

THE 2011 DIESEL PROGRESS INTERNATIONAL CLEAN AIR COMPONENTS GUIDE

A look at the latest developments in clean air products and emissions technologies. For a more detailed and extensive listing of clean air suppliers, go to the Emissions & Technology Forum at www.dieselprogress.com.



It's what's inside that counts.

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EMISSIONS CONTROL TECHNOLOGIES

ACS Industries manufactures high-temperature exhaust seals for static and dynamic exhaust joint connections. The seals contain a knitted wire mesh core with either composite or graphoil filler, depending on temperature and service. These seals are used from the manifold to the muffler in spring-loaded or clamped connections providing a durable, low leak joint.

ACS also manufactures a wide variety of knitted wire mesh end seals, mesh rings and cushions for diesel oxidation catalysts (DOCs), selective catalytic reduction (SCR) and diesel particulate filter (DPF) systems. The mesh rings are designed to contribute to mounting the substrate and to increasing the durability of the system by lowering mat erosion. The company also offers dynamic seal testing at its Rhode Island, U.S.A., technical center.



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EMISSIONS CONTROL TECHNOLOGIES

AirFlow Catalyst Systems is a developer of diesel exhaust emissions control systems. Systems include the EZDoc DOC, deNOx systems, custom coatings and the EZCat, a new combined unit designed to remove CO, HC and diesel particulates. According to AirFlow, the single EXCat assembly eliminates the need for additional controls, requires less installation space and minimizes downtime as there are no filters to replace.

Other benefits of the system include higher performance at lower temperature and a reduced overall capital expenditure, AirFlow Catalyst said. The EZCat is listed as an approved system by the Mine Safety & Health Administration (MSHA).



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EMISSIONS CONTROL DEVELOPMENTS

Albonair GmbH has opened its headquarters on the Phoenix West site in Dortmund, Germany. The new space encompasses 3000 m² and is equipped with the latest testing equipment, designed to allow Albonair to develop, manufacture and test its products under one roof.

In addition to offices, prototyping and laboratory, the building also provides sufficient space for series pro-

duction with capacity to produce 200 000 dosing units, among other products, each year.

In addition to the headquarters in Dortmund, Albonair has also opened a new production facility in Chennai, India, at the beginning of 2011. Albonair has been producing SCR mufflers in India since April 2010. The new site will produce about 30 000 units primarily intended for the Indian market. Another new site for the Asian market is currently being ramped up for production in Shanghai, China, Albonair said.

Albonair, a company of the multinational Hinduja Group, develops and manufactures exhaust aftertreatment systems for on-road and off-road medium- and heavy-duty vehicles. Its product portfolio covers SCR systems, DPFs, DOCs and catalytic silencers. Albonair supplies aftertreatment components as well as offers customer integrated systems to meet a variety of regional exhaust emissions regulations.



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EMISSIONS CONTROL TECHNOLOGIES

Alfdex produces high-performance systems for crankcase ventilation to meet existing emissions regulations in the U.S., Japan and Korea, as well

Company	Diesel Particulate Filter	Diesel Oxidation Catalyst	Fuel Borne Catalyst	NO _x Storage Catalyst	Selective Catalytic Reduction	Catalytic Silencer	EGR Modules	Controls & Governors	Others
ACS Industries					X				Knitted wire mesh products
Airflow Catalyst	X	X							Low temperature/low lightoff washcoats and catalysts
Albonair	X	X			X	X			Urea dosing system; complete aftertreatment system integration
Alfdex									Oil mist separators for crankcase ventilation
Aristo	X	X							
BASF	X	X			X				AdBlue diesel emissions fluid
Baumot	X	X							Filter cleaning systems, regeneration furnaces
Bosch Emission		X	X		X			X	
Chrican	X	X							
Cat Emissions	X	X			X		X		Repowers, engine upgrades
CleanAIR	X	X			X				
Combustion Components Associates	X	X			X				Low-NO _x burners, noncatalytic selective reduction, combustion modifications
Consilium									Analysis and monitoring systems
Corning	X	X			X				
Cummins Emission	X	X		X	X	X			
Cummins Filtration									Crankcase ventilation systems, diesel exhaust fluid
DCL	X	X				X			
Donaldson	X	X				X			DPF cleaning systems
Eaton			X		X		X		LNT catalysts, hybrid systems
Eberspächer	X	X		X	X	X			
Eminox	X	X	X		X				
Emitec	X	X			X	X	X	X	Urea dosing systems, low-pressure EGR filters
Engine Control Systems Europe	X	X	X			X			
Eno-Chem	X	X		X					Support structures, complete catalytic emissions control systems, catalyst washcoats
ESW	X	X				X			
GT Exhaust	X	X			X				DPF silencers, sound technologies
Gustav Wahler							X		Thermostats; EGR pipes
Haldex							X		
Heinzmann							X	X	Complete DPF regeneration; hybrid drive systems
HJS	X	X			X			X	Thermal management
Hug Engineering	X	X				X		X	
Hug Filtersystems	X	X						X	
Huss	X				X				Piping, silencers, pipe bending, catalyst housings, DPF spark arresters
Jiangxi	X	X							
Johnson Matthey	X	X		X	X			X	
LiqTech	X								
Mann+Hummel	X				X			X	Centrifuges, preliminary fuel filters, crankcase ventilation systems, air cleaners
Maxim Group	X	X			X	X			
MaximSilex	X				X	X			Catalyst housings
Miratech	X	X			X	X		X	Catalytic substrates, catalyst housings, non-selective catalytic reduction
Notox	X								
Racor Division, Parker Hannifin									Crankcase ventilation systems
Phillips And Temro		X				X			
Proventia	X				X	X			Tornado mixing modules
Puritech	X	X	X					X	Filter cleaning systems
Sensors									Mobile emissions measurement equipment
Sonceboz									Electric motors, actuators for emissions control
Süd-Chemie	X	X							
Tenneco	X	X		X	X		X		
Testo									Portable combustion efficiency analyzers, air emissions analyzers
Universal	X	X		X					
UT 99									Oil mist eliminators

as the upcoming Euro 6 requirements in Europe. The Alfdex oil mist separator is designed to provide a cleaning efficiency of over 98%, eliminating oils from being emitted into the environment or fouling in the turbocharger, the company said.

The Alfdex system is being used on Daimler (Mercedes), Volvo, Scania, Navistar, PACCAR, Renault, Mack and Freightliner vehicles.

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**EMISSIONS CONTROL
DEVELOPMENTS**

Aristo recently expanded its production facilities with a large envelope precision coater and an emissions bench reactor. According to Aristo, the new machines are part of continued investment in its U.S. business and will provide the necessary tools to compete with high productivity in the manufacturing area and with catalytic/technical insight on the research side.

The company has also recently rolled out a new family of oxidation catalysts specifically designed to meet large industrial engine emissions control, requiring catalysts to maintain performance for more than 8000 hours of continuous operation at moderate to high temperatures. The new catalyzed particulate filter meets upcoming and tightening PM emissions standards for industrial engines.

Aristo designs and manufactures catalyst technologies for a wide range of diesel, petrol and gaseous-fueled engines used in on-highway, off-highway, stationary and marine applications.

Aristo's portfolio also includes the DeNOx catalysts for rich-burn and stoichiometric engines. Within the last several months, Aristo has diversified its product range and entered into the

stationary market with a line of DOCs and DPFs to meet the RICE NESHAP regulations, already operating in several commercial power generation projects.

Within the next several months Aristo said it will roll out its newest catalyst family, designed for using SCR to control NO_x in mobile and stationary applications to meet stringent limits of NO_x emissions.

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**EMISSIONS CONTROL
DEVELOPMENTS**

BASF Corp. was recently awarded ISO 16949 quality certification at its mobile emissions catalysts plant in Krasnogorsk, Russia. BASF said this will provide a more cost-effective option to meet the tightening emissions regulations that Russia is implementing in a phased approach over the next several years, while also helping vehicle manufacturers meet local emissions requirements.

The Krasnogorsk site is closely linked with BASF's precious metal trading operations in Moscow, Russia.

BASF also marked a milestone in production at its Huntsville, Alabama, U.S.A., Mobile Emissions Catalysts facility, as the company has produced its 300 millionth catalyst. BASF has been producing catalysts in Huntsville since 1974 for use in vehicles in North America and around the world. In 2009, the company expanded operations at the facility to enable the production of advanced zeolite SCR technology, which was primarily used in heavy-duty diesel on-highway applications to meet 2010 emissions regulations.

BASF's SCR catalyst comprises a catalytically active component coated on a ceramic honeycomb. When a reductant — such as a diesel exhaust fluid (DEF) — is added to the system,

the catalyst promotes a chemical reaction that converts NO_x into water and NO₂.

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**EMISSIONS CONTROL
TECHNOLOGIES**

Baumot's DPFs comprise the BA passive system for heavy-duty vehicles with an average exhaust temperature above 230°C and the BA-A system with additives for machines with older engines where soot emissions, oil consumption and exhaust gas temperatures are all higher than normal. This allows filter regeneration from exhaust gas temperatures of 280°C, Baumot said.

In addition, Baumot offers the BA-B, which is effective from 200°C and oxidizes CO and HC as the exhaust gases flow through the mutually closed channels of the particulate filter. The soot coming from the engine is collected in the filter. Here, it is completely burned via a catalytic reaction. This catalytic reaction is initiated by the coating of the ceramic monoliths. Baumot said it uses a combination of precious metals for the coating.

Depending on the type of engine, the breakdown of the exhaust emissions starts at temperatures of 230°C and above, Baumot said. With the average temperature may be significantly lower.

The company also offers the BA-H DPF with an optional heating element, which can be used at lower exhaust temperatures, such as with diesel-operated emergency power supply units and generators, Baumot said.

Installed as a modular option, the heating element constantly measures the load condition of the particulate filter. If a certain limit value is reached, the heating element is switched on automatically. While the machine continues

to operate, the temperature is raised to the level required for regeneration.

Baumot's BA-F DPF has an optional burner element that is applicable for low temperature vehicles such as school buses, waste haulers and heavy-duty construction equipment. This system allows operation with low-temperature equipment without any action required by the operator, said Baumot.

The BA-F system represents the second generation of active DPFs by Baumot. It combines passive and active DPFs in one system.



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**EMISSIONS CONTROL
DEVELOPMENTS**

Bosch Emission Systems GmbH will begin series production of modular aftertreatment systems for on- and off-highway equipment this year. The company was established in the spring of 2010 as the first three-way joint venture in Bosch's 125-year history. It is co-owned by Bosch, aftertreatment specialist Eberspächer and diesel engine manufacturer Deutz.

Bosch Emission Systems is dedicated to the development of mix-and-match, modular systems that can take myriad components required in an advanced aftertreatment system to integrate a standard, yet customizable design. The assembly typically incorporates options such as hydrocarbon burner systems; DOCs; SCR systems; urea tanks; urea injection systems; controllers; temperature, pressure and NO_x level sensors; and the wiring harnesses needed to connect the aftertreatment system together.

The aftertreatment system is designed to be used on any type of mobile equipment as well as on-highway

vehicles and stationary engine systems. Bosch has also designed the system for retrofit applications.

The company is currently offering modules in five classes — 56 to 74 kW, 75 to 129 kW, 130 to 219 kW, 220 to 369 kW and 370 to 560 kW. Service intervals are designated at 3000 to 4500 hours, Bosch said.

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**EMISSIONS CONTROL
TECHNOLOGIES**

Chrican Environmental Technology Co. Ltd. specializes in the development and production of air purification catalysts and systems for mobile and stationary applications. Over the years, Chrican has developed catalyst formulations and production processes as well as air purification systems for emissions reduction in petrol and diesel vehicles.

Chrican's three-way catalytic converters use oxidation catalysts, which are platinum group metal-based catalysts coated on monolithic ceramic or metallic substrates. The catalyst formulation and coating processes enable the removal of CO, HC and NO_x as well as lower backpressure and lower ignition temperature of exhausts, said Chrican. The catalyst can support Euro 4 and 5 compliance, said Chrican, and has a service life up to 80 000 km.

The company's DOCs are capable of delivering CO, HC and soot removal efficiencies of 95%, 95% and 30%, respectively, it said. The catalysts are designed to provide reduced impact on backpressure and a service life of over 10 000 km. The DOCs can be used for both on-road and off-road applications.

Chrican's catalyzed DPFs have a wall flow ceramic substrate with a catalyst coating for continuous regeneration. The

DPFs can be used in OEM or retrofit applications to reduce CO, HC and PM.



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**EMISSIONS CONTROL
DEVELOPMENTS**

Caterpillar Emissions Solutions has announced plans to expand the CleanAIR facilities in Santa Fe, New Mexico, U.S.A. CleanAIR Systems became a wholly owned subsidiary of Caterpillar Inc. within its Customer Services Support Division following its acquisition by Caterpillar in mid-2010.

CleanAIR Systems designs and manufactures customized stationary aftertreatment systems for internal combustion engines. Its broad product line includes CARB-verified particulate filters, oxidation catalysts and silencers as well as a hybrid SCR/particulate filter/silencer system. CleanAIR's products and engineering expertise have seen significant application in retrofitting engine-powered generator set systems, as well as application in a diverse range of industries, Cat said.

Prior to the acquisition, Caterpillar Emissions Solutions signed an Allied Vendor agreement with CleanAIR Systems in an effort to strengthen its stationary aftertreatment business. According to Cat, the acquisition was based on the success of the vendor agreement and the working relationships developed with Cat dealers. About 70% of CleanAIR products were going to Cat dealers under the agreement.

Through the acquisition, Caterpillar Emissions Solutions will provide marketing and engineering support to CleanAIR Systems, assist with CARB and EPA verification and jointly develop next-generation products for Cat-

erpillar customers. CleanAIR Systems remains headquartered in Santa Fe and is known as CleanAIR Systems Inc. — a Caterpillar company.



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EMISSIONS CONTROL TECHNOLOGIES

As a wholly owned subsidiary of Caterpillar Inc. within its Customer Services Support Division, CleanAIR Systems Inc. designs and produces emissions control systems for on- and off-road vehicles, machinery and stationary generators. CleanAIR Systems' product line includes emissions control systems for engines using diesel, ultra-low sulfur diesel, biodiesel, natural gas or propane fuels, the CleanAIR E-POD SCR system, catalyzed DPFs to reduce PM, CO and HC from diesel engines using the CARB-verified permit filter, oxidation catalysts to reduce CO and HC emissions using the Assure DOC and three-way catalysts to reduce NO_x, CO and HC emissions with its Assure TWC.



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EMISSIONS CONTROL DEVELOPMENTS

Combustion Components Associates (CCA) has been awarded US\$6 million in emissions control orders in Europe and the U.S. Two orders are for selective noncatalytic reduc-

tion (SNCR) applications. The largest order is at a chemical facility firing a variety of liquid and gaseous waste fuels. The company has also received two additional orders for SCR systems for diesel engines located at a hospital and a new biofuels production facility. The systems use nontoxic urea injected into the engine exhaust to reduce NO_x emissions across a catalyst by up to 90%. Both systems will use CCA's Trim-NOx PLC-controlled injection system and patented airless injector.

CCA's product line also includes the Trim-NOx LT, a PLC-based injection controller used with CCA's patented airless urea injector. The system is aimed at SCR applications on engines from 150 to 2000 kW. The Trim-NOx M-T-S catalyst arrangement is designed to use off-the-shelf truck-based catalyst components on stationary engine generators rated up to around 600 kW to reduce the footprint and cost of SCR for small engines. The system is designed to reduce NO_x by up to 95%.



CCA's Trim-NOx M-T-S catalyst is designed to reduce NO_x up to 90% in stationary generator applications.

CCA provides utility and industrial customers with urea-based SCR systems, oxidation catalysts, DPFs, low-NO_x burners, selective noncatalytic reduction and combustion modifications.



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EMISSIONS CONTROL DEVELOPMENTS

Consilium produces analysis and monitoring systems such as the Salwico EMS, a continuous monitoring system for NO_x, SO_x and CO₂; the Salwico G1000, an opacity monitor for the smoke density of engine emissions; the Salwico G2000, an ambient oil mist detector for engine rooms; and the Salwico G36, an oxygen analyzer that controls the content of O₂ in inert gas.



The Salwico emissions monitoring system by Consilium.

The Salwico EMS continuous monitoring system is the newest product in Consilium's range. Aimed at marine applications, the Salwico EMS controls the functions of the aftertreatment devices, verifying compliance with regulations set by MARPOL Annex 6 and the NO_x Technical Code.

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EMISSIONS CONTROL DEVELOPMENTS

Corning has announced plans to increase the company's light-duty filter capacity in Kaiserslautern, Germany, with a US\$44 million investment. The expansion is expected to begin early production in the second half of 2011 and will increase the company's capacity to manufacture current and future generations of light-duty diesel DuraTrap AT filters.

In addition, the company broke ground on the US\$125 million expansion of Corning Shanghai Co. Ltd. (CSCL), Corning's automotive substrate facility in Shanghai, China. The expansion is expected to be operational in the second half of 2012.

Corning Shanghai Co. Ltd. is wholly owned by Corning Inc. In addition to manufacturing advanced substrates, CSCL also includes sales, marketing and engineering operations for Corning customers in China and throughout Asia.

Corning is a supplier of advanced ceramic substrates and DPFs. Corning offers a broad product portfolio and emissions control design, modeling and engineering services. By leveraging these capabilities, Corning said it is able to assist customers in developing technologies to achieve fuel efficiency, emissions reduction and system optimization across all petrol and diesel vehicles, including on-road and nonroad applications.



CUMMINS EMISSION SOLUTIONS

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EMISSIONS CONTROL DEVELOPMENTS

Cummins Inc. said it will sell its exhaust business to Global Tube, a portfolio company of Wind Point Partners, a private equity firm headquartered in Chicago, Illinois, U.S.A. The sale to Global Tube affects Cummins' acoustic exhaust operations in Stoughton, Arcadia, Black River Falls and Viroqua, Wisconsin, U.S.A., as well as in Scoresby, Australia, and Daman, India.

Cummins' exhaust operations are part of the company's Emission Solutions business. The exhaust business manufactures products such as bent tubes and small mufflers.

Cummins Emission Solutions said the sale will allow it to place greater emphasis and resources on manufacturing products that are a critical part of Cummins' growth strategy. The company produces DPF and the SCR systems that are critical to Cummins' meeting the

more stringent new emissions regulations for on-highway diesel engines. As other countries adopt tighter emissions standards in the future, Cummins said it expects significantly higher demand for products made by its Emission Solutions business — both on Cummins engines and on those engines produced by other companies.

Cummins Emission Solutions, a subsidiary of Cummins Inc. and a business in the company's Components segment, is a global designer, manufacturer and integrator of exhaust aftertreatment technologies for the commercial on- and off-highway medium-duty, heavy-duty and high-horsepower engine markets.

Cummins Emission Solutions produces a broad range of emissions products. These include custom engineering systems and integrated controls, oxidation catalysts, particulate filters, NO_x reduction systems such as SCR and NO_x adsorbers, and engineered components such as dosers, sensors and exhausts. With key operations in Indiana, U.S.A.; China, India, U.K., Brazil and South Africa, Cummins Emission Solutions serves both equipment manufacturers and engine first fit and retrofit customers.



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EMISSIONS CONTROL TECHNOLOGIES

Cummins Filtration designs and manufactures filtration and chemical technology products for all engine-powered equipment, with products such as the Fleetguard brand of filtration, coolant and chemical products. Cummins Filtration serves a diverse customer base with over 30 000 points of distribution around the globe. The product line covers a variety of applications on the market including transpor-

tation, mining, agriculture, construction, oil and gas, power generation, marine and industrial applications.



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EMISSIONS CONTROL TECHNOLOGIES

DCL manufactures catalytic converters, catalytic mufflers, flow-through filters and wall-flow DPFs for on- and off-highway vehicles, and stationary engines. DCL supplies to worldwide-based engine manufacturers, original equipment manufacturers and aftermarket retrofit.



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EMISSIONS CONTROL TECHNOLOGIES

Donaldson is a worldwide provider of filtration systems including air, lube, fuel, coolant, hydraulic and crankcase filtration products for medium- and heavy-duty equipment and vehicles, as well as emissions reduction products for diesel engines.



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EMISSIONS CONTROL DEVELOPMENTS

Eaton Corp. said that customers of its hybrid systems have collectively accumulated more than 160 million km of service. With more than 4500 hybrid systems in use on city buses, school buses, package delivery trucks, beverage delivery trucks, refrigerated delivery trucks, refuse and recycling trucks, utility vehicles and other commercial applications, the company estimated that fuel consumption has been reduced by approximately 15 million L and some 40 000 metric tons of emissions have been eliminated.

In 2010, the company delivered systems to customers in Australia, Belgium, Canada, China, Egypt, France, Germany, India, Japan, Korea, Mexico, Netherlands, Poland, Qatar, Russia, Singapore, Taiwan, U.K. and U.S. Eaton has also began commercial production of its Eaton HLA hybrid hydraulic system in the fall, and it has also begun offering a complete line of electric vehicle charging systems.

Eaton hybrid-electric, plug-in hybrid-electric and hybrid-hydraulic power systems are available or in development on truck models including Crane Carrier Corp., DAF, Daimler, Freightliner, Ford, International, Iveco, Kenworth and Peterbilt and on bus models from BCI, Foton, Heng Tong, JNP, King Long, Shen Long, Solaris, Tata, YoungMan, Yutong and Zhongtong.

Eaton offers a complete lineup of hybrid power systems for commercial vehicle applications including its hybrid electric, plug-in hybrid electric, parallel and series hydraulic power systems. It has also developed supercharger technologies for diesels, sophisticated engine valve and valve-train systems and advanced traction technologies that it said can help global manufacturers boost power and performance while at the same time help reduce fuel consumption and improve emissions.



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EMISSIONS CONTROL DEVELOPMENTS

The ActiveSilence system from Eberspächer has undergone a research project to test the sound level of its ActiveSilence system. The company said, thanks to use of anti-sound technology used in the ActiveSilence system, the exhaust noise from a six-cylinder Atego truck was reduced by up to 10 dB(A). At half the weight and with exhaust gas backpressure reduced by 25%, the ActiveSilence compact muffler also reduced CO₂ emissions, Eberspächer said.

For active post-treatment exhaust emissions, Eberspächer has further refined its Fuel Processor. It features multiple capabilities for exhaust systems by ensuring required temperatures for post-treatment of exhaust emissions. This is ideal for vehicles that operate at reduced speeds and have difficulty reaching the required temperature for regeneration, Eberspächer said.



Eberspächer's tailored steel bands cut to specific dimensions contribute to weight savings in emissions aftertreatment components.

The company has also developed a latent heat accumulator, to reduce

coldstart emissions in hybrid vehicles and passenger cars. The system works by pre-heating the catalytic converter, until it reaches operating temperature, usually between 180° and 200°C.

To address the need for lighter-weight vehicle components, Eberspächer has started production of weight-reduced, stainless-steel exhaust systems constructed of tailored steel bands cut to specific dimensions. The company said additional weight can be saved under specific conditions with its new lightweight tube designs.

At the end of 2010, Eberspächer started building a new production site in the town of Wilsdruff near Dresden, Germany. The new plant is specifically geared toward the production of exhaust systems in accordance with future Euro 6 standards for commercial vehicles.



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EMISSIONS CONTROL DEVELOPMENTS

Eminox emissions systems have been approved for the increasing number of Low Emissions Zones and E-Zones across Europe, including those in London, England; Germany, Holland and Denmark. The next generation of its SCRT technology provides an option for the new challenges of reducing NO_x pollution in these urban environments.

The latest developments of the SCRT system now make it suitable for challenging applications such as low-floor city buses, said Eminox. The system is specifically designed for urban driving conditions and has dem-

onstrated NO_x reduction in excess of 70% in real-time driving on city buses, Eminox said.



The redesigned SCRT system from Eminox has a more compact design to fit tighter space envelopes such as on a low-floor city bus.

The SCRT system has a new compact configuration that incorporates the urea mixing assembly in such a way that the unit is able to fit within a tighter space envelope, including that of a low-floor city bus.

The launch of the new product resulted in Eminox securing a contract to supply Transports Metropolitans de Barcelona (TMB) with several SCRT systems to upgrade more than 360 buses from the Euro 2 to Euro 5 emissions standards as part of a retrofit program targeting PM and NO_x reduction.



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EMISSIONS CONTROL DEVELOPMENTS

Since acquiring Danish company Grundfos NoNOx in 2010, Emitec has expanded its product line to include SCR technology. The company now offers a series of SCR systems with air-assisted and airless urea dosing and injection for the commercial vehicle and off-road sectors.

Emitec's urea dosing unit is a key component in an SCR system, as it al-

lows a precise quantity of the reducing agent to transform the engine's NO_x emissions into nitrogen and water.



Emitec's airless urea dosing unit for SCR systems.

The SCR dosing system incorporates a digital dosing pump with all the other SCR control system components fitted into one module. All connections are placed at one end, for easier and more cost-effective integration.

Emitec produces metallic substrates for catalytic exhaust aftertreatment such as DOC, SCR, three-way catalytic converter, lean-NO_x trap and particulate filters for applications in medium- and heavy-duty vehicles, off-road vehicles, stationary engines, marine engines, utility vehicles, passenger cars, and two- and three-wheeled vehicles.



Engine Control Systems

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EMISSIONS CONTROL DEVELOPMENTS

Within Engine Control Systems Europe's family of particulate filters, the new Purifier e4 system works as a replacement part for the exhaust muffler that can be used on a wide range of diesel-powered equipment.

The manufacturer reported a maximum PM reduction up to 99%, with no increase in the NO₂/NO ratio, and said the product has a wide temperature

range with low regeneration temperature.

Engine Control Systems Europe said the Purifier e4 is an uncatalyzed or lightly catalyzed filter that does not rely on expensive precious metal coatings and has no NO₂ secondary emissions. This is designed to make the Purifier e4 filter applicable to NO₂-sensitive areas or low emissions zones.

The Purifier e4 filter is available for Euro 1, 2 vehicles and can be used in good condition pre-Euro engines, Engine Control Systems Europe said. The filter was also engineered to comply with the London Low Emission Zone and allows U.S. Tier 1 vehicles to meet EPA Tier 4 specifications. The Purifier e4 is VERT verified, while at the time of writing, CARB and EPA verifications are in process, Engine Control Systems Europe said.

Engine Control Systems Europe has also introduced the Platinum Plus fuel-borne catalyst series. The new catalysts provide energy efficiencies and are capable of a CO₂ reduction of 5 to 12%, depending on fuel quality, engine type and application, the company said.



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EMISSIONS CONTROL TECHNOLOGIES

Eno-Chem LLC, a Maxim Group company, is the catalytic coating arm of Maxim Silencers Inc. Eno-Chem designs and manufactures three-way, oxidation and diesel catalyst, support structures and complete catalytic air pollution control systems for the gas compression, power generation and petrochemical markets. Catalyst elements are available in three-way and oxidation coatings, using custom formulations to meet specific applications.

Catalysts are manufactured for instal-

lation on reciprocating internal combustion engines, gas turbines, boilers and process heaters requiring up to 400 elements per system. Substrates are available in metallic or ceramic and come in a range of cell densities and geometry. Eno-Chem manufactures the complete catalytic air pollution control systems from inlet flange to outlet stack.

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EMISSIONS CONTROL TECHNOLOGIES

Environmental Solutions Worldwide Inc. (ESW) has announced the verification of its ThermaCat Active Level 3 Plus catalyst system, which is marketed by ESW Canada, has been expanded by CARB to cover applications from the original 1996- to 2006-year models to 1996 to 2010.

With the expansion of the CARB verification, the ThermaCat system can now be utilized on off-road engines from 75 to 280 kW, representing a 17% increase of applicable engine families from 1133 to 1325, ESW said. According to the company, approximately 14 000 engine configurations now fall under the guidelines and can be retrofitted with the ThermaCat technology.

The ThermaCat is a proprietary diesel engine emissions reduction retrofit technology that has demonstrated PM, CO and HC reductions in excess of 85% while meeting the nationwide NO₂ limitations. This new NO₂ limit, which came into effect on Jan. 1, 2009, requires that all CARB-verified diesel emissions retrofit technologies sold and installed in North America must not increase NO₂ emissions by more than 20%.

ESW said it is also currently pursuing verifications for a high-performance Level 1 DOC and a high-performance

Level 2 passive filter as well as a certification for marine retrofit and rebuild applications with a DOC.

ESW's product line consists of proprietary wire mesh and silicon carbide substrates, catalytic converters, custom catalytic mufflers and a variety of passive and active DPF systems, designed to achieve emissions compliance for a wide range of diesel engines used in on- and off-road vehicles, stationary engines, military, locomotive and marine applications. The lineup includes the Level 3 Plus Therma Cat active DPF, the Level 2 Particulate Reactor, and the Level 1 Plus Clean Cat and Clean Cat HP DOC for on-road and off-road applications.

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EMISSIONS CONTROL TECHNOLOGIES

GT Exhaust is a global provider of sound and emissions control systems. The company provides customers with emissions control products, service and consultation. GT's Purity catalyzed DPF has a CARB verification of Level 3 Plus, and it acts as a simultaneous silencer and filter for PM. GT's catalytic converter silencers incorporate a modular design, allowing users to scale catalysts when emissions requirements move. All of GT's units are customizable, allowing the company to design systems based on varying space and regulatory specifications required.

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EMISSIONS CONTROL TECHNOLOGIES

Gustav Wahler develops and produces exhaust gas recirculation (EGR) valves, EGR cooler bypass valves, throttle flaps and flexible EGR pipes (also in cooled versions) for NO_x emissions reduction. The valves, flaps and pipes are available for a variety of engine locations including high and low pressure and cold and hot sides.

Wahler's portfolio also includes flexible pipes as well as thermostats for engine fluids including electrically heated and actuated variants for optimized thermal management as well as CO₂ emissions reduction. Applications include medium- and heavy-duty vehicles and off-road engines.

Among the latest developments from Wahler are a line of EGR modules with a faster electric EGR valve and a more economical pneumatic bypass flap integrated into one unit. The design of the modules contributes to reduced EGR path volume and quicker response to transient loads, Wahler said.



The new EGR modules by Gustav Wahler were designed to be more compact to manage the ever-decreasing packaging space in the engine compartment.

Wahler has also developed electrically actuated, heavy-duty, off-road EGR valves. These are driven by a brushless dc motor and allow more precise EGR control in order to achieve optimized NO_x reduction for off-road engines without pressurized air availability.

Wahler said it is continually devel-

oping EGR valves to improve packaging, flow rates and controllability by direct position sensing, while retaining operating force and response time in combination with cost. It is also in development of an electrical exhaust backpressure valve for use with low-pressure EGR, thermo-electric generators and future exhaust systems.


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EMISSIONS CONTROL DEVELOPMENTS

Haldex said it is nearing production of the Haldex Varivent pump, which is designed for EGR systems. The Varivent system is designed to pump exhaust gas into the engine intake rather than rely on turbocharger pressure to deliver the gas.

Particularly with fuel savings becoming more critical, many manufacturers are looking to optimize the turbocharger, which often results in less gas recirculation capability, Haldex said. The Varivent pump system is engineered to actively deliver the exhaust gas to the intake independent of the turbocharger.

The system incorporates a venturi-based design specifically for the EGR application. According to Haldex, testing of the Varivent pump has shown a 2 to 5% savings in fuel consumption in comparison to a standard EGR system.


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EMISSIONS CONTROL DEVELOPMENTS

Over the last several months, Heinzmann has come to market with a number of new developments. This includes a new DPF regeneration unit that incorporates an electronic control unit and a customizable double HC dosing unit for evaporation and burner feed.

The company has also launched a new dosing unit for burner feed or direct injection into the exhaust system with fuel or urea. Along with that, the entire product range has been updated with a new leakage-safety valve system.



A single dosing and injection unit by Heinzmann.

Heinzmann has invested in researching material science, which has resulted in more temperature-resistant throttles for EGR and turbo wastegate systems. These more robust components have been developed to withstand exhaust temperatures up to 800°C, the company said.

Heinzmann targets the off-highway market, including mobile and stationary equipment, with a line of components related to emissions control. For EGR, the company produces wastegate and butterfly throttle valves of different sizes for gas temperatures up to 720°C, EGR dual poppet valves for cooled EGR systems, actuators and governors for hot environments, with and without water cooling.

Heinzmann also offers control units for complete exhaust gas aftertreatment management. The company's portfolio also includes components for DPF regeneration, such as HC and fuel dosing units, safety shutoff

valves, air control valves, HC atomization nozzles, and corresponding actuators and sensors.


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EMISSIONS CONTROL TECHNOLOGIES

HJS manufactures aftertreatment products for commercial vehicles, mobile machinery and stationary applications for OEMs and for retrofit purposes.

HJS has developed an aftertreatment system for critical applications with lower exhaust gas temperatures. To ensure regeneration or dosing during engine operation, HJS has developed a burner technology for OEM use and also for the upgrade of existing Stage 3a engines to Stage 3b.



The HJS SCRT system is designed to retrofit Euro 3 city buses to comply with Euro 5 and EVV emissions standards.

HJS has also extended its product range of CRT systems for on-road commercial vehicles. The company said these systems are easier to install and fit in the silencer space without the need for interface modifications.

The company also said its SCRT system for the retrofit of city buses has demonstrated its efficiency in a number of new applications. By using the SCRT system, a Euro 3 vehicle can meet the Euro 5 and EEV emissions standards, HJS said.



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EMISSIONS CONTROL TECHNOLOGIES

HUG Engineering is a manufacturer of exhaust gas purification systems for various types and sizes of engines, used in mobile applications as well as stationary plants.

For mobile on- and off-road applications between 15 and 650 kW HUG offers its Mobiclean R system. The Nauticlean series is designed for the marine market. It is certified for VERT, Lloyds and Germanischer Lloyd for applications in yachts from 200 to 5000 kW.

HUG Engineering produces all the substrates, filters and control systems at its factory in Switzerland.



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EMISSIONS CONTROL DEVELOPMENTS

HUG Filtersystems AG, an affiliate of Swiss Hug Holding, supplies the Mobiclean R DPF systems for engines from 15 to 650 kW, mainly used in on- and off-road applications. The latest launch in the range is the Mobiclean R advanced short, a closed filter system with passive regeneration starting at 170°C. It is designed for engines rated 15 to 650 kW.



The new Mobiclean R advanced short filter by HUG is a closed filter system with passive regeneration starting at 170°C.

HUG Filtersystems said the Mobiclean R advanced short system is ideal for engines with a moderate work load. It has different inlet and outlet options for the exhaust, and the product also addresses the problem of tight spaces with a smaller dimensions.

HUG tested the Mobiclean R advanced short under a series of extreme conditions and said it has proven to be maintenance free over the lifespan of a vehicle.

The filter is VERT certified and several country-specific certifications has available. In 2011, the system will receive German Anlage 27 and U.S. CARB certification, HUG said.

HUG's Mobiclean DPF range also features the Mobiclean R Basic model, a basic DPF system for higher exhaust temperatures; the Mobiclean R Flame unit, an active regeneration system for when a power supply connection is not easily available; the Mobiclean R Electro, a filter system with electro regeneration for onboard and offboard use; and the Mobiclean R Advanced, equipped with a pre-oxidation catalyst that allows regeneration to start at 170°C.



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EMISSIONS CONTROL TECHNOLOGIES

The cold start of an engine in some on- or off-road applications may cause higher emissions than during normal operation of that engine. Based on this situation, some engine manufacturers are incorporating the engine with an independent exhaust aftertreatment system and an online burner to keep exhaust gas temperatures up.

Huss offers an online burner that keeps exhaust temperatures above 300°C even at low load conditions. Huss was granted a conditional verification for its MK-System as a Level 3 Plus emissions control system for use on transport refrigeration units applications for engines manufactured from 1998 and newer up to 37 kW.



The inside of Huss' online burner. The burner keeps exhaust temperatures above 300°C even at low load conditions.

The Huss Group of companies, comprising CleanDieselCeramics and Metpela, produces exhaust aftertreatment products for diesel engines, with focus on both OEM equipment and retrofit of off-road and heavy-duty applications.

CleanDieselCeramics produces liquid phase sintered silicon carbide ceramic for particulate traps. Metpela is a specialist in noise reduction and metalworking. The two companies represent the production facilities of the Huss Group.

Retrofit products are represented by Huss with its own entities in North America, Germany, Switzerland and most recently the U.K. Its authorized partners are located throughout the world.

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EMISSIONS CONTROL TECHNOLOGIES

The CAS-KR-C01 catalyzed DPF developed by CAS Kerry utilizes a wall flow ceramic substrate and allows automatic and continuous regeneration of soot particles. CAS Kerry said the DPF achieves 95% reduction of soot filtration. The CAS-KR-C01 DPF has application in OEM or retrofit vehicles and is offered in customized designs manufactured to diesel engine filtration systems and according to customer requirements. Overall life of the filter is 10 000 hours or more, CAS Kerry said.

CAS Kerry also specializes in the production of SCR catalysts in a honeycomb design. According to CAS Kerry, the SCR catalysts have minute pore sizes for optimum pore distribution, are abrasion resistant and use a composition of active ingredients to effectively limit the SO₂/SO₃ conversion rate while guaranteeing a high denitrification rate. Other features of the SCR catalysts include a high thermal resistance, resistance to water and corrosion and improved reactivity at lower temperature to deliver greater NO_x removal efficiency, CAS Kerry said.



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EMISSIONS CONTROL DEVELOPMENTS

Johnson Matthey recently introduced its fourth generation two- and

three-way EcoNOx catalytic converters for stationary gas engine. The EcoNOx system can be used in new and retrofit gas compression, power generation, irrigation, pumping, standby equipment and pump jack applications

According to Johnson Matthey, the EcoNOx converters can convert up to 99% of NO_x, CO, HC, VOC and HAP emissions from engines fueled with natural gas, diesel, LPG, dual or biofuels, as well as reduce noise.

Included in the lineup is the EcoNOx catalytic converter for 186 to 1491 kW engines, the EcoNOx mini catalytic converter for 37 to 373 kW engines, the EcoNOx Q converter-Silencer and the EcoNOx Mini Q converter-silencer.

At the heart of the EcoNOx converter is the catalyst element, which is manufactured using dispersed platinum group metals (PGM). The metal monoliths that support the PGM are brazed, thin-walled stainless-steel honeycomb supports, which are resistant to damage from mechanical or thermal shock and metallurgic erosion, Johnson Matthey said.

Johnson Matthey's range of engine emissions control technologies also includes a series of DOCs, catalyzed soot filters, SCR catalysts, and three-way catalysts, CRT, CCRT and SCRT systems for light- and heavy-duty, on- and off-road vehicles and equipment for both OEM and retrofit applications.

The product portfolio also includes a complete line of catalytic converters to help engine owners and operators comply with the EPA's final National Emission Standards for Hazardous Air Pollutants (NESHAPS) regulation, affecting existing engines.



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EMISSIONS CONTROL TECHNOLOGIES

The LiqTech DPF is a wall-flow filter made of porous silicon carbide in a honeycomb structure. It is produced in ranges from 90 to 250 cpsi in any required shape or length, LiqTech said.



The porous silicon carbide substrate from LiqTech.

The company now delivers its 200 cpsi DPF filter in all the available diameters for both light- and heavy-duty vehicles. The LiqTech 200 cpsi DPF is targeted toward active regeneration systems and passive systems with repeated regeneration.



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EMISSIONS CONTROL DEVELOPMENTS

Mann+Hummel has received certification from the MSHA for its filters. According to the company, the filters have received separation efficiency verification and its systems with sintered metal filters separate 99% of the particulates.



The Mann+Hummel SintROC passive DPF is available for 75 to 600 kW engines.

Mann+Hummel's range of DPFs has been developed for nonroad applications and covers engine outputs up to 600 kW. The company said its filters, especially the SintROC DPF, are capable of lowering NO₂ emissions by up to 70% — an important feature in the field of underground mining.

The filters incorporate a metal element, designed to keep the filters intact for the life of the vehicle and to make the filters easier to clean.

Other features of the DPFs include high ash-holding capacity, while filter regeneration has been made fully automatic. According to Mann+Hummel, the sulphur content of diesel fuel has no influence on the filter.



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EMISSIONS CONTROL TECHNOLOGIES

Maxim Group produces emissions, acoustical noise control and steel fabrication products. The company was formed in 2010, supplying its product line to Asia and North America for power generation and oil and gas field projects. It offers emissions reduction, acoustical noise control, steel fabrication and engineering support under the companies: MaximSilex (Maxim Silencers Inc., Silex Innovations Inc.), R.C. Technical Welding & Fabrication Inc., R G TexIn Manufacturing Co. Pvt. Ltd. and Eno-Chem LLC.



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EMISSIONS CONTROL DEVELOPMENTS

MaximSilex offers a range of exhaust and emissions control products for diesel and natural gas engines ranging from the Maxim QAC or Silex SileNOx combination catalytic silencers and SNX catalytic housings to DPFs and SCR systems.

New for MaximSilex is the Centurion line of high-flow, low-pressure restriction catalytic heat recovery silencers. The Centurion product line is targeted toward engines rated 50 to 3542 kW.



MaximSilex's Centurion line of high-flow, low-pressure restriction catalytic heat recovery silencers.

The Centurion units are designed to provide emissions reduction and hospital-grade silencing while recovering waste energy. The recovered waste heat can be put to many uses, eliminating the requirement to burn additional fossil fuels, MaximSilex said. The patent-pending process can be used in many applications where reciprocating spark-ignited natural gas or diesel engines or gas turbine drivers are used — everything from small generator sets to large gas compressors.



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EMISSIONS CONTROL TECHNOLOGIES

Miratech delivers emissions control technologies for industrial engine applications, focusing on natural gas and diesel reciprocating engines used in natural gas production, oil and gas drilling, power generation, locomotive, marine and fluid pumping markets. In addition, the company provides engineering, service and support. Its product line includes NSCR, SCR, DPF catalysts, catalyst housings that include silencers, and control systems to reduce NO_x, CO, VOCs, diesel particulates, HAPs and noise.



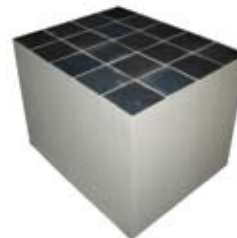
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EMISSIONS CONTROL DEVELOPMENTS

Notox Ceramic Filters A/S is a manufacturer of DPFs utilizing recrystallized silicon carbide. This type of substrate, combined with the thermal design, secures the filter monolith with greater durability, said Notox. The company's most recent introduction combines this technology with the marine industry.



Notox's custom-built 77 L filter for a mining application uses recrystallized silicon carbide, which the company has transferred into designs for the marine industry.

Notox has launched a line of DPFs for marine applications and water filtration using the recrystallized silicon carbide DPF technology for mobile vehicles it developed for emissions reduction and for liquid filtration purposes in the marine sector.

Notox said the silicon carbide filters are built for harsh operating environments where conventional polymeric membrane products are suited. With recrystallized silicon carbide, Notox said, it can design a filter and apply a variety of different membranes to the carrier, depending on the final application.

In the marine sector, Notox filters can cover several applications including main propulsion engines, auxiliary gen-set engines, bilge water treatment, ballast water treatment, wastewater treatment and onboard utility water treatment.



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**EMISSIONS CONTROL
DEVELOPMENTS**

The Racor Division of Parker Hannifin manufactures and markets filtration products and system components for engines and equipment including fuel and oil filtration systems, engine air filters and crankcase emissions filtration systems.

The new Cabaire Technologies air filtration system from Parker Hannifin's Racor Division incorporates a dynamic pre-cleaner designed to centrifugally remove over 90% of airborne dirt and cab pressurization filter to filter out contaminants while maintaining positive pressure in the cab for the operator. Air is passed through the filter and is pumped into the cab enclosure.

Clean pressurized air in the cab keeps contaminants from entering

through leaks and openings, ensuring a cleaner environment for the operator and instrumentation, Racor said. The filtration system is offered in 12 or 24 Vdc with a flow rate of 80 to 170 cfm.



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**EMISSIONS CONTROL
TECHNOLOGIES**

The Phillips and Temro line comprises engine exhaust silencing and emissions control technologies such as the EM Products Combo-NOx combination silencer/catalytic converter system for stationary industrial natural gas and diesel engine applications from 149 to 3728 kW. The company also offers three-way and oxidation replacement catalyst elements along with Micro-NOx compact (37 to 186 kW) and EC-NOx three-way (224 to 1491 kW) catalytic converters.

The company also produces air intake and coolant heating systems designed to improve cold starts and reduce emissions for a broad range of diesel and petrol engine applications, as well as the Cab Power idle reduction system, a series of pre-wired, modular components installed in the sleeper cab of over-the-road trucks to provide distribution of 120 Vac power to run hotel loads for a drivers comfort during nondriving intervals. The system is designed to be used with mobile idle reduction technology, such as an auxiliary power unit (APU) or deep-cycle battery-operated system, and can also be directly connected to shore power.



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**EMISSIONS CONTROL
TECHNOLOGIES**

Targeting the OEM market, Proventia specializes in developing integrated Stage 3b/Tier 4 interim emissions systems. The company also provides aftertreatment systems for challenges that different emissions technologies may create on various applications. The company's Tornado mixing module was developed to combat urea deposits, which develop in some SCR systems in certain applications.



Proventia develops integrated emissions systems for OEM and retrofit applications.

For the retrofit market, Proventia has developed the NOxBuster. It combines a DPF and an SCR system to upgrade on-road vehicles from Euro 3 to the EEV emissions standard. The company said the NOxBuster has a PM reduction above 90% and NO_x reduction above 80%.

Applications for the NOxBuster include on- and off-road vehicles from 70 to 450 kW. The unit is also available for stationary and marine engines. Proventia offers the NOxBuster system as an OEM installation or as a retrofit device.

Proventia's product line also includes the Proair passive DPFs, Chili filters and Procat mufflers. The Proair passive DPFs are German Anlage 27 certified. The Proair Flex version enables complete fleet customization, Proventia said. The Chili filters are for low load applications. They have electrically activated regeneration that is independent of exhaust temperature.

Procentia's Procat catalytic mufflers are ready-to-install muffler replacement systems designed to reduce HC and CO.

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EMISSIONS CONTROL DEVELOPMENTS

PuriTech recently launched the new Purimobil series of low-maintenance passive catalytic filters with precatalyst for medium-duty cycle and exhaust gas temperatures. The Purimobil filters can be used in light trucks, caravans and similar duty vehicles.

The Purimobil unit is a closed catalytic-coated filter with an additional prefilter. It has a 99.99% PM efficiency while reducing NO_x emissions, said PuriTech. The filter does not use an additive or extra fuel injection, PuriTech said, providing lower maintenance and overall costs.



The Puriclean modular cleaning unit from PuriTech.

PuriTech has also introduced the Puriclean line of modular filter cleaning units. The Puriclean line is based on PuriTech's Precision Pulse System, which is combined with its High Tech Heat Regenerator and a dust collector to ensure a high level of exhaust cleaning, the company said.

PuriTech offers the Puriclean filter cleaners with options such as modules for testing, assembly and maintenance service and software and

training. The Puriclean units can be used to clean any filter module used on a truck, off-road vehicle or stationary engine.

The company produces a lineup of DPF systems with or without DOC and with or without HC dosing for trucks, buses and coaches, off-road machinery, construction equipment, marine and locomotive applications, and stationary engines.



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EMISSIONS CONTROL DEVELOPMENTS

Sensors Inc. has formed a strategic partnership with Froude Hofmann, an international company specializing in the design and manufacture of test cell equipment. The partnership combines Sensors' Portable Emissions Measurement Systems (PEMS) with Froude Hofmann's dynamometer and control systems, enabling a lower-cost stand-alone or integrated emissions measurement system for test cell applications.

The new Aura1000 system measures the gaseous emissions of CO, CO₂, NO, NO₂, O₂ and HC for both spark-ignited and compression-ignited engines. The Aura1000 system can take the place of traditional test cell emissions measurement systems, requiring low infrastructure requirements of a cart and gas bottles.

According to Sensors, the initial capital investment for the Aura1000 is significantly less than that of a traditional test cell. The measuring system was also engineered to align with the gaseous emissions measurement criteria of worldwide regulatory agencies such as the U.S. EPA, the Hong Kong Environmental Protection

Department and the European Joint Research Commission.

Froude Hofmann is the technical and commercial contact for the Aura1000 system.

Sensors Inc. develops gas analysis technology, primarily for use in the transportation industry. The company is experienced in the design and manufacture of measurement systems that are distributed throughout the U.S., Europe and Asia.

Sensors also provides in-field emissions and fuel-economy testing services covering a wide range of applications including, on- and off-road vehicles and equipment, and marine, mining and power generation systems using internal combustion engines.

The company's emissions measurement products are used by government regulatory agencies and universities, as well as engine and vehicle manufacturers in the U.S., Europe, Japan, China and Hong Kong for the measurement of CO, CO₂, NO, NO₂, THC, NMHC, CH₄, NH₃, O₂ and PM.



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EMISSIONS CONTROL DEVELOPMENTS

New from Sonceboz is the brushless dc (BLDC) actuator, a high-performance electronically commutated device specifically developed for controlling emissions in large diesel engine applications. The actuator delivers peak torque values beyond 5.96 Nm in a low-weight, compact housing, the company said. The unit's dimensions make it easier to integrate into narrow engine compartments.



Sonceboz's BLDC actuator for controlling emissions in large diesel engine applications.

This BLDC actuator features integrated CANbus control electronics and can operate in a supply voltage range between 9 and 32 V. In the event of power failure and in order to prevent malfunctions, an integrated return-to-zero spring is included. The fail-safe position is customizable, the company said.

Sonceboz said it designed the actuator to deliver short positioning times, while providing positioning accuracy for finer flow control. The BLDC has an integrated position sensor and electronics drive, allowing it to act as a modular and compact stand-alone actuator.

Typical medium- and heavy-duty engine applications for the actuator include air admission and exhaust gas applications such as EGR and air charging, variable valve timing, cam phasing and front-module flaps.

According to Sonceboz, the BLDC actuator offers a high degree of reliability, and service life is guaranteed over an operating temperature range of -40° to 140°C.



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EMISSIONS CONTROL TECHNOLOGIES

Süd-Chemie is a manufacturer of oxidation catalysts, three-way cata-

lysts, CARB-verified Level 3 Plus catalyzed DPFs and DOCs for spark-ignited and compression-ignition engines and gas turbines.



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EMISSIONS CONTROL DEVELOPMENTS

Tenneco Inc. has opened a new manufacturing plant in Chennai, India. The plant will primarily produce emissions control products and systems for original equipment manufacturers, initially supplying Nissan's global small car platform.

The company invested US\$5 million in the 2600 m² facility — Tenneco's seventh manufacturing plant in India — which began producing exhaust systems for the Nissan Micra in May of this year. Tenneco is also supplying modular assembled struts and shocks to Ford from this new facility. The plant currently employs about 60 people and is expected to expand employment and operations as the company wins new business with OEMs operating in the Chennai area.

Tenneco first established manufacturing in India in 1995 and has grown its operations to include 1500 employees at five production plants and two Just-in-Time facilities. In addition to Chennai, the company produces emissions control components in Halol and Pune, India. Tenneco's ride control production is in Bawal, Pune, Hosur and Puducherry, India. These facilities serve a growing customer base including Tata Motors, Mahindra & Mahindra, Maruti Suzuki, Renault-Nissan, Ford, Volkswagen, TVS Motor Co., Toyota Kirloskar Motor and General Motors.

Tenneco's emissions control products are designed to enable diesel

engines to cost-effectively achieve mandated global emissions levels. Available technologies from Tenneco include DOCs in round and oval configurations that can be combined in a single package with silencing devices, DPFs and NO_x abatement technology. DPFs are available in a variety of substrate materials as part of either a coated, uncoated or additive-based system. The company has also developed the DeNO_x Converter, a NO_x adsorber system designed for engines under 3.0 L.

Tenneco's TRUE-Clean active burner DPF, engineered for low-temperature applications like nonroad or urban stop-and-go, regenerates the filter when exhaust temperatures are low. The technology also provides faster aftertreatment warmup for improved cold-start performance, Tenneco said. The proprietary ignition and fuel system provides performance advantages such as ion-sensing technology for combustion sensing and electrode cleaning.

Tenneco's ELIM-NO_x SCR system offers customers a fully integrated emissions control system designed to meet stringent 2010 to 2012 global diesel emissions regulations for NO_x reduction in passenger cars and trucks. The system removes 70 to 90% of NO_x emissions through SCR technology, Tenneco said. The ELIM-NO_x injector system is engineered to provide rapid, uniform dispersion of urea without the use of steam or compressed air, reducing overall system life-cycle cost. The ELIM-NO_x "self-learn" device provides control prototyping capability for customers, as well as a practical approach for retrofit applications.



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EMISSIONS CONTROL DEVELOPMENTS

Testo is a worldwide manufacturer of portable combustion efficiency analyzers and air emissions analyzers for emissions compliance. The company has recently introduced the new 340 portable combustion analyzer.

The new 340 analyzer is an advanced four-gas portable device that incorporates special design features specifically for engine and boiler tuning, maintenance and industrial combustion analysis.

To provide the testing flexibility, Testo has developed the 340 analyzer to measure oxygen and as many as three other user-selected gases such as CO, CO_{low}, NO, NO_{low}, NO₂ and SO₂.

The analyzer incorporates Testo's plug-and-play sensor technology designed to allow the convenience of exchanging sensors in the field for additional measurement opportunities. It also includes an advanced dilution system that enables a CO testing range to 50 000 ppm, NO to 15 000 ppm and SO₂ to 25 000 ppm. These are optimum testing ranges for engine and boiler tuning, high-concentration applications or uncontrolled combustion, said Testo.

The 340 also features controlled flow gas sampling for constant reading. This feature effectively eliminates the challenges of high draft conditions, or heavy particulate loading through increased pumping capacity and a modular probe and hose system that incorporates a cam lock for secure connections for sampling up to 7.62 m.

Testo said the analyzer can also handle up to 18 fuels and has built-in features such as extensive memory management, automatic programs, data logging and onscreen graphic displays of sensor output to provide sensor health information.

Additional options include printable calibration logs, battery status, sample flow and leak check diagnostic tools.

Testo's 340 analyzer weighs 0.9 kg and carries a two-year instrument warranty and one-year sensor warranty.

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EMISSIONS CONTROL DEVELOPMENTS

Due to increased market demands created by the new stationary engine emissions rules, Universal Acoustic & Emission Technologies has created a RICE compliance program designed for diesel engine packagers.

The Universal RICE NESHAP program is intended to focus on application-specific features — such as area or major source designation, emergency or non-emergency engine application and the engine's power — and thereby make the new rules easier to understand. The company offers emissions control devices to meet regulations, testing and site evaluation, monitoring and controls for the required reporting, technical guidance, interpretations of regulations as well as evaluation of engine performance and emissions output throughout the compliance process.

Universal provides custom-engineered and standard emissions control products for reciprocating engines and turbines. The standard line consists of the GreenShield-

branded products that include emissions control devices such as DPFs, DOCs, three-way catalysts, oxidation catalysts and SCR systems. Integrated silencing is also available. The GreenShield line is available in end-in/end-out and end-in/side-out configurations and many sizes of inlet diameters.

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EMISSIONS CONTROL TECHNOLOGIES

The UPF oil mist filters by UT99 comply with TA-air, the German guideline for clean air. The company said it is able to offer customized designs and removal efficiency of its demister according to its shape. UT99 said it guarantees its products a residual amount of oil of less than 1.0 mg/m³.

UT99 has been producing oil mist eliminators since 1969. The oil mist eliminators are used in gas and diesel engines as well as turbines, compressors, gears and generators.



The UT99 oil mist eliminator for closed-crankcase ventilation in gas engines.