

# Donaldson Diesel Emission Control Systems

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[www.donaldson.com](http://www.donaldson.com)



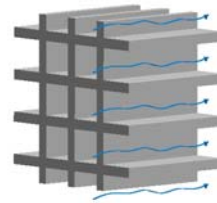
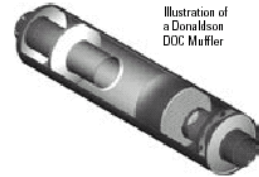
## Donaldson DECS Technologies

- Existing CARB Verified Technologies (see [www.arb.ca.gov/diesel/verdev/verdev.htm](http://www.arb.ca.gov/diesel/verdev/verdev.htm))
  - Level 1 ( $\geq 25\%$  PM reduction)
    - Diesel Oxidation Catalyst (DOC) and Closed Crankcase Filtration System (Spiracle)
  - ❖ **New** Level 2 ( $\geq 50\%$  PM reduction): Verification request 7/05  
Flow through Diesel Multi-stage Filter (DMF) and Closed Crankcase Filtration System (Spiracle)
  - Level 3 ( $\geq 85\%$  PM reduction)
    - Diesel Particulate Filter (DPF) Passive Regeneration
- Future CARB Technology Verifications
  - Level 3 ( $\geq 85\%$  PM reduction): Target verification request late 2005
    - Active Regeneration DPF system



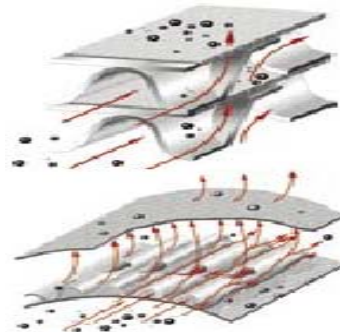
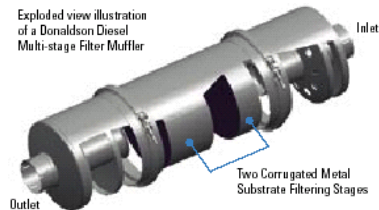
## Diesel Oxidation Catalysts (DOC)

- Flow through technology
- About 20% PM reduction
- Very reliable
- Operates with any fuel
- Usually maintenance free
- Allows direct replacement mufflers
- EPA & CARB verified
- 1.0-1.5 hr installation



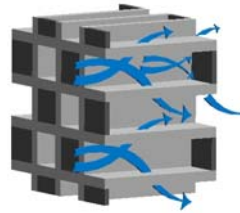
## Flow Through Diesel Multi-Stage Filter (DMF)

- Offers CARB Level 2 performance ( $\geq 50\%$  reduction)
  - Between DOC and DPF
- Exhaust temperature sensitive
- Requires ULSD fuel
- Resistant to plugging
- Meets NO<sub>2</sub>/NO<sub>x</sub> regulation



## Diesel Particulate Filter (DPF)

- Wall through technology
- 85+% PM reduction
- Exhaust-temperature sensitive → Data-logging required to determine suitability
- Requires ULSD
- Periodic cleaning
- EPA & CARB verified
- 3 hr installation



## DPF Cleaning Maintenance

### Two-Stage DPF Cleaner System



1<sup>st</sup> Stage

Pulse Cleaner



2<sup>nd</sup> Stage

Thermal  
Regenerator



## Total PM Emissions Control

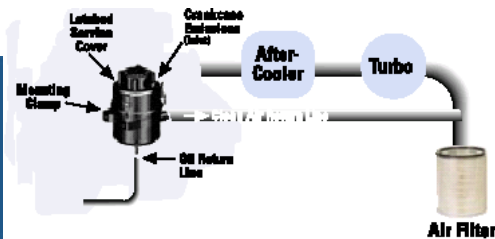
- Both tailpipe and crankcase vents are emission sources
- Open crankcases emit blow-by emissions into the environment
- Crankcase emissions account for a significant amount of particulate matter

Engine Model Year	PM Tailpipe Regulation	PM Crankcase Contribution	
	(g/bhp-hr)	(g/bhp-hr)	Relative %
1988-1990	0.60	0.01-0.04	5%
1991-1993	0.25	0.01-0.04	10%
1994-2006	0.10	0.01-0.04	25%
2007+	0.01	0.01-0.04	50+%

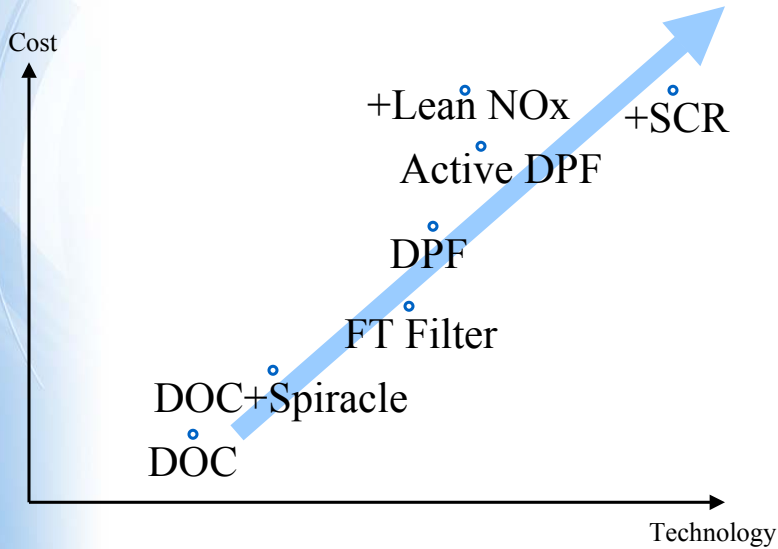


## Closed Crankcase Filtration System

- Eliminates emissions from crankcase
- Two stage filter protects engine
- Filter change required every 500 hr
- 2.5-3.0 hr installation



## Product Transition



## Donaldson DECS Support

- Retrofit Experience
  - School bus ~ 5000
  - Refuse ~ 3000
  - Municipal fleets ~ 1000
  - Urban bus ~ 100s
  - Port Vehicles ~ 600
- CARB/EPA Verified Products
- Fleet Analysis / BACT Assessment
- Technical support
  - Installation manuals, operating guide
- Train, assist or provide installation
- Warranty



## Donaldson Information Help

- Contacts
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- Additional Retrofit Information
  - Emissions Resource Center  
[www.donaldson.com/en/erc](http://www.donaldson.com/en/erc)

