SCRT® Technology for Retrofit of Heavy Duty Diesel Applications

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Heavy Duty Diesel

Outline

- Introduction
- System Description
- Development Results
- Field Demonstrations
- Conclusions

SCRT® Retrofit Development Project

- Objective
  - The goal of this project is to develop a retrofit SCRT® system that can simultaneously reduce the PM and NOx emissions from a diesel engine in urban applications for the Worldwide market. The system will work on electronically or mechanically controlled 4-stroke engines .
- The emission reduction goals:
  - NOx 50-80%
  - PM > 80%
  - HC >90%
  - CO >90%

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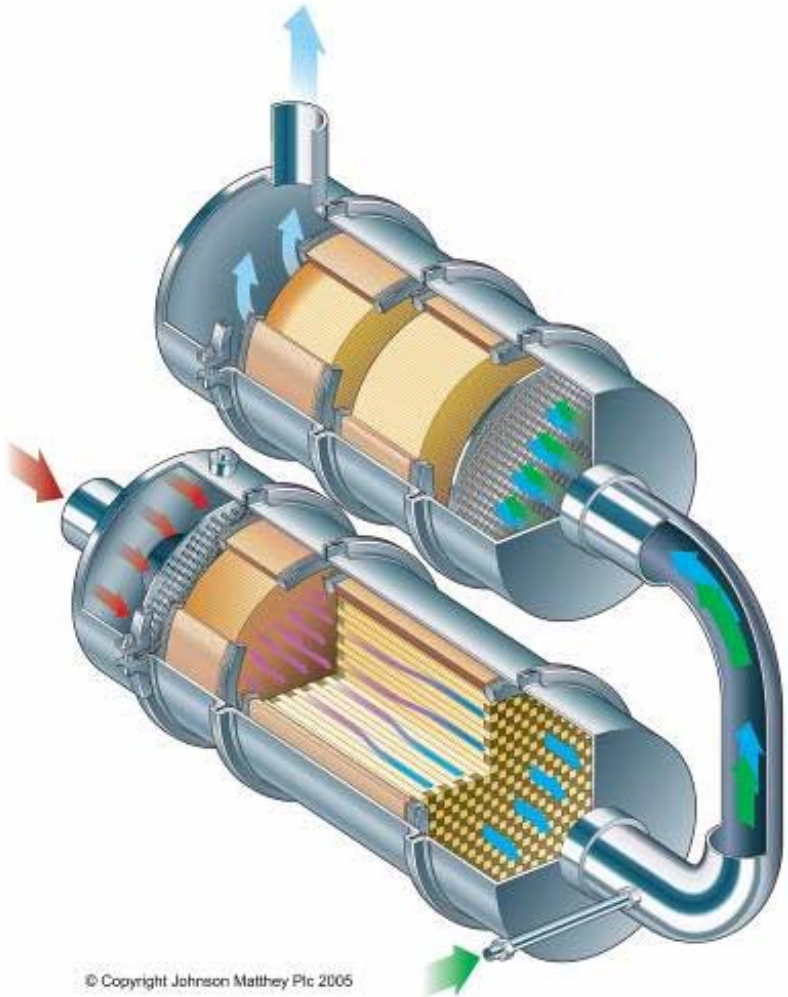
SCRT Retrofit Product

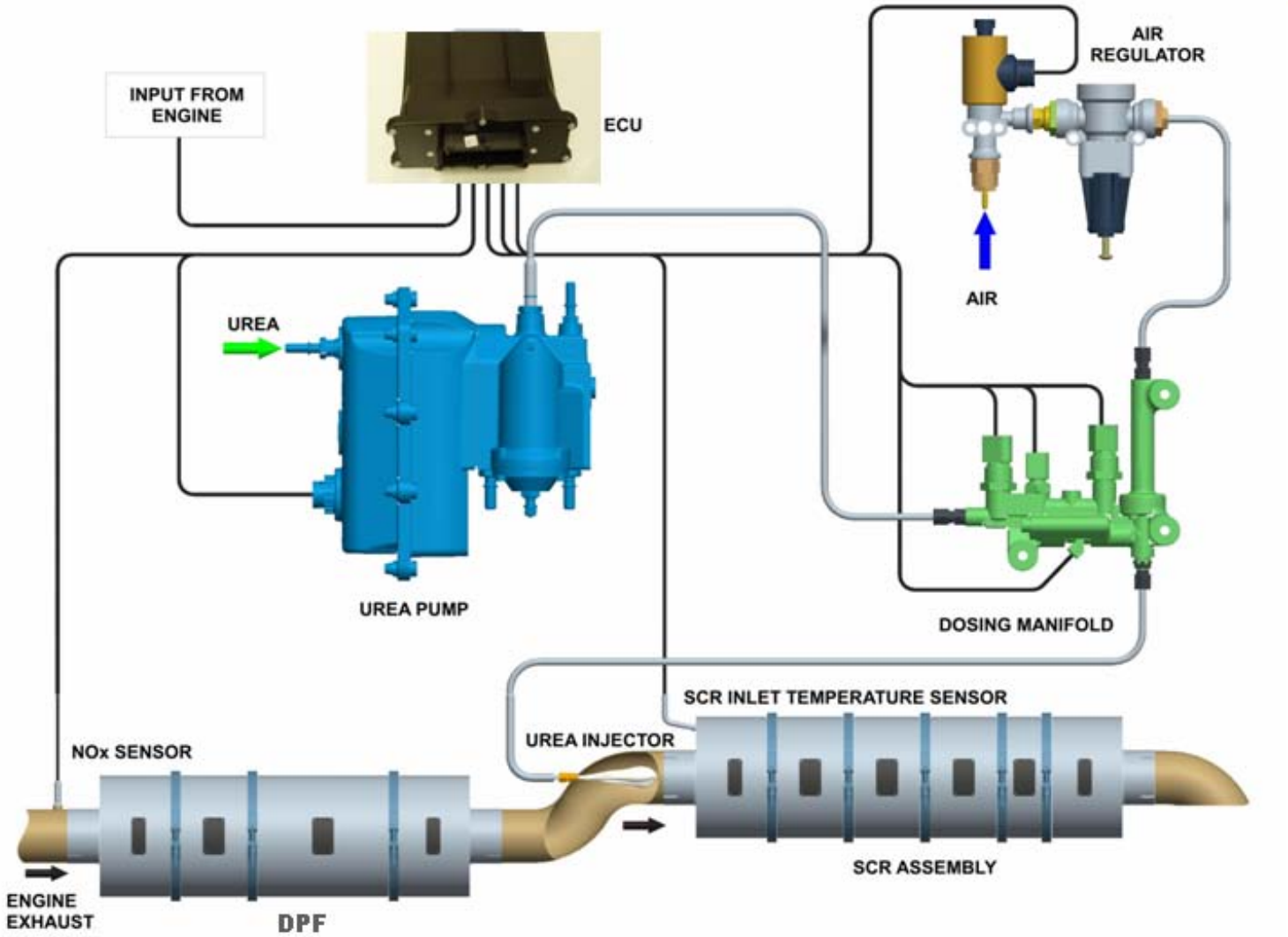
- SCRT ® = SCR + CRT®
  - SCR = Selective Catalytic Reduction of NOx with urea
  - CRT® = Continuously Regenerating Technology for reduction of PM,HC and CO emissions



SCRT Retrofit System

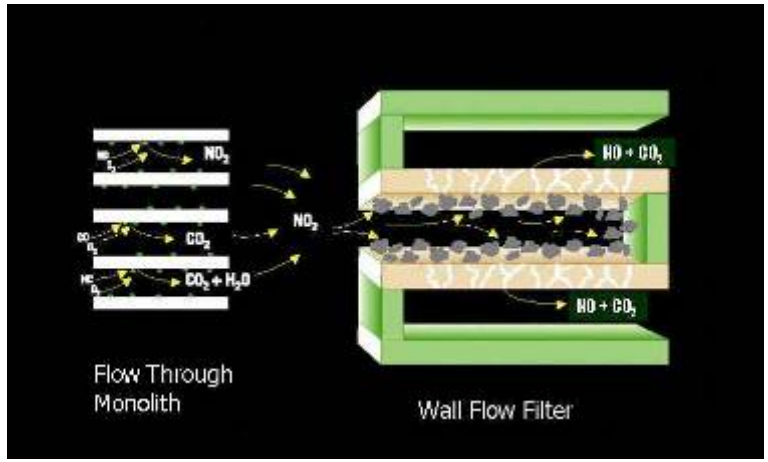
- **System Components**
  - CRT
  - SCR Catalyst system
    - SCR catalyst
    - NH_3 slip catalyst
    - NOx sensor(s)
    - Temperature sensors
  - Urea delivery system
    - Urea tank
    - Urea Pump
    - Air regulator
    - Dosing Manifold
    - ECU & wiring harness
    - Nozzle
    - Sensors

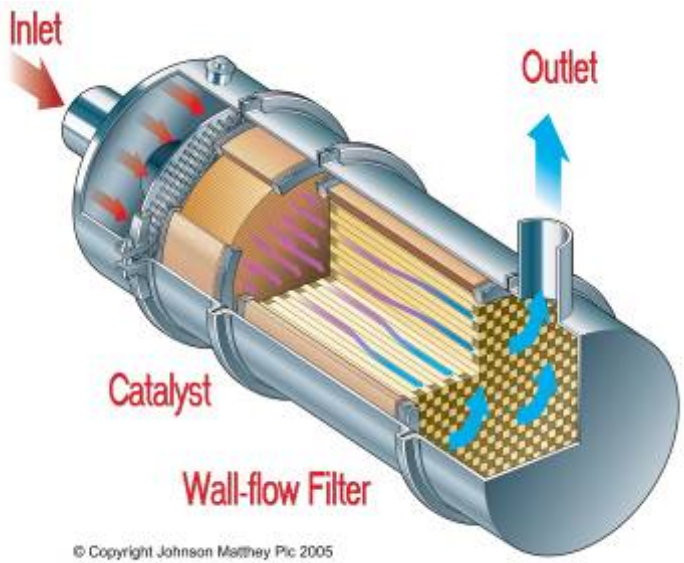
SCRT System Overview



SCRT System Components
CRT

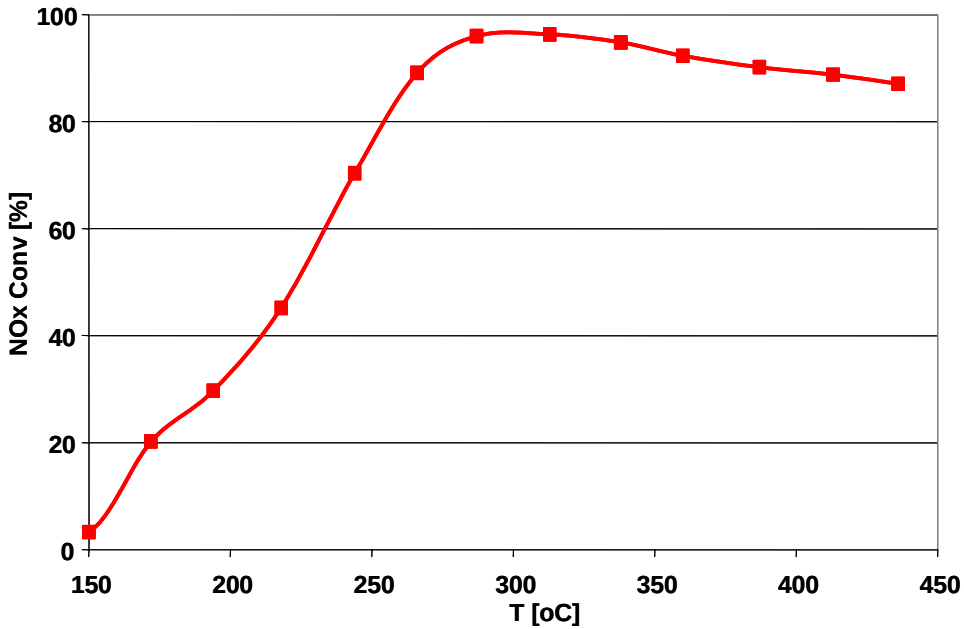
- CO/HC/PM Emission Control System combining Oxidation Catalyst & Filter
- Engineered as a totally passive emission control system
- Uses NO_2 produced by a specially formulated catalyst to burn soot collected by the filter at typical operating temperatures of diesel engine exhaust
- Requires the use of Ultra Low Sulfur fuel





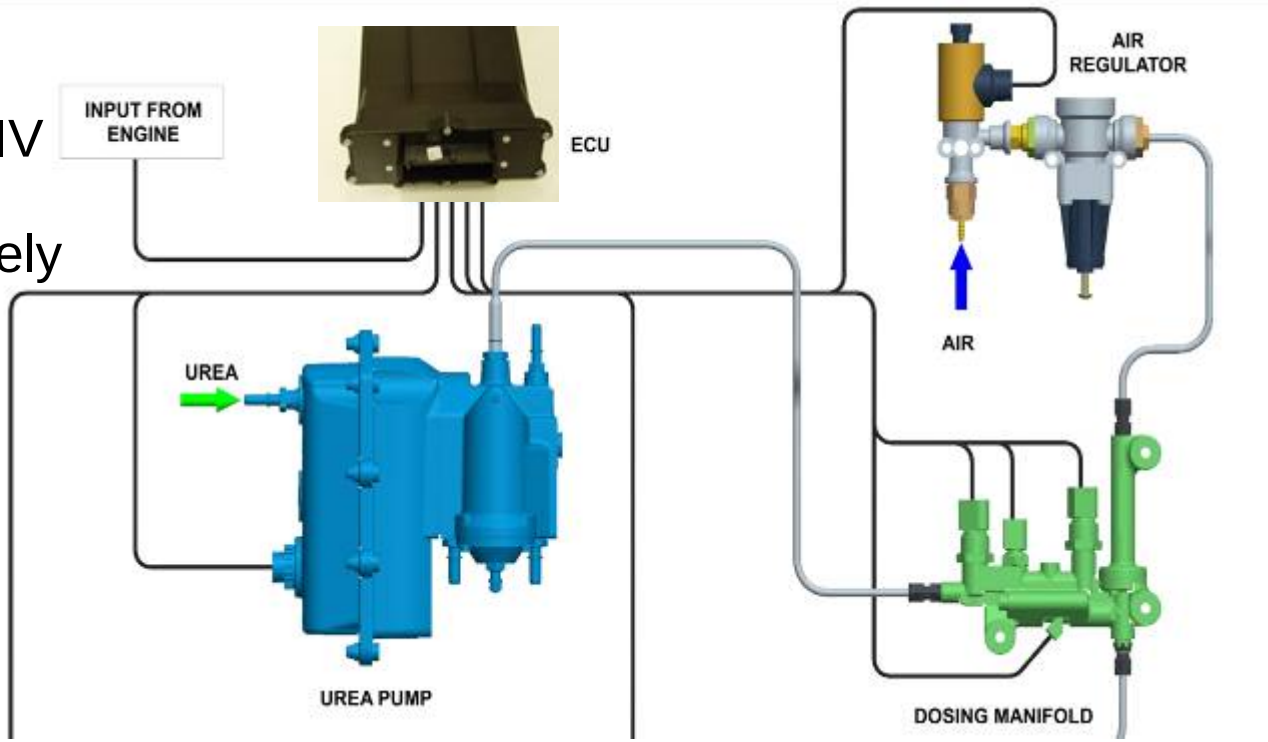
SCRT System Components
SCR Catalysts

- SCR Catalyst
  - Vanadia based catalyst on corderite substrate
  - Tested for thermal durability and poison resistance
  - In general, catalyst volume to engine volume 2:1
- NH_3 Slip Catalyst
  - PGM Catalyst on corderite substrate
  - Very active resulting in smaller size



SCRT System Components
Urea Injection System

- Injection System
  - Compact
  - Precise Air and Urea mixing
  - Proven technology - Currently in series production for Euro IV applications
  - High volume, relatively low cost



SCRT System Components
Urea Injection System (cont)

- Electronic Control Unit (ECU)
  - Can handle up to 15 control inputs
    - Analog, Digital and CAN
  - Can use either a look-up table (map) or algorithm for urea injection
  - Datalogging capabilities
  - Developed and tested to on-road automotive standards

SCRT System Components
Control Algorithm