Main topics:

- Automatic and dual clutch transmissions
- Hybrid modules
- Transmission topologies as part of electrified powertrains
- Use of artificial neural networks in simulation
- E-axes
- Development tools

Panel discussion: Urban Mobility 2030 caught between political, societal and technological objectives

Prof. Dr. Uwe-Dieter Grebe, Global Business Development, Sales and International Operations, Passenger Cars and Powertrain Systems, AVL List GmbH
Toralf Müller, Managing Director, Verkehrsbetriebe Hamburg-Holstein
Gunnar Herrmann, Vice President Quality, Chairman of the Management Board, Ford-Werke GmbH
Reinhard Otten, Strategy Climate and Ressource Protection, Audi AG

Lecturer companies amongst others

Accompanying congresses

International VDI Congress
EDrive
5. International VDI Congress on Transmissions in mobile machines

www.dritev.com
#VDI_Drive
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<th>Time</th>
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<td>End of the 1st congress day and evening reception</td>
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Dritev – Drivetrain for Vehicles
Anmelden unter: www.dritev.com
2nd Congress Day
Thursday, June 28, 2018

08:30 Dritev Accompanying congresses
Systems
Transmission manufacturing
Hybrid modules
EDrive
Transmissions in mobile machines

10:30 Coffee break and visit to the exhibition

11:15 Plenum - Panel discussion

12:45 Lunch and visit to the exhibition

14:15 Dritev Accompanying congresses
Components
Simulation
48V Systems
EDrive
Transmissions in mobile machines

15:45 Awarding of the best presentation award for junior engineers

16:00 Closing remarks and end of the congress

Sophisticated technology
Focused and dedicated
Hands-on approach
Extremely valuable
Cross-functional and cross-industry alignment

This is your international technology congress for powertrain and transmission developers in Bonn!
**Program**

**Room New York**

**1st Congress Day:**
Wednesday, June 27, 2018

- **07:30** Registration
- **08:30** Opening and welcome
  
  Dipl.-Ing. Matthias Zink, CEO Automotive, Schaeffler AG, Bühl, Germany

### PLENARY LECTURES

- **08:45** What moves us and drives us – Future mobility and powertrain
  - New mobility concepts open new opportunities
  - E-mobility and ‘well to wheel’
  - Drivetrain optimization through system competence
  
  Matthias Zink, CEO Automotive, Schaeffler AG, Bühl, Germany

- **09:15** Internal combustion engine and electromobility – Competition or synergies?
  - Potential to increase the efficiency ICE-powertrains and further CO₂-reduction potential by means of e-fuels
  - Emission technologies for passenger car powertrains with respect to the upcoming legislation
  - Hybridization to further reduce the emission level and high customer benefit
  - Trends for battery electric vehicles – Increase of energy density and cost reduction in order to further improve the attractiveness of these concepts
  
  Prof. Dr. Stefan Pischinger, Head of the Institute, co-authors: Christoph Lentz, both Fakultät für Maschinenbau, Lehrstuhl für Verbrennungskraftmaschinen (VKA), RWTH Aachen University, Dr.-Ing. Ingo Steinberg, Dr.-Ing. Matthias Thewes, both FEV Europe GmbH, Aachen, Dr.-Ing. Michael Wittler, FEV Consulting GmbH, Aachen, Germany

- **09:45** Coffee break and visit to the exhibition

- **10:30** IONITY – Free E-Mobility
  
  Dr. Michael Hajesch, Managing Director/CEO, IONITY GmbH, Munich, Germany

- **11:00** The first 7DCT automatic transmission developed and produced in China and future technologies
  - Project strategy and targets
  - Technical highlights and advantages
  - Testing and calibration
  - Future technologies
  
  Dipl.-Ing. (TU) Gerhard Henning, Executive Chief Engineer Automatic Transmissions, Great Wall Motor Company Ltd., Hebei Province, China

- **11:30** Future challenges for drive technology in agricultural engineering
  - Global requirements and challenges
  - Future trends
  - Potentials through digital transformation
  
  Dr.-Ing. Herbert Reiter, Vice President Engineering Tractors Global, Managing Director, AGCO GmbH, Marktoberdorf, Germany

- **12:00** Lunch and visit to the exhibition
### Room New York

**AT/DCT**

Dr. Carsten Bünuder, GETRAG Magna Powertrain

**13:15** The new generation 8-speed AT for the Opel Grandland X
- Design optimization and weight reduction
- Improved shift quality and fuel economy
- Integration of internal ETRS and Start-Stop Sailing capability
- New oil, friction material and gear surface finishing
- Challenges in hydraulics: off-axis low-loss oil pump, dynamic line pressure and flexible lubrication flow valve control  
  Dipl.-Ing. Georg Bednarek, Global Chief Engineer & Global Program Manager Purchased Automatic Transmissions, co-authors: Dr.-Ing. Karl Geratz, both Opel Automobile GmbH, Rüsselsheim, Germany, Hervé Chariou, Groupe PSA, La Garenne Colombes, France

### Room Addis Ababa

**Tools/Component optimization**

Prof. Dr.-Ing. Karsten Stahl, Technische Universität München

**13:45** Churning oil path optimization process development
- Application of moving particle method to analyze churning oil path
- Comparison of CFD method between grid and particle method
- Correlation to bench test with simulation model  
  Chulmin Ahn, B.Sc., Research Engineer, Hyundai Motor Company, Gyeonggi-do, Korea

### Room Nairobi

**Transmission topologies as part of electrified powertrains**

Thomas Pfund, LuK GmbH & Co. KG

**13:15** Electrified automated manual transmission (eAMT) – Synergies by combining an electric drive with an automated transmission
- P4 hybrid solution by electric axle drive
- Electrified automated manual transmission
- Automated manual transmission for full hybrid functionality
- Synergy between electric axle drive and automated manual transmission  
  Dr.-Ing. Florian Mühlfeld, Team Manager Mechatronics AMT, co-authors: Dipl.-Ing. Matthias Hochrein, Dipl.-Ing. Jörg Buhl, all ZF Friedrichshafen AG, Schweinfurt, Germany

**13:45** Dedicated Hybrid Transmissions: How a systemic approach accelerates engineering process from concept development to real applications
- Model-based transmission systems analysis and synthesis
- EE HW/SW architecture for HEV/EV application
- Synthesis of actuation mechanisms  
  Oscar Sarmiento, Global Head Advanced Development, Continental AG, Nuremberg, co-authors: Daniel Schönberger, Technische Universität Darmstadt, Detlev Runkel, Romax Technology Ltd., Ludwigsburg, Germany

**14:15** 3rd generation of the 8 gear automatic transmission by ZF
- Drag loss reduction
- Increase of total spread
- Functional measure to reduce the fuel consumption
- Optimization oil supply  
  Dipl.-Ing. Christian Sibla, Project Manager Development, Basedevelopment Inline Transmission, co-authors: Andreas Donges, Dr. Friedemann Jauch, all ZF Friedrichshafen AG, Friedrichshafen, Germany

**14:45** The impact of efficiency enhanced drivetrain components on the energy consumption of electric and conventional vehicles
- Efficiency improvements in the drivetrain: extreme different impact on the energy consumption
- A highly comprehensible modelling approach for a new view on the different propulsion systems and the coherences which lead to the different energy savings
- The electrification of the propulsion systems: higher energy savings in the future  
  Christoph Schmahl, M. Eng., Test Coordinator, co-authors: Dr. Wolfgang Hildebrandt, both GKN Driveline International GmbH, Lohmar, Prof. Dr. Dirk Reith, Hochschule Bonn-Rhein-Sieg, Sankt Augustin, Germany

**15:15** AVL's future hybrid X-mode, a modular transmission family concept
- Compact, power shiftable and modular DHT transmission family
- Modular transmission family for all levels of electrification
- Cost effective transmission family for high production flexibility
- Modular transmission with four variants on one common assembly line  
  Dipl.-Ing. Ivan Andrasci, Design Engineer Passenger Car Transmission, co-author: Bernd Jeitler, M.Sc., both AVL List GmbH, Graz, Austria
14:45 Enhancement of a dual clutch transmission kit – Audi S tronic
- Development of version for all-wheel drive
- Increase of torque and power
- HV-electrification: Integration of EM and clutch K0
- HV-electrification: Modification of hydraulic and torsional vibration isolation

Dr.-Ing. Alexander Schmidt, Head of Development Electrified Dual Clutch Transmission, co-author: Dipl.-Ing. (FH) Hans-Peter Fleischmann, both Audi AG, Ingolstadt, Germany

Holistic approach for fatigue life design of vehicle transmissions
- Fatigue life design of transmission components
- Method of load spectra evaluation
- Holistic procedure model for design and testing

Dr.-Ing. Michael Hein, Team Leader Flank Load Carrying Capacity, co-authors: Dr.-Ing. Thomas Tobie, Prof. Dr.-Ing. Karsten Stahl, all Forschungsstelle für Zahnräder und Getriebebau (FZG), Technische Universität München, Garching, Germany

Dr.-Ing. Alexander Schmidt, Head of Development Electrified Dual Clutch Transmission, co-author: Dipl.-Ing. (FH) Hans-Peter Fleischmann, both Audi AG, Ingolstadt, Germany

15:15 Future Schaeffler CVT concepts with innovative actuation systems
- Conventional and hybridized CVT
- Compact CVT with small center distance
- Efficiency optimized actuation system for CVT clamping and adjustment
- Simulation regarding CO₂ reduction through ‘power on demand’ actuation

Dipl.-Ing. Reinhard Stehr, Development Engineer, Advanced Development CVT, co-authors: Dipl.-Ing. Andreas Götz, Dipl.-Ing. Markus Ciesek, all LuK GmbH & Co. KG, Bühl, Germany

Innovative transmission topologies using the example of a P2-hybridtransmission for front-transverse applications
- Hybrid transmission in P2-structure with reduced complexity and six speeds
- Dog shift elements for loss reduction while retaining load shiftability
- Design of one variant for front-transverse applications

Dipl.-Ing. Tom Smejkal, Development Engineer, co-author: Dr.-Ing. Christian Wirth, both ZG GmbH, Eching, Germany

Dipl.-Ing. Reinhard Stehr, Development Engineer, Advanced Development CVT, co-authors: Dipl.-Ing. Andreas Götz, Dipl.-Ing. Markus Ciesek, all LuK GmbH & Co. KG, Bühl, Germany

15:45 Coffee break and visit to the exhibition

16:00 WM Special: Public Viewing in the exhibition area
South Korea - Germany
Mexico - Sweden
18:00 CVT: dedicated to hybrid solutions
- Concept of a dedicated hybrid CVT system
- Benchmark of modular and dedicated hybrid systems
- Optimizing energy efficiency, performance, packaging and cost
Ing. Gert-Jan van Spijk, Head of Transmission Development, co-authors: Luc Römers, M.Sc., Ing. Mattijs Tweehuysen, all Bosch Transmission Technology B.V., Tilburg, Netherlands

The generic transmission model for hybrid electric drives
- Integration of the dynamic behaviour of all ICE, electric, and hybrid mode types in one model
- Contribution to the development process of hybrid drivetrains
- Practical application: control optimization for arbitrary hybrid electric drives
Wilco van Harselaar, M.Sc., Ph.D, E-Concepts, E-Motor & E-Drives, co-authors: Dipl.-Ing. Markus Brouwer, both Daimler AG, Stuttgart, Germany, Dr. Theo Hofman, Eindhoven University of Technology, Netherlands

18:30 Development of new torque converter lockup control matched with engine torque management and shift control
- Adoption of new CVT control for engine downsizing
- Optimized acceleration performance and connected feeling
- Torque converter clutch control matched with D-Step logic
Yasuhiro Endo, Development Engineer, Control System Development Department, co-authors: Akihiro Tanabe, both JATCO Ltd., Kanagawa, Masashi Ono, Nissan Motor Corporation, Japan

Method for automated generation of design concepts
- Automated design concept generation of automatic transmission
- Automated generation of bearing concepts
- Optimization concepts
David Evenschor, M.Sc., Ph.D Student, Advanced Development Drivetrain - Simulation, co-authors: Dr.-Ing. Dirk Dennin, both BMW AG, Munich, Prof. Dr.-Ing. Peter Tenberge, Ruhr-University Bochum, Germany

Evening Reception in the former German Parliament
Visit the assembly hall of the former German Parliament! The nearby Rhine river provides the picturesque backdrop where you can treat yourself with good food while you take in the sounds of some great music! Have a chat with old and new friends or colleagues and meet new contacts in a laid-back atmosphere.

19:00 Breathe some living German history!
The Drive of Success
- Susie’s Story - The journey to F1
- You are only as good as the team around you
- Strong leadership
- Coping in a high stress high pressure environment
- Managing change & new technological developments
- Being the best version of yourself
- Performance is power
Susie Wolff, Founder of Dare To Be Different, former F1 Test Driver

19:30 The Drive of Success
- Susie’s Story - The journey to F1
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- Managing change & new technological developments
- Being the best version of yourself
- Performance is power
Susie Wolff, Founder of Dare To Be Different, former F1 Test Driver

Seamless-shift two-speed eAxle with torque vectoring
- Electric Axle with two-shift transmission: High launching torque combined with high maximum vehicle speed
- Power-shift capability for increase of performance and comfort
- Torque-vectoring for increase of vehicle stability and recuperation capabilities
- Efficiency increase due optimized operating possibilities
Dr.-Ing. Dirk Güth, Programme Manager Advanced Engineering, Driveline Systems, co-authors: Dipl.-Ing. Jan Haupt, Dipl.-Ing. Theo Gassmann, all GKN Driveline International GmbH, Lohmar, Germany

Volvo Cars modular electric axle drive
- Volvo Cars electrification strategy
- Electric axle concept
- Volvo Cars test facilities
- Inhouse manufacturing
Mathias Jörgensson, M.Sc., Technical Leader Propulsion Drive & Torque Transfer, co-author: Christian Wolrath, B.Sc., both Volvo Car Group, Göteborg, Sweden
08:30 From fleet requirements to optimized dedicated hybrid powertrains
- Powertrain technology setup for 2025 and beyond
- Hybridization scenarios for a complete vehicle fleet
- CO2- and cost-optimal mass electrification

Dr.-Ing. Christoph Danzer, Development Engineer, Powertrain Concepts, co-authors: Dipl.-Ing. Tobias Voigt, Dipl.-Math. Techn. Tobias Guenther, Dr.-Ing. Ralf Tröger, all IAV GmbH, Stuttgart, Germany

09:00 Transmission technology contribution to CO2 roadmap – a benchmark
- Transmission loss and fuel consumption benchmark for DCT, AT, CVT
- Which technology is ahead regarding fuel consumption?
- CO2 potentials of next generation DCT
- Potentials for upgraded DCT to dedicated hybrid powertrains - DHP

Martin Bahne, Attributes & Technical Excellence Attributes, GETRAG International GmbH, Magenta Powertrain, Cologne, Germany

09:30 Hybridization of manual transmission drivetrains
- Basic variant with MPlus and P0 12 V
- Clutch by-wire with P0 12 V
- ECM (2-pedal) with P0 12 V or 48 V

Dipl.-Ing. (FH) Markus Kneißler, Head of Development Automated Clutches, co-authors: Dr. Roland Welter, Dipl.-Ing. (FH) Matthias Baumann, all LuK GmbH & Co. KG, Bühl, Germany

10:00 3D-metal printing – Chances and challenges in the automotive environment
- What is needed to make 3D metal printing to become a pioneer for the automotive industry?
- Specific automotive examples
- Technological and economic challenges
- Assessment and perspectives

Dipl.-Ing. (FH) Heinrich Dismos, Chief Technology Officer Rheinmetall Automotive AG, co-authors: Dipl.-Wirtsch. Ing. (FH) Benedikt Szukala, Stefan Pförtner, Dipl.-Ing. (FH) Ralf Dahmen, all Solidteq GmbH, Neuss, Germany

10:30 Industrie 4.0 in the automatic transmission production
- Network and physical cyber systems
- Virtual Launch/Implementing
- Big Data Analytics
- Technical Assistance
- Working with 4.0

Dipl.-Ing. (FH) Klaus-Peter Fritsch, Senior Manager Plant Systems and Processes, Car Powertrain Technology, Production Automatic Transmissions, ZF Friedrichshafen AG, Saarbrücken, Germany

11:00 Fast and efficient clutch coordination control application in P2 hybrid transmission systems
- Realizing complex shifts for improving transmission performance
- The importance of hysteresis and response influences existing in hydraulic systems
- Requirements on torque priority control, gear shift priority control and clutch parallel control
- Continuous, stable and fast shifting processes by complex gear shift control processes

Dr. Wei Guo, Manager of Software Development Department, co-authors: Shuhan Wang, both Beihang University & Shengrui Transmission Corporate Limited, Shandong, China, Mick Jordan, M.Sc., Ruhr-University Bochum, Germany

11:30 HEV P2 module concepts for different transmission architectures - Clutch and E-motor options
- P2 module comparison in respect to on-axis and off-axis arrangements
- Discussion of different disconnect clutch options
- Discussion of different e-motor options


12:00 The new plug-in hybrid module as an extension of the AUDI S tronic transmission generation
- P2 Plug-in hybrid module
- Highly integrated system components
- Development goals: Maximum efficiency and maximum power density
- New manufacturing methods for stator and rotor

Dipl.-Ing. Jakob van der Meer, B.A., Technical Projectleader, Development Electrical Machine, co-authors: Dipl. Ing.(FH) Götz Hangen, both Volkswagen AG, Baunatal, Jürgen Uhlig, B.Eng. Audi, Ingolstadt, Germany

12:30 Dritev – Drivetrain for Vehicles
Anmelden unter: www.dritev.com
10:00 Investigation of gear shifts in a parallel-series hybrid powertrain with dog clutches at a powertrain test bench
- Development of an innovative parallel-series dedicated hybrid powertrain
- Gear shifts and mode changes using dog clutches
- Commissioning and testing of the transmission control unit at a powertrain test rig
- Discussion about the evaluation of shifting comfort

Andreas Viehmann, M.Sc., Research Assistant, Vehicle Systems, co-author: Ruben König, M.Sc., Prof. Dr.-Ing. Stephan Rinderknecht, all Institut für Mechatronische Systeme im Maschinenbau (IMS), Technische Universität Darmstadt, Germany

10:30 Coffee break and visit to the exhibition

11:15 Urban Mobility 2030 caught between political, societal and technological objectives
Moderation:
Guido Reinking, Journalist

Panelists:

- „Mobility plays a key role for us as manufacturer as well as user. We don’t see individual modes of transport entering a competitive struggle but rather a necessary interplay (co-modality) of all modes of transport that needs to be in place as a key for a well-functioning transport infrastructure.”
  Gunnar Herrmann, Vice President Quality and Chairman of the Management Board, Ford-Werke GmbH, Germany

- „At the moment, electrification and autonomous driving are changing the streetscape as we know it, allowing new business models for private transport to arise. We as engineers are challenged to optimise these new technologies in terms of vehicle attributes as well as make sure that they remain affordable.”
  Prof. Dr. Uwe-Dieter Grebe, Global Business Development, Sales and International Operations Passenger Cars and Powertrain Systems, AVL List GmbH, Austria

- „The Internet has not only gone deep into everyone’s daily life, but also in conjunction with automotive industry. To adopt the Internet thinking into automotive industry will bring the customer superb experience beyond expectation.”
  Dr. Charles Huang, VP-E Powertrain, NIO, China

- „In 2030 urban mobility will be different to what we are commonly experiencing today. Future mobility will be electric and partly autonomous. In addition, it will curtail the MIT’s habits of moving around as they please.”
  Toralf Müller, Managing Director, Verkehrsbetriebe Hamburg-Holstein GmbH, Hamburg, Germany

- „In order to achieve the climate targets, the automobile needs to be part of the shift from fossil fuels to clean sources of energy. It is of questionable environmental integrity and from a economical perspective highly precarious to just rely on one type of drive technology.”
  Reinhard Otten, Strategy Climate and Ressource Protection, Audi AG, Ingolstadt, Germany

How does Additive Manufacturing influence automotive component design and the factory of the future?
- Further development of rapid prototyping applications towards production
- High quality and cost-efficient metal and plastic applications achieved by significant technological progress
- Examples of additional manufacturing processes in different industries, including the automotive sector
- Additional manufacturing processes in the future factory
- Realisation of transmission applications

Dipl.-Ing. Nikolai Zaepnick, MBA, Senior Vice President Central Europe, Electro Optical Systems GmbH, Kraling, Germany

12:45 Lunch and visit to the exhibition
14:15  Low friction and low viscosity oils: solutions for F.E. performance developed in order to reduce the torque loss in the final drive unit
   - Developed final drive oil concept (balance between low viscosity and countermeasure against negative impact)
   - Evaluation method of final drive oil (to define market applicability)
   - Result and correlation (F.E. performance improvement and prove correlation between dyno and actual vehicle condition)

Tadashi Nishikawa, Design Manager, Engine and Transmission Engineering Department, co-author: Tomoo Kubo, both Nissan Motor Co. Ltd., Kanagawa, Japan

14:45  TorqueLINE: Thermo-mechanical stability of cone clutches for automatic transmissions
   - Cone clutches with form fit for automatic transmissions
   - Thermo-mechanical finite element analysis of synchronization processes and experimental validation
   - Thermal stability of cone clutches subjected to high loads

Marco Mili, M.Sc., Project Manager electro-mechanical Drivetrain, co-authors: Dr.-Ing. Hermann Pflaum, Prof. Dr.-Ing. Karsten Stahl, all Lehrstuhl für Maschinen elemente – Forschungsstelle für Zahnrad und Getriebebau (FZG), Technische Universität München, Garching, Germany

15:15  Potential of lightweight design of a vehicle transmission by usage of high strength steels
   - Lightweight construction of transmission based on material substitution
   - Use of high-strength steels
   - Demonstrating the lightweight construction potential in terms of mass, inertia and assembly space
   - Potential shown by a hybrid transmission as well as a truck transmission

Felix Busch, M.Sc., Scientific Assistant, Drive Systems, co-authors: Dipl.-Ing. Sascha Ott, Dipl.-Ing. Katharina Bause, all Karlsruher Institut für Technologie KIT, Karlsruhe, Germany

15:45  Awarding of the best presentation award for junior engineers

16:00  Closing remarks and end of the congress

Room Addis Ababa

Simulation

Neural net based driver model for powertrain control and calibration optimization
   - Powertrain system simulation
   - Neutral net based driver model development
   - Drive style index
   - Control and calibration optimization for FE and performance

Hong Jiang, Department Manager, Transmission, Driveline and P/T as-installed Research & Advanced Engineering, Ford Motor Company, Dearborn, Michigan, USA

Torque opediction in vehicle drive trains based on bus signals using artificial neural networks (ANN)
   - Virtual torque sensing using an ANN
   - Derivation of a representative set of data, covering all relevant perturbations
   - Investigation of the proposed approaches range of validity in terms of possible perturbations

Jan-Michael Veith, M.Sc., Doctoral Student, Integration and Evaluation Drivetrain, co-authors: Bastian Krüger, B.Sc., both Dr. Ing. h.c. F. Porsche AG, Weissach, Univ.-Prof. Dr.-Ing. Dr. h. c. Albert Albers, Institut für Produktentwicklung am Karlsruher Institut für Technologie, Karlsruhe, Germany

Shift simulator for shiftability development of manual transmissions using artificial neural networks (ANN)
   - Mechanical design of shift simulator
   - Usage within Opel transmission development
   - Simulation model
   - Correlation to shiftability feeling in vehicle

Dipl.-Ing. (FH) Joachim Hofmann, Project Leader RLM, Opel Automobile GmbH, Rüsselsheim, Germany and Dipl.-Ing. Philip Clarenc, Siemens Industry Software S.A.S. Lyon, France

48 Volt Torque Vectoring Electric Rear Drive Module (eRDM)
   - Realization of the torque vectoring element through a P3 HEV architecture with modular functionality
   - Flexible use of the system (torque vectoring mode, hybrid mode etc.)
   - Combination of excellent driving dynamics by torque vectoring via direct 48V electric motor control with significant CO2 savings by 48V hybridization
   - Optimized controllability and efficiency by utilization of an electrical machine for the torque vectoring function

Tua Högnäs, M.Sc., System Project Leader, Electric Drive Modules, co-author: Gabriel Beldie, both BorgWarner, Landskrona, Sweden

Advanced powertrain functions of 48V hybrid vehicles
   - 48 V mild hybrid system in high performance sports car
   - Electric supercharging
   - PO hybrid architecture
   - Fuel economy and driving pleasure

Dipl.-Ing. Rene Savelsberg, Team Leader, Hybrid System, co-authors: Dr.-Ing. Georg Birmes, Dipl.-Ing. Andreas Sehr, all FEV Europe GmbH, Aachen, Germany

Thermal behavior of 48V hybrid systems
   - Presentation of the modular simulation model
   - Thermal modelling of electric components in 48V powertrains
   - Simulation results regarding the thermal stress
   - Statements regarding the suitability of the electric components for different 48V powertrain topologies

Matthias Werra, M.Sc., Research Assistant, Hybrid and Electric Drives, Requirement Engineering, co-author: Arno Ringleb, M.Sc., both Institut für Fahrzeugtechnik, Technische Universität Braunschweig, Germany
Room Wien

5th International Congress
„Transmissions in mobile machines“

June 27 and 28, 2018, World Conference Center Bonn

Main topics:
• Visions and vehicle concepts in agricultural and construction machinery, including those of the winner of the German Environmental Award 2017
• Current drive and transmission concepts of the OEMs, Tier 1 suppliers and universities
• Opportunities and limitations entailed with the electrification of the powertrain
• Systems: Needs and challenges in daily practice
• Topologies: Solutions to handle complexity
• Consequences on the drive and transmission development in agricultural and construction machinery going along with digitisation
• Global vs. regional transmission and drive development in the off-highway industry - quo vadis?

Chairman:
Prof. Dr. Ludger Frerichs, Head of Institute for Mobile Machines and Commercial Vehicles, TU Braunschweig, Germany

With lectures held by:
AGCO Fendt | AVL | BHF | Caterpillar | IAV | John Deere | Liebherr | LiuGong | MAN | Oswald Elektromotoren | Oerlikon | RWTH Aachen | TU Braunschweig | ZF Friedrichshafen

For the current program and more details, please visit www.vdi-wissensforum.de/en/event/getriebe-mobile-arbeitsmaschinen/

Room Bangkok

5th International Congress
„EDrive“

June 27 and 28, 2018, World Conference Center Bonn

Main topics:
• Challenges posed by system optimization
• Power electronics and battery
• Integration of the e-machine
• Transmission topologies for electrified powertrains
• E-axles
• Hybrid modules
• 48V Systems

Chairman:
Dr. Andreas Schamel, Ford-Werke GmbH, Aachen, Germany

With lectures held by:
Bosch | Danfoss | FEV | Ford | IAV | Magna | Semikron | Silver Atena | Valeo | Volkswagen | Volvo

For the current program and more details, please visit www.edrive-congress.com

Accompanying VDI Congresses

Free of charge for the participants of the Congress “Drivetrain for Vehicles”

Special exhibition
EDrive
### Kupplungen für elektrifizierte und hybride Antriebssystemlösungen

**9.00 – ca. 17.00 Uhr (02ST135001)**

**Ihre Leitung:** Dipl.-Ing. Sascha Ott, Mitglied der Institutsleitung und Geschäftsführer, IPEK – Institut für Produktentwicklung, Karlsruher Institut für Technologie (KIT), Dr.-Ing. Kristin Sittig, Leitung Erprobung Antriebsmodule und Tribologie, Entwicklung Geschäftsfeld Getriebe, Volkswagen AG, Kassel

**Zielsetzung:**

**Inhalte des Spezialtages**
- Struktur und Aufbau elektrifizierter Antriebe - Übersicht und Synthese
- Bedeutung der Kupplung in aktuellen und zukünftigen elektrifizierten Anwendungen
- Auslegungsrücksichten auf Fahrzeugkupplungen
- Änderungen der Auslegungsrücksichten durch Elektrifizierungsansätze
- Einflussgrößen bei der Kupplungsauslegung durch hybride Betriebsmodi
- Einflüsse von Kupplungsschwingungen und Regelbarkeit auf die Hybridisierung

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### Hochvolt-Sicherheit an elektrifizierten Fahrzeugen

**9.00 – ca. 17.00 Uhr (01ST070001)**

**Ihre Leitung:** Dipl.-Ing. Andreas Brozowsky, Sachverständiger für Hochvoltfahrzeuge und Hochvoltenergiespeicher, Ingenieurbüro Jansen, Köln

**Zielsetzung:**
Die Sicherheitsanforderungen an elektrisch bzw. teilelektrisch fahrende Automobile sind deutlich höher als bei herkömmlichen Fahrzeugen. Sie erlangen in diesem Workshop einen ganzheitlichen Überblick zu den Herausforderungen und rechtlichen Vorschriften im Umgang mit diesen Systemen. Dabei geht es darum, die Anforderungen im späteren Lebenszyklus (z.B. an die Wartung und Instandhaltung, aber auch bei Unfällen) dieser Fahrzeuge unter HV-Aspekten zu verstehen und zu berücksichtigen.

**Inhalte des Spezialtages**
- Fach- und Führungsverantwortung
- Arbeitsschutzsysteme – Gesetze und Vorschriften
- Gefahren des elektrischen Stromes
- Schutzmaßnahmen für elektrische Systeme
- Technische Sicherheitsmaßnahmen bei HV-Fahrzeugen
- Maßnahmen bei der Fehlersuche an „unter Spannung stehenden“ Teilen
- Lithium-Ionen Energiespeicher (Aufbau, Umgang, Gefährdungspotential)

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### Electric Vehicle und DHT-Antriebsstränge - Herausforderungen in der Entwicklung

**9.00 – ca. 17.00 Uhr (01ST012001)**

**Ihre Leitung:** Dr. Jörg Müller, Teamleiter Vorentwicklung Hardware Getriebe und Hybridsysteme, IAV GmbH, Stolberg und weitere

**Zielsetzung:**

**Inhalte des Spezialtages**
- Flottenanforderungen für DHT-Güterfahrzeuge
- Getriebekonzepte für DHT und EV: Virtualisierung und Automatisierung in der Vorentwicklung
- Optimierung elektrischer Maschinen für Fahrzeuganwendungen
- Virtuelle NVH-Bewertung elektrischer Antriebsstränge im Entwicklungsprozess
- Systematischer Entwicklungsprozess von Aktorkomponenten für EV- und DHT-Antriebsstränge
- Virtuelle Absicherung der Software für EV- und DHT-Antriebsstränge
- Steuerung komplexer Multi-Mode-DHT-Systeme durch Transformation

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### EMV im elektrifizierten Antriebsstrang

**9.00 – ca. 17.00 Uhr (01ST179001)**

**Ihre Leitung:** Dr.-Ing. Sebastian Jeschke, Teamleitung F&E Elektromobilität, EMC Test NRW GmbH, Dortmund und weitere

**Zielsetzung:**
In der Entwicklung des elektrifizierten Antriebsstrangs spielt die elektromagnetische Verträglichkeit eine entscheidende Rolle, die häufig unterschätzt wird. Dabei nimmt sie entscheidenden Einfluss auf Auslegung und Anordnung von mechanischen, mechatronischen und elektronischen Komponenten. Der Spezialtag möchte vor allem maschinenbaugeprägten Antriebs- und Getriebentechnikern aufzeigen, wie die Zusammenhänge sind und was bei der Antriebskonzeptionierung zu beachten ist.

**Inhalte des Spezialtages**
- Motivation: Warum ist die EMV im elektrifizierten Antriebsstrang von so großer Bedeutung?
- (Einflussfaktoren, HV-Komponenten, Spannungsebenen, Überkopplung)
- Herausforderung: Welche EMV-Aspekte ergeben sich durch die Elektrifizierung?
- (Störspannungen, Störfestigkeit, Störemissionen, Schirmdämpfung etc.)
- Normung: Welche gesetzlichen und normativen Vorgaben sind zu beachten?
- Lösung: Wie und unter welchen Rahmenbedingungen können die EMV-Anforderungen überprüft und eingehalten werden? (EMV-Messungen nach ECE R10 Edition 3, 4 und 5 sowie nach Herstellerspezifikationen und CISPR ZS, Annex K etc.)
Dritev, the international congress of drivetrain experts, is one of the world’s best specialist congress for transmission engineering. Illustrating the whole supply chain for drivetrains in mobile applications (passenger cars, commercial vehicles, mobile machines) the exhibition becomes a cross-industry information platform for requirements on transmission and powertrain (conventional transmissions, hybrid concepts, electrified drivetrains).

If you want to meet with and reach out to the first-rate experts attending this VDI congress and to powerfully present your products and services to the well-informed community of conference participants, please contact:

**Your contact person:**
Christoph Brockerhoff
Project Consultant Exhibitions & Sponsoring
Phone: +49 211 6214 - 228
Fax: +49 211 6214 - 167
Email: brockerhoff@vdi.de

### Attendees by company type in 2017

<table>
<thead>
<tr>
<th>Company Type</th>
<th>Percentage</th>
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<tr>
<td>System and component suppliers</td>
<td>47%</td>
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<td>OEMs</td>
<td>18%</td>
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<tr>
<td>Construction and mechanical engineering</td>
<td>14%</td>
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<tr>
<td>Engineering services</td>
<td>13%</td>
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<tr>
<td>Metal processing industry</td>
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**Function**

- **Specialists:** 37%
- **Head of department:** 28%
- **CEOs / Managing director:** 14%
- **Project manager:** 13%
- **Others:** 8%
Magna Powertrain is an operating group of Magna International, is a premier supplier for the global automotive industry with full capabilities in powertrain design, development, testing and manufacturing. Complete system integration sets us apart from our competitors. To address increasing environmental pressures, many of Magna Powertrain’s innovations focus on electronically controlled technologies, supporting the quest for improved efficiency and reduced emissions.

Magna Powertrain c/o GETRAG | Hermann-Hagemeyer-Straße | 74199 Untergruppenbach, Germany
Phone: +49 (0) 713 164 440 | Fax: +49 (0) 713 164 435 65 | Email: anna-sophie.kreis2@magna.com

GKN Driveline is the world’s leading automotive driveline technology and systems engineer. As a global company serving the world’s leading vehicle manufacturers, GKN Driveline designs, develops, manufactures and integrates an extensive range systems for use in the smallest ultra low-cost car to the most sophisticated and dynamic premium vehicle. As a vehicle optimisation specialist, GKN helps OEMs define the way a vehicle drives whether two wheel drive, all wheel drive, hybrid or pure electric. GKN Driveline is a leading global producer of CVI Systems, AWI and eDrive Systems and operates in 23 countries at 46 locations employing approximately 25,500 people.

GKN Driveline | Hauptstraße 130 | 53797 Lohmar, Germany
Phone: +49 (0) 224 610 022 65 | Fax +49 (0) 224 610 022 93 | Email: info@gkndriveline.com | Internet: www.gkndriveline.com

ZF Friedrichshafen AG | Graf-von-Soden-Platz 1 | 88046 Friedrichshafen, Germany
Phone: +49 (0) 754 177 0 | Fax: +49 (0) 754 177 908 000 | Email: postoffice@zf.com
Internet: www.zf.com

KOKI TECHNIK Transmission Systems GmbH | Bernd-Beltrame-Str. 7 | 09399 Niederwürschnitz, Germany
Phone: +49 (0) 37296 7640 | Fax: +49 (0) 37296 764 159 | Email: info@kokitransmission.com | Internet: www.kokitransmission.com

Castrol is the lubricant specialist within the BP Group - one of the leading global oil companies. With more than 100 years experience in the development and production of lubricants Castrol is a partner of many passenger car, commercial vehicle and transmission / axle manufacturers and stands for leading technology, competence, innovation and premium product qualities. Castrol is - often as a market leader - represented in more than 140 countries worldwide with a very strong brand awareness. Within the Global Driveline Technology Centre in Hamburg Castrol is developing high performance driveline lubricants in close co-operation with leading international OEM’s. In a tight network with their blend plants Castrol is producing transmission fluids and setting global milestones due to its innovative production processes. For keeping the technical standards and production capabilities at its highest level the ISO/TS 16949 certification is a clear pre-requisite.

BP Europa SE Lubricants International | Überseeallee 1 | 20457 Hamburg, Germany
Phone: +49 (0) 406 395 5389 | Email: kundenservice@castrol.com | Internet: www.castrol.com
## Exhibitor list 2018

**Exhibition (April 2018):**

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<tr>
<th>Sponsor Name</th>
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The current list can be found below [www.vdi-wissensforum.de/en/dritenv/exhibition-and-sponsorship/](http://www.vdi-wissensforum.de/en/dritenv/exhibition-and-sponsorship/)
In light of the growing electrification in the powertrain, first and foremost all components from the field of electronics, semi-conductors, software and e-motors play a key role.

At the special exhibition „EDrive“ meet those businesses, that form a crucial part along the value-added-chain in these fields.

Learn more about the players! Extend your network!
**ZF Electric Innovation Challenge**

**Calling all startups, agile companies and colleges.**

You are creative, have innovation-driven ideas and work with passion and energy on subjects related to e-mobility? We have an exciting challenge for you!

Share your ideas and solutions with us at our pitch event „Electric Innovation Challenge“.

A jury of representatives from the ZF E-Mobility Division will choose the most innovative ideas and give you the opportunity to realize it as a prototype collaboratively with ZF.

In addition, you will also be given the opportunity to present your ideas as a company at the VDI Congress „Dritev - Drivetrain for Vehicles“. All details and application forms can be found at www.zf.com/e-innovation

**Dritev Lab**

**Gain first-hand experience in the transmission world!**

Have a close look at specific transmission parts, get an overview of how the various components work together and compare design and workmanship!

The following transmissions will be on display, stripped down into assembly units:

- Opel 6-Speed MT „MIX“
- Ford FWD 6 Speed Planetary Automatic Transmission
- Jatco CVT 8 High Torque
- Ford FWD Hybrid Transmission

**Round Tables**

**Discuss with the experts those questions that fuel the current debate in the industry:**

- E-drives in the next decade: To what extent can electromobility be reasonably scaled to fit the needs arising until the year 2030?
- The combustion engine – is it only a momentary contributing factor? What’s its future role?
- E-motors: What potential lies in new materials and manufacturing processes?
- High voltage wiring system: What’s the appropriate voltage level? Where are the limits?
- Power semiconductor: When is the right time to switch from silicon to silicon carbide?
- Change in mindset: How should drive development be addressed in future?

Share your thoughts and views, gain an insight of the current status and liaise with international experts!
The VDI Society Product and Process Design (VDI-GPP) and its technical divisions provide all sectors with verified knowledge on the design of products and processes and their optimization in terms of quality and the time- and cost-benefit ratio. This verified knowledge covers the entire product lifecycle, from the product idea and product development, marketing and service to recycling using optimized methods, tools and systems, including the necessary information technology. This ensures the successful connection of market and technology for the purpose of sustainable growth and profit. The VDI-GPP – as the largest technical division in the VDI – provides a platform for specialist discussion and cooperation ranging from the technological state of the art and continuous improvement to trends in development. The task of the VDI-GPP is to concentrate the extensive range of services of the VDI in these fields, display them in summary and constantly improve them. This also includes the lively exchange of ideas with other VDI societies.

The activities of the society are planned and coordinated by an advisory board staffed with decision-makers working on an honorary basis. The secretariat is located in the VDI building in Düsseldorf. Besides the main secretariat, the regional chapters, which take care of the VDI members in their own areas, include work groups active in the field of product and process design.

VDI Society Automotive and Traffic Systems Technology

The VDI Society for Vehicle and Transport Technologies, VDI-FVT in short, has around 28,000 members that are affiliated to at least one of its 8 technical sections. This makes it the second biggest of the VDI’s dedicated societies. VDI-FVT is the community for engineers working in the vehicle industry, as well as for engineers dealing with transport and traffic outside manufacturing industries.

Traditionally, a majority of members work in automotive. VDI-FVT is the German affiliate of the world federation of automotive engineers’ societies, FISITA, and it is the intellectual sponsor of many big conferences on automotive technology and thus fosters exchange and knowledge transfer both nationally and internationally. It also sponsors Formula Student Germany, awarding VDI membership to all German participants, and promotes other student competitions for transport engineers. VDI-FVT has recently reconstituted technical sections for rail and marine technologies, as well as space- and aircraft. It is putting a strong focus on transport and traffic in general and aims to mediate between technology and society.
Highly committed and with great passion to succeed, the program committee - consisting of 20 experts from industry and research - draws up the congress agenda every year. In terms of lectures they lay particular emphasis on high quality, profound technical expertise and degree of innovation – which is quality management at the highest level.

Dipl.-Ing. Dirk Adamczyk, Head of Corporate Research and Development, ZF Friedrichshafen AG, Friedrichshafen, Germany

Dipl.-Ing. Georg Bednarek, Global Program Manager and Global Chief Engineer, Purchased Automatic Transmissions, Opel Automobile GmbH, Rüsselsheim, Germany

Dipl.-Ing. Gerd Bofinger, General Manager Transmission Development, Dr.-Ing. h.c. F. Porsche AG, Weissach, Germany

Dr. Carsten Bünker, Director Global Product Management, GETRAG Magna Powertrain, Untergruppenbach, Germany

Dipl.-Ing. Hans-Peter Fleischmann, Director Dual Clutch Transmission Development and Series Support Transmission, Audi AG, Ingolstadt, Germany

Dipl.-Ing. Volker Heinz, Director, Engineering, DualTronic® and Clutch Systems, BorgWarner Drivetrain Engineering GmbH, Ketsch, Germany

Dipl.-Ing. Gerald Hilpert, VDI Society of Product and Process Design, The Association of German Engineers (VDI e.V.), Düsseldorf, Germany

Prof. Dr.-Ing. Bernd-Robert Höhn, Retired Professor at the Institute for Machine Elements/FZG, Technische Universität München, Garching, Germany

Dr. Uwe Keller, Director Transmission & Drivetrain, Mercedes-Benz Cars Development, Daimler AG, Stuttgart, Germany

Thomas Landsherr, Vice President, Engineering Driveline Truck & Bus, MAN Truck & Bus AG, Munich, Germany

Dr. Thilo Leineweber, Senior Vice President Gasoline Systems Transmission Control, Robert Bosch GmbH, Schwieberdingen, Germany

Peter Moelgg, CEO AW&EE Drive, GKN Driveline AG, Bruneck, Italy

Dr.-Ing. Florian Mulzer, AGCO Transmission Specialist, AGCO GmbH, Marktoberdorf, Germany

Dr. Markus Nussbaumer, Head of Longitudinal Transmissions, Advanced Development, BMW Group, Munich, Germany

Prof. Dr.-Ing. Stephan Rinderknecht, Full professor and Head of the Institute for Mechatronic Systems in Mechanical Engineering, Technische Universität Darmstadt, Germany

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