

**RYPOS**

Clean Air Technology

**RYPOS**



***CARB Level 3 Plus Verified for Stand-by Gensets!!***

**Active Diesel Emission Control Systems**

## Background/History of the Company

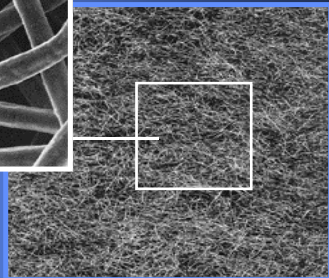
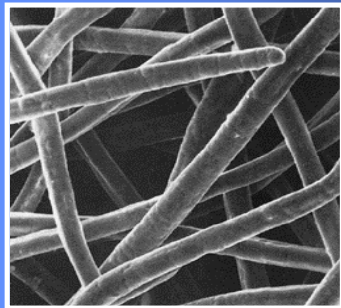
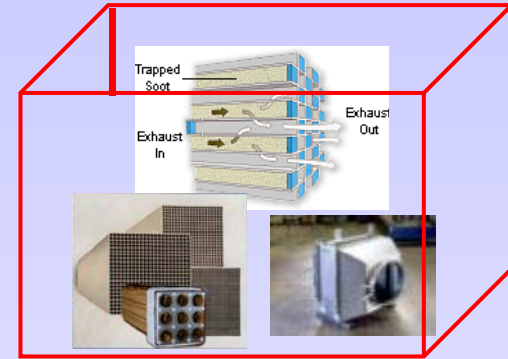
## RYPOS Current Market Focus

- **Power Generation**
  - Rypos HDPF/C targeted towards small to large scale new and retrofit deployments
  - Establishment of formal sales channels through diesel OEM dealers and distributor
- **Off-Road Equipment**
  - Selected to participate in the CARB Off-Road Showcase
  - Pilot programs for underground mining and above ground construction
- **Truck APU/TRU**
  - Leverage Level 3 performance and active regeneration technology for market entry

## Technology Overview

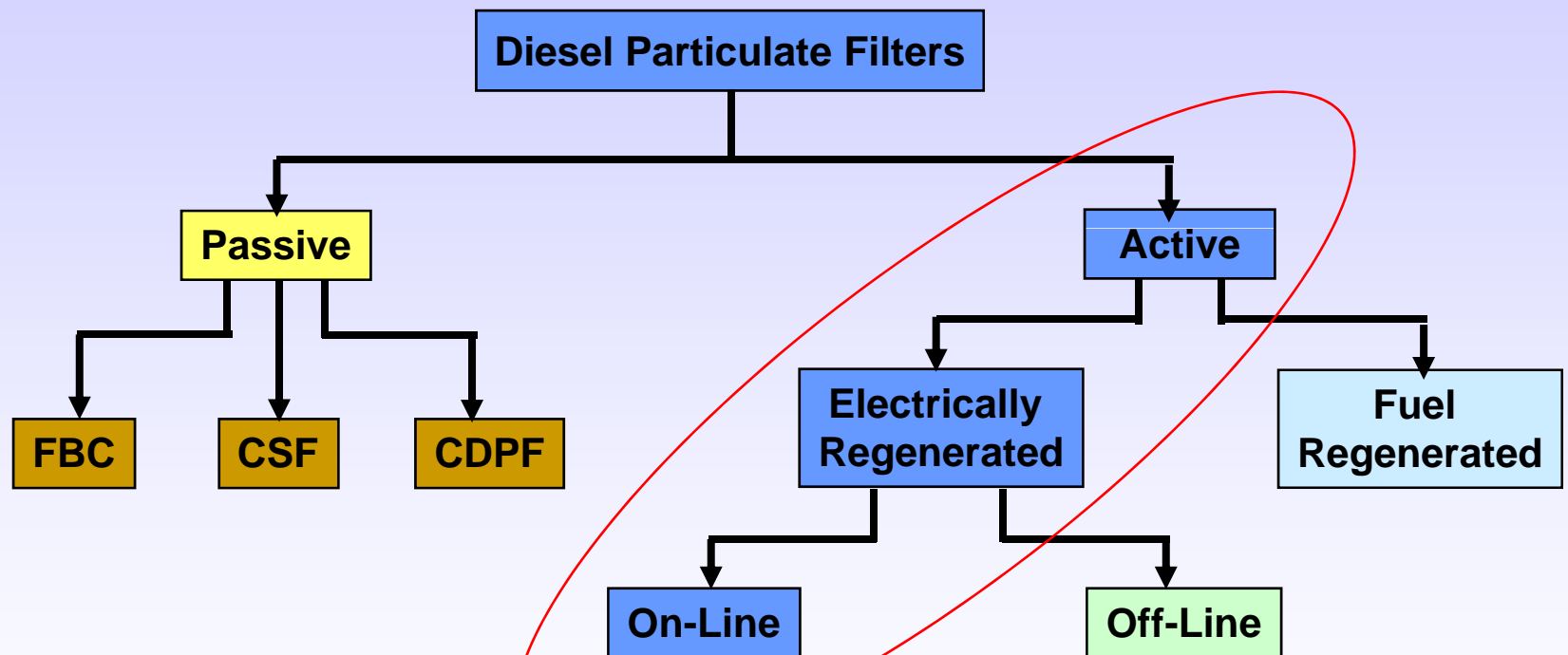
## Outside the Box

### Sintered Metal Fibers



- o Electro-conductive
- o High porosity (up to 95%)
- o Low back pressure
- o Withstands high temperatures (1000°C)
- o Fast heating (low thermal mass)
- o High filtering efficiency
- o High surface area

## Diesel Exhaust After-treatment Options



**FBC:** Fuel-Borne Catalyst

**CSF:** Catalyzed Soot Filter

**CDPF:** Catalyzed Diesel Particulate Filter (DOC + DPF)

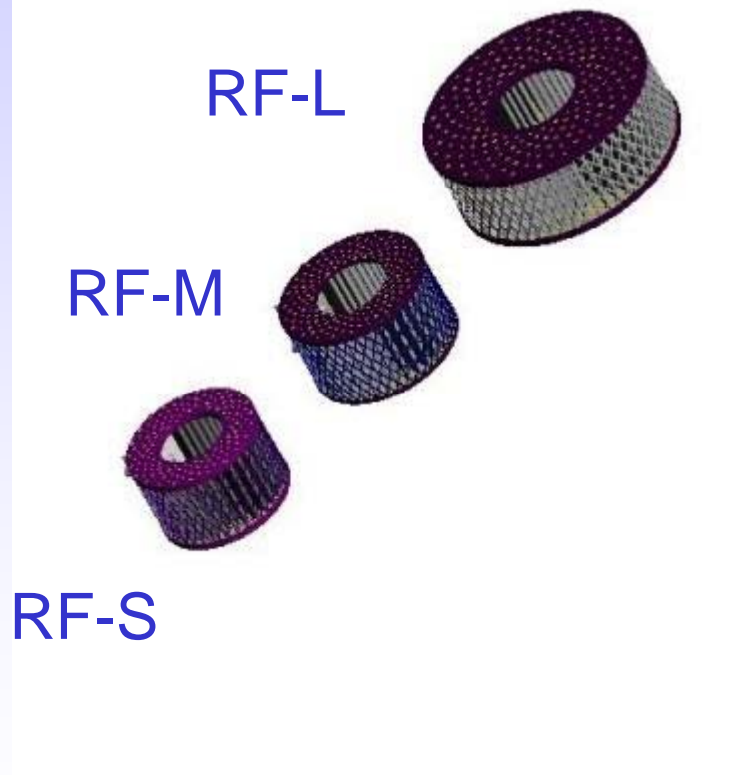
Rypos core technology

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## RYPOS Technology Overview

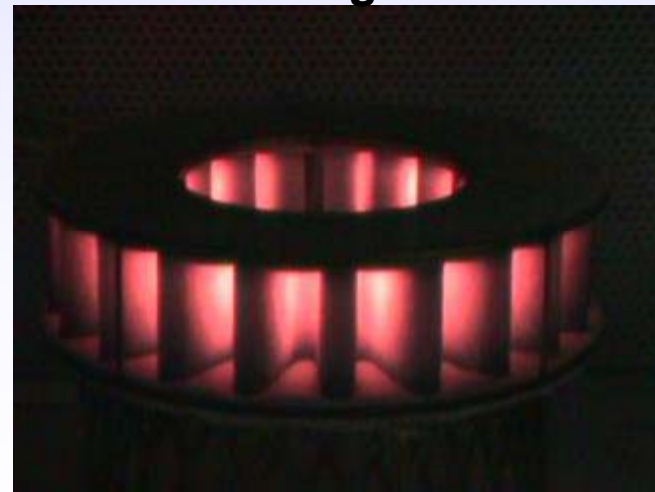
## Active Filter Cartridges



## Intellectual Property

- 4 US patents issued
- Several patents in application
- Advanced filter design
- Proprietary control software
- Proprietary circuit designs
- Proprietary pleating method

## **Electrical Regeneration\***



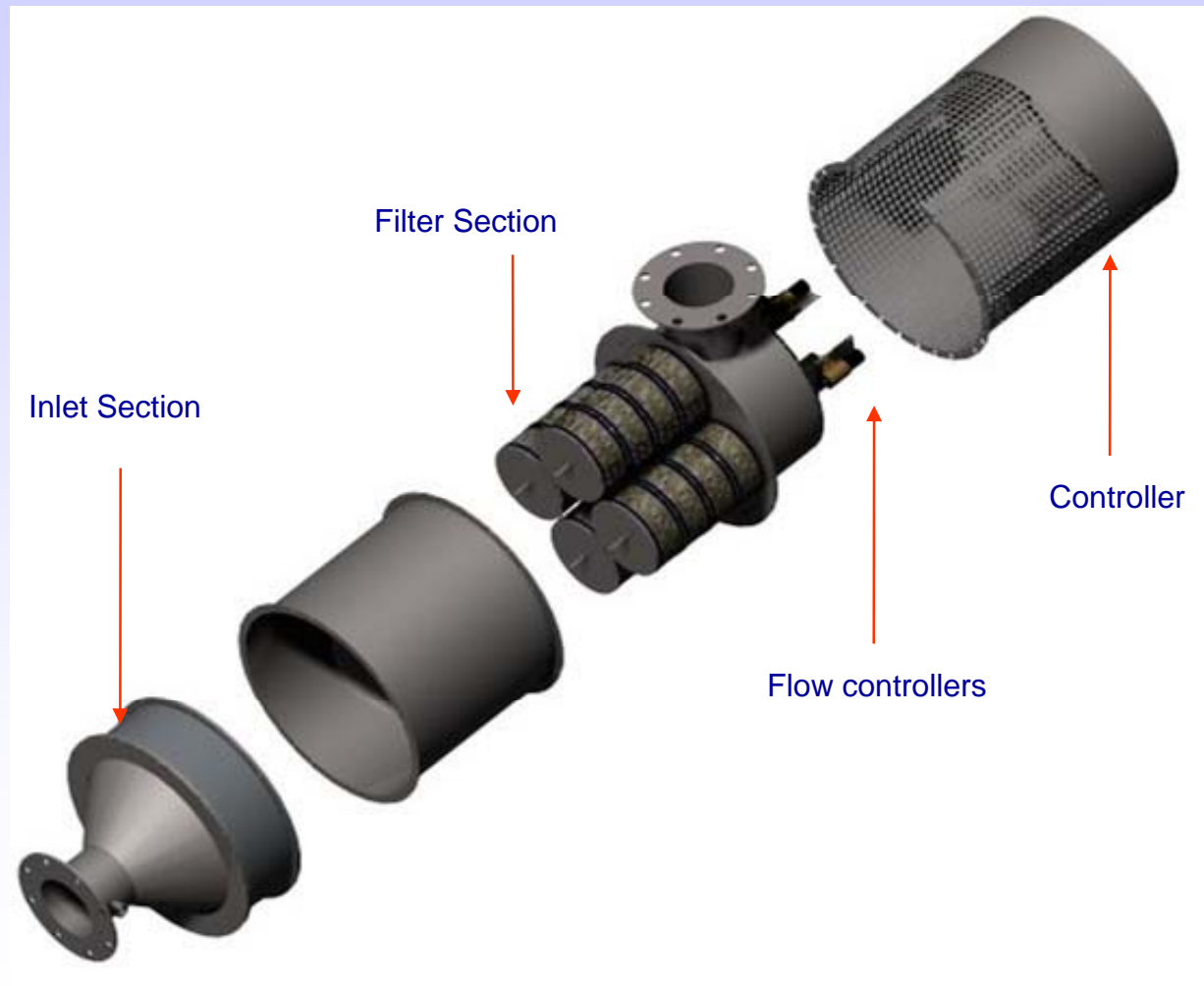
**\*Only Active Regeneration DPF where the FILTER element IS the HEATING element**

## Microprocessor Control

- Automatic regeneration cycles
- Timing sequence, duty cycle
- Flow control and filter unit selection
- Pressure and temperature sensing can be used to initiate regeneration cycles
- Electronic switching of filter elements (automatic)
- Monitoring and remote display



## RYPOS Active Diesel Particulate Filter



## Flexible System Configurations



*Industrial Genset HDPF*



*Retrofit to Terex V-12  
760hp Earthmover*



*Retrofit to CAT3126  
Front-end Loader*



*Small Truck APU  
Application w/Kubota  
.48L Z482-E Engine*



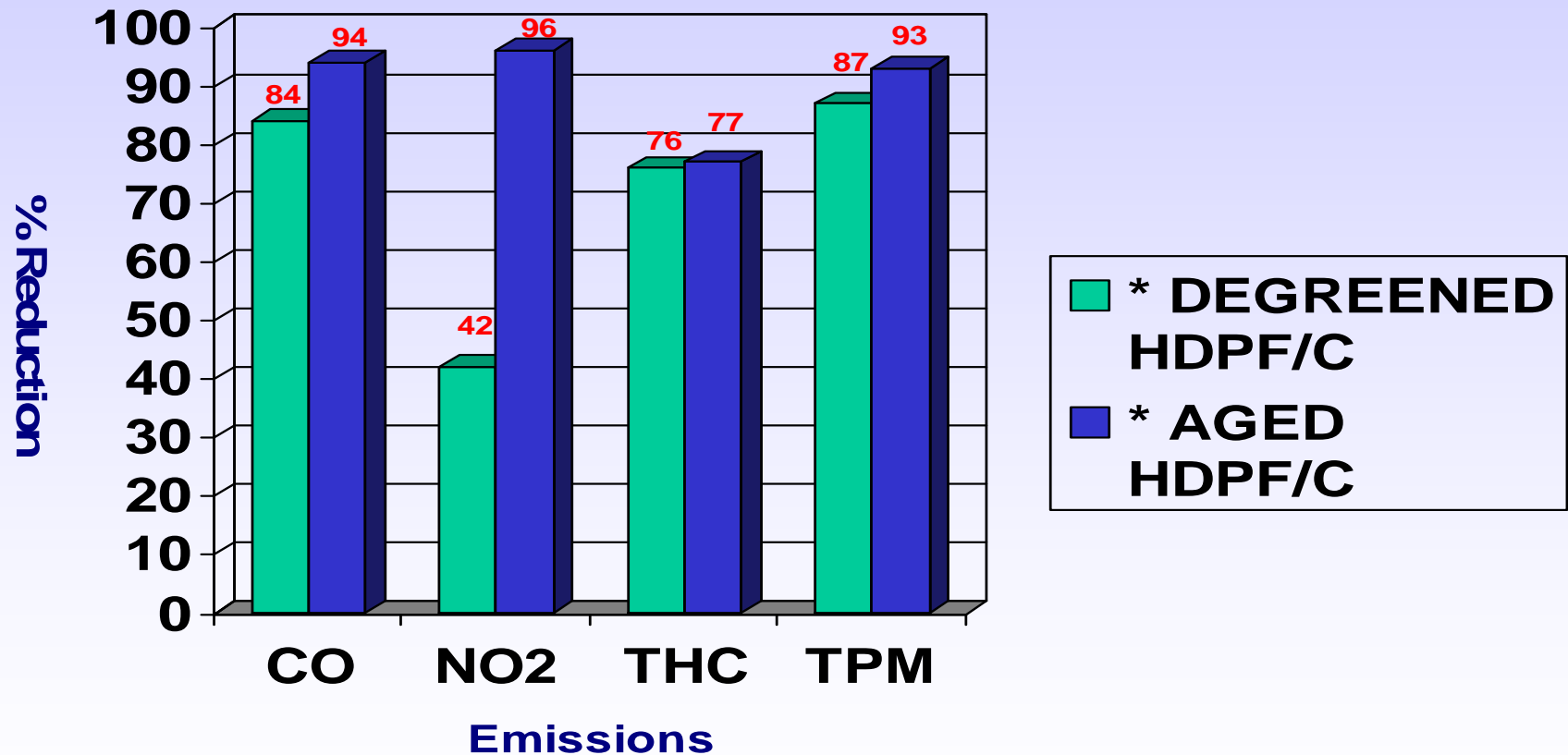
*TRU Active Filter  
w/Kubota 2.2L V2203-E*

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## Independent Testing RYPOS HDPF/C Technology

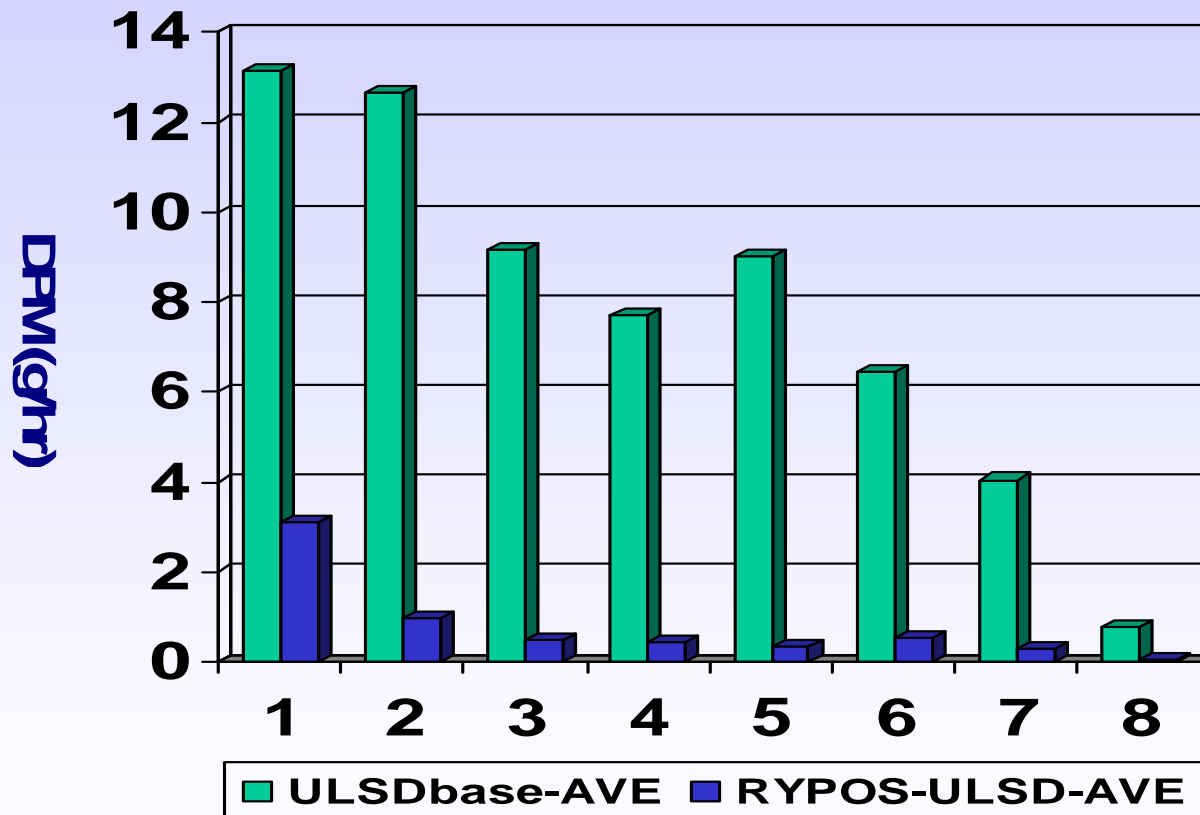
## CARB Level III Testing for Stand-by Gensets



\* Source: Environment Canada, Emission Research and Measurement Division

## Mining Safety Health Administration (MSHA)

Source: MSHA Lab Test for Underground Mine Equipment



RYP0S RH305-M DPM 8-Mode Test with ULSD Certified Fuel

90% Average DPM Reduction with RYPOS HDPF

## Typical RYPOS Installations

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## Caltech-Owens Valley Radio Observatory/Bear Power 1/2008

**(2) 600kW Kohler Power  
Generator Sets  
2005 12V2000  
Detroit Diesel engines**



**(2) RYPOS RH708-L-C**



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## Bear Power Products/Fortune 50 Oil Refinery in California 3/2007

**Detroit Diesel  
1985 2-cycle  
Model 1033-7000**

**(2) RYPOS RH404-M-C**



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Cummins West, Inc./City of San Jose, CA Central Service  
Yard  
3/2007

**Cummins  
2006  
QST30-G5 NR2  
1000kW Genset**

**RYPOS RH1207-L-C**



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Milton CAT/Cincotta, Saugus, MA, 1/2006

**CAT 3412**

**500kW**

**RYPOS RT-24**



# RYPOS

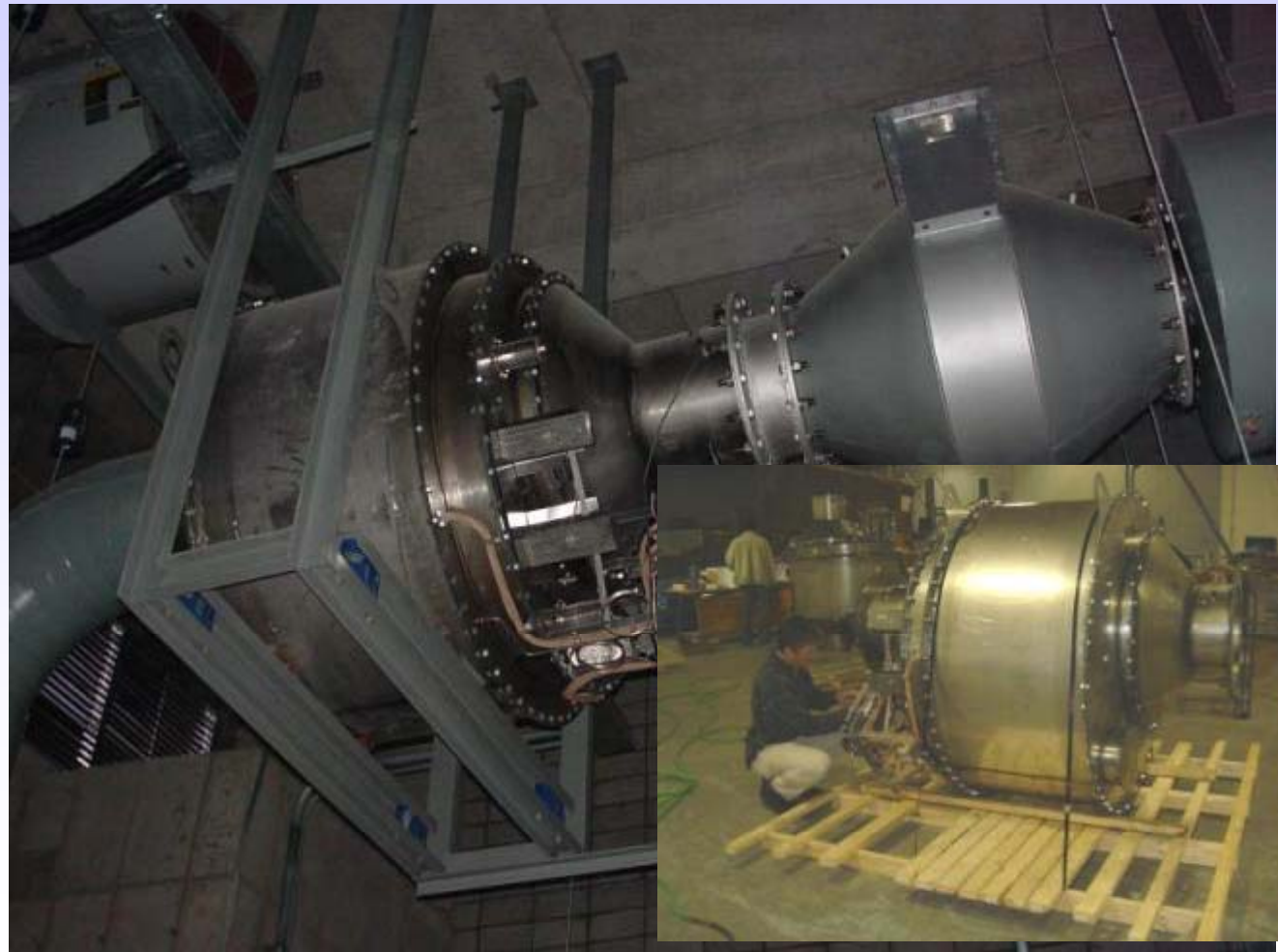
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## Korean Coastal Power/Kangwonland Resort 11/2005

**CAT 3516**

**2000kW**

(4) RYPOS  
RH1907-L-C



## CARB/UC Riverside/NAVSEA Testing at Suisun Bay California 11/05 to present

DDC 12V71 (2-cycle)  
Engine Year: 1974

Currently 2000+ hours  
of operation

Test Cycle: ISO 8178

Long-term test program to  
accumulate hours on a  
“Tier 0” engine

**2 RA24-2C**

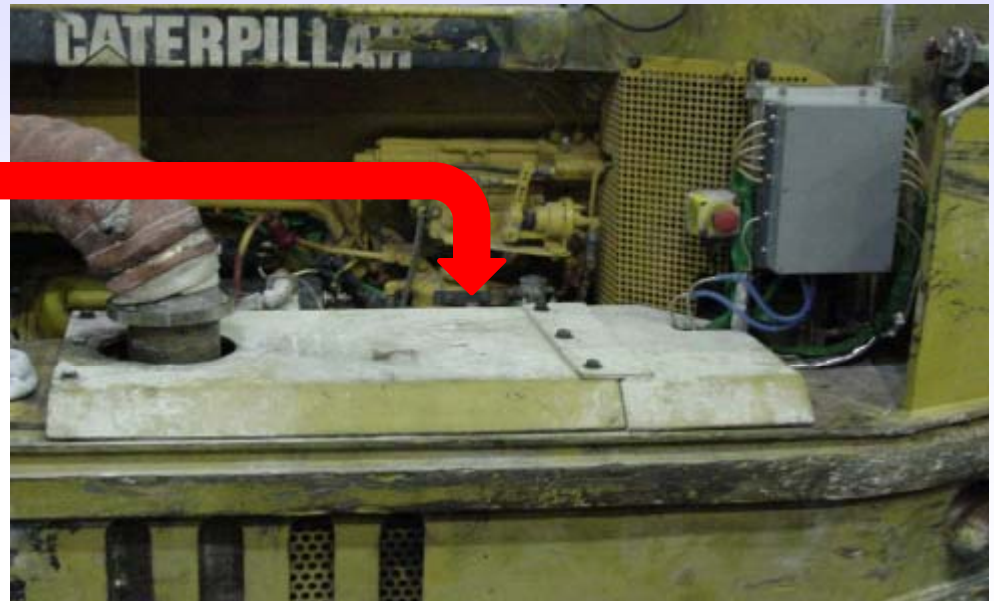


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- **Stillwater Platinum Mine**

- Retrofit to Elphinstone R1300 CAT3306 175hp
- June 07 Pilot program for RYPOS RH506-M-C HDPF/C
- Positive feedback for PM and NO2 emissions
- Durability testing continues
- Repeat orders received



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## Croton Water Filtration Project, Bronx, NY 2/2006

**Terex TR-70 Quarry  
Trucks**

**DDC2000  
760 HP**

**RYPOS RH707-M-C**

- In full operation since March 2006
- Rypos sintered metal filter fiber more durable for shock and vibration versus ceramic substrates
- Active DPF reduces PM independent of exhaust temperature



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## The RYPOS Competitive Advantage

- Our sintered metal filter material *is both* the particulate filter AND the heating element
  - Industry leading energy efficiency: very low fuel penalty
- RYPOS HDPF/C can reduced up to 90% of TPM
  - CARB level 3 PLUS Verification (only technology with “Plus” designation for level 3)
- Intelligent microprocessor control
  - Filter cartridges are regenerated in real-time during normal system operation
- Modular system design
  - Scales from 100kW to 50MW for stationary generator sets
- Non-catalyzed regeneration of filter cartridges
  - Does not create (NO<sub>2</sub>) nitrogen dioxide, in fact it is reduced
- Low cost of ownership
  - Minimal system maintenance is required: can operate continuously in remote locations
- No requirement or specification for low temperature exhaust
  - Ideally suited for for stand-by generator sets or long periods of engine idle
- Not fuel grade dependent
  - Not necessary to utilize costly low sulfur diesel fuel or expensive fuel additives, system will perform to specification with fuel sulfur content up to 500ppm
- Low thermal mass of filter material
  - Highly efficiency, heats quickly, cools quickly