



Exhaust gas particulate filters for diesel and gasoline engines

Innovative ‘Ceramic Coated Paper’ production technology creates new opportunities in filter design and improves filtration performance

With ever stricter demands to protect the environment and safeguard health worldwide, effective and efficient filtration technology is becoming increasingly important. The particulate filters manufactured by MANN+HUMMEL retain soot particles in the exhaust systems of diesel and gasoline engines.

An innovative production process characterises the exhaust gas particulate filter from MANN+HUMMEL. For this CCP (Ceramic Coated Paper) manufacturing process, the company has drawn on years of experience in the production of compact air filter elements.

An amended type of paper compact air filter is used as a carrier medium for the new particulate filter. From the two-layer medium, a coiling technique is applied to create homogeneous paper coil. An embossing process is used to produce the rippled filter structure. In the CCP process developed by MANN+HUMMEL, the paper carrier medium is then immersed in a ceramic suspension. Aluminium titanate particles present in this suspension, when absorbed by the carrier medium, completely surround the paper fibres. The paper is subsequently cauterised, at the same time sintering the ceramic particles.

As a ceramic adhesive is inserted between the layers of paper during the coiling process, the channels are alternately closed automatically – an essential pre-requisite for filtration. At the end of the new production process, the diesel particulate filter is complete.



New filter design opportunities

Through the use of aluminium titanate (ATi), it is possible to produce monolithic, i.e. one-piece particulate filters. The excellent filtration properties, increased storage capacity for soot and ash, as well as lower exhaust gas back pressure make it ideally suited for diesel and gasoline engine applications.

This innovative manufacturing process can produce both trapezoid and straight channels. Improving the inflow in this way can reduce exhaust gas back pressure and thus also lower emission levels. It is possible to modify the channel shape and cell density, as well as to alternate large and small channels simply by changing the embossing rollers during the coiling process.

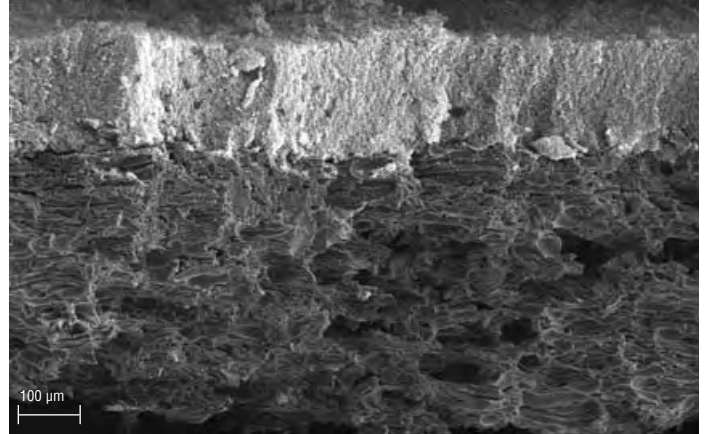
As it is not difficult to change the position of the channel seals and apply a catalytic coating, it is possible to place a catalytic converter upstream or downstream in the same filter monolith.

The particulate filter is suitable for use with both diesel and direct-injection gasoline engines.

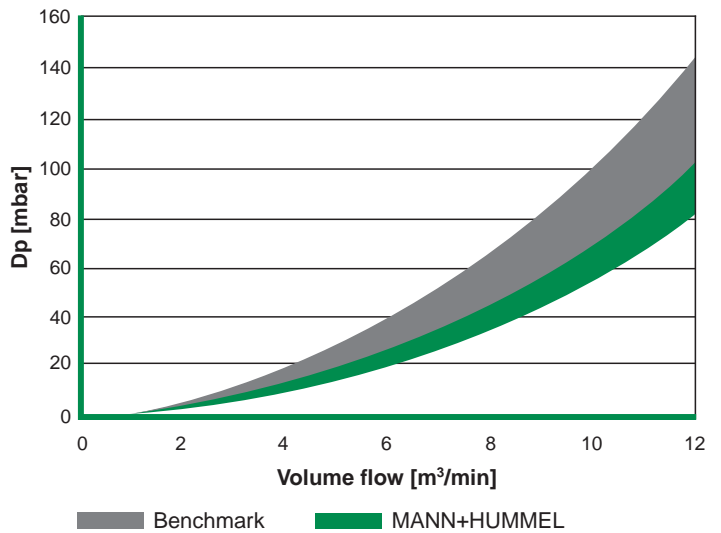
The first particulate filters from a pilot plant currently under construction will be available towards the end of 2009.

Advantages

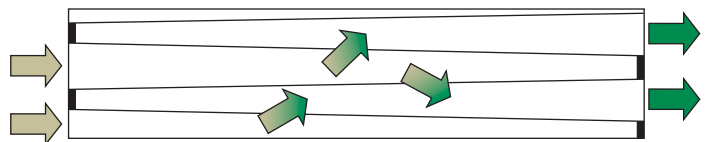
- Variation of filter body shape possible
- Greater leeway in channel geometry
- Possible integration of catalytic converter in the filter monolith
- Aluminium titanate material
- Lower exhaust gas back pressure
- Higher soot holding capacity
- Change filter geometry quickly by adapting paper coil
- Possible modification of porosity and pore size
- Suitable for diesel and gasoline engine applications



Particulate filter wall cross-section with soot deposited on the upper surface



Under the same test conditions, an unloaded MANN+HUMMEL particulate filter recorded lower exhaust gas back pressure, compared with the competition



Through conical channel geometry, particles can be deposited more evenly, thus further reducing exhaust gas back pressure



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