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11th International CTI Conference

SCR Systems

Seminar 7 July 2015
Conference 8 - 9 July 2015

HIGHLIGHTS

- INNOVATION: Promoted NOx Decomposition by Electro-Catalytic Honeycomb
- DeNOx Control System for Future RDE Standards
- VECTO Tool / PEMS Testing
- Blue Sticker for Environmental Zone
- Control and OBD-Monitoring of SCR Systems
- Novel Titania / Vanadate SCR Catalyst-Powder
- SCR on Filter Systems
- Different Approaches for Urea Quality Sensors
- Optical Visualization for Efficient Catalyst Layout

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Basiswissen SCR-Systeme

Fachliche Leitung: Prof. Dr. Werner Müller

Schadstoffe im Abgas von Verbrennungsmotoren
- Entstehung von Schadstoffen
- Möglichkeiten zur Schadstoff-Minderung
- Wieso Abgasnachbehandlung erforderlich ist

Wirkung von Abgasschadstoffen
- Wie Schadstoff-Emissionen die Gesundheit beeinträchtigen
- Wie Emissionen zur globalen Klimaveränderung führen

Gesetzliche Anforderungen und Stickoxid-Grenzwerte
- Definition der Gesetzesvorschriften
- Woran orientieren sich die Emissions-Grenzwerte?

Abgasnachbehandlung bei Dieselmotoren
- Anforderungen an heutige Abgassysteme
- Grundsätzliche Zusammenhänge
- Die Rolle der SCR Technologie

Grundlagen eines SCR Systems
- Was versteht man unter selektiver katalytischer Reduktion (SCR)?
- Chemische Grundlagen von SCR Systemen
- Einflüsse auf die Systemaktivität
- Übersicht der Katalysator-Arten

Systembestandteile: Aufbau und Funktionsweise
- Komponenten eines typischen SCR Systems
- Welche Materialien werden bei heutigen Systemen verwendet?
- Weiterer Entwicklungsbedarf

Alternative Formen der Reduktionsmittel-Speicherung
- Alternativen zur wässrigen Harnstofflösung (AdBlue®)
- Bewertungskriterien dieser Alternativen

Zukunftsaussichten und Potenziale der SCR Technologie
- Welche Steigerung der Aktivität von SCR Katalysatoren ist möglich?
- Sind in Zukunft grundsätzlich andere Techniken zur Stickoxid-Minderung zu erwarten?

ZEITLICHER ABLAUF

9.00 Eröffnung des Einführungsseminars
12.30 Gemeinsames Mittagessen
17.00 Ende des Einführungsseminars
Kaffeepausen werden flexibel festgelegt

Basic knowledge of SCR Systems

Seminar leader: Prof. Dr Werner Müller

Pollutants in the exhaust gas of combustion engines
- Formation of pollutants
- Different approaches to reduce pollutants
- The need for exhaust aftertreatment

Effects of exhaust pollutants
- Adverse health affects induced by exhaust pollutants
- Effects of emissions on global warming

Legal requirements and NO_x limits
- Definition of legal regulations
- Regulation of emission limits

Diesel exhaust aftertreatment
- Requirements on current exhaust systems
- Underlying correlations
- Significance of SCR technology

Basics of SCR systems
- Definition of selective catalytic reduction (SCR)
- SCR chemistry: basic chemical principles
- Influences on performance and activity
- Overview on different types of catalysts

System components: structure and functions
- Components of a typical SCR system
- What kind of materials are used for modern systems?
- Further need for development

Alternative forms of reducing agent storage
- Alternatives to aqueous urea solution (AdBlue®)
- Evaluation criteria for alternatives

Future perspectives and potentials of the SCR technology
- Is it possible to increase the activity of SCR catalysts?
- Can we expect different NO_x reduction technologies in the future?

SCHEDULE

9.00 Opening of the introductory workshop
12.30 Lunch
5.00 End of the introductory workshop
Flexible coffee breaks

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CONFERENCE DAY 1

Wednesday, 8 July 2015

9.00 – 9.45

Reception – Business Breakfast

Bring plenty of business cards and find out who is who right from the start!

9.45 – 10.00

Welcome address by CTI and opening by the chairman

Prof. Dr Werner Müller, Former Professor at the Internal Combustion Engines Department, Technical University of Kaiserslautern

Introduction and Overview – Trends & Outlook

10.00 – 10.30

Emission Legislation

- Additional and renewed legal instruments for emission control – WLTP and RDE
- Why are more comprehensive measures necessary?
- What is behind WLTP and RDE and the impact on NOx reduction systems?
- Status of current legal work

Dr Christiane Vitzthum von Eckstädt, Scientific Assistant, Federal Environmental Agency (UBA)

10.30 – 11.00

Calculating CO2 Emissions from Heavy Duty Vehicles with VECTO tool – Policy Issues and Future Developments

- VECTO development
- Policy issues
- Future steps
- VECTO demonstration

Dr Dimitrios Savvidis, Policy Officer, European Commission – DG CLIMA

11.00 – 11.30

PEMS testing: taking the Laboratory on the Road

- How intensive PEMS testing works in practice and what we have learnt
- Insights on NOx collected on more than 500 real-world tests
- PEMS for RDE legislation – sharing our expertise

Nick Molden, CEO, Emission Analytics

11.30 – 12.00 Discussion

12.00 – 1.30 Lunch Break in the Exhibition Area

1.30 – 2.00

Blue Sticker for Environmental Zone

- NO2 pollution in European metropolitan areas
- Proposal of environmental organizations: introduction of blue sticker
- Pollution problems of the existing fleet
- Retrofitting SCR systems, feasibility

Stefan Carstens, CEO, EngineSens Motorsensor

2.00 – 2.30

25 Years of V-TDI Exhaust Gas Aftertreatment at Audi

- From EU1 to EU6
- From 5 cyl. to 12 cyl.
- Important milestones of aftertreatment
- From oxicat to combination system (LNT + SCR)

Dr Henning Lörch, CEO, Audi

2.30 – 3.00 Discussion

3.00 – 3.30 Coffee Break in the Exhibition Area

Innovations in DeNOx Systems

3.30 – 4.00

Challenge of DeNOx Emission Control System for Future Real Driving Emission RDE Standards

- Overview emission legislation
- Updates in developments SCR
- Material developments SCR catalysts
- SDPF
- Advances in SCR filter combinations
- SCR in Off-Highway applications
- Advanced substrate material for DeNOx application

Claus Dieter Vogt, Chief Technical Officer, NGK EUROPE GmbH

4.00 – 4.30

INNOVATION: Highly-Fuel-Efficient Automobile via Promoted NOx Decomposition by Electro-Catalytic Honeycomb

- Higher NO concentration can lead to higher DeNOx rate, without consuming any resource
- Higher O2 concentration can lead to higher DeNOx rate
- No temperature window and effective DeNOx from engine cold start
- Relatively-constant DeNOx rate at very low NOx concentrations for near-zero NOx emission

Professor Huang Ta-Jen, Department of Chemical Engineering, National Tsing Hua University

4.30 – 5.00

A novel Titania / Vanadate Based Catalyst-Powder with Outstanding DeNOx Performance Applicable for Direct Coating („Ready to Coat") of SCR-Catalyst Substrates

- Overview on the current applied Titania / V-SCR technology and its limits in the application
- Demands for improvements of Titania / V-SCR catalysts (manufacture, performance)
- Properties and advantages of a novel Titania / Vanadate SCR catalyst-powder applicable for direct coating of SCR-catalyst substrates
- Scope of application for the new "Ready to Coat" catalyst powder

Dr Karl Schermanz, Head of R&D Department, Rare Earth Chemistry, Treibacher Industrie AG

5.00 – 5.30 Discussion

5.30 Closing remarks & end of the first conference day

6.00 – 7.00

Evening Get Together!

After the official programme, CTI invites you to an evening event with a dinner in a relaxed atmosphere and a special surrounding.

Use this perfect opportunity to strengthen your network and to make new contacts.

CONFERENCE DAY 2

Thursday, 9 July 2015

9.00 – 9.30 Reception with Coffee and Tea

On-Board Diagnostics and Sensors

9.30 – 10.00

Control and OBD-Monitoring of SCR-Systems

- Principal structure of an exhaust aftertreatment system
- Basic control functions and interaction with the engine control system
- Different types of diagnostic and safety monitors
- Interaction with the OBD-system

Matthias Weber, Senior Manager Business Development, Continental Engineering Services

10.00 – 10.30

Role of a Urea Quality Sensor (UQS) for Improved Management of the SCR System in Real Life Driving Conditions

- NEDC cycle simulation: decreased urea concentration results in increased NOx reduction
- The reactivity of the system to recover from a sudden change of urea concentration in between two transient cycles can be largely improved using a UQS sensor, as observed through the simulation
- Integrating a UQS sensor into the control loop of a SCR system enlarges its performance range

Jean Milpied, R&D Manager, TE Connectivity – Sensors Solutions

10.30 – 11.00 Discussion

11.00 – 11.30 Refreshment Break in the Exhibition Area

11.30 – 12.00

AdBlue® Leak Detection in a Liquid SCR System – Detection Needs and Strategy

- SCR architecture: UREA injector will to inside engine bay – urea lines now run close to hot end of exhaust
- Improvement of SCR efficiency in lowering NOx emissions. However, a leak of AdBlue® on the hot exhaust could lead to creation/emission of gaseous ammonia
- SCR systems need to be able to detect an AdBlue® line leak with sufficient accuracy, to avoid uncontrolled ammonia release
- Definition of required detection accuracy and development of a pump based leak detection strategy

Stéphane Leonard, SCR Modules Leader, Plastic Omnium

12.00 – 12.30

AdBlue-Quality Sensor – New Member of SCR Sensor Family at TT Electronics plc

- AB Elektronik within TT electronics as specialist of sensors for aftertreatment systems
- AdBlue-Quality sensor created by AB Elektronik Sachsen GmbH
- Latest update of opto electronic sensor for practical use

Frank Rothe, Product Application Manager, AB Elektronik Sachsen GmbH

12.30 – 1.00 Discussion

1.00 – 2.30 Lunch Break in the Exhibition Area

Innovative Systems and Components

2.30 – 3.00

Investigation of Potential for Complexity Reduction of SCRF Systems, under the Boundary of RDE Requirements

- Efficiency requirements for different vehicles and cycles
- Potential of sophisticated storage control to avoid ammonia slip catalyst
- Accurate engine NOx model as solution to save upstream NOx sensor
- Trade-off between efficiency and urea consumption

Evangelos Georgiadis, Technical Manager, Diesel Aftertreatment Development, Denso Automotive

3.00 – 3.30

Lupolen GX 5038 – A new HDPE (high-density polyethylene) for Injection Molded SCR Reservoirs

- Technology of SCR tank manufacturing changes – increased need for new material
- Known materials from Blow Molding (BM) do have the lack of flowability as well the tendency of higher warpage
- The new Lupolen GX 5038 keeps the well known properties from the BM process, but show optimal flowability and significantly less warpage as well as a good performance regarding ESCR in contact to AdBlue®

Dr Bernd Hoécker, Application Development & Technical Service, Basell Deutschland GmbH

3.30 – 4.00

A new innovative Urea Dosing Unit for DeNOx SCR Systems for Marine Applications

- User-friendly, compact and cost effective solution
- Reliable control unit with smart-phone connection
- Very precise urea-dosing (coriolis urea flow control principle)

Andrea Carli, Owner, AirLife Srl

4.00 – 4.30

Solutions for a successful Integration of SCR Catalysts into an Exhaust Line using Optical Visualization and the Coupling of CFD with Multi-oD SCR Simulation

- Advanced CFD model of AdBlue injection, evaporation and thermolysis – predicts locations and amounts of AdBlue deposits in the pipe and the ammonia distribution at the SCR inlet
- Non-intrusive in-situ visualizations of NH_3 distribution in the exhaust line via tracer-LIF validate these calculations
- Validation for both injection in the pipe and radial injection of AdBlue between DOC and SCR on filter in close-coupled mounting
- Accurate 2D boundary conditions are consequently available at the inlet of SCR or SCR on filter catalyst allowing precise prediction of SCR reactions efficiency

Dr Stephane Raux, Exhaust Aftertreatment System Project Leader, IFPEN

4.30 – 5.00 Discussion

5.00 End of the Conference "SCR Systems" and Closing Remarks

Advisory Board:

Professor Werner Müller, former professor at the Internal Combustion Engines Department, Technical University of Kaiserslautern

Stefan Carstens, EngineSens Motorsensor

Andreas Wegman, Voith Turbo

Dr Claus Görsmann, Johnson Matthey

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If you have any questions about the forum, we will be pleased to help you.

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