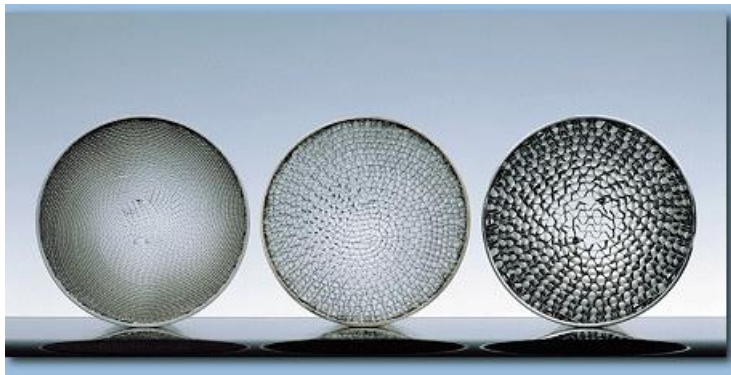
1. Catalysts - function

The base of each catalysts is a honey comb structure produced from:

- ceramic
- metal

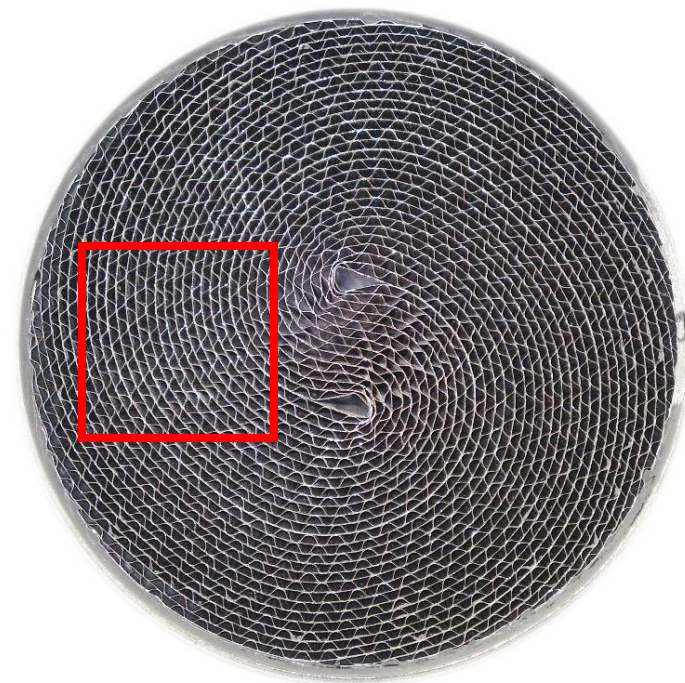


The honey comb structure maximizes the exhaust flow (off) area; this leads to the best catalytic function possible.



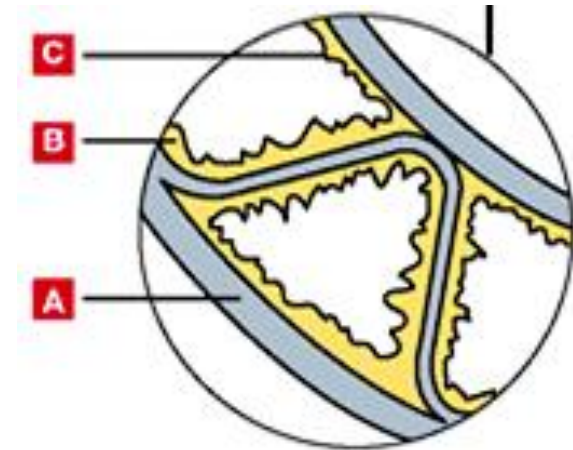
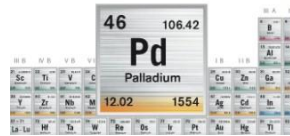
The structure has different density; measured in cells per inch² (cpsi).

2,54 cm x 2,54 cm



1. Catalysts - function

Washcoat and coating



The substrate structure (A) is coated with a highly porous ceramic coating known as the "washcoat" (B).

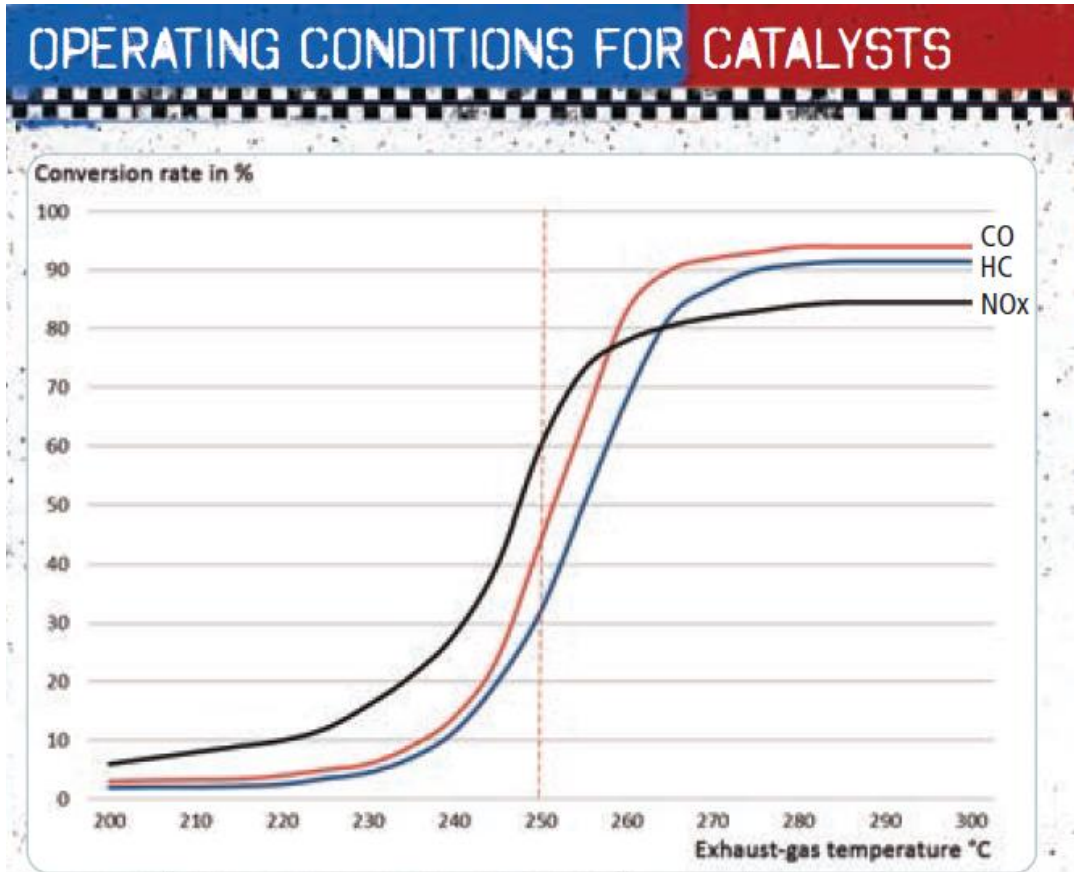
This washcoat massively increases the active surface area of the catalyst (by a factor of 7,000!).

Suspended and finely dispersed in the washcoat are the precious metals platinum, palladium and rhodium (the load, (C)).

The effectiveness of the catalytic process depends very much on the quantities and the ratio of the three precious metals, and on the chemical composition of the washcoat.

HJS's washcoat is characterized by its excellent ability to store oxygen and it is specially stabilized in order to minimize thermal and other ageing effects.

1. Catalysts - function



Catalysis begins when exhaust-gas-temperatures are greater than 250°C. A catalyst achieves its optimum efficiency in a temperature window between 400 and 800°C.

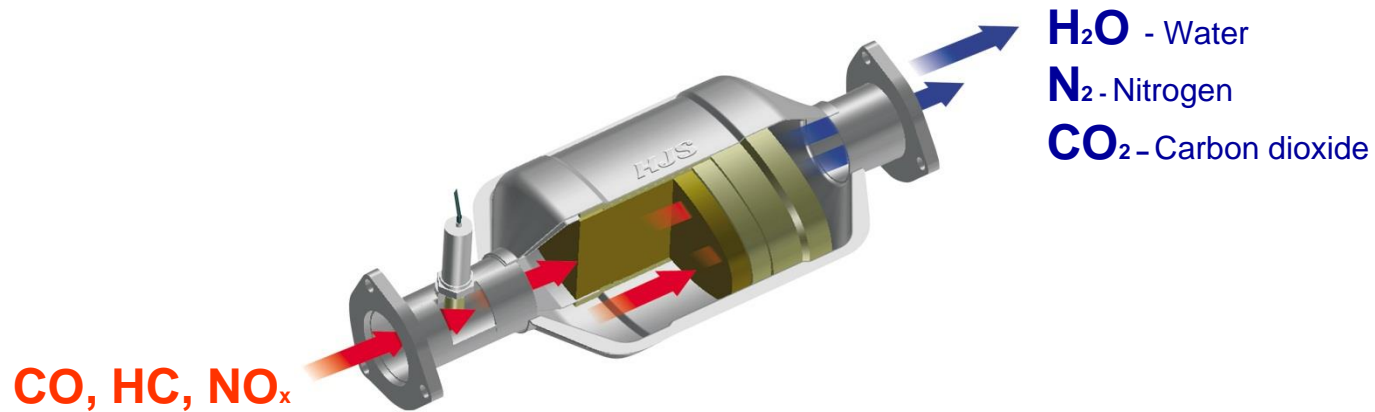
Catalysts are most efficient when $\lambda = 1.0$, that is, when the air-fuel ratio is 14.7:1 (with 95 RON petrol).

1. Catalysts - function

As a result of the incomplete combustion of fuel in the engine:

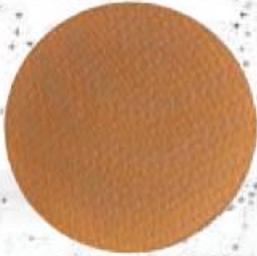
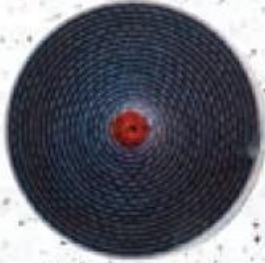

- Carbon monoxide **CO**
- Hydrocarbon **HC**
- Nitrogen oxides **NO_x**

The 3-way catalytic converter for vehicles with petrol engine ensures a conversion of pollutants



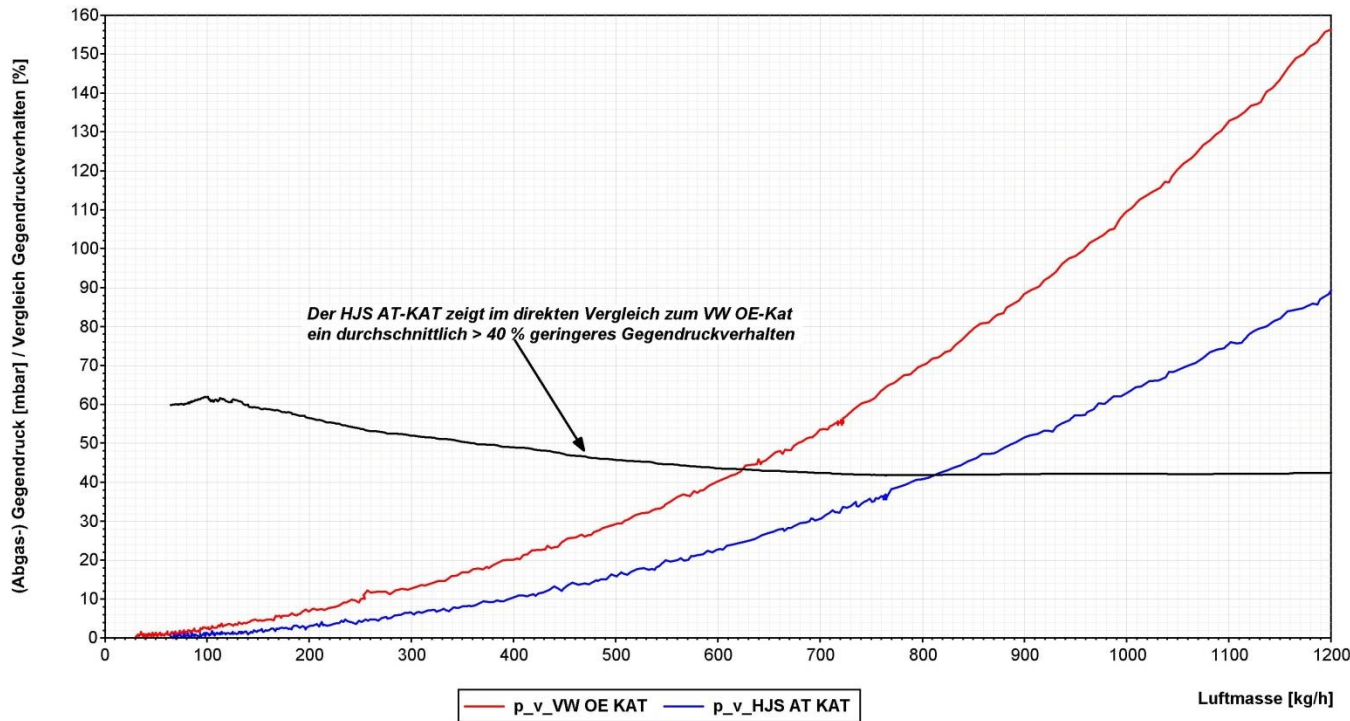
2. Catalyst - technology

2. Catalysts - technology

SERIES VS. TUNING CATALYSTS			
			
	Series catalyst	„No name“ catalyst	HJS Tuning catalyst
Structure	Ceramic honeycomb	Metal substrate	Metal substrate
No. of cells	400 - 600 cpsi	200 cpsi	200 cpsi
Free space	55 - 65 %	75 - 85 %	75 - 85 %
Wall thickness	0,02 - 0,08 mm	0,02 - 0,05 mm	0,05 - 0,08 mm
Durability	low	low	very high
Thermal stability	max. 800 °C	max. 800 °C	max. 1050 °C
Structure	Honeycomb	Central winding	HF- / HD- / TS-Design

2. Catalysts - technology

Exhaust back pressure measurement: VW Golf VII GTI mit 162 kW



Original catalyst

Ceramic honeycomb

500 cps

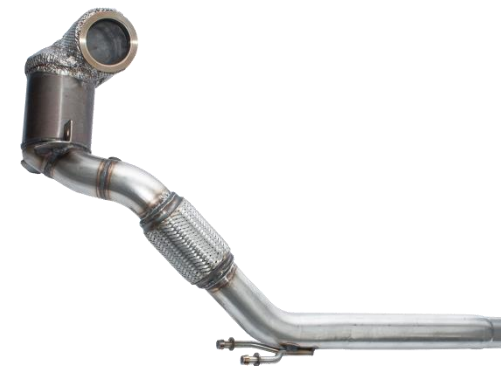
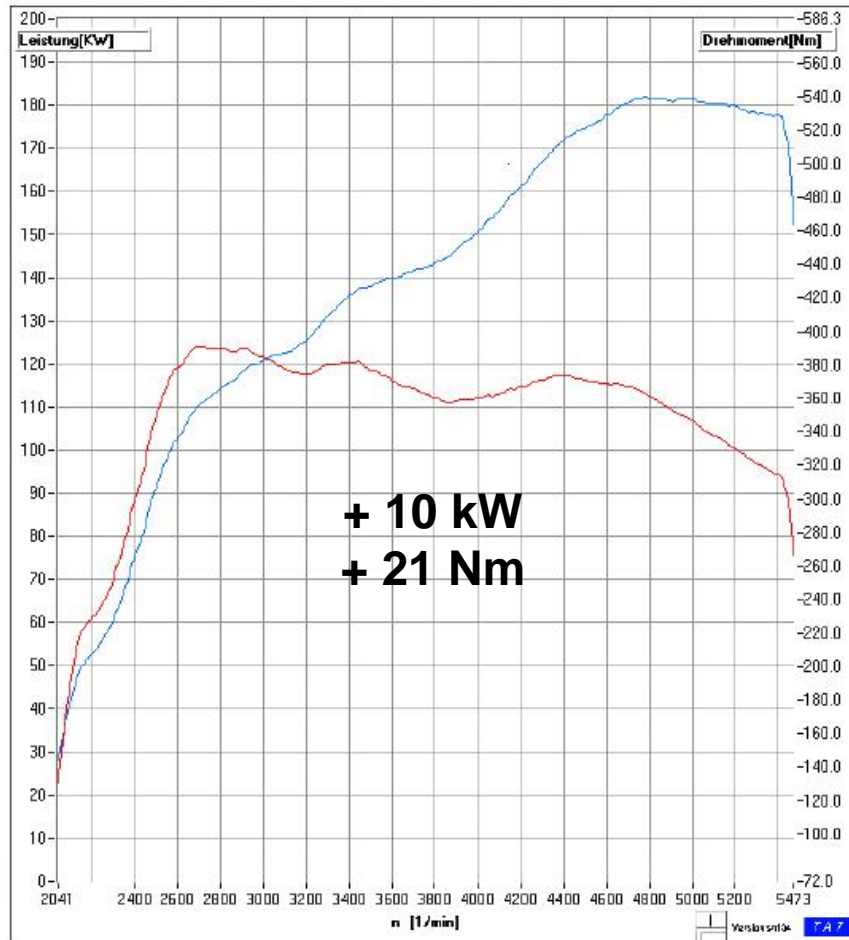
HJS Tuning catalyst

Metal substrate

200 cps

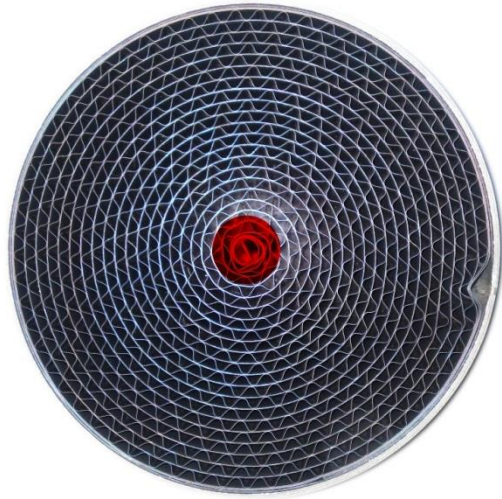
2. Catalysts - technology

Performance test: VW Golf VII GTI with 162 kW / 350 Nm



2. Catalysts - technology

Spiral – Matrix



- Winding of one flat and one corrugated foil
- Winding center is focus area
- No high durability
- Technology is severely outdated
- Use is not recommended
- Risk of telescoping

S - Matrix



- Winding of two flat and two corrugated foils
- Two winding centres as centroid
- High durability and strenght
- Used in the tuning range

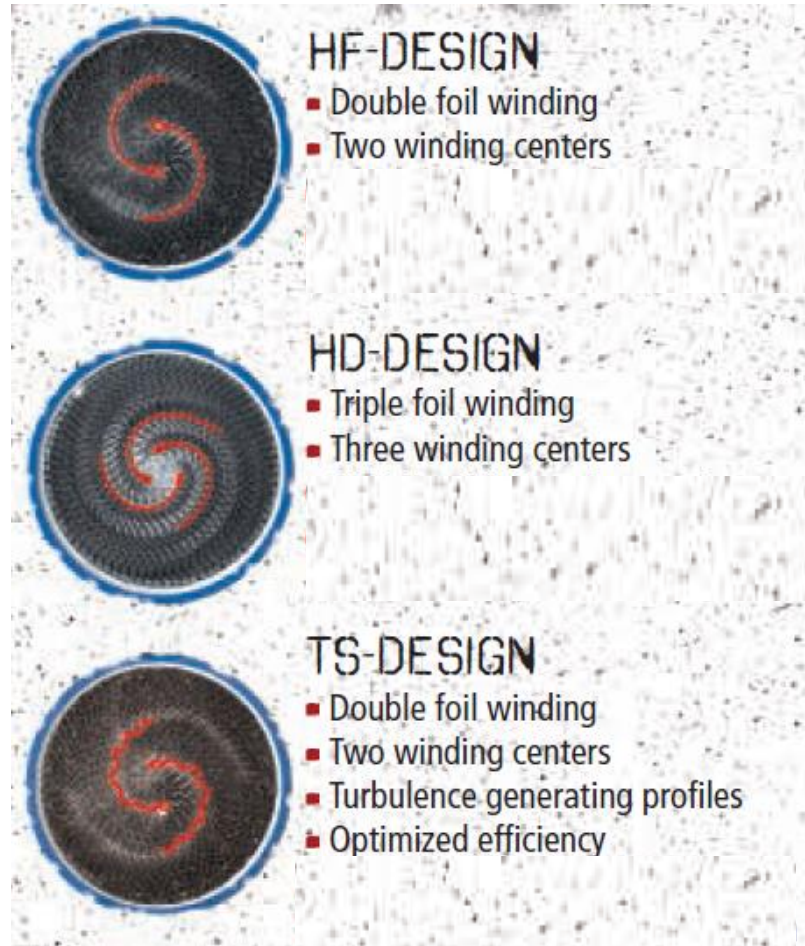
SM - Matrix



- Winding of three flat and corrugated foils
- Three centers are winding wound around one center
- Very high durability and strenght
- Used in the motor sport an tuning range

2. Catalysts - technology

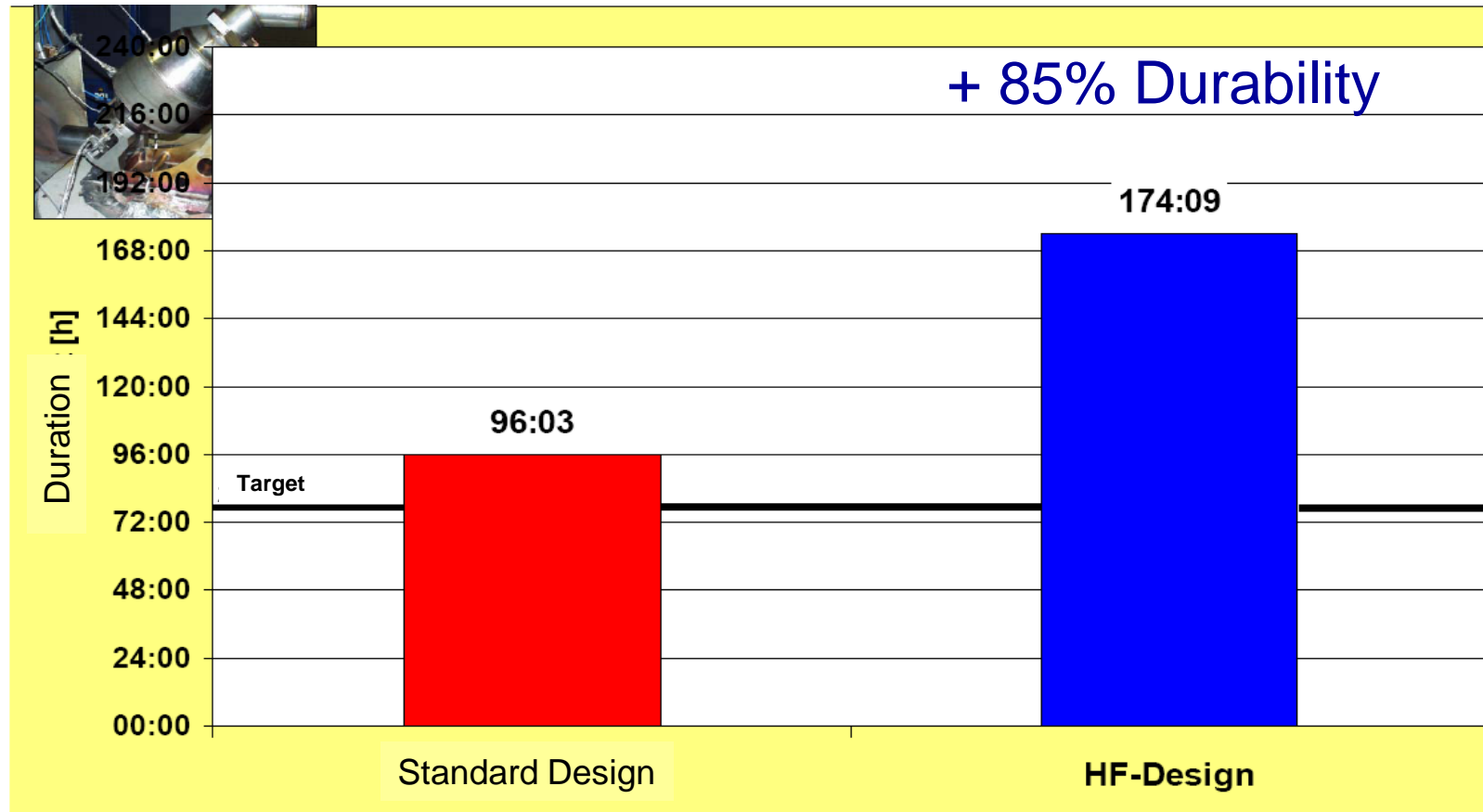
Foil - designs:



2. Catalysts - technology

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HF – Matrix (runtime on testing bench under worst case terms)



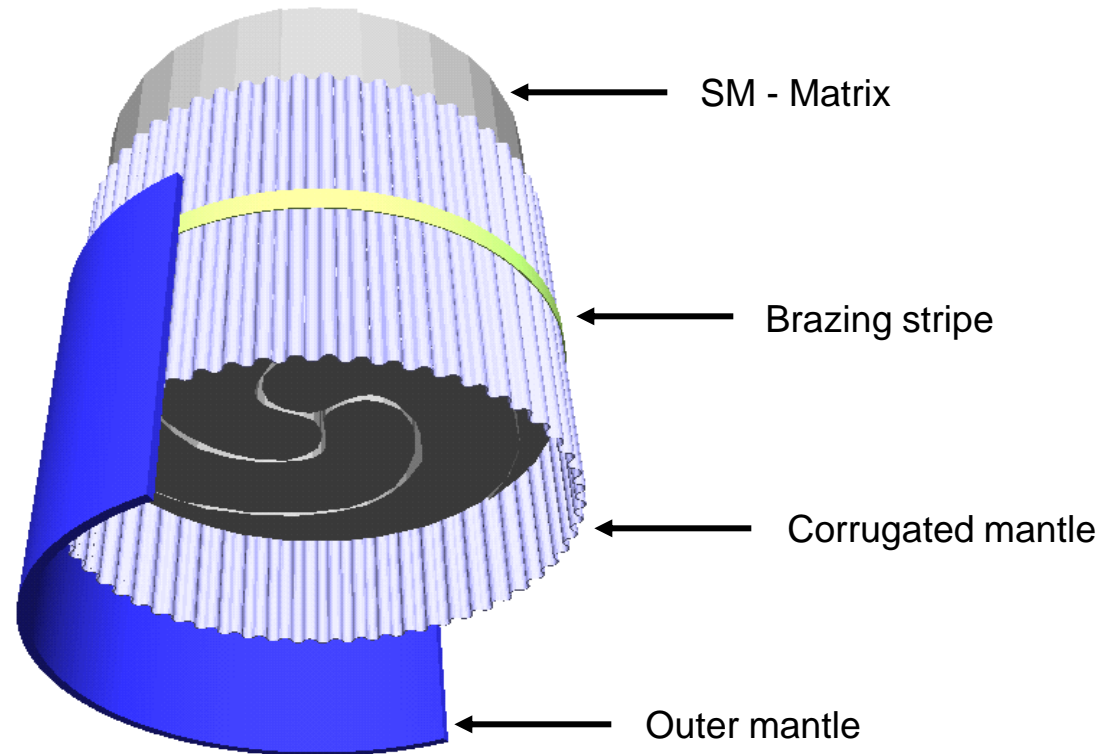
2. Catalysts - technology

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HD – Matrix (High Durability Metal catalyst)



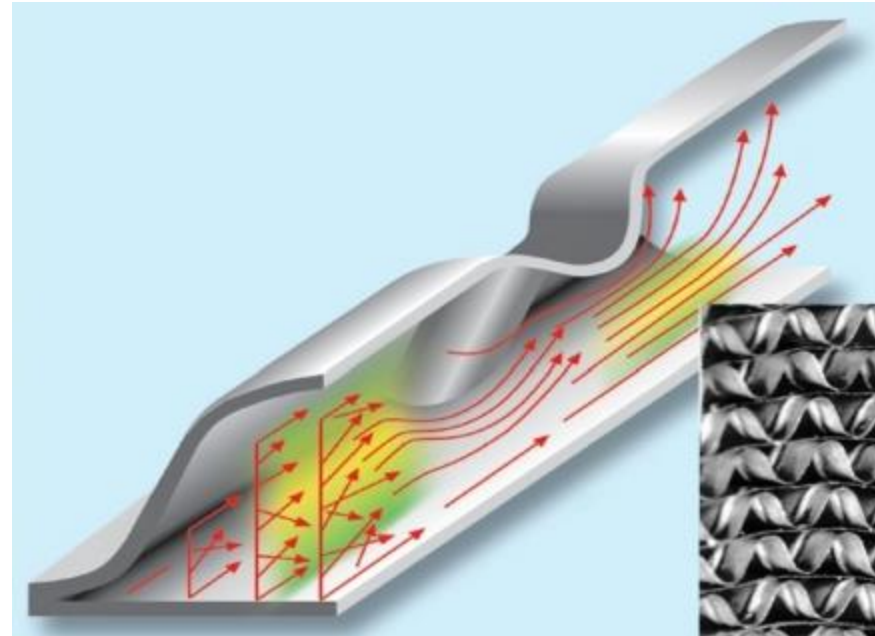
- Basis: SM – Matrix
- Special connection to the matrix sheath
- Again significantly increased durability
- Designed for extreme loads



2. Catalysts - technology

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TS – Matrix Design (Turbulence generating profiles)



- Basis: S – Matrix
- Stable integration of the matrix to coat
- Greater durability
- Optimized catalytic efficiency / conversion rates
- Cell density can be reduced to minimise backpressure without affecting conversion rates, e.g. 200 cpsi TS catalyst instead of 300 cpsi standard catalyst.

3. Intergral - insulation

3. Intergral-Insulation

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High-temperature, integral insulation for exhaust systems

Integral insulation is used to **protect temperature-sensitive engine components against radiant heat** and to **improve the functionality (thermal management)** of catalytic converters and diesel particulate filters.

- 0.1-mm thick stainless steel foil (outer shell)
- 4 - 12-mm-thick high-temperature-resistant fibre mat (insulating material)
- Long-term durability up to 1.050°C
- Peak temperature up to 1.200°C
- Melting point 1.600°C
- Resistance welding production



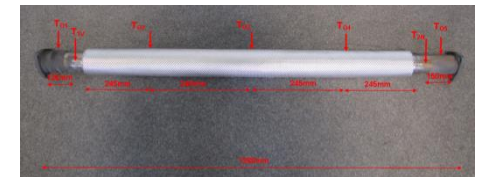
Temperature reduction:

- 4 mm fibre mat: approx. 60% temp. reduction

For example: Inlet exhaust temperature 1.000°C / reduction of the pipe surface temp. to 400°C

- 12 mm fibre mat: approx. 70% temp. reduction

For example: Inlet exhaust temperature 1.000°C / reduction of the pipe surface temp. to 300°C



4. Summary

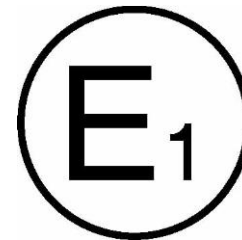
4. Summary

HJS tuning catalysts...

- very high **durability** and **strenght**
- **best possible performance**
- **EOBD compliant**
- tested for **Euro 1** up to **Euro 6 engines**
- **continued further development and upgrading**
- to profit by the experience in the **motor sport**



In Europe have only the **HJS** tuning catalysts the



certification!

Vielen Dank

Thank You

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