

Next Generation Off-Highway Engines

Emission reduction potential in off-highway powertrains

27th – 29th June 2011 | Hotel Steigenberger Metropolitan, Frankfurt, Germany



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Get updated on the latest engine technologies for off-highway applications

- **Legislation:** Hear about upcoming EU and international regulation, to assess its impact on the off-highway market segment
- **Engine performance:** Find out how new engine developments for off-highway engines can achieve optimal performance and fuel economy for all applications
- **Alternative powertrain solutions:** Compare innovative engine applications for new powertrain technologies to prepare yourselves for a market beyond pure diesel technology
- **Retrofitting:** Learn how to get your old fleets up to the new emissions norms through the use of intelligent retrofitting technologies
- **Exhaust aftertreatment:** Gain insight into how to comply with future emission reduction standards using the latest exhaust aftertreatment technologies

Chairmen:



Dr. Claus Görsmann,
HDD Non-road and Retrofit
Technology Manager, Emission
Control Technologies (ECT),
Johnson Matthey Plc, UK



Dr. Stephan Schraml,
Head of Advanced Engineering
Exhaust Aftertreatment,
Advanced Engineering,
Deutz AG, Germany

Our expert speakers:



Vincenzo Perrone,
Manager, Market
Planning, Sales and
Marketing – Power
Systems,
**John Deere Power
Systems, USA**



Dr. Regis Vonarb,
Head of Exhaust
Aftertreatment,
**Liebherr Machines
Bulle SA, Switzerland**



Torbjörn Gustafsson,
Global Director
Product Planning,
**Volvo Construction
Equipment, Sweden**

INTERACTIVE WORKSHOP DAY | Monday, 27th June 2011

- A** Thermal management in off-highway engines and its applications
- C** Quo vadis SCR?

Next Generation

Off-Highway Engines

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Dear Colleague,

As you know, ever more stringent European and international emission legislation has triggered a **new era in diesel design** – to meet future standards for off-highway equipment, new ideas, new concepts and new ideas are required.

Bearing in mind that the industry is aware that the next step in emission regulation standards will not be met without exhaust **aftertreatment** technologies, IQPC's 2011 conference will focus on key engine systems as the most critical components in any low emission diesel powertrain.

Find out how to benefit from further **development potential** of modern **combustion engines** at IQPC's international conference on

Next Generation Off-Highway Engines

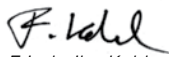
Hotel Steigenberger Metropolitan, Frankfurt, Germany
27th – 29th June 2011

Experts from international companies such as John Deere, Caterpillar, ZF, Deutz, Volvo and many more will present first-hand experiences and best practices on

- Meeting the **upcoming** legislative standards through the application of the latest emission reducing powertrain technologies for off-highway diesel engines
- Different **exhaust aftertreatment** and **engine** system configurations and retrofit control systems to reduce emissions
- Alternative powertrain solutions for off-highway vehicles to plan for a future beyond diesel

Save your place and book now! I look forward to meeting you in Frankfurt on the 27th - 29th June 2011!

Best regards



Friederike Kohl
Transport IQ Team

P.S.: Don't miss this chance to discuss the future of the diesel engine with top industry experts

Who will you meet?

International off-highway machinery OEMs, engine manufacturers, Tier ones and suppliers for engine systems

Global heads, product development directors, senior engineers and project managers of the following

departments:

- Research & Development/ Pre-development
- Engine & Powertrain
- Engine Design and Applications
- Charging Systems
- Injection Systems
- Exhaust Aftertreatment Systems
- Emissions Systems
- Fuel Development
- Electric and Electronics

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Workshop A
10:00 – 13:00

Thermal management in off-highway engines and its applications

In addition to an optimised low PM **combustion system** featuring **high air utilisation** and **EGR tolerance** exhaust aftertreatment technology is a key component to achieve Tier4final. With respect to the cold/warm **NRTC** emission testing and real world duty cycles, **thermal management** has a major role in the aftertreatment strategy.

This workshop will focus on current thermal management technologies such as

- Brunnens
- Throttles
- HC-Dosers
- Advanced air path management

with respect to multiple applications respectively a comparison between on- and off-highway solutions.

Axel Schwarz, Principal Engineer Heavy Duty Diesel, **Ricardo Deutschland GmbH, Germany**
Oliver Böcker, Teamleiter Performance, **Ricardo Deutschland GmbH, Germany**

Workshop C
14:00 – 17:00

Quo vadis SCR?

This workshop will discuss how **Selective Catalytic Reduction** (SCR) systems can help to meet future off-highway emission requirements. SCR technology is one of the most cost-effective and fuel-efficient technologies available to reduce nitrogen oxide (NOx) emissions of internal combustion engines. SCR systems can be combined with a diesel particulate filter systems for a simultaneous NOx und particulate matter (PM) reduction. Discuss future developments in SCR, such as

- **Boundary conditions** for SCR systems in off-highway applications
- **SCR catalyst** choice
- **AdBlue** dosing and mixing
- Emission control systems with combined **NOx** and **PM** control

Dr. Claus Görsmann, HDD Non-road and Retrofit Technology Manager, Emission Control Technologies (ECT), **Johnson Matthey Plc, UK**



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09:15 Registration & coffee

10:00 Chairman's welcome & opening address
Dr. Claus Görsmann,
 HDD Non-road and Retrofit Technology Manager,
 Emission Control Technologies (ECT),
Johnson Matthey Plc, UK

An outlook on off-highway industry trends & upcoming emission legislation

10:05 **Industrial policy for non-road mobile machinery**

- EU legislation
- Industrial policy
- Further steps to non-road mobile directive 97/68/EC
- Energy efficiency
- Green house gas emissions

Dimitrios Savvidis,
 Seconded National Expert (SNE), Mechanical, Electrical
 and Telecom Equipment,
European Commission, Belgium

10:45 **Emission reduction potential in off-highway powertrains**

- Off-highway driveline history
- Current mega trends
- Powertrain potentials
- Component contribution
- System contribution
- Conclusion

Wolfgang Rebholz,
 Manager Engineering Transmissions, Construction Machinery,
ZF Passau, Germany

11:25 Refreshment break and networking

Engine performance improvement

11:55 **Ricardo's low particulate matter combustion system – Twin Vortex**

- New combustion system for next generation off-highway engines
- Improvement of engine-out emissions
- The role of combustion systems meeting Tier4Final requirements

Axel Schwarz,
 Principal Engineer Heavy Duty Diesel,
Ricardo Deutschland, Germany

12:35 **Contribution to CO₂ reduction and system simplification by DENSO 4th generation common rail**

- DENSO 4th generation 3000 bar common rail technology
- Combustion development potential with 3000 bar injection pressure
- Requirements for Tier4f w/o NOx-Aftertreatment

Dr. Olaf Erik Herrmann,
 Team Leader Advanced D-EMS, Diesel Engineering,
DENSO Deutschland Automotive GmbH, Germany

13:15 Networking luncheon

14:45 **Common rail injection for Cat MaK engines**

- Cat MaK diesel engines' system properties
- Performance results and efficiency goals
- Operational experience and challenges
- Outlook on future developments

Stefan Haas,
 Supervisor Fuel Systems and Control Monitoring,
Caterpillar Motoren GmbH & Co. KG, Germany

Highlight

Fuel injection system development

15:25 **Upgrading diesel turbocharging systems to fulfill EU legislation requirements**

- The effects of engine downsizing on the charging system
- Principle and examples of downsizing
- Overall expected CO₂ potential in light of stringent regulations and aims

Speaker tba,
 turbocharger research group,
Imperial College, UK

16:05 Refreshment break and networking

16:35 **Research Project NEMO: Low emission truck diesel engine**

- Inner engine emission reduction without aftertreatment
- Potential of injection, EGR and boost pressure
- Euro VI reachable without aftertreatment?

Dr. Maximilian Prager,
 Chief Engineer, Institute of Internal Combustion Engines,
TU München, Germany

17:15 **Discussion panel: Will future engines render exhaust aftertreatment unnecessary?**

Even now, some manufacturers claim they are able to reach international legislation standards without having to rely on emission aftertreatment technologies. In the future, is that going to be valid for all applications? Or will we still see, in the future, a balanced combination of efficiency improvement in the powertrain combined with advanced aftertreatment systems?

Discuss this and other questions with the conference speakers

17:55 Closing remarks of the Chairman and end of conference day one

18:00 IQPC and the Steigenberger Hotel Metropolitan invite you to an evening reception with drinks. This is an excellent opportunity for you to meet the other attendees and make new business contacts.



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Testimonial to one of our transport conferences

“Information on the latest technology available & future thoughts for development.”

R. Satishkumar, Manager Engine Design, Tata Motors

08:30 Registration & coffee

09:00 Chairman's welcome
Dr. Stephan Schraml,
 Head of Advanced Engineering Exhaust Aftertreatment,
 Advanced Engineering,
Deutz AG, Germany

Alternative powertrain solutions for off-highway vehicles

09:05 **Hybrid drive systems for off-highway applications**

- Fuel savings and emission reduction potential and other benefit of hybrid drives in off-highway applications
- Mild hybrids vs full hybrids
- Actual application examples and outlook

Dr. Mark Mohr,
 Manager of Advanced Engineering Off-road Lines,
ZF Friedrichshafen AG, Germany

Cross industry outlook: next generation genset engines

09:45 **Transitioning to the next generation of genset engines**

- New emissions requirements for genset engines
- Product optimization to serve different genset markets and applications
- Engine integration in gensets
- Reliability, durability and overall life cycle cost requirements for genset engines
- Present and future applications

Vincenzo Perrone,
 Manager, Market Planning, Sales and Marketing –
 Power Systems,
John Deere Power Systems, USA

10:25 Refreshment break and networking

Emissions control for off-highway vehicles

10:55 **Exhaust aftertreatment for off-highway vehicles – Challenges and options**

- Emission legislation
- Comparison on-road and off-road requirements
- EAT and engine system configurations and strategies for Tier4interim and Tier4final
- Overview on control strategies
- Outlook on forthcoming emission legislation
- Summary and conclusions

Dr. Stephan Schraml,
 Head of Advanced Engineering Exhaust Aftertreatment,
 Advanced Engineering,
Deutz AG, Germany

11:35 **DPF vs. SCR for Liebherr's stage IIIb engines: Two different aftertreatment approaches for earth moving equipment and for cranes**

- Stage3B/Tier4i market constraints and Liebherr answers...
- Overview of the DPF systems layout and installation examples
- Overview of the SCR systems layout and installation examples
- Tier4f EATS system layout example
- Summary and conclusions

Dr. Regis Vonarb,
 Head of Exhaust Aftertreatment,
Liebherr Machines Bulle SA, Switzerland

12:15 Networking luncheon

Exhaust retrofitting

13:45 **Retrofit emission control systems for non-road mobile machinery (NRMM)**

- Motivation and challenges for non-road retrofit emission control systems
- Designing retrofit emission control systems
- Particulate (PM) emission reduction systems
- NOx emission reduction systems
- Combined PM and NOx emission control systems

Lynzi Robb,
 HDD Retrofit Technology Chemist, Emission Control
 Technologies (ECT),
Johnson Matthey Plc, UK

Fuel requirements of off-highway engines

14:25 **Next generation fuels for off-highway heavy duty engines**

- The importance of fuel quality in ever more complex off-highway engines
- Emissions reduction potential for new on-road heavy duty engines by optimizing fuels
- Examples for cleaner and alternative fuels
- Supply issues and outlook

Torbjörn Gustafsson,
 Global Director Product Planning,
Volvo Construction Equipment, Sweden

15:05 Closing remarks of the Chairman and end of conference day two with farewell coffee

For further information

please visit our website www.off-highway-engines.com/MM
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