

# DIESEL PARTICULATE FILTER AND DeNO<sub>x</sub> SYSTEM FOR RUBBERY TIRE GANTRY CRANES

by  
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**PACECO® Corp**

## Overview

- About PACECO CORP.
- Rubber Tire-Gantry (RTG) Cranes
- Diesel Particulate Filter
- DeNO<sub>x</sub> System
- Installations, Demonstrations, & Emissions Tests
- Conclusion



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## About PACECO CORP.

- Leading Supplier of Container Handling Cranes
- Primary Products: Dockside Cranes and RTG Cranes



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## Rubber Tire Gantry (RTG) Cranes

- Function: Stacking Containers in Container Terminals for Storage
- Powered by Diesel-Electric Generators: provides flexibility



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## Diesel Particulate Filter (DPF)

- The DPF Passive Exhaust Filter designed to Reduce Particulate Matter (PM) emissions
- Currently CARB Verified for RTG Crane Engines
- Operation Principal: Regeneration Trap



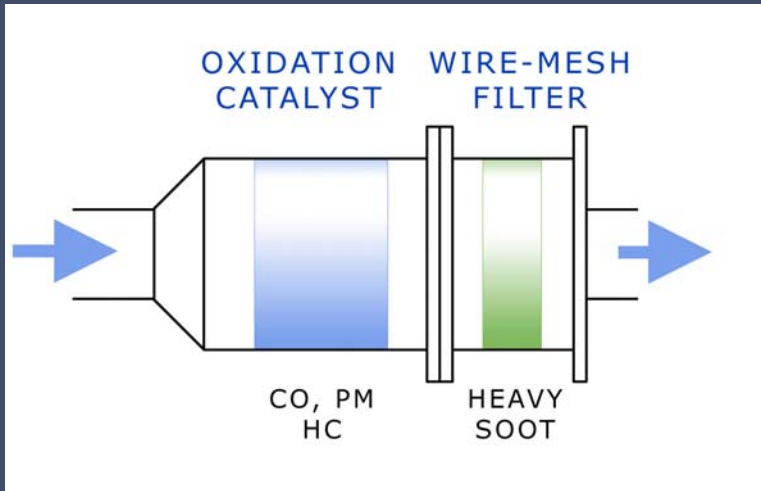
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## Principal of Operation: Regeneration Trap

- The DPF is composed of two primary components: an Oxidation Catalyst and a Wire-Mesh Filter
- The Oxidation Catalyst reduces PM, HydroCarbon, and Carbon Monoxide Emissions
- The Wire-Mesh Filter Traps and "regenerates" heavier PM soot

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# DPF Schematic



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# DPF Performance & CARB/EPA Verification

The DPF is verified under:

- CARB Diesel Emissions Control Strategies Verification Program (DECSV) [Level 1 VDECS]
- EPA Environmental Testing Verification (ETV)
- EPA Voluntary Diesel Retrofit Program (VDRP)

EPA ETV Test Results (Aged DPF Unit vs. Baseline)	
Mean Reduction (%)	
PM	39.2%
HC	100%*
CO	95.0%
95% Confidence Interval (%)	
PM	35-43%
HC	N/A
CO	88-100%

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## Advantages of the DPF System

- Easy to Install and Operate  
(passive device require only annual filter cleaning/replacement)
- Designed Specifically for RTG Crane
- Over 2,000 hours of Verified Operational Performance

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## DPF Summary

- Reduces PM Emissions from RTG Cranes by Approx. **40%**
- CARB & EPA Verified Level 1 VDECS with CARB
- Is a Passive Filter that is easy to install and operate

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## DPF/DeNO<sub>x</sub> System

- Active Exhaust Treatment System called a *Selective Catalytic Reduction* (SCR) System
- Reduces NO<sub>x</sub> Emissions from RTG Crane Diesel Engines by **50-70%**



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## Principal of Operation: Selective Catalytic Reduction (SCR)

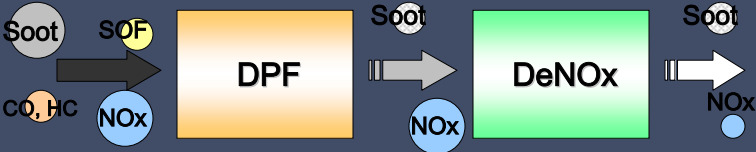
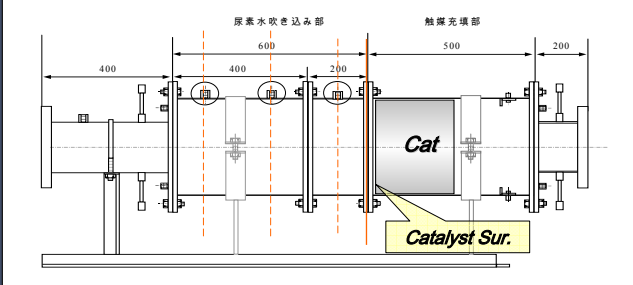
- SCR's inject an Exhaust Treatment Fluid into Exhaust Stream to reduce NO<sub>x</sub> Emissions
- DeNO<sub>x</sub> System Consists of an Injection Nozzle and SCR Catalyst



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# Schematic



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# DPF DeNO<sub>x</sub> Performance/Advantages

- The DeNO<sub>x</sub> System Reduces NO<sub>x</sub> Emissions from RTG Cranes by 50-70%
- Combined DPF/DeNO<sub>x</sub> System reduces a range of emissions: HC, CO, PM, NO<sub>x</sub>

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## Demonstrations/Installations

- PACECO Corp. is supplying customers with the DPF
- Port of LA/LB Terminals are assisting PACECO Corp. with demos of the combined DPF/DeNO<sub>x</sub> System
- There has been extensive funding/assistance from Port Authorities in LA/LB



## Conclusion

- PACECO Corp. provides both the DPF and DeNO<sub>x</sub> System to improve the environmental impact of port operations
- The DPF is a simple, passive device which cuts PM emissions by **40%**
- A combined DPF/DeNO<sub>x</sub> system will also reduce NO<sub>x</sub> emissions by **50-70%**





# Thank You

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