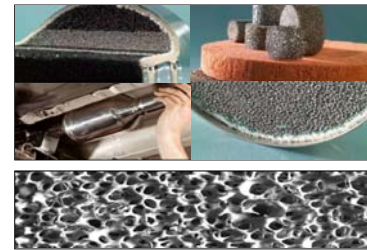
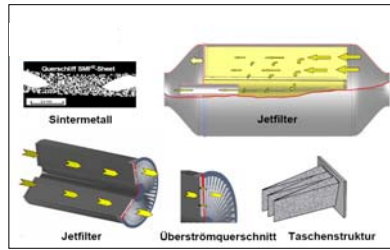
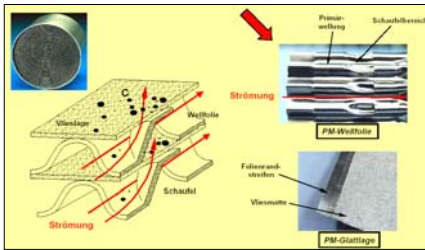


# (Nano)Particle Filtration of PM-Catalysts

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## Investigated materials:



Metallic foams

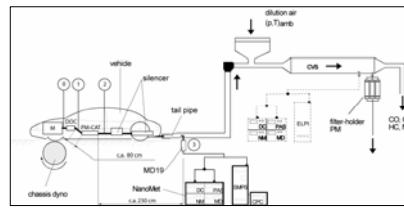
Ceramic foams

## Measuring set-up:

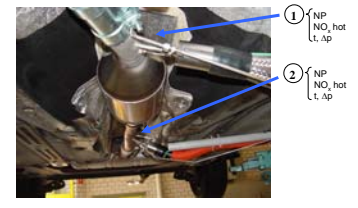
Production year: 2005  
Type: 3BG  
Displacement: 1.9 dm<sup>3</sup> (1896 cm<sup>3</sup>)  
Power: 96 kW at 4000 rpm  
Torque: 310 Nm at 1900 rpm  
Engine type: AVF  
Engine: TDI 2V VTG  
Injection system: unit injector  
Exhaust aftertreatment: DOC near to engine  
Catalyst: Gillet 8D0 178 E  
Emission level: 400 cps, 1.56 g Pt EURO 3  
Gears: 6 manual gears  
Odometer: approx. 30'000 km



Test vehicle and measuring systems for nanoparticles analysis on a chassis dynamometer



Sampling positions and measuring set-up for exhaust gas and nanoparticles

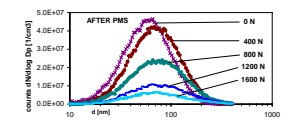
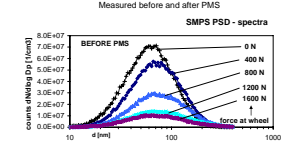


Sampling positions directly before (SP1) and after (SP2) PM-cat at the bottom of vehicle.

## Some results:

### Load steps

SMPS : nanoparticle filtration efficiency at 85 km/h with engine warm and engine load variations.



NO<sub>2</sub> before and after PMS

NO<sub>x</sub> before and after PMS

Configuration	BEFORE	AFTER	PZAG
0N	100	100	100
400N	150	150	150
800N	200	200	200
1200N	250	250	250
1600N	300	300	300

### Driving cycles

### Filtration efficiencies in different driving cycles

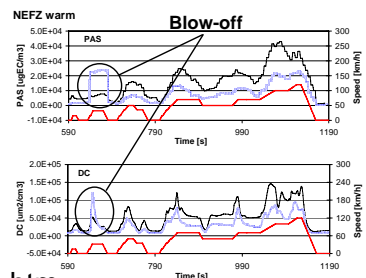
Filtration efficiencies in different driving cycles

	PM-cat 1				PM-cat 2			
	PMAG	DCAG	CPCAG	PASAG	PMAG	DCAG	CPCAG	PASAG
NEFZ c.	31.3	15.9	32.5	31.4	42.0	51.8	40.6	44.9
NEFZ w.	33.3	8.0	29.9	20.3	37.9	39.3	31.0	27.7
FTP 75 w.	30.3	12.3	31.1	24.6	42.1	37.3	31.9	34.3
CADC Urb w.	44.4	23.5	35.9	51.4	26.4	38.6	28.9	39.0
CADC Rd w.	17.3	10.8	32.0	16.5	2.9	19.7	23.8	3.0
CADC Mw w.	44.3	22.9	37.1	19.9	37.6	35.3	35.9	23.5
NYCC w.	25.0	9.8	34.2	50.4	3.8	47.7	58.2	52.7
BAB w.	19.2	14.1	32.5	30.7	16.5	15.9	24.6	12.5
AVERAGE	30.6	14.7	33.1	30.6	26.2	35.7	34.4	29.7

	PM-cat 3				PM-cat 4			
	PMAG	DCAG	CPCAG	PASAG	PMAG	DCAG	CPCAG	PASAG
NEFZ c.	55.7	65.3	56.1	65.0	38.1	43.5	30.6	38.8
NEFZ w.	59.8	56.9	50.2	52.8	26.4	28.1	19.8	10.8
FTP 75 w.	60.5	55.0	55.2	61.3	37.9	28.3	20.7	24.2
CADC Urb w.	60.5	56.8	54.9	66.5	17.6	36.9	29.3	50.1
CADC Rd w.	49.6	48.3	49.8	51.5	10.8	18.4	22.3	18.2
CADC Mw w.	63.4	58.1	61.7	57.0	32.8	25.6	30.9	23.8
NYCC w.	39.6	54.8	67.0	74.4	22.6	28.6	27.2	45.5
BAB w.	41.2	41.0	45.8	47.8	18.9	14.1	18.3	20.8
AVERAGE	53.8	54.5	55.1	59.5	25.6	27.9	24.9	29.0

### Blow-off effects

NanoMet signals PAS / DC in NEFZ driving cycles



## Summary (extract):

- At transient operation in different driving cycles, the average reduction rates, which were attained with the investigated PM-cat, are between 25% - 55%.
- The NO-NO<sub>2</sub>-conversion in the oxidation catalyst causes a NO<sub>2</sub>-increase comparing the original status only with one PM-cat mounted in underfloor.

Internet address of complete reports:

<http://www.umweltbundesamt.de/verkehr/techemissmm/technik/pms.htm>

