DIESEL TECHNOLOGY FORUM
FUTURE OF DIESEL PART 1: GREATER EFFICIENCY AND LOWER EMISSIONS
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Dmitri Konson
Vice President Engineering
Tenneco Clean Air

Keri Westbrooke
Vice President, Chief Technical Officer
Tenneco Powertrain
Driving progress toward cleaner, more efficient mobility

The Tenneco Clean Air and Powertrain business groups combine the expertise of two companies to create a pure-play powertrain company committed to enabling more efficient, more powerful, more sophisticated engines and developing advanced systems to reduce emissions in traditional and hybrid applications.
TENNECO GLOBAL FOOTPRINT

21 Technology Centers • 144 Manufacturing Sites • 50,000 Employees

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A global leader in designing, engineering and manufacturing Clean Air solutions to meet global emissions regulations anywhere in the world, our products and solutions enable cleaner air and healthier lives.

59 manufacturing locations  
7 engineering & technical centers  
$7.1B 2019 revenue  
120+ customers served  
18,000 employees
FULL-SYSTEM CAPABILITIES TO ADDRESS TODAY’S COMPLEX AFTERTREATMENT SYSTEMS

TESTING/VALIDATION
• Durability: bench/vehicle
• Modeling and simulation
• Data processing/analysis
• Validation

VEHICLE INTEGRATION
• Packaging / Clearance
• System Layout and FMEA
• Sound quality
• Serviceability

AFTERTREATMENT HARDWARE
• Substrates / Catalysts
• Canning / Support Mat
• Reactors / Mixers
• Mounting / NVH Isolation

CONTROL SYSTEM MANAGEMENT
• Embedded Control Logic with Integrated Hardware Controllers
• On Board Diagnostics (OBD)
• Sensor Integration
• Vehicle Control and Security System Integration

DIESEL EXHAUST FLUID DELIVERY MANAGEMENT
• Pumps, Injectors
• Temp / Pressure Control
• Tank interface: Hoses, Lines, Filters

THERMAL MANAGEMENT
• Active Heating
• Close-coupling, Insulation
• Catalyst Activation / Filter Regeneration

Aftertreatment System Controls

 Fluid Delivery Management

Thermal Management

Aftertreatment Hardware

Full-System Capabilities

Testing/Validation
Modular Aftertreatment Systems with Fuel Efficient Emission Control Technologies

System solutions designed to enable customers meet current and future regulations

- **Cold Start Thermal Unit (CSTU)**
  - Supplies engine independent heat to the aftertreatment system
- **Close-coupled SCR**
  - Low load duty cycles, thermal retention
- **Next Generation Mixers**
  - Robust designs for broad range of injector spray characteristics and low backpressure
- **Fabricated manifolds**
  - Reduce Potential to increase boost and heat the aftertreatment system
- **Large Engine Aftertreatment Systems including Urea Dosing**
  - Reactors and dosing control solution for precise NOx conversion
- **XNOx Selective Catalytic Reduction (SCR)**
  - Minimized exhaust system complexity with greater than 95% NOx conversion efficiency
- **Waste Heat Recovery**
  - Harvests lost heat for conversion into usable electrical/mechanical energy
One of the world’s largest providers of advanced technologies and precision components for demanding powertrain applications and environments

- 85 manufacturing locations
- 14 engineering & technical centers
- $4.4B 2019 revenue
- 1,000+ customers served
- 32,000 employees

GLOBAL BRAND HERITAGE

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Innovations to Improve Fuel Efficiency and Reduce CO₂ Emissions

Engineering Support

Hybrid Electrification Technologies

- Material and design advancements
- Metallurgical laboratories, design, simulation, analysis prototyping
- Wear and fatigue rigs, hydraulic pulsators
- Thermal Management

- Right first time in design (advance simulation tools, prototyping, control of design and process limits)
- Proprietary test rigs, engine test bench capabilities, more than 50 engine test beds up to 1,500kW
- Enabling technology development

- Non-disruptive/easy integration
- New, innovative electrification technologies, motors, generators, compressors, turbines
POWERTRAIN SEGMENT
KEY DRIVERS AND TECHNOLOGIES

Technologies enable energy efficiency, reduce CO₂ emissions and enhance durability