

Retrofit Emission Controls for On-Road Diesel Engines

Manufacturers of Emission Controls Association [MECA]

Mid-Atlantic Diesel Collaborative

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www.meca.org

www.dieselretrofit.org



Outline

- Diesel Retrofit Overview
- Diesel Oxidation Catalysts
- Diesel Particulate Filters
- Active and Passive systems
- Combined technologies
- Q & A

MECA Background

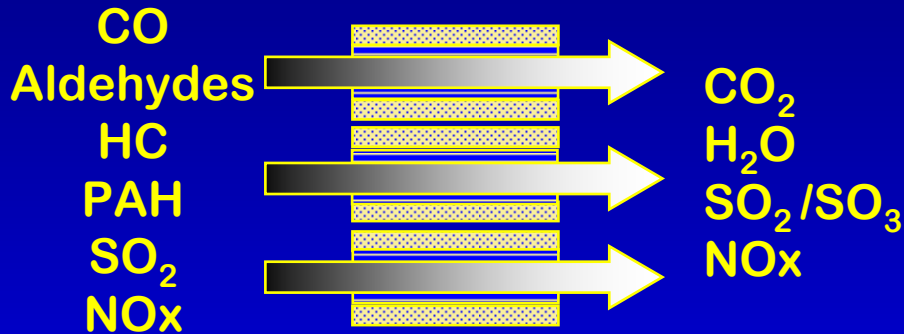
- Founded in 1976 to be The Technical Spokesperson for Our Industry
- Currently, 46 Member Companies
- Member companies have over 35 years of experience and a proven track record of success in developing and manufacturing emission control technology
- Members cover diverse range of emission control technologies for both new and existing engines/vehicles:
 - Catalytic converters (all fuels)
 - Diesel particulate filters
 - Exhaust components/exhaust system integration
 - Sensors

Experience with Diesel Retrofits Spans a Variety of On-Road Vehicle Applications



Retrofit Emission Control Technologies: DOCs Have Largest Experience Base

Diesel Oxidation Catalysts



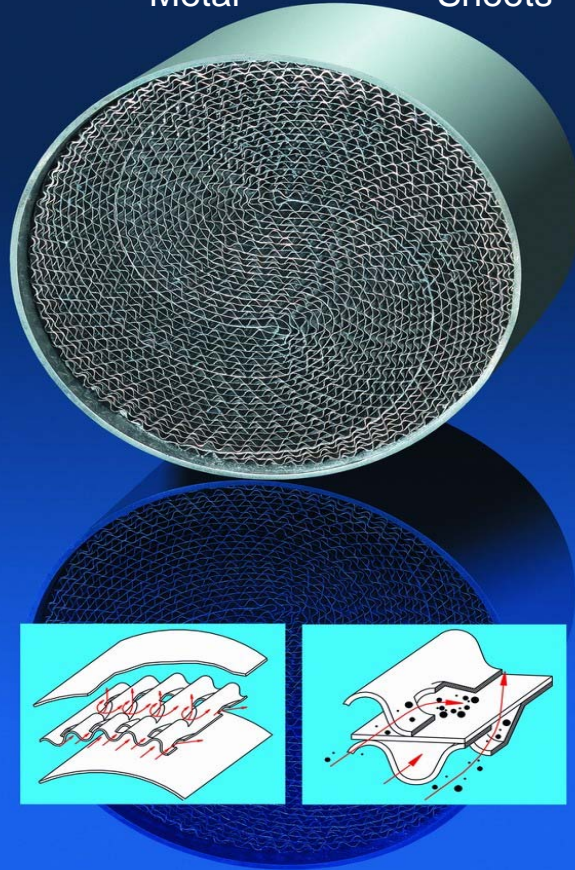
Flow through monolith
with catalytic coating

- Level 1 PM Reduction (25%)
- Large Reduction in Toxics
 - Carbon monoxide and HC (90%)
 - Moderate PM reduction (25-50%)
- Nearly Universal Application with > Millions of Retrofits Worldwide
- Tens of Millions of OE Applications



“Flow-Thru” or “Partial” Filter Technologies Emerging for Diesel Retrofits

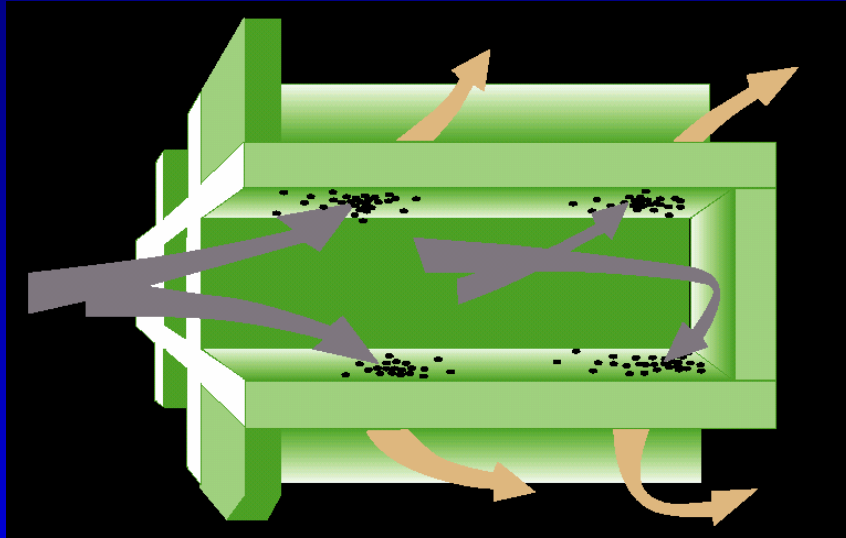
Metal Substrate with Sintered Metal Sheets



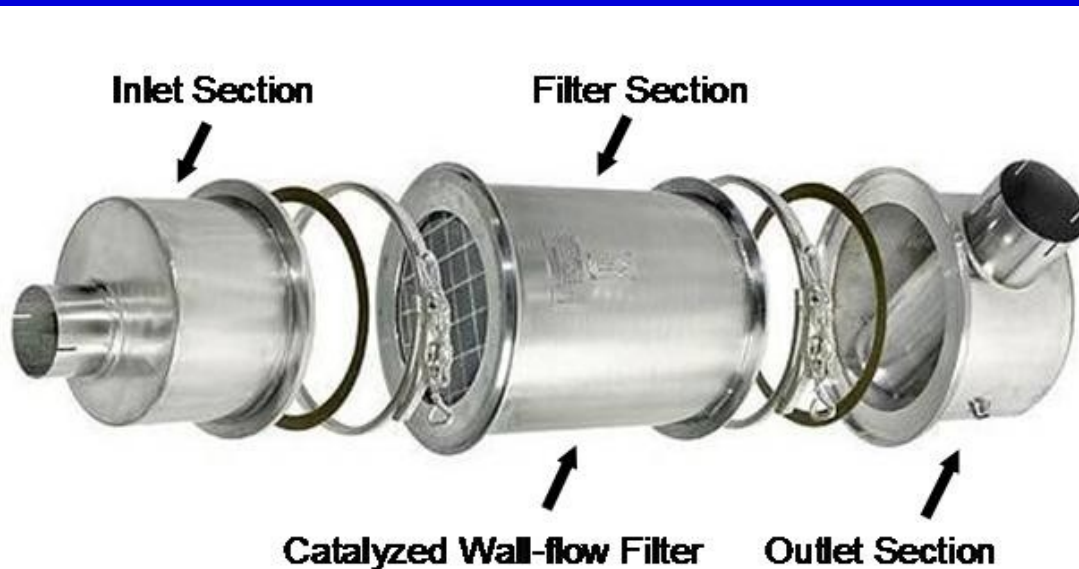
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- 50-75% Level 2 PM reduction
- Can be catalyzed, used with a DOC
- Has applicability on older engines
- Resistant to plugging
- Filtering achieved with sintered metal sheets or wire meshes.

Wall Flow Filters Offer the Highest Filtration Efficiency

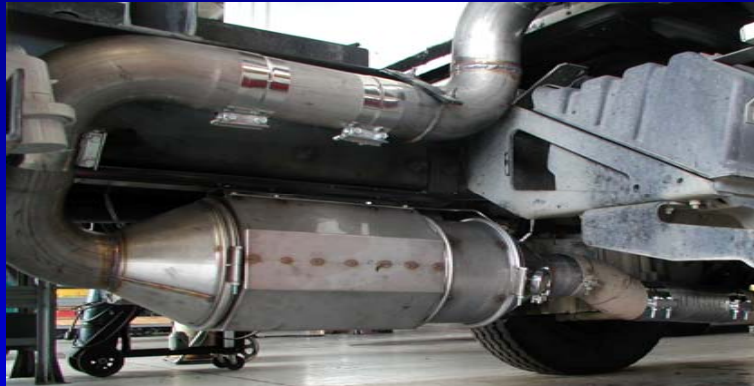


- Level 3 PM reduction (>85%)
- Large reduction in toxics from catalyzed filters
- Filters include passive & active regeneration.
- > 200,000 retrofits worldwide
- > 3 Million OE applications
- Same technology as on 2007 OE trucks.



Passively regenerated filters employ catalysts and available exhaust heat to burn captured soot – specified exhaust temp. requirements

DPFs with Active Soot Regeneration Strategies Available for Retrofits

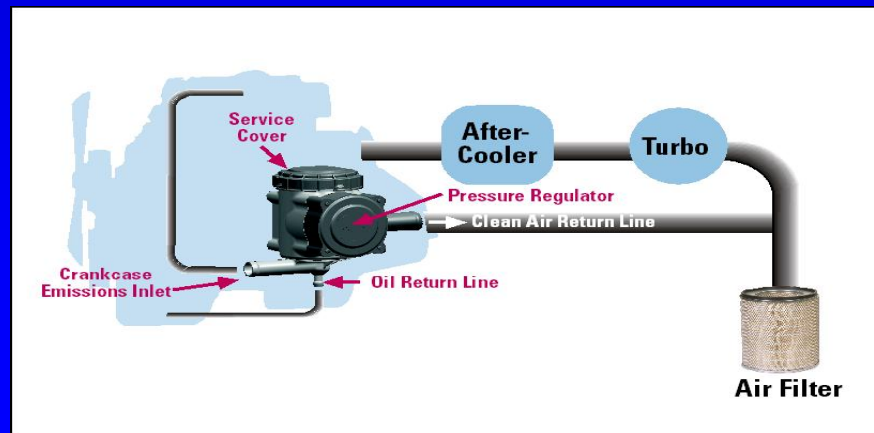


- Active regeneration is required for filter systems in cool exhaust applications
 - Un-catalyzed filters require external heat source for soot regeneration.
 - Electric heaters or fuel burners can be installed in front of DPF.
 - DPF can be regenerated externally.
 - 1-8 hour regeneration cycle



Closed Crankcase Filters can Provide Additional PM Control

- DOC provides Level 1 PM reduction (25%)
- Flow through or “partial” filters provide Level 2 PM reduction potential (50%)
- Wall flow filters provide (85%) or Level 3 reduction.
- Closed crankcase filters can be combined with any of the above for additional PM control.
- ARB and EPA verified system is DOC and CCF.

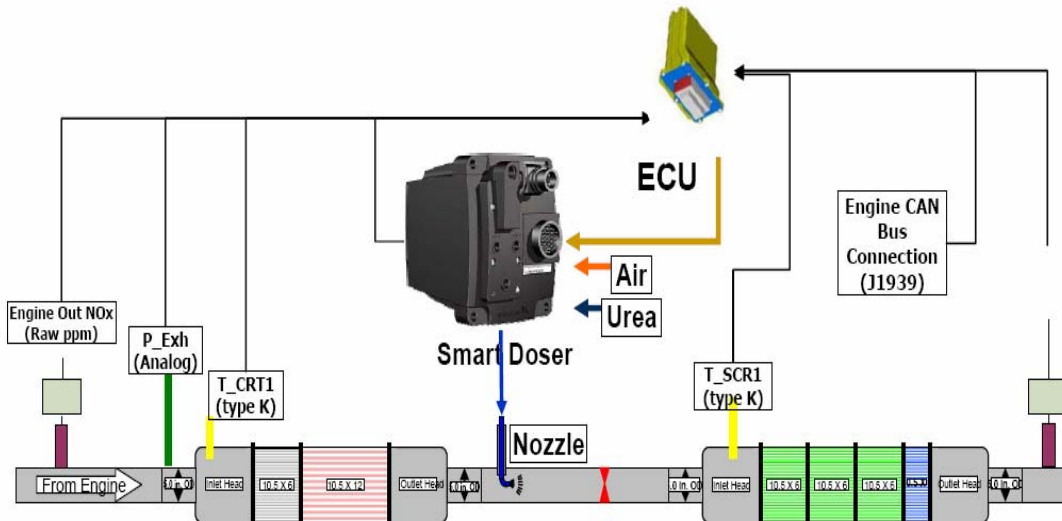
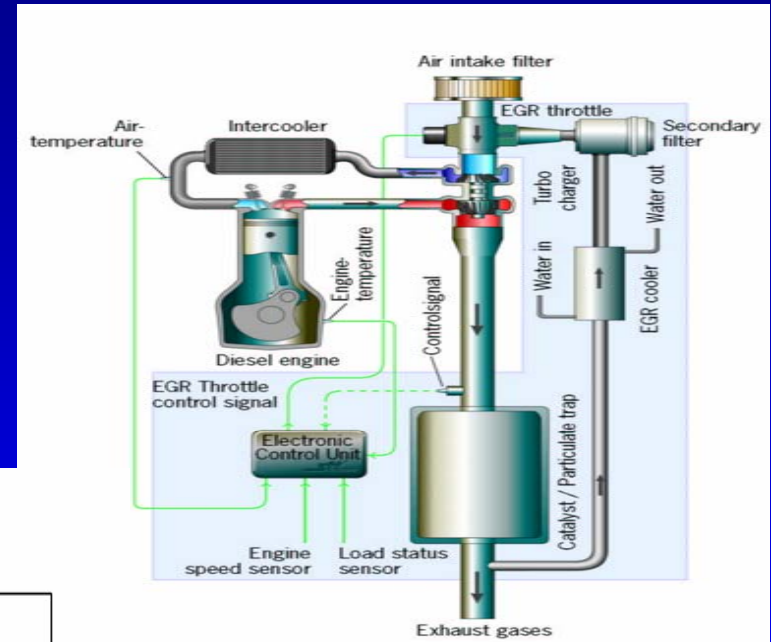


Integrated Solutions for Combined PM/NOx Reductions Available for Retrofit

Lean NOx Cat. + DPF
- 25% NOx reduction



Low Pressure EGR + DPF
- 40% NOx reduction



Catalyst-based Filter + Urea-SCR Catalyst
70+% NOx reduction

Key Considerations for Successful Retrofit Programs

- Application engineering – matching the right technology to the vehicle or equipment
 - Proper professional installation
 - On-vehicle monitors – provide important user feedback on performance
 - Maintenance – vehicles & retrofit equipment require frequent inspections and maintenance; variety of filter cleaning machines available (see MECA Filter Maintenance White Paper at www.dieselretrofit.org or www.meca.org)
- **Successful Retrofits Require a Team Effort Between Fleet Owners, Operators, and Technology Providers**

Backpressure Monitors / Loggers

- BP monitors emerging with added features
 - Extended datalogging capability (1-2 yrs)
 - BP and Temperature
 - Multi-light displays to indicate system faults, warnings and alarm conditions
 - Real time monitoring
- Systems come with software to allow data analysis



Emission Control Industry's Perspective on Retrofits

- Proven Technology Available
- Technology Options Expanding
- Application Range Expanding
- Retrofit “Success” Builds on Experience
- Incentive Funds Needed to Make Large Impact on Air Quality



Diesel Retrofit Technology for *Clean Air*



The purpose of this web site is to provide useful information related to diesel retrofit emission control technology. By making this information available, MECA hopes to assist interested stakeholders in establishing and operating more effective diesel retrofit programs.

The **Manufacturers of Emission Controls Association (MECA)** is a non-profit association incorporated in Washington, DC. MECA's mission is to provide technical information on emission control technology, thereby facilitating the establishment of strong and effective state, federal, and international air quality programs that promote public health, environmental quality, and industrial progress.

For an overview of this website, please refer to our [Site map](#).

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