RYPOS TRAP

Active Diesel Particulate Filter

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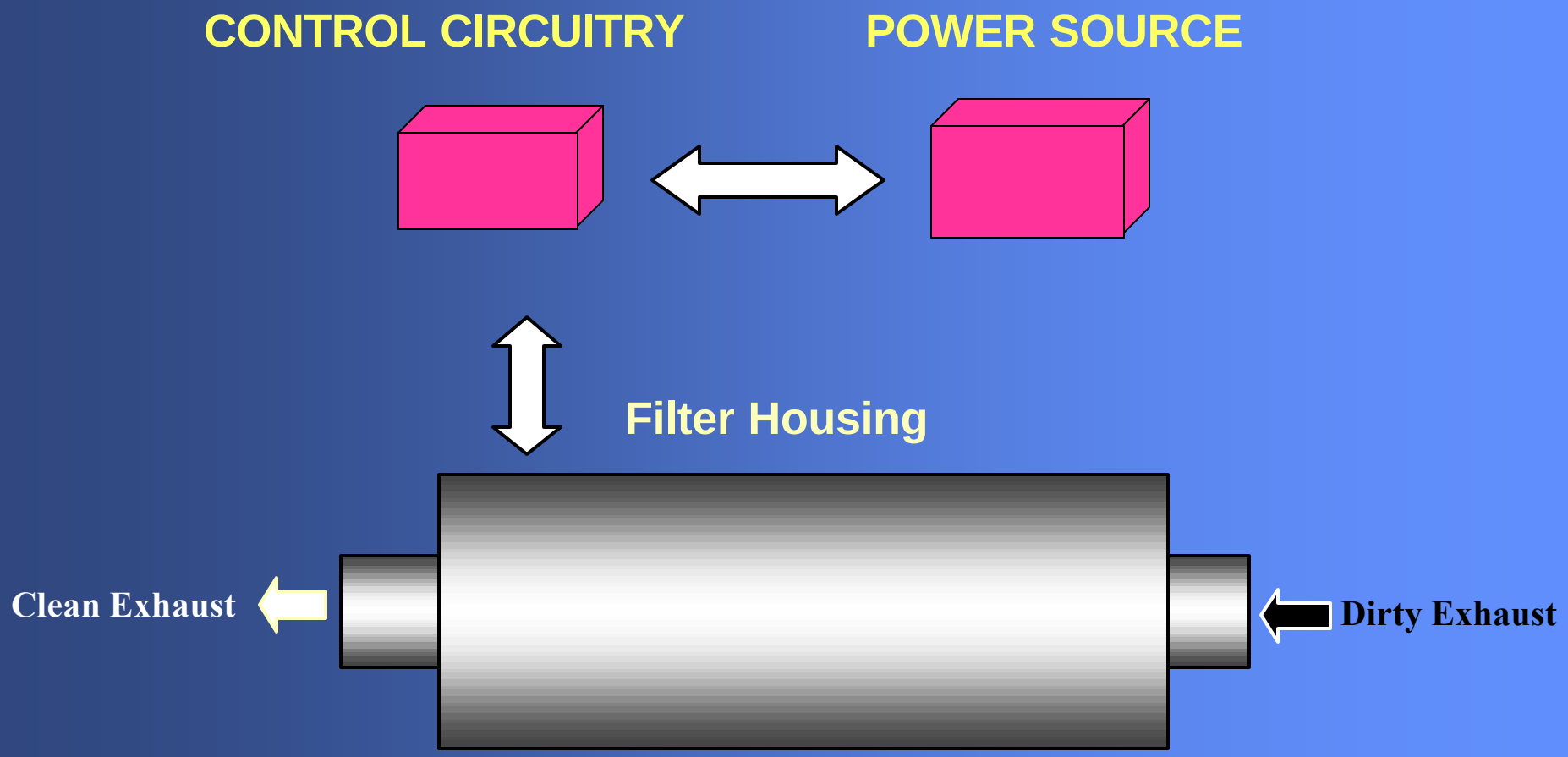
OUTLINE

- RYPOS TRAP: New Concept
- History
- Current Development
  - Filter Media
  - Filter Cartridge Design
  - Filter Housing
  - Electronic Control
- Results
- Competitive Advantages
- Conclusions

RYPOS TRAP: New Concept

- BEKAERT Filter Media: Metal Fibers
- Direct Electric Heating
- Controlled Regeneration
  - Independent of Exhaust Temperature
  - Independent of Fuel Sulfur Content
- Smart (Automatic)
- Energy Efficient

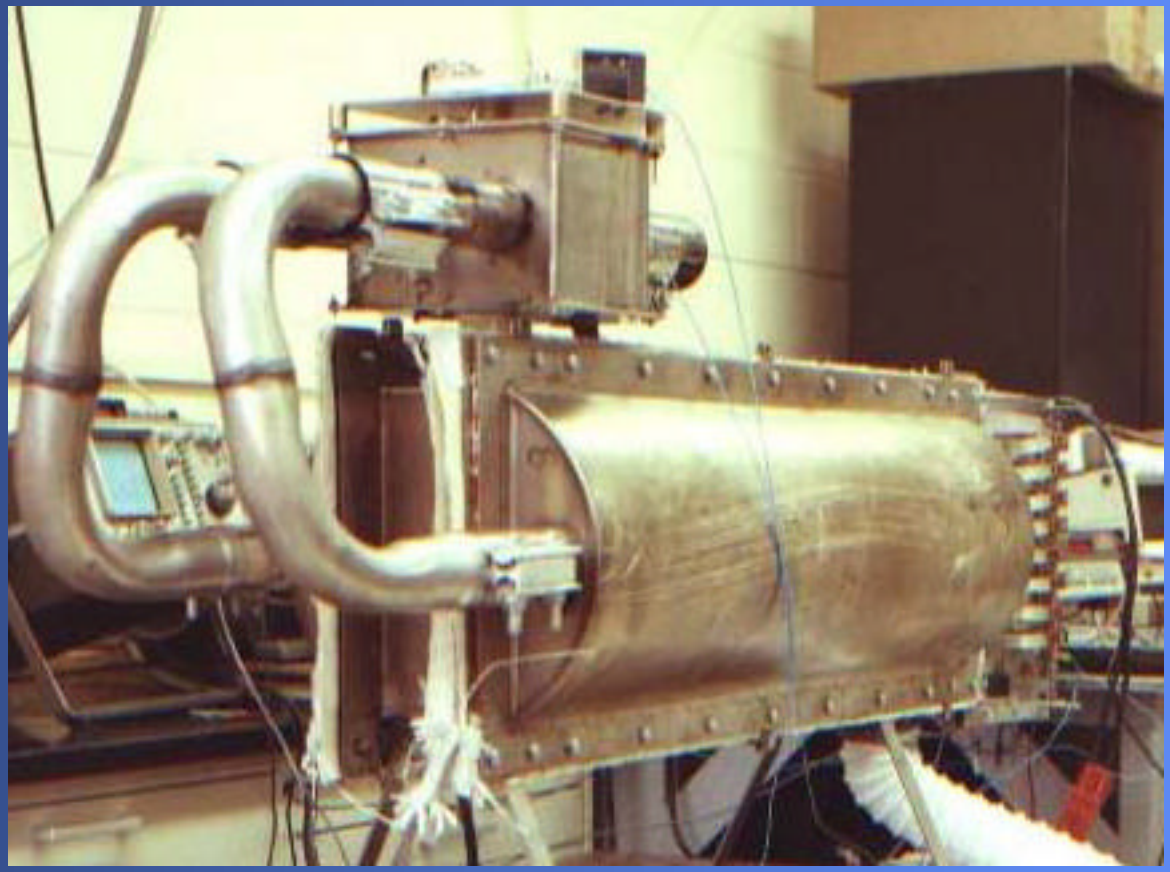
RYPOS TRAP: Design Concept



RYPOS TRAP: Development History

- 1996- Proof of Concept
- 1997- First Prototype (Pickup Truck)
- 1998- Second Prototype (Pickup Truck)
- 1999- Cooperation Agreement Between RYPOS and BEKAERT
- 1999- Third Prototype (Pickup Truck)
- 2000- Fourth Prototype (5.9L, 160 hp)
- 2001- Current Development

RYPOS TRAP: 1st Prototype, 1997



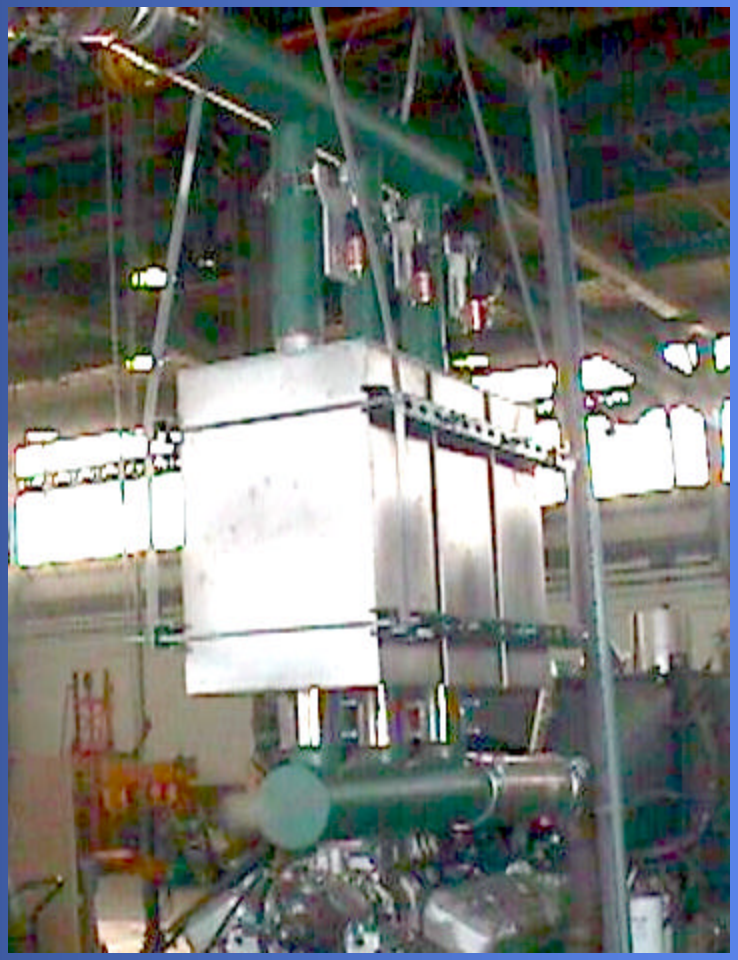
RYPOS TRAP: 2nd Prototype, 1998

Pickup Truck: 6.3 L, 160 hp

RYPOS TRAP: 3rd Prototype, 1999

Pickup Truck: 6.3 L, 160 hp

RYPOS TRAP: 4th Prototype, 2000



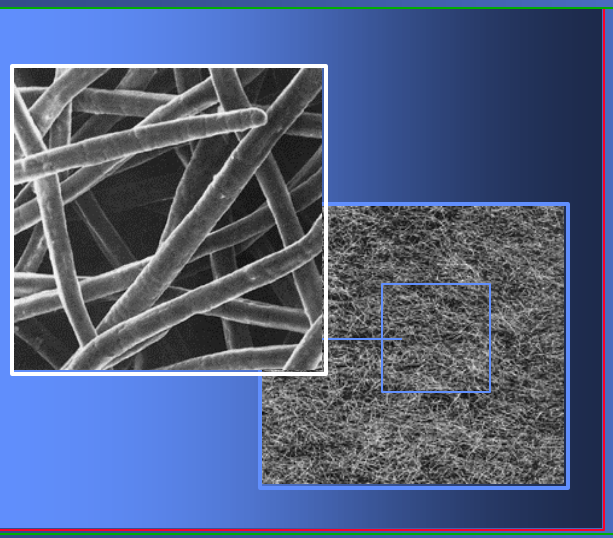
Massasoit College: 5.9 L, Turbo, 160 hp

Current Development: 5th Prototype, 2001

- **BEKAERT Filter Media**
- **Filter Cartridge Design**
- **Electronic Control**
- **Filter Housing**

RYPOS TRAP: BEKAERT Filter Media

Sintered Metal Fibers

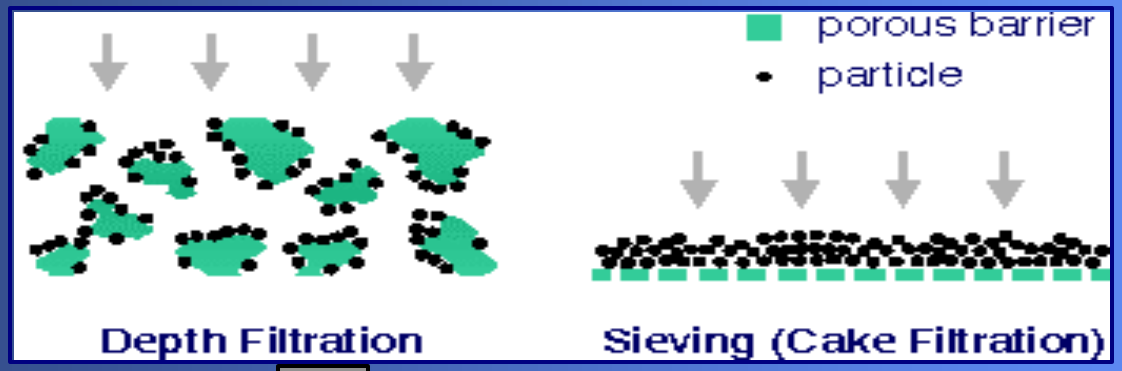


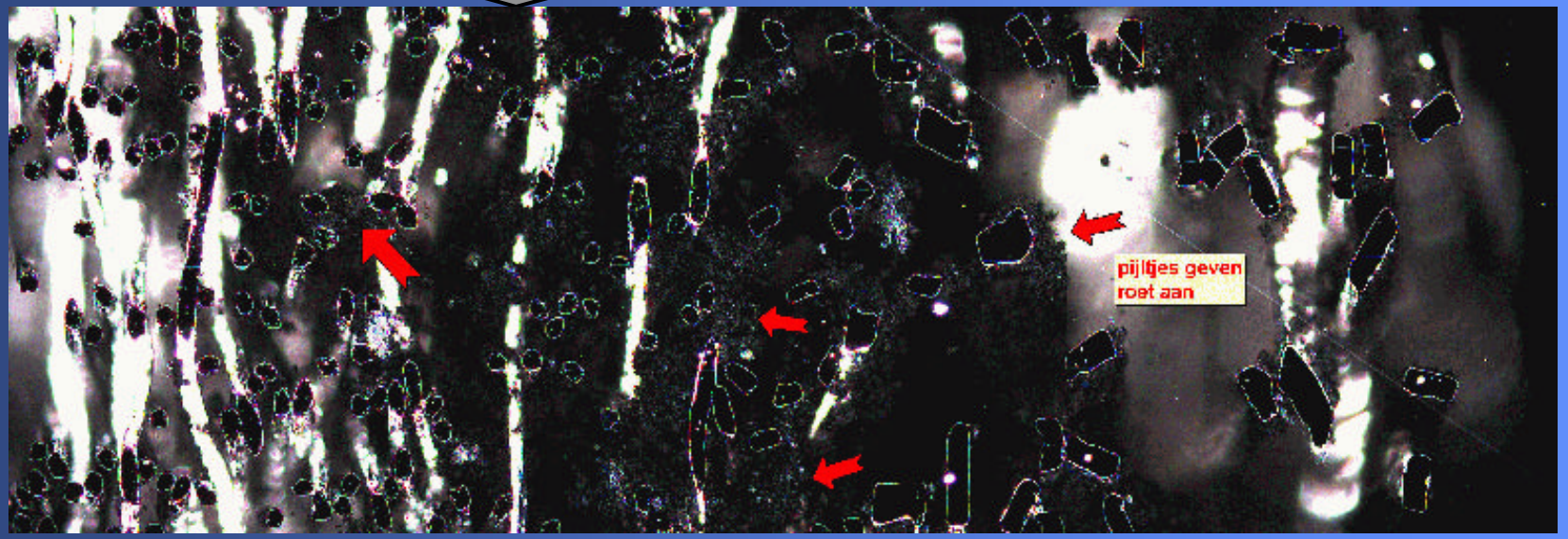
- o Electro-conductive
- o High porosity (85%)
- o Low back pressure
- o Withstands high temperatures
- o Fast Heating (low thermal mass)
- o High filtering efficiency

Graded Filter (three layers)

- – High Holding Capacity
- – High Removal Efficiency
- – Low Back Pressure

RYPOS TRAP: BEKAERT Filter Media

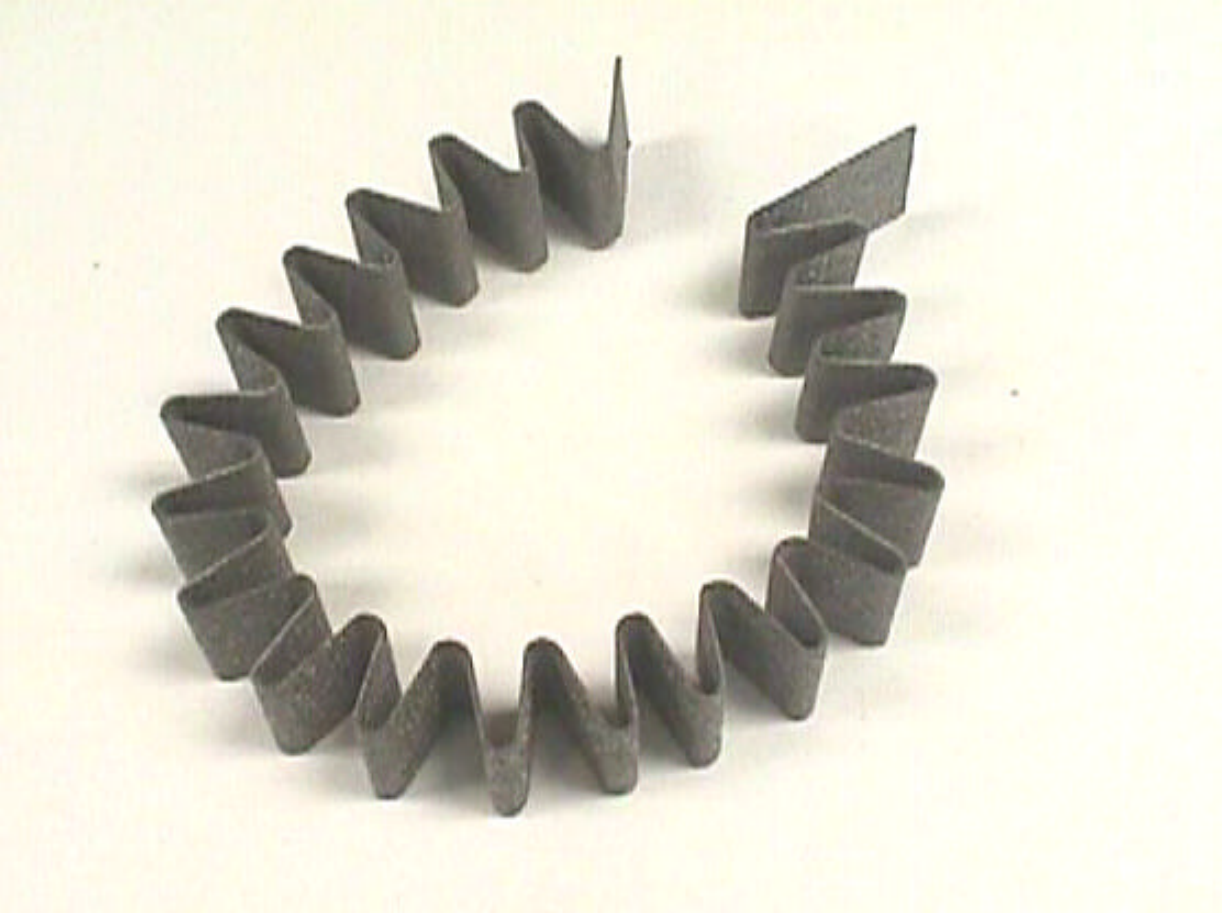




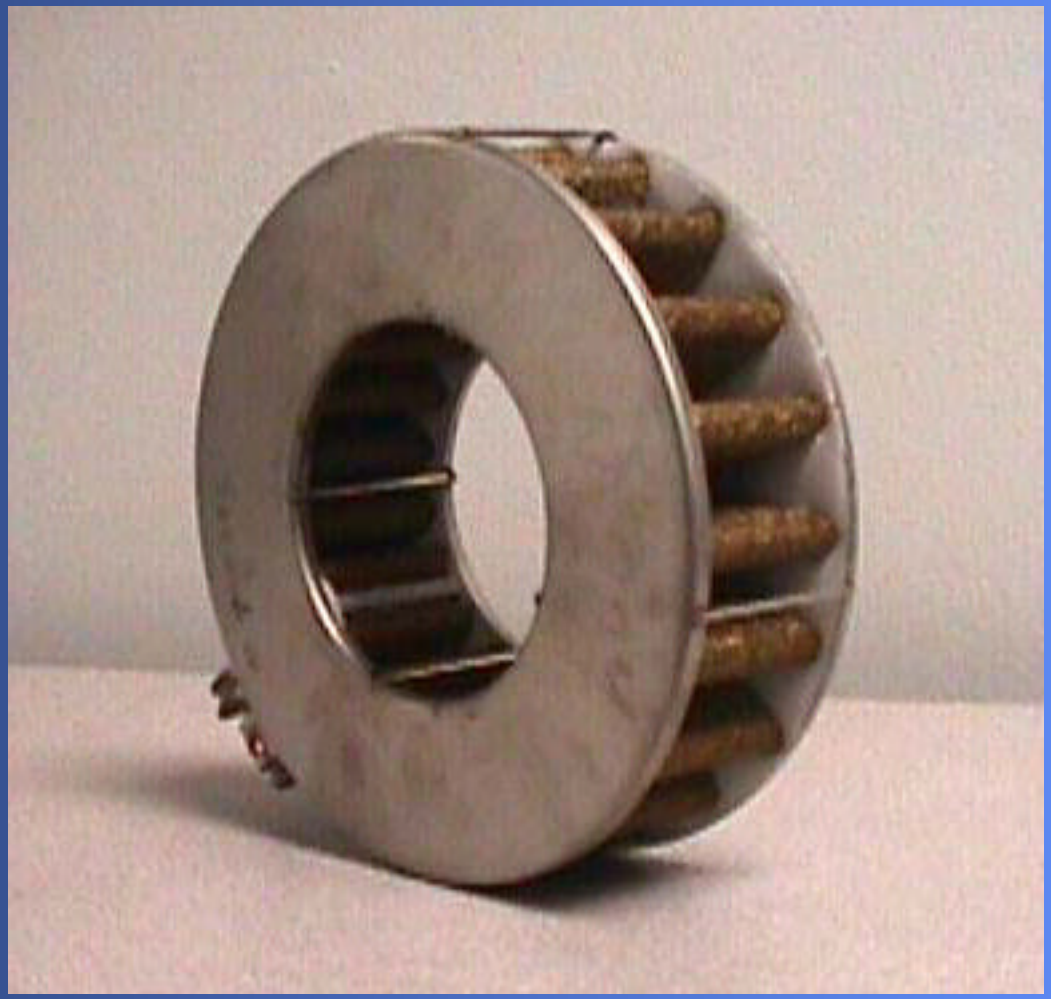
FLOW OUT

FLOW IN

RYPOS TRAP: Pleated Strip

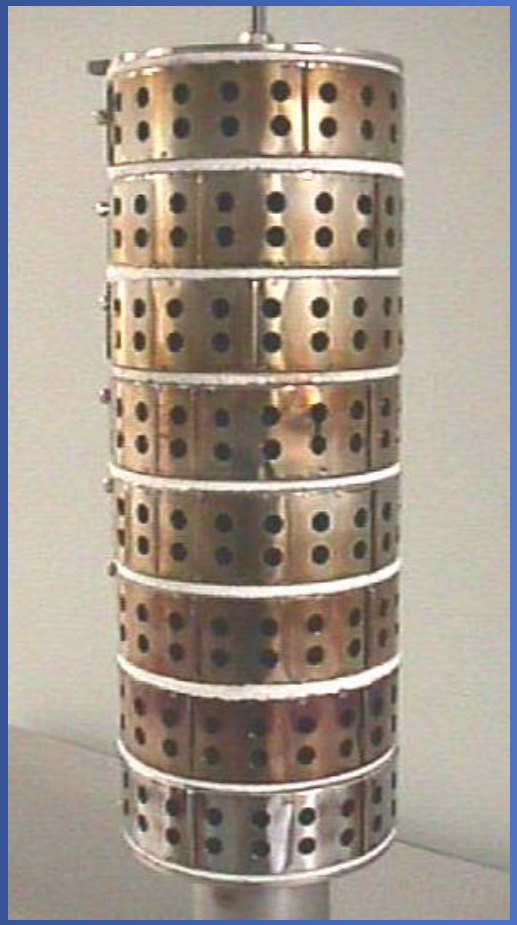


RYPOS TRAP: BEKAERT Filter Cartridge



RYPOS TRAP: Electrical Regeneration

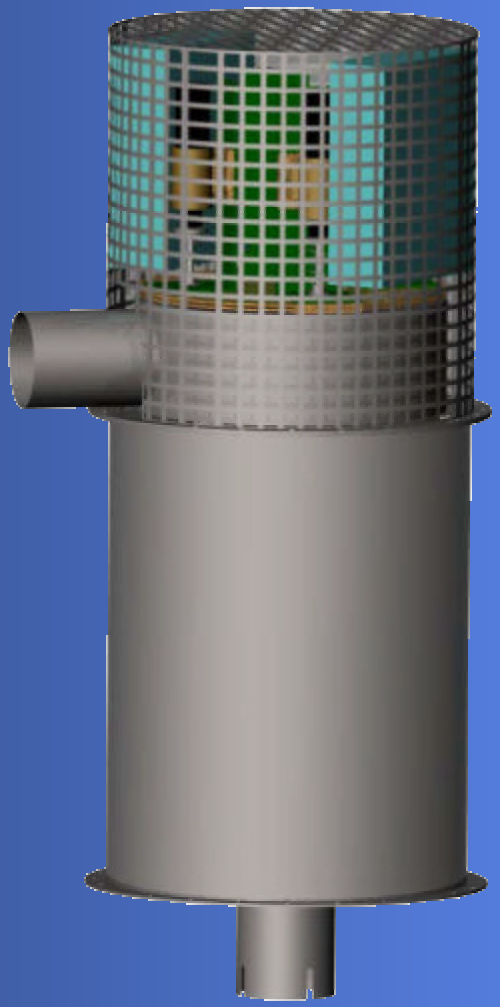
RYPOS TRAP: Filter Cartridge Assembly



RYPOS TRAP: Electronic Controller

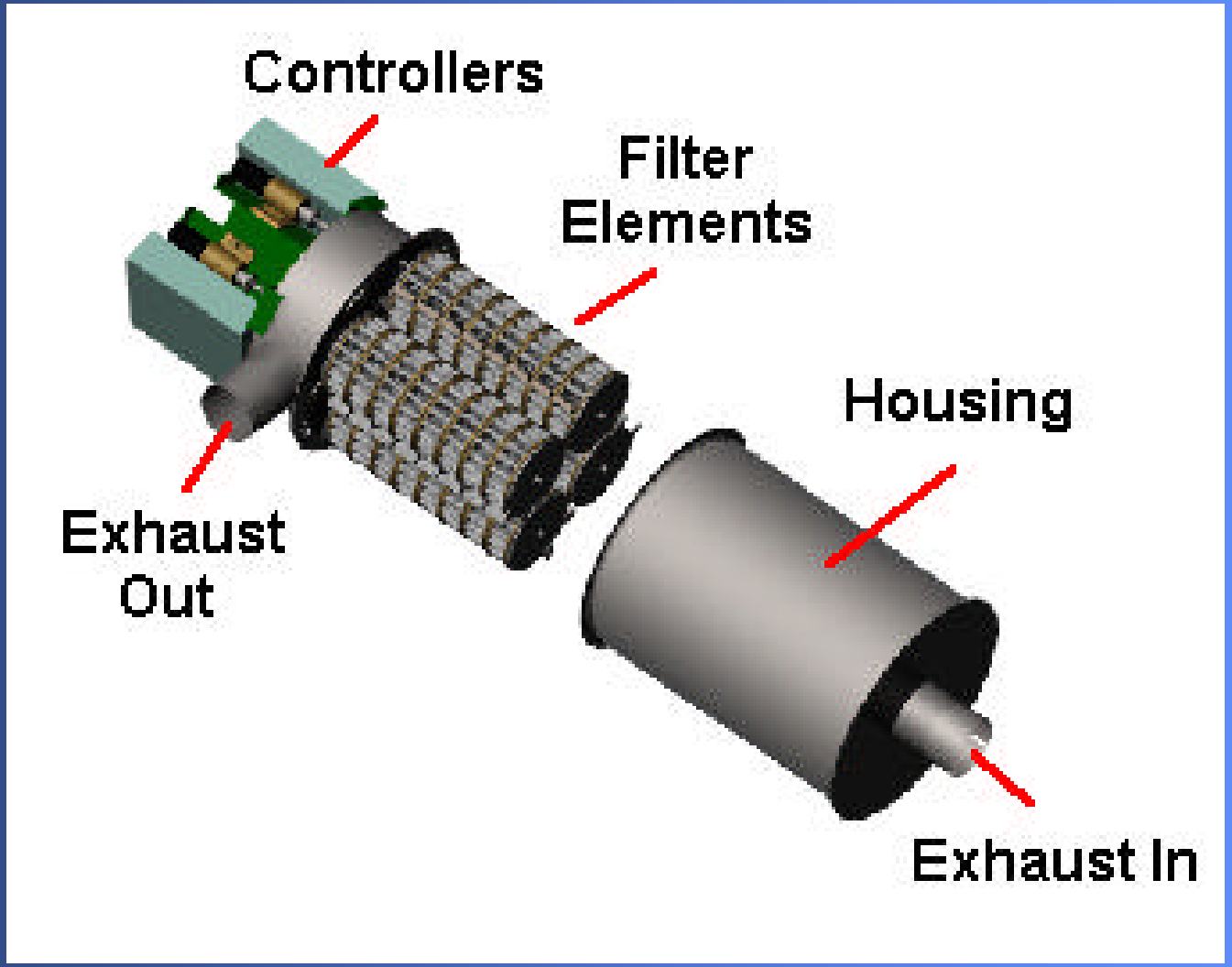
- Active Regeneration
  - Fully Automatic (smart)
  - Energy Efficient
  - Maintains Low Back Pressure
- Remote Data Collection

RYPOS TRAP: Filter Housing



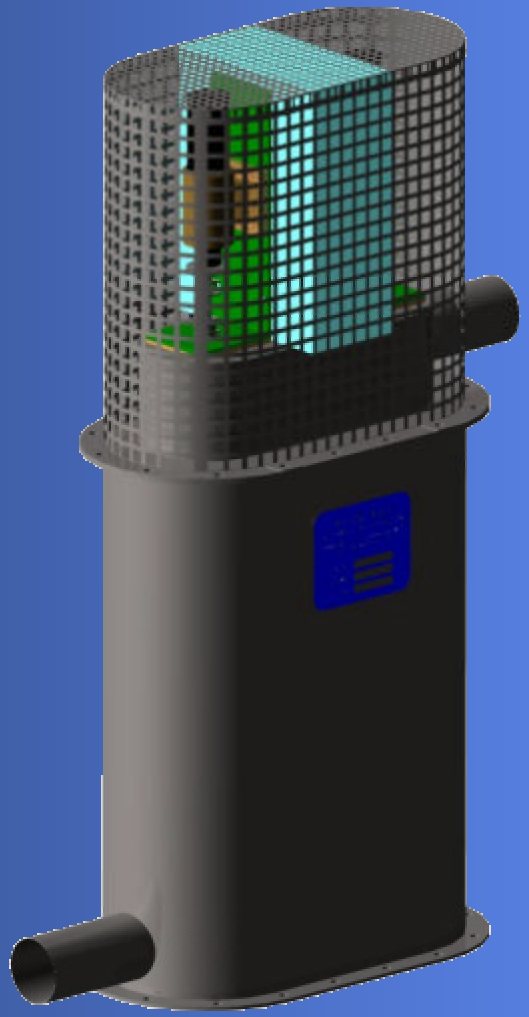
RT408C

RYPOS TRAP: RT408C

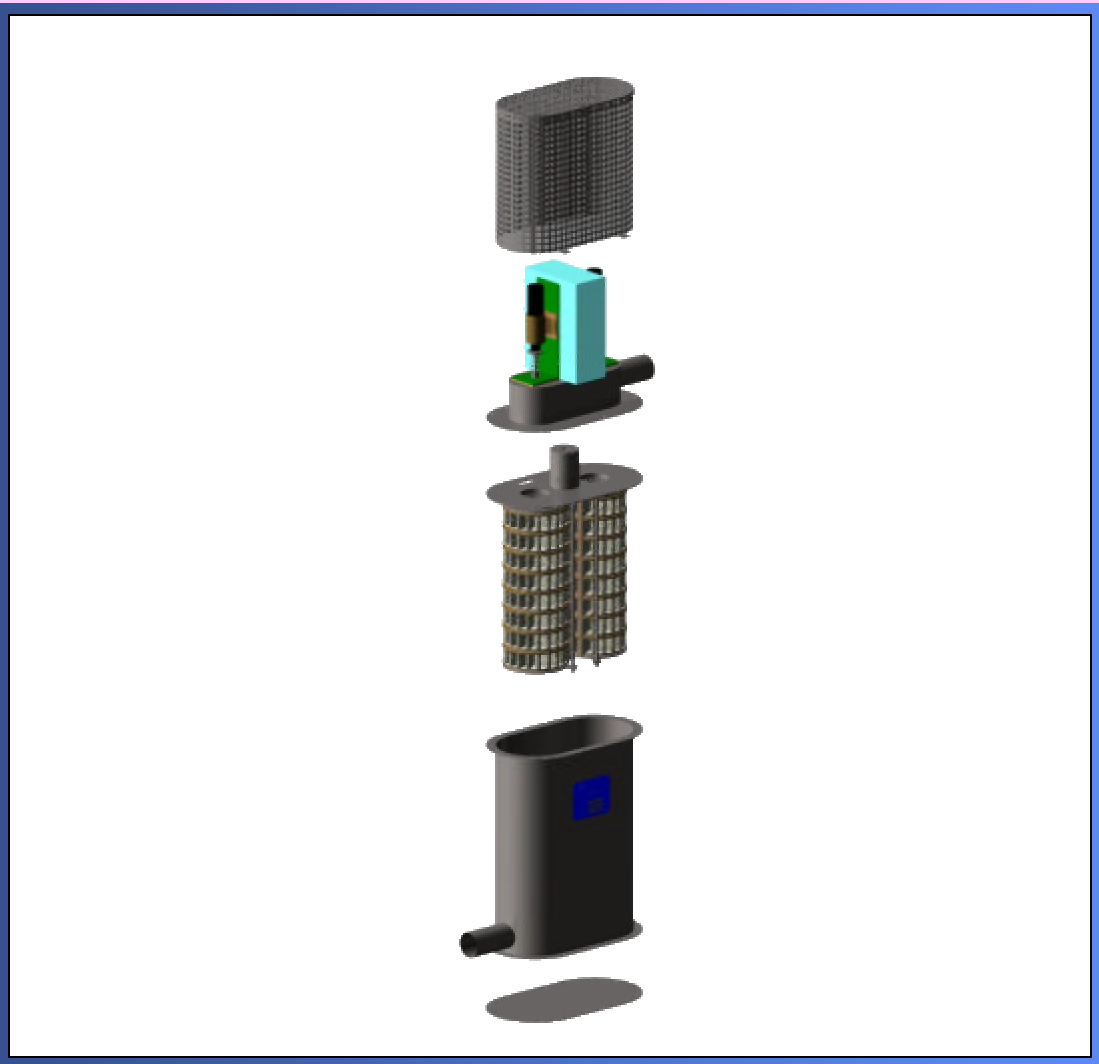


RYPOS TRAP: Filter Housing

RT208E



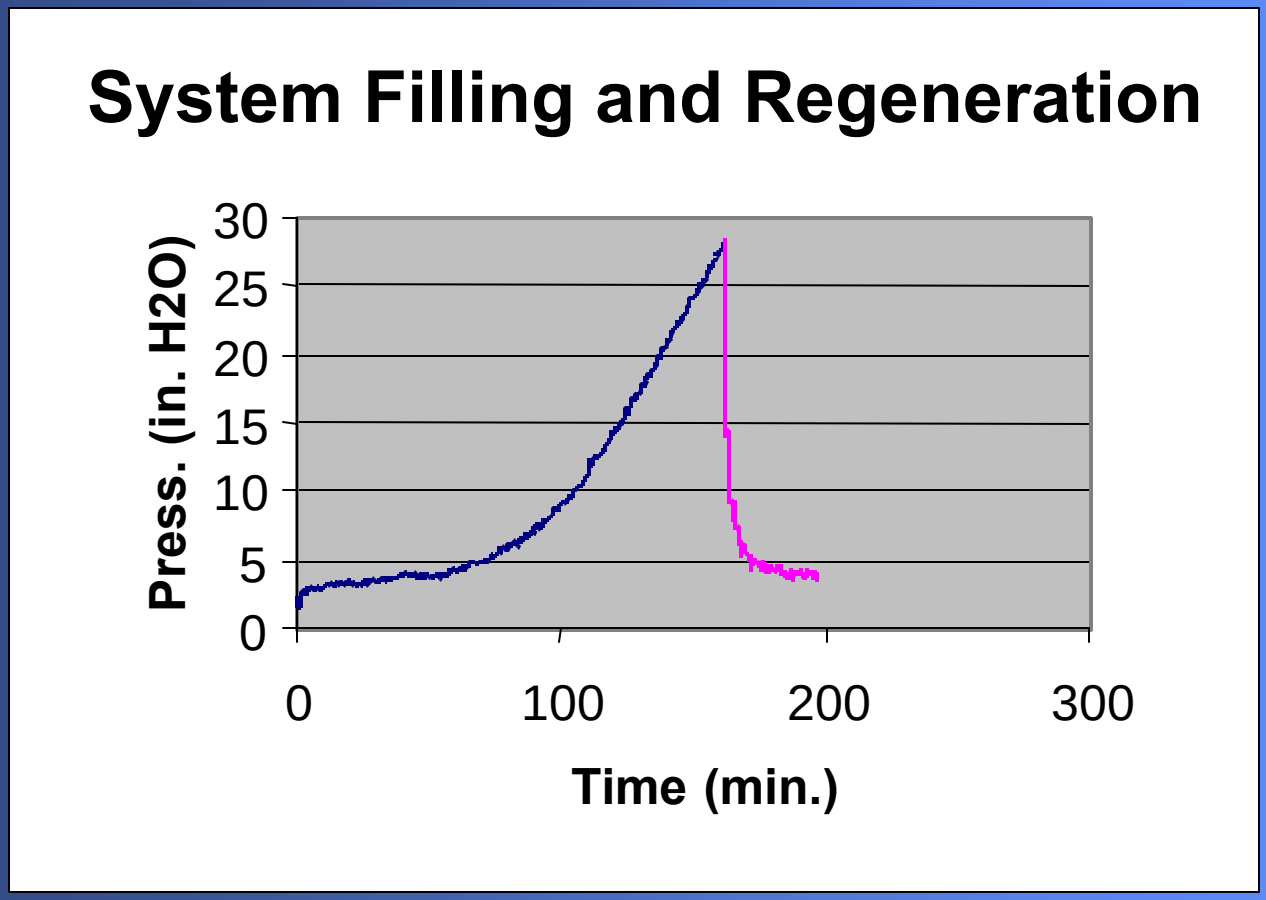
RYPOS TRAP: RT208E



RYPOS TRAP: RT408C

Massasoit College: 5.9 L, Turbo, 160 hp

RYPOS TRAP: Filling and Regeneration

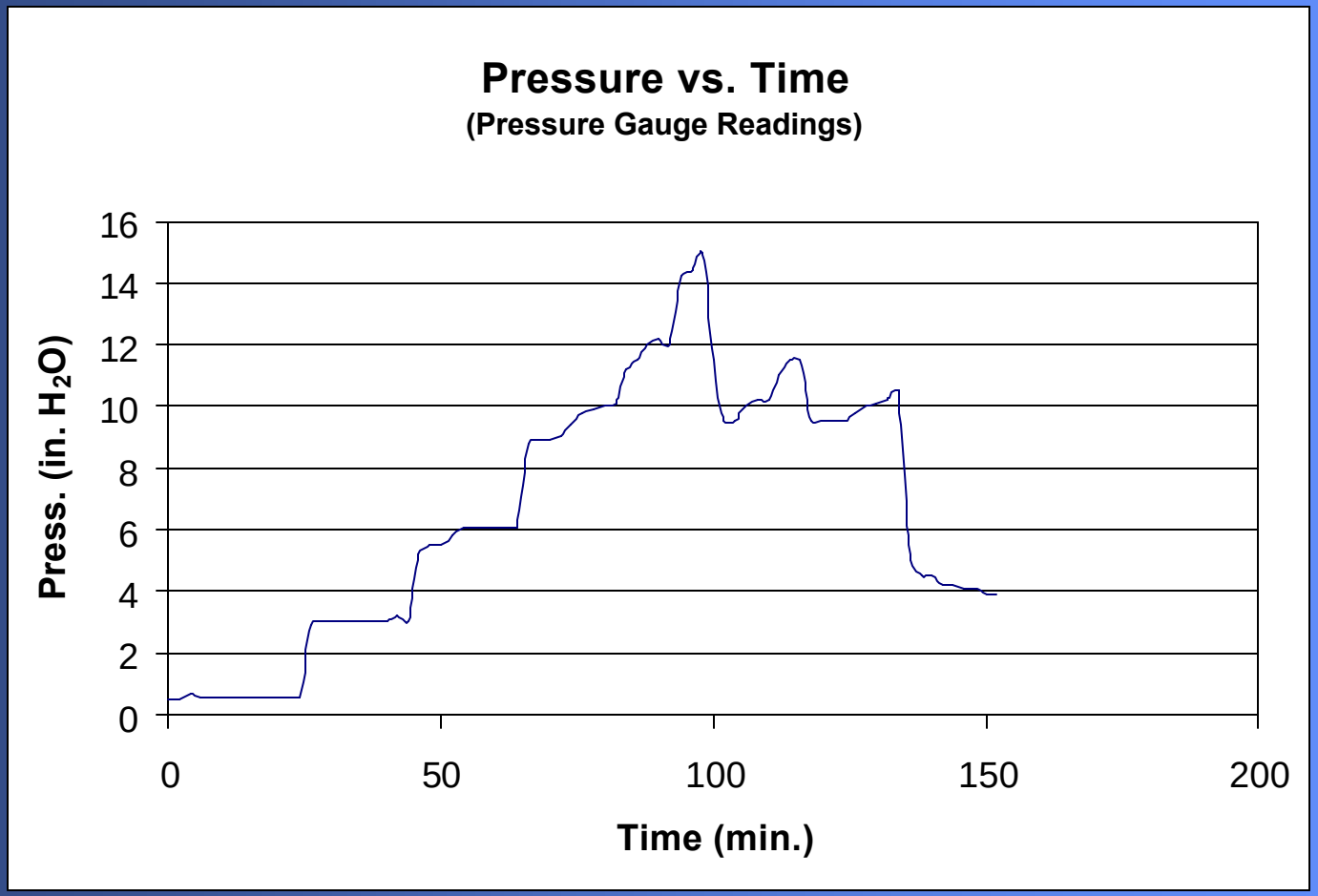


Cummins 5.9 L Turbo, 120 hp @ 1800 rpm

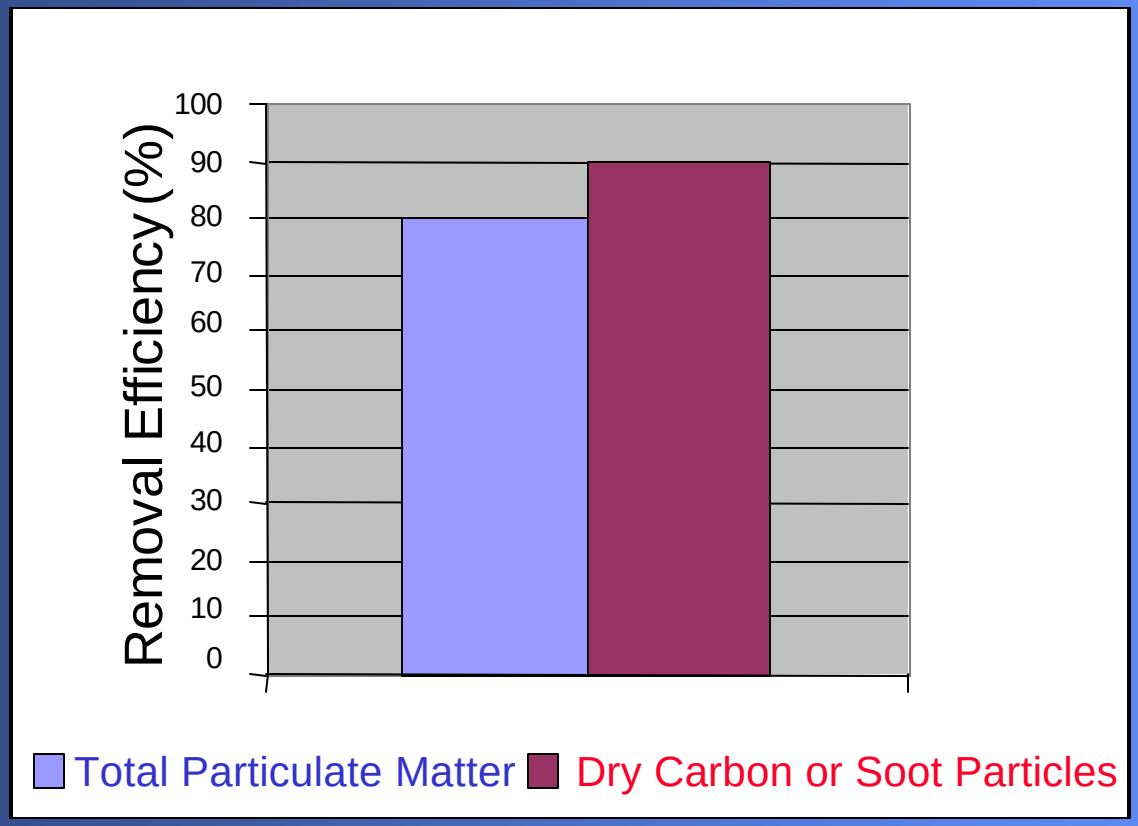
RYPOS TRAP: Regeneration Test

Idle	850 rpm	20 min
40 hp	1600 rpm	20 min
80 hp	1800 rpm	20 min
120 hp	1900 rpm	44 min
80 hp	1800 rpm	20 min
40 hp	1600 rpm	20 min
Idle	840 rpm	20 min

RYPOS TRAP: Regeneration Test



RYPOS TRAP: Efficiency Test



Competitive Advantages

RYPOS/BEKAERT Metal Fibers	Ceramic/SiC Fibers/Cells
	Passive: Oxidation Catalyst / Fuel additives
Active: Direct Heating Fast/Low Energy Consumption	Active: Indirect Heating Slow/High Energy Consumption
Low Back Pressure (< 40 inches of water)	High Back Pressure (> 60 inches of water)
Not Sensitive to Exhaust Temperature	Sensitive to Exhaust Temperature

Conclusions

- High Performance: 80% of Total PM and 90% of Soot
- Fully Automatic
- Regeneration
  - Independent of Exhaust Temperature
  - Independent of Fuel Sulfur Content
- Energy Efficient
  - 750 Watts (1 hp) Average for a 200hp Engine
- Long Life (est. 20,000 engine hours)
- Can Be Adapted to Any Size Diesel Engine, Stationary or Mobile