



Press Release

Emissions control technologies for construction machinery

Emitec presenting innovative emissions control concepts

- **Robust components and integrated emissions control systems**
- **Continuous PM- and NO_x-reduction**
- **AdBlue dosing system for construction machinery**

From 2011 construction machinery will have to meet a soot particle limit (PM) of 0.025 g/kWh as specified by EU stage IIIB. This represents a reduction of at least 87% compared to stage IIIA. At the same time nitrogen oxide (NO_x) emissions will be limited to 3.3 g/kWh for engines up to 130 kWh and to 2.0 g/kWh for higher-performance engines, a reduction of 50% compared to stage IIIA.

While it is possible to meet the requirements of stage IIIA with engine-based measures alone, technology for stage IIIB will also include exhaust gas aftertreatment with catalysts and/or particulate filters. In engines up to 130 kW the nitrogen oxide limit can easily be met through engine-based measures. In addition, particulate emissions from these engines typically have to be reduced by approx. 40 – 60%. Emitec has developed the PM-METALIT[®], a continuously regenerating particulate filter, which has proven itself in serial production cars and trucks over many years. Thanks to its compact size it can be integrated in the silencer close to the engine. The filter has been designed to be maintenance-free for the service life of the machine. The robust all-metal construction is ideally suited for use in construction machinery applications.

The SCR system represents a practical solution to optimum fuel consumption and compliance with the lower permissible NO_x emissions specified by stage IIIB for engines > 130 kW. Highly effective Emitec metal substrate catalysts are available in a number of different geometries, can provide equal performance with up to 30% smaller volume, allowing them to be installed inside the engine bay for unrestricted driver visibility and machine working range. Consequently, the smaller volume requirement results in significant cost saving compared to conventional systems.

From 2014 the introduction of stage EU IV will further tighten emission requirements in Europe. This will require development of even higher performing emission control systems.

Emitec Gesellschaft für Emissionstechnologie mbH, Lohmar, the specialist for exhaust aftertreatment and world leader in metal catalyst substrates, can supply optimum serial-production ready components and systems for both emission reduction methods today.

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Exhibition-Highlight: Combination System for Soot-particle and NO_x-Reduction

Emitec is introducing the SCRi[®] system (pict. 1) for Non-road mobile machines and construction equipment at *bauma 2010*. The company has developed an innovative, integrated system combination that reduces diesel particulate and nitrogen oxide (NO_x) emissions

The system uses the selective catalytic reduction (SCR) process to reduce NO_x emissions. Small, precisely adjusted quantities of an aqueous urea solution (AdBlue) are injected into the exhaust gas and converted to ammonia, which is then used to convert the nitrogen oxides in the catalyst to form the natural components of air, that is, nitrogen, water and carbon dioxide.

A continuously operating, maintenance-free PM-METALIT[®] particulate filter (pict. 2) is integrated in the SCRi[®] system. The filter not only reduces particulates but also uniformly blends the exhaust gas with the AdBlue and generates ammonia by completely evaporating the injected solution.

The prepared exhaust gas ensures the optimum operation of the SCR catalyst. The use of highly efficient, structured Emitec metal catalysts results in a compact design - an up to 30% smaller and cost-effective solution - allowing the system to be installed in all kinds of construction equipment, including wheelloaders and excavators of all sizes, dump trucks, mobile cranes and crawlers, to name some applications. Emitec catalyst substrates and filters are all-metal products, hence perfectly suited for utilization even in rough operating conditions of construction sites for long-term trouble-free performance.

Emitec developed a complete AdBlue dosing system (pict. 3) for SCR and SCRi-applications, consisting of an AdBlue tank, a delivery pump, control valve, injection unit and an electronic control system with associated sensors and pipes. The system can operate autonomously, that is, independently from the engine management system. The system is eminently suitable for future serial applications in construction machinery as well as for retrofit applications.

SCRi exhaust gas treatment allows engines to be tuned for maximum fuel efficiency, which reduces consumption by around four percent, hence the environmentally friendly solution pays-back for the user! And, it is reality already today:

At **booth 109 in hall B3** Emitec presents serial production-ready SCRi[®]-compact systems for simultaneous combined PM and NO_x reduction, achieving the future Stage IV (and Tier 4 final) emissions standard already today. The emission control system is entirely integrated into the available space envelope of current non-road machines (see pict. 4, example tractor)

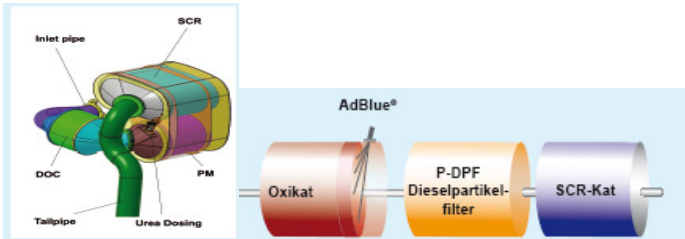
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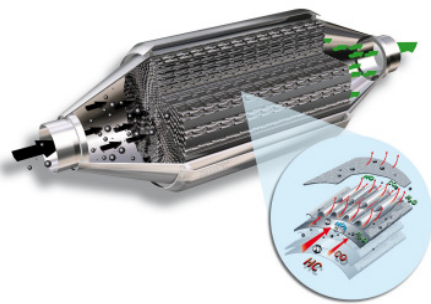
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Picture 1



Picture 2



Picture 3



Picture 4

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Engine Power	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
P < 19 kW	No limits									
19 ≤ P < 37	US: NO _x + HC = 7.5 / PM = 0.6 EU: NO _x + HC = 7.5 / PM = 0.3									
37 < P < 56	NO _x = 7.0 PM = 0.4	US: NO _x = 4.7 / PM = 0.3					US: NO _x 4.7 PM 0.02			
		EU: NO _x = 4.7 / PM = 0.4					EU: NO _x 4.7 PM 0.025			
56 ≤ P < 76	US: NO _v = 4.7 / PM = 0.3					US: NO _x 4.7 PM 0.02		NO _x 0.4 PM 0.02		
	EU: NO _x = 4.7 / PM = 0.4					EU: NO _x 4.7 PM 0.025		NO _x 0.4 PM 0.025		
76 ≤ P < 130	US: NO _x = 4.0 / PM = 0.3					NO _x 3.4 PM 0.02		NO _x 0.4 PM 0.02		
	EU: NO _x = 4.0 / PM = 0.3					EU: NO _x 3.3 PM 0.025		NO _x 0.4 PM 0.025		
130 ≤ P < 660	US: NO _x + HC = 4.0 / PM = 0.2					US: NO _x 2.0 PM 0.02		NO _x 0.4 PM 0.02		
	EU: NO _x + HC = 4.0 / PM = 0.3					EU: NO _x 2.0 PM 0.025		NO _x 0.4 PM 0.025		

ULSD (<15ppm) →

 EU Stage III B/ Tier 4 Interim

 EU Stage IV/ Tier 4

Table 1: Emission limits for NRMM

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Emitec: A brief company profile

Emitec Gesellschaft fuer Emissionstechnologie mbH was founded in 1986 with three employees. Today, the company is a world leader on the metal substrate market for vehicle exhaust gas catalysts and diesel particulate filters. Complete SCR systems round off this product range. Since its foundation Emitec has sold more than 100 million metal substrates of the highest quality with no field failures.

The company employs around 750 people in Lohmar and Eisenach, Germany, at the Fountain Inn plant in South Carolina, USA, at the plant in Pune, India and at several application engineering offices around the world. Development centres are based in Lohmar and Eisenach.

Emitec's most important markets are in Europe, North America and Asia. The company has subsidiaries in China, Japan, Korea and Vietnam.

The company's customers include the major car-, truck- and motorcycle-manufacturer from across the world as well as in the non-road sector producer of tractor-, agricultural and construction engines, recently of diesel locomotive engines, too. Emitec owns over 1,800 patents worldwide, a fact that reflects the company's innovative strength.

Product Range

Metal catalyst substrates and diesel particulate filters for engine exhaust gas aftertreatment:

METALIT[®] Metal Substrates, metal substrates with structured foils (LS-Design[®], PE-Design[™] for 'turbulent' cat), Conical Catalyst substrates (ConiCat[®]), Lambda Sensor Catalysts (Lambdasondenkat[™]), Electrically Heated Catalysts (EMICAT[®]), Partial Flow P-DPF Diesel Particulate Filter (PM-METALIT[®]), Pre Turbocharger Catalysts (Pre Turbo METALIT[™]), Hybridkat[™], Hydrolyse Catalyst for SCR-Systems, Sensor-Catalyst (Sensorkat[™]) for NO_x-Adsorber, Emitec CompactCat[®], SCRi[®] - System

System Components:
AdBlue Dosing System

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EMITEC Gesellschaft fuer Emissionstechnologie mbH at a glance:

Management:

- Wolfgang Maus (Chairman)
- Andreas Aumüller

Employees 2009:

- Approx. 750, including 30 trainees

Revenue 2008:

- 170 million euros

Percentage of sales:

- Automotive industry: approx. 90%
- Export volume: approx. 50%

Administration, production and development sites and their products:

- Lohmar, Germany: Prototypes and series catalyst substrates, head offices, research and development
- Eisenach, Germany: Series catalyst substrates, test centre
- Fountain Inn, SC, USA: Series catalyst substrates
- Pune, Mumbai District, India: Motorcycle catalyst substrates
- Rochester Hills, MI, USA, Sales and application engineering office
- Tokio, Japan: Sales and application engineering office
- Seoul, Korea: Sales and application engineering office

Major customers:

AvtoVaz, Bajaj, BMW, Caterpillar, DAFTRUCKS, Dachangjiang, Daewoo, Daimler, Fiat, Hyundai, Liebherr, MAN, Opel, Porsche, Renault, Scania, Toyota, TVS, Volkswagen Group, Volvo, others

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