Key topics discussed:

- European regulations in the off-highway sector: emissions, technical rules, examples
- Opportunities for electrified off-road applications: Li-ion battery, fuel cell, hybrid systems
- Modular solutions for traction and process drives
- Increased efficiency through digitalization: real-time data acquisition, predictive maintenance, driving analysis
- Smart driving strategies through AI
- Field reports on innovative drive systems from the following industries

Conference Chairman:
Prof. Dr. Ludger Frerichs, Director, Institute of Mobile Machines and Commercial Vehicles (IMN), TU Braunschweig, Germany

With experts from:

Simultaneous translation: German – English

Free entrance to parallel events
Dritev 2020
EDrive 2020

Exhibition

Be interactive at Speakers Corner and DritevLab

June 24th – 25th, 2020, World Conference Center Bonn (WCCB)
1st Conference Day
Wednesday, June 24th, 2020

07:45 Registration

08:30 Collective welcome (Room New York)
Dipl.-Ing. Matthias Zink, Schaeffler AG, Bühl, Germany

09:00 Models for urban mobility of the future in Hamburg
- Field tests of the vehicle industry and of mobility service providers in Hamburg
- Hamburg Takt: largest mobility offensive in public transport
- Plans for the expansion of the transport infrastructure

Director of the Senate Martin Huber, Director-General of Transportation and Highways, Ministry of Economic Affairs, Transportation and Innovation, Free and Hanseatic City of Hamburg, Germany

09:25 eV: state and outlook for Europe
- Current registration/sales figures of passenger cars in Europe – Can 2021 targets be achieved – and how?
- EV outlook: EU, China, US, world until 2030 (passenger cars and commercial vehicles)
- Outlook alternatives: fuel cells, e-fuels

Dr. Wolfgang Bernhart, Senior Partner, Dr. Christian-Simon Ernst, Stefan Riederle, all of Roland Berger GmbH, Munich, Germany

09:50 100 % electrified by 2024 – how Opel becomes an electric brand
- 2020: the year in which e-mobility will take off
- E-mobility requires offers in the small- car segment
- Flexible multi-energy platforms of Groupe PSA as significant enablers for comprehensive electrification
- In-field experience with Ampera and Ampera-e as a foundation
- What comes next or what will complement? View on fuel cell and synthetic fuels

Dipl.-Ing. Christian Müller, Managing Director Engineering, Opel Automobile GmbH, Rüsselsheim, Germany

10:15 Machine intelligence for Construction Site 4.0
- Climate protection and emission regulation
- Energy supply (diesel, battery, fuel cell, power-to-X)
- Increased efficiency through assistance systems and digitization

Martin Lehner, CEO and Chairman of the Executive Board, Wacker Neuson SE, Munich, Germany

10:40 Be interactive – Meet & Greet in the exhibition area

11:05 Powertrain Systems in Mobile Machines 2020 (Room Bangkok)
Prof. Dr. Ludger Frerichs, Director, IMF, TU Braunschweig, Germany

11:30 Keynote
Moderation: Dr.-Ing. Hagen Adam, CLAAS KGaA mbH, Paderborn, Germany

11:30 Regulations and measures for limiting emissions from non-road mobile machinery in Europe
- Emissions legislation in Europe and UNECE Regulation 96
- Technical solutions and certificates: Annex XXVII STVZO; Technical Regulations for Hazardous Substances TRGS 554; UNECE No. 132
- Control and retrofitting: (EU) 2016/1628 Article 60; Government/State Working Group for Immission Control (LA); examples


12:00 Spectrum of current and future drive solutions
Moderation: Dr.-Ing. Hagen Adam, CLAAS KGaA mbH, Paderborn, Germany

12:00 Alternative drives for agricultural machinery
- Greenhouse gas agreements and regulations on the global, European and national levels with relevance for agricultural machinery
- Agricultural machinery’s contribution to greenhouse gas emissions out of combustion processes in Europe and Germany
- Concepts of alternative drives for agricultural machinery, their validation regarding CO₂, prevention and market opportunity

Dr.-Ing. Axel Kunz, Manager Advanced Energy Management/Mid Tractor Emissions, John Deere GmbH & Co. KG, Mannheim, Germany

12:30 Future drivetrains for compact and medium-sized wheel loaders
- Study regarding wheel loader electrification: operations, requirements, cycle analysis
- Feasibility and application of fully electric and hybrid drivetrains, also estimation about solutions with alternative energy carriers
- Results of the study in terms of electric central drives for compact and mid-sized wheel loaders


13:00 Time for Business Lunch – Meet & Greet in the exhibition area

Development of modular drivetrain solutions
Moderation: Dr.-Ing. Christof Lamparski, Bosch Rexroth AG, Dortmund, Germany

14:30 Automated multi-domain modelling for a computer-aided powertrain synthesis
- System theory for an automated multi-domain modelling
- Solving strategy for calculating the efficient powertrain design
- Efficiency improvements achieved through an algorithm-based powertrain design

Hagen Neurath, M. Sc., Research Assistant, Prof. Dr. Ludger Freichs, Director, Institute of Mobile Machines and Commercial Vehicles, TU Braunschweig, Germany

15:00 The leadership role of drive and motion technologies in electric transformation
- Electrification impacts on component development in off-highway technology
- Challenges and requirements of emerging e-Drive and e-Motion technologies, including energy management, power electronics, electric motors, and electric actuations
- Component development that meets duty cycle requirements and system performance expectations: a case study

Dr.-Ing. Axel Kunz, Manager Advanced Energy Management/Mid Tractor Emissions, John Deere GmbH & Co. KG, Mannheim, Germany

15:30 Modular, electrified powertrain for compact equipment
- Motivation for BEV within compact equipment: CO₂ and regulations
- Requirements for BEV compact equipment: performance and power durability
- Development of electrified powertrains with high speed concepts
- ZF modular building block system for electric powertrains: power electronics, E-motor, gearbox and axle


www.vdi-wissensforum.de/en/01TA807020
09:15 New battery-driven vehicle generation of electric tractors
- Fully electric vehicle system: vehicles currently available, new developed vehicle power chassis, technical advantages and disadvantages
- Integration of the electric powertrain in detail: battery, e-motors and inverters, cooling
- Control of a highly automated vehicle: integrated sensors, future sensor systems
- Different applications in fields e.g. landscaping, winegrowing

09:45 Electrified powertrain for tractor-implement systems
- Combining the functionality of a continuously variable transmission and electric power generation
- Re-circulating used for something good
- New challenges of the new drivetrain: traction management, e-machine behavior, oil management
Dr.-Ing. Rainer Gugel, Supervisor Drivetrain Engineering, John Deere GmbH & Co. KG, Mannheim, Germany; Roger Burjes, B. Sc., Manager New Transmission Engineering, John Deere Product Engineering Center, Waterloo, USA

11:00 Transferability of economic electrification concepts in heavy goods traffic to mobile machinery
- Approaches to the electrification of heavy goods vehicles
- Economic utilization scenarios
- Transferability of the concepts to mobile machinery
Aaron Riegmauf, M. Sc., Research Assistant, Group Fuel Cell, Chair of Production Engineering of E-Mobility Components (PEM), RWTH Aachen University, Germany

11:30 The use of H\textsubscript{2} in industrial forklift trucks: a competition of technologies
- Design and function of a fuel cell integrated into industrial forklift trucks, requirements applying to the vehicles
- Infrastructure and project management with example of a large retailer
- Comparison of the new technologies of fuel cell vs. Li-ion – Who is the winner?

12:00 Potential and challenges for fuel cells in off-road applications
- Fuel cells (FC) for off-road applications: FC type PEM – SOFC, general set-up of fuel cell systems, fuel cell projects around the world
- Market drivers and fuel cell technology advantages: zero emission/low emission, total cost of ownership, operating time/range, refilling time, weight
- Challenges of implementation into off-road applications: packaging, cooling, H\textsubscript{2} Infrastructure
William Resende, DI Chemie Ingenieurwesen, Global Product Manager Fuel Cell Systems, AVL List GmbH, Munich; Dipl.-Ing. (FH) Ronald Kruth, Business Field Leader & Key Account Manager Off-Road, AVL Tractor Engineering Germany GmbH, Neuss, Germany; Dipl.-Ing. (FH) Christian Auer, Global Product Manager Off-Road Engines, AVL List GmbH, Steyr, Austria

16:00 Be interactive – Meet & Greet in the exhibition area

16:45 CVT drivetrain concept for high-horsepower tractors
- Latest generation of wheel- and track-type tractors
- Demands on the drivetrain
- Drivetrain architecture
- Potentials

17:15 4-speed electric drive unit for heavy-duty vehicle
- Electric drive unit: battery electric vehicle, series development
- Commercial vehicle: truck, off-road, on-road
- Multi-speed: power-shift capability, highly integrated
Dipl.-Ing. Ralph Fleuren, Product Manager, Dr. Gereon Hellenbroich, Department Manager, Business Unit Transmission Systems, FEV Europe GmbH, Aachen, Germany; Jiantao Geng, Project Leader, eKontrol Drive (Suzhou) Co., Ltd., China

17:45 Electrification of the drivetrain of truck mixers
- Locally emission-free drum drive CO reduction, silent, no particulate pollution
- Plug-in hybrid concept consisting of electric drivetrain and Li-Ion high voltage battery
- Fuel consumption lowered by 30% and noise level reduced by half by turning off the truck engine on the job site as well as in the batching plant
Dipl.-Ing. (FH) Silvan Gadner, Product Manager Truck Mixers, Liebherr Concrete Technology, Bad Schussenried, Germany

18:15 End of the 1st conference day

18:30 Get-together – Football Summer Night

You can look forward to a wonderful evening under the sign of the European Football Championship. Join in the excitement of the last group game of the German soccer team. Enjoy the evening with good food and music. Make new contacts in an informal setting and meet old colleagues and friends!

2nd Conference Day
Thursday, June 25th, 2020
Forward-thinking system solutions for drives in agricultural machines
Moderation: Dipl.-Ing. Florian Mulzer, AGCO GmbH, Marktoberdorf, Germany

08:45 “There is (no) future yet!” – electric, sensor-controlled drive system modules in agricultural machines
- Advantages and disadvantages of modularized drive systems
- Potential for process efficiency of variable function drives and active traction support by implements
- Implementation example in the tractor-implement system taking the example of “Kronos”
Prof. Dr.-Ing. habil. Thomas Herlitzius, Chair of Agricultural Systems and Technology, Institute Director, Dipl.-Ing. Tim Bögel, Research Assistant, Institute of Natural Materials Technology, Faculty of Mechanical Science and Engineering, Technische Universität Dresden, Germany

12:30 Time for Business Lunch – Meet & Greet in the exhibition area
More efficiency through use of digital technologies

Moderation: Dipl.-Ing. Joachim Bereth, John Deere GmbH & Co. KG, Mannheim, Germany

14:00 Smart components: impact on the powertrain system
- Integration into existing systems and communication networks
- Challenges in using standardized interfaces and protocols
- Connection to customer systems and covering the needs of the different user groups
Dipl.-Ing. Stefan Walmüller, Main Department Manager Advanced Controls, Ing. Nadapuram Venkatnarasimha, Head of Product Management, Business Unit Combustion Engines; Adrian Lindner, Head of On-Board Diagnosis & Diagnosis Tools, Liebherr Machines Bulle SA, Bulle, Switzerland

14:30 Intelligent driving strategy for off-highway transmissions
- Integration of hardware and/or software for an optimized driving strategy based on future or past information
- Event detection with surround sensing sensor or from last passage
- Intelligent gear selection for AG and CE-transmissions for better performance or fuel consumption

15:00 Smart variable speed belts – condition monitoring
- Condition monitoring on belt drives in agriculture
- Technical challenges upon temperature monitoring
- Combine-harvester field test
Dr.-Ing. Heiko Sattler, Head of Industrial R&D, ContiTech Antriebssysteme GmbH, Hannover, Germany

15:30 Resource-efficient dimensioning and predictive maintenance of machine components based on real-time monitoring and holistic optimization
- Real-time monitoring and collection of real load data through AI-based virtual sensors
- Increase in availability through the introduction of predictive maintenance measures
- Consideration of fleet data in a holistic optimization problem for a knowledge-based dimensioning: cost, weight, CO2 footprint and maintenance
Prof. Dr.-Ing. Stephan Rinderknecht, Head of the Institute for Mechatronic Systems in Mechanical Engineering; TU Darmstadt; Dr.-Ing. Stéphane Foulard, Managing Director R&D, Dr.-Ing. Rafael Fietzek, Managing Director Finance & Sales, COMPREDICT GmbH, Darmstadt, Germany

16:00 Concluding discussion

16:05 Closing remarks/end of the 6th International VDI Conference

Powertrain Systems in Mobile Machines 2020

Advisory Board

1st row from left to right:
- Dr.-Ing. Hagen Adam, CTO Small Tractor, CLAAS KGaAmbH, Paderborn, Germany
- Dr.-Ing. Ettore Cosoli, Vice President, Global Engineering, Off-Highway Drive and Motion Technologies, Dana Incorporated, Arco, Italy
- Prof. Dr. Ludger Freichs, Director, Institute of Mobile Machines and Commercial Vehicles (IMI), TU Braunschweig, Germany (Conference Chairman)
- Prof. Dr.-Ing. habil. Klaus G. Hoehn, Senior Advisor Innovation & Technology to the Office of the Chairman, Deere & Company World Headquarters, Moline, USA

2nd row from left to right:
- Dipl.-Ing. (FH) Tilo Huber, Vice President Product Line Construction Machinery Systems, ZF Friedrichshafen AG, Passau, Germany
- Dr.-Ing. Christof Lamparski, Vice President Development and Sales Gearbox Technology, Bosch Rexroth AG, Dortmund, Germany
- Dr.-Ing. Florian Mulzer, Transmission Specialist, AGCO GmbH, Marktoberdorf, Germany
- Philipp Suhr, M. Sc., Head of Development, Drive System Technology, Liebherr-Components Biberach GmbH, Biberach an der Riss, Germany

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VDI workshops
Tuesday, June 23rd, 2020

These one-day seminars – held on the day before the conference – must be booked separately and are only offered in the German language.

Hochdrehzahlantriebe zur Realisierung hoher Leistungsichten: www.vdi-wissenforum.de/02ST231001
Chancen für die agile Systementwicklung durch ASD-Agile Systems Design: www.vdi-wissenforum.de/02ST385001
NVH im E-Antriebsstrang: www.vdi-wissenforum.de/01ST022001
DritevLab

Gather hands-on experience in the transmission world!
The following transmissions will be exhibited, stripped down into subassemblies (February 2020):
- Porsche Taycan two-speed transmission
- Opel 6 speed manual transmission MB6
- Audi e-tron Schaeffler rear-axle drive EQ400-1K
- ZF hybrid transmission 8P75PH

Football Summer Night

Your networking hotspot for the international powertrain community
This is where the who’s-who of the international developer community meets. Meet old colleagues and project partners and use the informal atmosphere to get to network anew.

Speakers Corner

Direct any questions you might have to the drive system experts
Do you still have any unresolved questions? You are welcome to turn to our speakers who will address your concerns at the speakers corner following the sessions. It is located on the Rhine floor – straightforward, subject-specific, instantaneously.

Car Presentation

Powertrain systems with an emotional appeal
Be it a standard vehicle, a fancy roadster or a real headturner – they all need to be presented to their audience in their own specific way, no matter how perfect the drive unit. Learn about current vehicle concepts and ask the experts at the congress about the vehicles’ characteristic features and how the specific drive solutions have been integrated.
Please register for (Price per person plus VAT):

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**6th International VDI Conference**
**Powertrain Systems in Mobile Machines 2020**

You need help? Please contact us!
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**Venues:**
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Phone: +49 228/9267-0, Email: info@worldccbonn.com
Workshops: Maritim Hotel Bonn, Godesberger Allee, 53175 Bonn, Germany, Phone: +49 228/9108-0,
Email: info.bon@maritim.de

**Accommodation:**
Conference: A limited number of rooms have been reserved for participants. Please book your room early.
A reservation form can be found at www.dritev.com.
For information on other accommodation possibilities, see Tourismus & Congress GmbH Bonn:
www.bonn-region.de/events/vdi-drivev-2020.html

**Note:** If you book a room via Tourismus & Congress GmbH Bonn you will also be given a complimentary mass-transit ticket.

**VDI Workshops:** A limited number of rooms are available to you under special conditions in the above mentioned Maritim Hotel Bonn until:
www.vdi-wissensforum.de/hrh

**Information:**
Conference: The price includes congress documents (e-book), coffee breaks, beverages during breaks, lunches and the evening reception (congress).
Workshops: The price includes beverages during breaks and lunch. The participants get the compendium at the venue.

Participants with an invoice address outside of Austria, Germany and Switzerland are kindly requested to pay by credit card. Please don’t send your credit card details via email, fax or post. Please book your ticket at www.vdi-wissensforum.de. Transferring your credit card details via our website ensures your details are encrypted and security of your data is guaranteed.

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