



CTI Symposium

Automotive Transmissions, HEV and EV Drives

4 – 7 December 2017, Berlin, Germany



Dr Stefan Sommer



Wolf-Henning Scheider



Rolf Najork



Prof. Dr Peter Gutzmer



Dr Wolfgang Warnecke



Dr Sven Beiker

Plenary Speakers



Tatsuya Osone



Lipeng Zheng



Alessandro Coda



Anders Nielsen



Prof. Dr Ferit Küçükay

Dr Stefan Sommer

CEO, ZF Friedrichshafen AG

Wolf-Henning Scheider

Chairman of the Management Board and CEO, Mahle Group

Rolf Najork

President of the Executive Board, Bosch Rexroth AG

Prof. Dr Peter Gutzmer

Chief Technology Officer, Deputy CEO, Schaeffler AG

Dr Wolfgang Warnecke

Chief Scientist Mobility, Shell

Dr Sven Beiker

Founder and Managing Director, Silicon Valley Mobility, LLC

Lecturer in Management, Stanford Graduate School of Business

Tatsuya Osone

Vice President Advanced Technology Development and CTO, Jatco Ltd

Lipeng Zheng

Vice President and Project Director, Great Wall Motor Transmission Research Institute

Alessandro Coda

Chief Technology Officer, CLEPA – The European Association of Automotive Suppliers

Anders Nielsen

Chief Technical Officer, Volkswagen Truck & Bus AB

CHAIRMAN OF THE CTI SYMPOSIUM

Prof. Dr Ferit Küçükay

Director of the Institute of Automotive Engineering, Technische Universität Braunschweig

1.350 Delegates

135 Exhibitors @ the Transmission Expo

40% International Participants

25 Countries

Panel Discussion

“How will future mobility requirements change powertrain and transmission?”



Simultaneous Translation German ↔ English
English Conference Documentation!

CHAIRMAN:

Prof. Dr Ferit Küçükay
Director of the Institute of Automotive Engineering, Technische Universität Braunschweig



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Vice President Fundamentals and Technologies
ZF Friedrichshafen AG



Georg Bednarek
Global Chief Engineer and Program Manager Automatic Transmission, Adam Opel GmbH



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Director Transmission Development
Dr. Ing. h.c. F. Porsche AG



Dr Carsten Bündler
Director Global Product Management, GETRAG Magna Powertrain
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Prof. Dr Klaus Dröder
Director of the Institute of Machine Tools and Production Technology, Technische Universität Braunschweig



Sven Ennerst
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Pascal Hervet
Transmission Systems R&D Director
Valeo Powertrain Systems



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



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Torsten Murr
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Taisuke Naito
President
Jatco France SAS



Rolf Najork
President of the Executive Board
Bosch Rexroth AG



Tatsuya Osone
Vice President Advanced Technology Development and CTO, Jatco Co. Ltd



Sascha Ott
Managing Director Institute of Product Engineering and Managing Director, KIT Center Mobility Systems
Karlsruhe Institute of Technology



Stephan Rebhan
Executive Vice President
BU Transmission
Continental



Prof. Dr Stephan Rinderknecht
Director of the Institute for Mechatronical Systems in Mechanical Engineering, Technische Universität Darmstadt



Göran Sandgren
Senior Manager Gearbox Development, NTB
Scania AB



Gianpiero Saroglia
Technical Director Transmission Engineering, Fiat Chrysler Automobiles, Italy S.p.A.



Michael Schäfer
Head of Transmission Development
Volkswagen AG



Michael Schöffmann
Head of Transmission Development
Audi AG



Ulrich Schrickel
Senior Vice President, Gasoline Systems, Transmission Control
Robert Bosch GmbH



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Chief Technology Officer (CTO)
Valeo Siemens eAutomotive GmbH



Dr Jörn Seebode
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Takashi Shibayama
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Gunnar Stein
Chief Technology Officer, Senior Vice President
Oerlikon Drive Systems



Dr Ingo Steinberg
Vice President Transmission Systems
FEV Europe GmbH



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Director of the Institute for Industrial and Automotive Drivetrains, Ruhr-Universität Bochum



Prof. Christopher P. Thomas
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BorgWarner Inc.



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Executive Deputy Director of National Engineering Research Center for Passenger Car Automatic Transmissions, School of Transportation Science & Engineering, Beihang University



Prof. Dr Tong Zhang
Director, National Fuel Cell Vehicle and Powertrain System Engineering Center, Clean Energy Automotive Engineering Center, Tongji University

HONORARY MEMBERS:

Wolfgang Eng
Automotive Consulting



Dr Wolfgang Reik
Automotive Consulting



Georg Weiberg
Automotive Consulting

16th CTI Symposium focusing on the transformation of drive systems in the age of electromobility

The automotive industry – and therefore also automotive transmissions and drive systems – are on the road to a **new age of electrified and connected mobility**. The new age will be characterised by autonomous, emission-free and connected driving and it will connect the automotive world with the digital world. In addition, there will be efficient, demand-oriented **transport and mobility services**, so owning a car will become superfluous for many customers. The **requirements on vehicles and drive systems** will change:

In addition to **comfort, efficiency and charging infrastructure, IT expertise, artificial intelligence, connectivity, cloud-based operating systems** for passenger cars and commercial vehicles, intelligent mobility solutions in urban traffic, **sharing concepts** and **connected goods transport** will be important factors in the development of the new mobility world while less priority will be given to number of gears, power and driving dynamics. However, how long this fundamental change will take and how conventional drive systems and fuel technologies will develop in the next years – those questions still need to be answered by the drivetrain and energy industry.

The fact is that conventional drive systems with internal combustion engine are increasingly complemented or locally replaced by electric vehicles in order to **meet the demands for zero-emission transport and mobility** in predictive short-distance operation in cities. It is also a fact that the **share of electric vehicles will increase to up to 25% in 2025** – as a result of a **better energy density**, the reduced **costs of battery and electric drive components** and the increasing density of charging stations. Surrounding conditions also include especially the tighter legal constraints, e.g. **environmental obligations** for urban traffic, lower CO₂ limits and the **electric vehicle quota** in China and maybe also in Europe.

At present, the module and component suppliers follow the extended development portfolio of the automotive manufacturers, which – in addition to conventional drive systems – includes all types of electrified drives from 48V mild hybrids and full hybrids to plug-in hybrids and hydrogen drive systems. However, particularly medium-sized automotive companies often wonder if and how long the **diversity and complexity of multi-technology solutions**, including conventional drive systems and transmissions continue to be in the focus as intense as today. What **recommendations** can be derived from the development trends for the **investments** in the drivetrain industry as well as for future-oriented **teaching and research** in the field of drive systems and transmissions?

At this year's symposium, we will discuss this and further questions related to the automotive, transmission and drivetrain industry as well as new transmission, hybrid and electric drive concepts, but also production and component-related **topics and problems** with regard to passenger cars and commercial vehicles:

- Change in mobility, market requirements and drive systems
- Hybridisation through versatile DHTs (Dedicated Hybrid Transmissions) and add-on solutions with parallel structures
- 48V mild hybrids with different topologies and power classes
- EV drivetrains and transmissions with high power density, high voltage systems
- New AT, DCT, CVT and MT concepts with innovations for increase in efficiency and hybridisation

- All-wheel drives, e.g. by combining conventional drivetrain and electric axle
- New transmission and electric drive concepts for commercial vehicles and buses, synergies to passenger car propulsion systems
- Compact, efficient shift and starting elements, e-clutch
- Increase in efficiency through innovative oils, lubrication and actuation
- Batteries: development of power and energy density as well as ageing, infrastructure strategies
- Objectification and optimisation of the gear change, V2X operating strategies, benchmarks of transmissions and electrified systems
- Production: EM production, function integration using additive manufacturing, thin-film sensors and energy management

The **9th CTI Young Drive Experts Award** for outstanding student papers and theses in the field of transmission and drivetrain development is again of special importance this year to emphasise how important the young engineers are.

The extensive conference programme takes account of the above-mentioned variety of topics: about **100 presentations** – plenary presentations and **16 parallel sessions**. **Mobility, drivetrain and transmission specialists** will discuss the question **“How will future mobility requirements change powertrain and transmission?”** in the **panel discussion**. In addition, the **Transmission Expo** will take place again, our “technology market for innovations at your fingertips” with **135 exhibitors**.

Together with the **Introductory Day for Newcomers** in advance of the main programme and the annual **CTI Test Drive** – to experience new developments and advancements of vehicles with different drive and transmission concepts – after the main conference days, the **16th CTI Symposium** in Berlin is again an excellent forum for international transmission and drive experts to exchange opinions. It also provides a valuable status update and a glimpse into the future.

I am looking forward to your participation and to many useful discussions and ideas.

Best regards



Prof. Dr. Ferit Küçükay

Director of the Institute of Automotive Engineering
Technische Universität Braunschweig

2017



CTI
YOUNG DRIVE EXPERTS
AWARD



BSC, MSC GRADUATES AND PHD STUDENTS

of Automotive, Mechanical, E/E, Mechatronics and Mobility Engineering

Written your BSc, MSc or PhD thesis on transmission,
powertrain and/or environmental friendliness?

TAKE YOUR CHANCE AND APPLY !



CTI Symposium
5 + 6 DECEMBER 2017

FREE ADMISSION



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PECHA KUCHA
PRESENT YOUR PAPER
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4 December 2017**Introductory Day
Basics and Practice of Automotive Transmissions,
Hybrid and Electric Drives**

- 9.00 Registration and hand out of the document
 9.45 Welcome address
 11.30 Lunch
 12.30 Parallel sessions:
 Conventional Drive Trains
 Hybrid and Electric Drives
 6.00 End of Introductory Day

Pre-Check-In

- 5.00 – 9.00 Pre-Check-In for the Symposium

- 6.30 – 9.00 Welcome reception

Start networking during the informal kick-off meeting!
 The CTI invites you to a reception with drinks and finger food.
 We look forward to welcoming you at the Expo area!

5 December 2017**Symposium, Day One**

- 7.45 Reception and hand out of the conference documents
 Opening of the Transmission Expo

- 8.30 **Welcome address**

- 8.50 **Plenary speeches**

- 10.45 **Panel discussion**

- 12.30 **Parallel sessions**

Concepts: HEV

Concepts: MT, AWD

Components: Switching Elements, Actuation, Sensors,
 Electric Components

48 Volt

EV Transmission, High-Voltage

Oils, Lubrication, Efficiency

Shifting, Operating Strategy, Benchmarking

Concepts: CVT, NVH

- 1.30 Lunch

- 3.00 **Continuation of the parallel sessions**

- 5.10 **Plenary speeches**

- 6.00 End of the lecture programme, day one

- 7.30 Start of the evening event at the Estrel Hotel

6 December 2017**Symposium, Day Two**

- 8.15 Reception and opening of the Transmission Expo

- 8.30 **Welcome address**

- 8.40 **Plenary speeches**

- 9.55 **9th CTI Young Drive Experts Award**

- 11.00 **Parallel sessions**

Dedicated Hybrid Transmission (DHT)

Concepts: DCT, AT

Components: Starting Elements, Damper

Battery, Energy Storage

Production

Commercial Vehicles

CO₂, Markets, RDE

Concepts: EV

- 12.30 Lunch

- 2.00 **Continuation of the parallel sessions**

- 4.15 **Plenary speeches**

- 5.10 **Summary of the symposium and final discussion with the attendees**

- 5.30 End of the lecture programme, day two

12.00 – 5.00

Check-In CTI Test Drive

7 December 2017**CTI Test Drive
ADAC Centre of Driving Safety
Berlin/Brandenburg**

- 8.30 Departure by bus shuttle

- 9.30 Arrival at the ADAC Centre of Driving Safety

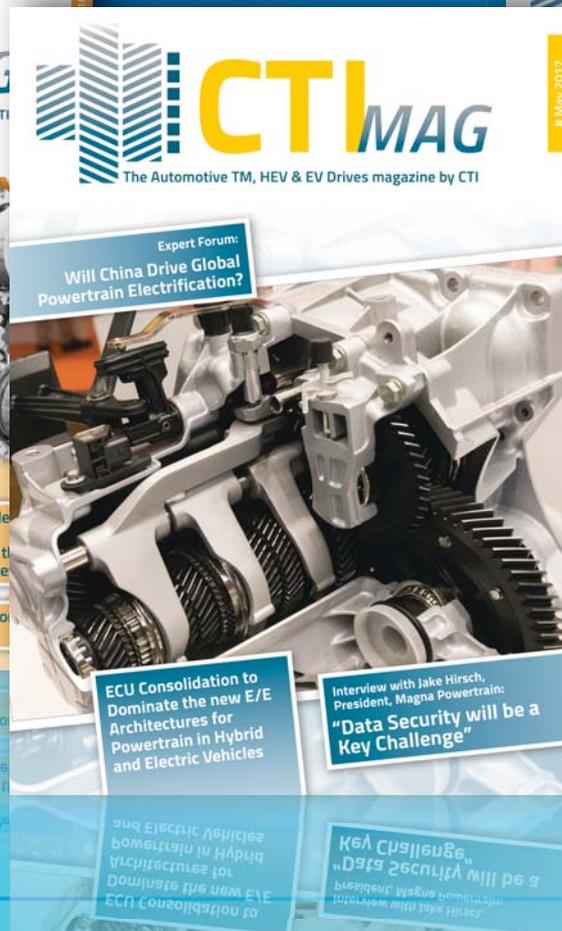
Welcome address, tour around the proving ground and instruction

- 4.00 End of the ride and drive and return to the Estrel Hotel Berlin

- ca. 5.30 Arrival at the hotel



Please be flexible with your return journey!
 Limited number of participants – register early!



Your specialist transmission and drive magazine.
Published twice yearly in English and
annually in Chinese.

www.transmission-symposium.com/mag

Free download!

Basics and Practice of Automotive Transmissions, Hybrid and Electric Drives

9.00 Reception and hand out of the conference documents

9.45

Welcome address

Prof. Dr Ferit Küçükay, Director of the Institute of Automotive Engineering, Technische Universität Braunschweig, Germany

10.00

Automotive drive concepts

- Drive characteristics and driving resistances, basics of longitudinal dynamics
- Background and function of starting devices, transmissions, hybrid and electric drives
- Design and function of
 - conventional drive concepts
 - serial, parallel and power-split hybrid drives
 - electric drives
- Market and development trends

Prof. Dr Ferit Küçükay

11.30 Lunch – afterwards sectioning into parallel sessions

Objective

Newcomers and career changers will get an overview of the basics of conventional, hybrid and alternative drives during the Introductory Day. Based on road resistance as well as electric motor and combustion engine maps, the role of starting devices, transmissions and other drive train elements will be defined. Furthermore, the power flow of different drive concepts (conventional; parallel, serial and power-split hybrid; electric) will be explained and the corresponding development objectives presented.

Different transmission concepts, namely manual transmissions, automated manual transmissions, dual-clutch transmissions, automatic transmissions and continuously variable transmissions, will for example be illustrated in the session “Conventional Drive Train“. The topic of drive train management completes this session. The parallel seminar series “Hybrid and Electric Drives“ will deal with the basic requirements and characteristics of electric motors, power electronics and vehicle batteries.

Following the presentations, the topics of the respectively parallel sessions will be presented as summary.

Session	Conventional Drive Trains	Session	Hybrid and Electric Drives
12.30	Constructive executions I <ul style="list-style-type: none"> • Starting devices – clutch, dual-mass flywheel, torque converter • Transmission concepts (1): <ul style="list-style-type: none"> • manual transmission (MT): two and multiple-shaft transmission for front-wheel and standard drive • automated manual transmission (AMT): “add on“ and integrated solutions • dual-clutch transmission (DCT): DCT in serial application, introduced prototypes Florian Schober , Research Associate, Institute of Automotive Engineering, Technische Universität Braunschweig, Germany	12.30	Lithium-ion batteries <ul style="list-style-type: none"> • Overview on lithium-ion batteries: design and operating principle • Cathode and anode materials • Electrical behaviour and ageing • System technology (charging protocols, state diagnostics, system integration) • Cost and safety aspects • Modelling of lithium-ion batteries Prof. Dr Julia Kowal , Chair of Electrical Energy Storage Technology, Technische Universität Berlin, Germany
1.45	Coffee break	1.45	Coffee break
2.15	Constructive executions II <ul style="list-style-type: none"> • Transmission concepts (2): <ul style="list-style-type: none"> • automatic transmission (AT): different gear set arrangements, examples of application • continuously variable transmission (CVT): layout, chains and belts, driveability • dedicated hybrid transmissions (DHT): layout, modes, examples • All-wheel drives Carl-Philipp Seekamp , Research Associate, Institute of Automotive Engineering, Technische Universität Braunschweig, Germany	2.15	Electric motors as vehicle drives: design, features, characteristics <ul style="list-style-type: none"> • Physical basics • Design and characteristics of the most important types of electric motors • Operation of synchronous and induction motors of the frequency converter • Important technical characteristics Prof. Dr Bernd Ponick , Director of the Institute, Electrical Machines and Drive Systems Department, Institute for Drive Systems and Power Electronics, Leibniz Universität Hannover, Germany
3.30	Coffee break	3.30	Coffee break
4.00	Drive train management <ul style="list-style-type: none"> • Drive train management and operating strategy <ul style="list-style-type: none"> • control and regulation: shifting characteristics, applications • interfaces – to engine, body, chassis Dr Gunther Alvermann , Senior Research Associate, Institute of Automotive Engineering, Technische Universität Braunschweig, Germany	4.00	Power electronics for hybrid and electric vehicles <ul style="list-style-type: none"> • Power electronic components and circuits • Assembly concepts and thermal management • Control of power electronic converters • Special considerations for vehicular applications Prof. Dr Axel Mertens , Director of the Institute, Power Electronics and Drive Control Department, Institute for Drive Systems and Power Electronics, Leibniz Universität Hannover, Germany
5.15	Short break	5.15	Short break
5.30	Summary of the parallel session: Basics of hybrid and electric drives	5.30	Summary of the parallel session: Basics of conventional drive trains
6.00	End of the Introductory Day	6.00	End of the Introductory Day

Rolf Najork, President of the Executive Board, Bosch Rexroth AG, Germany

Rolf Najork studied mechanical engineering at RWTH Aachen and after his examination to Graduate Engineer in 1991 started his career at Ford Werke AG, where he was intensively engaged in the development of automatic and dual clutch transmissions. As Division Manager Transmission Units and Electronic Controls he was also responsible for the electrification of purely mechanical components as well. In 2003, he was appointed as Executive Vice President Engineering at GETRAG Ford Transmissions GmbH. Five years later he accepted the responsibility for product development at GETRAG Corporate Group and in 2011 switched to the Schaeffler Group, where he headed the e-mobility, mechatronics, and R&D transmissions as a Member of the Executive Board Automotive. In 2013, he joined the Executive Management of the Heraeus technology group. As Managing Director and Chief Operating Officer he was responsible for production, purchasing, and development at Heraeus Holding GmbH. Rolf Najork has accepted the position of President of the Executive Board of Bosch Rexroth AG effective February 1, 2016 with responsibility for engineering, where he promotes the electrification of all drive technologies for integrated solutions in mobile and industrial applications.

Prof. Dr Peter Gutzmer, Chief Technology Officer, Deputy CEO, Schaeffler AG, Germany

Peter Gutzmer studied mechanical engineering at the University of Stuttgart, where he received his doctoral degree on the subject of internal combustion engines. After six years of research at the Research Institute of Automotive Engineering and Vehicle Engines in Stuttgart, he began his professional career at Porsche in 1984, where he assumed various project management and leadership responsibilities for engine and vehicle development. In his last position, he acted as deputy to the Member of the Management Board for Development. In 2001, Prof. Dr Gutzmer joined the Schaeffler Group as Member of the Management Board for Technical Product Development. From 2002 to 2006, he also acted as Chairman of the Management Board of LuK in Bühl. From 2009 to 2011, he once again assumed further responsibilities as Head of the Engine Systems Business Unit in Continental's Powertrain Division. He restructured this unit and initiated various joint strategic projects between Schaeffler and Continental. When the company's legal entity changed to Schaeffler AG in 2011, he became Chief Technology Officer and, in December 2013, he was appointed as a Member of the Supervisory Board of Continental AG. In June 2014, Prof. Dr Gutzmer was appointed Deputy CEO of Schaeffler AG.

Dr Wolfgang Warnecke, Chief Scientist Mobility, Shell, Germany

Wolfgang Warnecke studied mechanical engineering at the Technical University of Hannover (specialising in automotive combustion engines), and gained a PhD in Automotive Engineering from Hamburg Technical University in 1987. Since joining Shell on graduation, Dr Warnecke has gained extensive experience both in Germany and the UK as a scientist and business leader in the field of lubricant development, in engine testing and vehicle technology, in technical services for lubricants, and in fuels marketing. He had led both automotive fuels and lubricants development in Hamburg before global management roles in lubricants and, more recently, retail and automotive fuels development. In 2005, Dr Warnecke, together with Dr Wolfgang Steiger of Volkswagen were awarded the "Professor Ferdinand Porsche Prize" for their work on synthetic fuels development. Dr Wolfgang Warnecke was appointed as Chief Scientist of Mobility for Shell in May 2011. His expertise in all forms of mobility, vehicle technology, fuels and lubricants sees him advising on technology strategy, championing science, R&D and innovation.

Dr Sven Beiker, Founder and Managing Director, Silicon Valley Mobility, LLC, USA
Lecturer in Management, Stanford Graduate School of Business, USA

Dr Sven Beiker is the Founder and Managing Director of Silicon Valley Mobility, a consulting and advisory firm serving startups, venture/consulting firms, and corporations to understand trends in mobility. The firm specialises in market sizing and implementation roadmaps for mobility topics. Dr Beiker brings to bear his well over 20 years of experience gained during his tenure at McKinsey & Company, Stanford University, and the BMW Group. In addition to his consulting business, Dr Beiker is a Lecturer at the Graduate School of Business at Stanford University where he instructs students on strategies for startups and corporations in the field of automated, connected, electrified, and shared mobility. He also serves as the Automotive/Mobility Advisor for the German American Chamber of Commerce in San Francisco and as a member of the Scientific Advisory Board for the Lecture Notes in Mobility of Springer Science+Business Media.

Alessandro Coda, Chief Technology Officer, CLEPA - The European Association of Automotive Suppliers, Belgium

Alessandro Coda graduated with full marks in electronic engineering at the Turin Polytechnic in May 1987, followed by various positions at the FIAT Research Centre, in Italy, and at FIAT Auto where he worked as General Manager for Methodologies, Intellectual Properties and Regulations (2004 - 2005) and for Innovation Projects (2001 - 2003). Before joining CLEPA, he served, since 2006, as Research Coordinator and temporarily as Acting Director at EUCAR (European Council for Automotive R&D) in Brussels, where he coordinated the research and innovation activities of the European vehicle manufacturers. In 2016 Alessandro Coda joined CLEPA, taking up the new role of Chief Technology Officer. Bringing almost three decades of experience in automotive research and engineering expertise, he oversees all technical operations at CLEPA, including both the Research and Innovation and Technical Regulations Departments.

7.45 Reception and hand out of the conference documents, opening of the Transmission Expo

8.30 **Welcome address by CTI and the chairman of the Symposium**

Prof. Dr Ferit Küçükay, Director of the Institute of Automotive Engineering, Technische Universität Braunschweig, Germany

8.50 **How to make Industry 4.0 a business for the powertrain industry**

- Seamless conversion of Industry 4.0 vision into the factory of the future
- New industry segment specific business models
- New products

Rolf Najork, President of the Executive Board, Bosch Rexroth AG, Germany

9.10 **Mobility for tomorrow – an integrated view on the energy and powertrain options**

- Fuel and energy options – Well-to-Tank evaluation
- Optimisation of the combustion engine and electrification – Tank-to-Wheel
- Holistic view through sector-coupling

Prof. Dr Peter Gutzmer, Chief Technology Officer, Deputy CEO, Schaeffler AG, Germany and
Dr Wolfgang Warnecke, Chief Scientist Mobility, Shell, Germany

9.40 **Next generation Silicon Valley, an indicator for the mobility of tomorrow?**

Are tomorrow's simple, efficient, and reliable concepts replacing emotion and technology savvyness?

- Is the interest in the automobile going to die?
- Autonomous, electric, connected and ownership only by the minute?
- Insights for the development of electrified and conventional powertrains

Dr Sven Beiker, Founder and Managing Director, Silicon Valley Mobility, LLC, USA;
Lecturer in Management, Stanford Graduate School of Business, USA

10.00 Q&A

10.20 Short break

10.45 **PANEL DISCUSSION**

“How will future mobility requirements change powertrain and transmission?”

Moderator:

Ulrich Walter, Moderator

Panellists:

Dr Sven Beiker, Founder and Managing Director, Silicon Valley Mobility, LLC, USA;
Lecturer in Management, Stanford Graduate School of Business, USA

Prof. Dr Peter Gutzmer, Chief Technology Officer, Deputy CEO, Schaeffler AG, Germany

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

Roland Werner, Head of Government Affairs & Policy, DACH, Uber Germany GmbH, Germany

11.45 Coffee break and visit to the Transmission Expo | Change to parallel sessions

12.30 Parallel sessions

4.30 Coffee break and visit to the Transmission Expo | Change to plenum

5.10 **CLEPA WtW approach for the CO₂ post-2020 emissions**

- CO₂ post-2020 emissions
- Advantages and challenges of a Well-to-Wheel CO₂ regulation
- Well-to-Wheel methodology

Alessandro Coda, Chief Technology Officer, CLEPA – The European Association of Automotive Suppliers, Belgium

5.30 **Presentation in coordination – Be excited!**

5.50 Q&A

6.00 End of the lecture programme, day one

7.30 Start of the evening event



Concepts: HEV

12.30

Vario.Drive: PHEV powertrain concept for medium- and upper-class vehicles

- Drivetrain with novel DHT (dedicated hybrid transmission)
- Various driving modes through new transmission concept
- Combination with electric rear axle and high-performance battery

Dr Tobias Böhm, Head of Electrified Powertrain and
Dr Hendrik Schröder, Head of Powertrain Architectures,
 Volkswagen AG, Germany

1.00

TRANSCEND: an integrated hybrid, ultra-wide ratio transmission

- Integrated PHEV/MHEV solution for in-line installations
- Ultra-wide ratio capability to cover wide range of vehicles
- Multi-clutch functionality with parallel axis helical gears

Neil Rayner, TRANSCEND Mechanical Lead Engineer,
 Jaguar Land Rover Ltd, UK

1.30

Lunch and visit to the Transmission Expo

2.30

Facing future: E-DCT hybrid dual clutch transmission

- E-DCT hybrid dual clutch transmission development
- E-DCT hybrid dual clutch transmission technical introduction
- A new type of hybrid dual clutch transmission

Xiang Xue, Technical Director/Project Director,
 JF PowerTronic Technology Co., Ltd, China

3.00

The 9GH-TRONIC plug-in hybrid transmission in the electrified powertrain from Mercedes-Benz

- Development of the 9GH-TRONIC transmission
- Highly efficient and modular hybrid powerhead
- Powertrain integration
- Efficiency and hybrid system application

Dr Matthias Maisch, Manager Design Hybrid Transmission & Project
 Manager Development Hybrid Transmission, Daimler AG, Germany

3.30

HEV P2 module concepts for different transmission architectures

- P2 hybrid module arrangements
- P2 clutch design considerations
- P2 e-motor design considerations

Eckart Gold, Senior Manager, Advanced Engineering, and
Csaba Vári, Sales Engineer Europe, Borg Warner, Germany

4.00

A comprehensive system approach for future powertrain electrification

- Global customer expectations for electrified powertrains
- System approach based on a modular component kit
- Examples for new customer benefits through electrification

Werner Ness, Product Manager eMobility,
 Magna Powertrain GmbH, Austria

4.30

Coffee break and visit to the Transmission Expo,
change to the Plenary Hall

Concepts: MT, AWD

12.30

Cost-affordable 6-speed manual transmission for developing countries

- 6-speed MT for Inovar Brazil
- Affordable 6-speed MT to meet Inovar Brazil
- Vehicle emissions legislation: cheap and low investment 6-speed MT

Edson Luciano Duque, Engineering Group Manager,
 General Motors, Brasil

1.00

Objective assessment of the shift quality for manual transmissions

- Online measurement and evaluation system
- Static and dynamic objective grades for gear-shifting
- Standardised evaluation process

Johann Rutz, PhD Student, Institute of Automotive Engineering,
 Technische Universität Braunschweig, Germany and
Dr Thomas Ebner, Project Manager Drive, AVL List GmbH, Austria

1.30

Lunch and visit to the Transmission Expo

2.30

Rethinking drive axles

- Significantly improved component efficiency
- Unprecedented light-weighting results
- Advanced manufacturing methods

Michael Schulte, Director, Product Engineering – Europe,
 AAM Germany GmbH, Germany

3.00

A paradigm shift to fuel-saving AWD in the future

- Increasing demand for vehicle dynamics
- Continuous power distribution when needed
- Electrification to overcompensate CO₂ impact

Walter Sackl, Director Product Management,
 Global Driveline Systems, Magna Powertrain AG, Austria

3.30

E-axle family in coaxial and offset arrangement

- From theory to series production
- Schaeffler e-axle roadmap – future with system(s)

Benjamin Daniel, Vice President Electric Axle Systems,
 Schaeffler Technologies AG & Co. KG, Germany

4.00

Integrated electric transaxle and electric rear drive module for passenger vehicles

- Integrated electric transaxle and its advantages
- Integrated electric rear drive module with disconnect
- FWD application and AWD applications

Ping Yu, Chairman & CEO, Powertrain Chief Engineer,
 Jing-Jin Electric Technologies, China

4.30

Coffee break and visit to the Transmission Expo,
change to the Plenary Hall

Components: Switching Elements, Actuation, Sensors, Electric Components

12.30

Optimisation of wet clutches in automatic transmissions by use of different types of springs

- Influence of cushion and separating springs on the shift comfort
- Use of separating springs for piston return
- Interaction of the spring types with each other
- Comparison in terms of comfort, space and drag torque

Dr Jörgen Schulz, General Manager Business Unit Transmission Springs, Mubea Tellerfedern GmbH, Germany

1.00

Development techniques of high efficiency with low drag torque automatic transmission friction disk

- Wet clutch
- CFD modeling simulation
- Reduction of fuel consumption

Dr Shahjada Pahlovy, Technical Team Leader, Advanced Technology Development Team, Dynax Corporation, Japan

1.30

Lunch and visit to the Transmission Expo

2.30

Innovative concepts for shifting elements using the example two-speed electric axle

- Electric performance axle with torque vectoring function
- Implementation of a concept for shifting element "Twin Cone"
- Implementation of a concept for "Disconnect Clutch Carrier"

Peter Echtler, Head of Advanced Engineering, Hoerbiger Antriebstechnik Holding GmbH, Germany

3.00

New fast-acting low-noise actuator technology for hybrid and electrical vehicles

- Model-based actuator and dog clutch design
- Improved dynamics through actuator gear set optimisation
- Dog geometry based trajectory planning for NVH reduction
- Verification and validation of shifting performance on DHT

Oscar Sarmiento, Head of Advanced Development, Continental AG, Germany

3.30

The slim synchroniser: save space, gain strength

- Installation space gain of as much as 20%
- Greater strength for synchroniser hubs
- Scalable pre-synchronisation forces

Ottmar Back, Senior Vice President, Strategic Business Unit Drive Technology, Hoerbiger Antriebstechnik Holding GmbH, Germany

4.00

The impact of scalable electrical oil pump solutions on the transmission architecture and efficiency

- Electrical transmission oil pump family
- Platform based scalable solutions
- Solutions for high efficiency transmissions

Dr Erkan Arslan, Development Engineer, Product Segment Powertrain, Bühler Motor GmbH, Germany

4.30

Coffee break and visit to the Transmission Expo, change to the Plenary Hall

48 Volt

12.30

Solutions for modular hybridisation of FWD DCTs

- Challenges of different hybrid architectures
- Trade-offs modularity, package, functionality
- Solutions through new architectures

Dr Gereon Hellenbroich, Department Manager Design and CAE, Transmission Systems, FEV Europe GmbH, Germany

1.00

Modular low cost 48V P4 system for front- and 4-wheel-drive architectures: a customer plug-in hybrid

- Low cost 48V P4 hybrid
- Fuel consumption reduction with lowest cost
- 48V electric driving

Dr Paul Kapus, Manager Gasoline Engine Development, AVL List GmbH, Austria

1.30

Lunch and visit to the Transmission Expo

3.00

48V advanced hybrids: mild and smart for better electrification

- 48V P2 powertrain electrification
- Connectivity

Dr. Stefan Lauer, Project Manager, Powertrain Technology & Innovation, Continental AG, Germany

3.30

Low voltage hybridisation: how to lower costs, enhance CO₂ benefits and transmission impacts

- Low-voltage board net
- Hybridisation functions and assisted electric boosting
- Energy optimisation and transmission impacts

Philippe Hamon, R&D and Product Marketing Director, Valeo, France

4.00

AVL DynoShift II: low-cost modular powershifted transmission for complete electrification range

- One transmission for applications from 12V to PHEV
- Hysteresis motor-brake for robust launch
- Powershifting with single dry clutch
- Torque-filled engine start from zero vehicle speed

Vitaly Davydov, Design Engineer Transmission, AVL List GmbH, Austria

4.30

Coffee break and visit to the Transmission Expo, change to the Plenary Hall

EV Transmission, High-Voltage

12.30

800V: key for long range and high power e-mobility

- 800V basis for real fast charging
- Realisation of high power
- Measures and advantages in the vehicle
- Transmissions for e-vehicles

Dr Klaus Küpper, Executive Chief Engineer, System, Software & Vehicle, AVL List GmbH, Austria

1.00

Design opportunities and challenges of battery electric vehicles

- Charge requirements (exp. voltage level)
- Efficiency influences
- Battery temperature operating conditions
- Powertrain availability

Dr Fabian Schüppel, Project Engineer, IAV GmbH, Germany

1.30

Lunch and visit to the Transmission Expo

3.00

Development of a high-efficiency single-speed transmission for performance electric drive applications

- Motorsport efficiency developments in modelling and implementation
- Architecture selection and gear geometry optimisation
- Continuous material and component innovation

Dr Maik Hoppert, Engineering Specialist – Tribology & Low Carbon, Romax Technology Ltd, UK

3.30

Ultra-lightweight design of a single speed EV transmission

- Trading off NVH, efficiency and durability
- Extreme light weighting using structural polymers
- Using light weighting to solve NVH challenges

George Scott, Chief Engineer, Design, Drive System Design Ltd, UK

4.00

Highly integrated HDU with advanced gear set structure

- Planetary gear set
- Dual inverter
- Cooling concept

Peter Janssen, Manager Hybrid Drive Systems, FEV Europe Group, Germany

4.30

Coffee break and visit to the Transmission Expo, change to the Plenary Hall

Oils, Lubrication, Efficiency

12.30

Lubricant technology for hybrid electric vehicle automatic transmissions

- Introduction to new fluid technology for HEV
- Electrical properties, conductivity, dielectric strength
- Strong anti-corrosion characteristics
- Compatibility with e-motor/magnet wire insulation

Dr Michael Gahagan, Technology Manager, Driveline Additives, Lubrizol, UK

1.00

Low viscosity universal fluids as a solution for e-mobility application

- General transmission market trends incl. e-mobility visions
- Formulation challenges of universal transmission fluids under today's fluid requirements
- Formulation requirements in 2025 and beyond

Max Weskamm, Project Manager Transmission Fluids, Shell Global Solutions Deutschland GmbH, Germany

1.30

Lunch and visit to the Transmission Expo

3.00

Low cost, low drag passive lubrication system developed with smoothed particle hydrodynamics

- The design of a novel low cost passive lubrication system
- Brand new approach to fluid modelling
- Real world correlation of computation fluid models

Matthew Hole, Head of Design, Drive System Design Ltd, UK

3.30

Friction and wear control of transmission fluids

- Screening methods to evaluate clutch and gear friction and wear
- Effect of different friction modifiers and base fluids
- New group V base fluid

Dr Gareth Moody, Applications Specialist, Lubricants, Croda Europe, UK

4.00

High-performance friction systems for active torque management

- Requirements of state-of-the-art powertrains
- Technology core values of friction systems
- Development methods and tools
- Simulation of friction systems for virtual system development outlook

Falk Nickel, Head of R&D, Miba Frictec, Austria

4.30

Coffee break and visit to the Transmission Expo, change to the Plenary Hall

Shifting, Operating Strategy, Benchmarking

12.30

Novel gear selection algorithm without shift maps

- Gear selection for connected and autonomous vehicles
- Unique definition of the driver accelerator pedal input
- Reduction of calibration efforts for gear selection

Muammer Yolga, Department Manager, Transmission Software, System & Simulation, AVL List GmbH, Austria

1.00

A quantitative method for the selection of gears ratios for a P2 hybrid DCT

- An approach for identifying the ideal gear ratios for a PHEV
- The influence of PHEV operational modes on ratio selection
- Determination of the optimum number of gears for a PHEV

Dr Andrew Lockyer, Principal CAE Engineer, Transmission Design, Changan UK R&D Centre Ltd., UK

1.30 Lunch and visit to the Transmission Expo

2.30

Advanced benchmarking analysis tool J-BAT

- The importance of benchmarking and target setting for calibration
- Newly developed advanced automated tool for Benchmarking
- Examples of outstanding functions and benefits obtained by the J-BAT

Guillaume Le Fessant, Benchmarking Project Leader, Jatco France SAS, France

3.00

Improving gear shift quality in a PHEV DCT with integrated PMSM

- Modeling of a hybrid 7-speed DCT for shift quality
- Position control of synchronisers
- Speed and torque control of PMSM
- Supervisory control for shift quality improvement

Muddassar Zahid Piracha, PhD Student, Electric Propulsion Systems, CEVT AB, Sweden

3.30

Utilisation of V2X communication for AWD disconnect control strategies

- DSRC hardware and system overview
- Enhancement of safety and performance
- Implementation of control strategies
- Further developments

Blake Brown, Senior Product Engineer, Driveline and
Matt Griffith, Senior Product Engineering, McLaren Engineering, USA

4.00

Comparing the regenerative braking efficiency of various HEV architectures

- Regenerative braking with shifting
- Regenerative braking efficiency
- Parallel, power split architecture

Walter Ortmann, Technical Expert, Electrified Powertrain Systems, R&A, Ford, USA

4.30 Coffee break and visit to the Transmission Expo, change to the Plenary Hall

Concepts: CVT, NVH

12.30

Pushbelt CVT integration in 48V system

- Benefits of CVT electrification
- 48V system implemented in a small demo-vehicle with CVT
- Challenges in hardware integration for hybrid vehicles

Dr Esin Ilhan Caarls, Electrical System Engineer, Transmission/Engineering, Bosch Transmission Technology, The Netherlands

1.00

A new torque converter CVT fit for moving market requirements

- Ratio coverage and efficiency improvements
- New hydraulic concept
- Versatile driving functions
- Hybrid ready

Darren Foster, Systems Engineer VT5, Punch Powertrain Nederland, The Netherlands

1.30 Lunch and visit to the Transmission Expo

3.00

The CVT pushbelt reinvented for future compact and efficient powertrains

- New innovative pushbelt concept for the future
- New element design and loop configuration
- 40% reduction in variator loss
- 12% reduction in packaging, 10% reduction in transmission weight

Markus Kunze, Vice President Engineering, Bosch Transmission Technology, The Netherlands

3.30

Virtual driveability and NVH development of HEV impulse start from concept to SOP

- HEV impulse start challenging re time allowed and driveability
- New simulation enables early specification of HW system
- Model based control of AT, e-motor, separation clutch & ICE
- Virtually quantify & optimise impulse start driveability

Dr Stephen Jones, Principal Product Manager Systems, System Engineering Powertrain Electrification, AVL List GmbH, Austria

4.00

Impact force modeling for rattle noise in automotive gearbox supported by experimental analysis

- Test rig setup
- Impact force characterisation
- Correlation with dynamic model

Yoshitaka Mukai, Team Leader, Scientific Analysis Engineering Department, Aisin AW Co., Ltd, Japan

4.30 Coffee break and visit to the Transmission Expo, change to the Plenary Hall

CTI Networking Night

5 December 2017

Drink, dine and be entertained –

all participants, speakers, exhibitors and sponsors are invited to the annual CTI Networking Night: an evening full of highlights, culinary surprises, in a top-class location with an exciting social programme.

Discuss the topics of the day in a relaxed atmosphere and make new contacts at the CTI Networking Night – a great opportunity to get together again!



Perfect to intensify your contacts to fellow specialists in a relaxed atmosphere!





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Automotive Transmissions, HEV and EV Drives

14 - 17 May 2018, Novi, MI

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Dr Stefan Sommer, CEO, ZF Friedrichshafen AG, Germany

Stefan Sommer completed his studies in mechanical engineering at the Ruhr-Universität Bochum and gained his PhD at the professorship for Process and Control Technology. He began his professional career in 1994 as Development Engineer at ITT Automotive Europe. In 1997 he transferred to Continental Automotive Systems where he had held various positions in the field of Electronics, Sensor Technology and Occupant Protection prior to his appointment as Vice President Profit Center EBS Systems and Senior Vice President EBS Customer Center in 2007. In 2008, Dr Sommer was appointed Member of the Board of Management at ZF Sachs AG where he was responsible for Suspension Division. Afterwards (2010 – 2012) he became Member of the Board of Management at ZF Group with responsibility for Materials Management. Dr Sommer has been Chief Executive Officer of ZF Friedrichshafen AG since May 1, 2012. In this position, he is directly responsible for some corporate functions, the domain function Research & Development and the Division ZF Aftermarket.

Anders Nielsen, Chief Technical Officer, Volkswagen Truck & Bus AB, Sweden

Anders Nielsen began his career in 1995 as Plant Manager for gearbox production at Scania, later (1997 – 2002) he overviewed the cab production. In 2002, he became Technical Director at Scania Latin America, before he was appointed Senior Vice President of Chassi and Cab Production at Scania in 2006. From 2010 to 2012, Anders Nielsen was Executive Vice President Production and Logistics, afterwards he became CEO at MAN Truck & Bus AG until 2015. He then changed to Volkswagen Truck & Bus where he was appointed Head of Business Development. Since 2016, Anders Nielsen is Chief Technical Officer and as a member of the senior leadership team of Volkswagen Truck & Bus responsible for the research & development activities across the Volkswagen Truck & Bus Group.

Lipeng Zheng, Vice President and Project Director, Great Wall Motor Transmission Research Institute, China

Lipeng Zheng started his professional career as engineer at the Great Wall Motor (GWM) R&D Center in 2006. In 2009, he became Section Leader of the GWM Transmission Research Institute before he was appointed Leader of the GWM Transmission Research Institute Technical Development Department in 2012. In the following year, Lipeng Zheng was named Director of the GWM Transmission Research Institute DCT project and he earned the position of Vice-President of Transmission Research Institute since 2015, where he is responsible for automatic transmission and hybrid transmission development.

Tatsuya Osone, Vice President Advanced Technology Development and CTO, Jatco Ltd, Japan

Tatsuya Osone started his career in 1991 as Engineer of Hydraulic Control System and Electrical Components in Nissan Motor Company and later Engineer of Field Engineering Service in the USA. From 2002 to 2005, he transferred to Jatco as engineer in the CVT unit experimental group. In 2006, he became Chief Engineer of RWD Hybrid Transmission Development at Nissan. From 2011 to 2013, Tatsuya Osone held the position General Manager and Chief Project Engineer of FWD Hybrid Transmission Development at Nissan. In 2014, he took over the position as General Manager of the Hardware System Development Department at Jatco. Last year, Tatsuya Osone was appointed Vice President. In this position, he is responsible for the Advanced Technology Development Department and the Hardware System Development Department. He was also appointed Chief Technical Officer from this April.

Wolf-Henning Scheider, Chairman of the Management Board and CEO, Mahle Group, Germany

Wolf-Henning Scheider completed his Master in Business Administration in 1987 from Saarland University in Saarbrücken and Technical University (RWTH) in Aachen. After graduating, he joined Robert Bosch GmbH as a trainee. In 1989, he took over responsibility for several functions at Bosch Power Tools and was promoted to Vice President Sales of Bosch Power Tools in France in 1995. In 1999 he moved on to Bosch Car Multimedia Division, where he first held the position of Senior Vice President (Sales and Marketing) and later was appointed President of the whole division. He then became President of the Gasoline Systems Division. In 2010, Wolf-Henning Scheider was appointed member of the Board of Management of Robert Bosch GmbH and by July 2013 was responsible for the activities of the Automotive Group. He joined the MAHLE Group in April 2015. Wolf-Henning Scheider was appointed Chairman of the Management Board and CEO of the MAHLE Group from July 2015.

8.15 **Opening of the Transmission Expo**8.30 **Welcome address**

Prof. Dr Ferit Küçükay, Director of the Institute of Automotive Engineering, Technische Universität Braunschweig, Germany

8.40 **More gears? More intelligence! The last steps to the perfect transmission**

- Future CO₂ targets cannot be achieved without electrification
- However, the internal combustion engine will continue to be a mainstay of mobility throughout the world
- In order to further increase efficiency in conventional drives, what is needed is not more gears in the transmission but more intelligence in the integrated driveline

Dr Stefan Sommer, CEO, ZF Friedrichshafen AG, Germany

9.00 **E-mobility in commercial vehicles**

- Challenges in drive train development

Anders Nielsen, Chief Technical Officer, Volkswagen Truck & Bus AB, Sweden

9.20 **First 7-speed DCT developed and produced in China**

- Product orientation and target
- Technical highlights
- Process ability
- Testing

Lipeng Zheng, Vice President and Project Director, Great Wall Motor Transmission Research Institute, China

9.40 Q&A

9.55



9. CTI Young Drive Experts Award

Presentation of the winners

The authors who submitted the best Bachelor, Master or PhD theses in the field of transmission and drive technology selected by the expert committee will be introduced. The awarded theses will also be presented live on site.

Further information about the CTI Young Drive Experts Award:

www.cti-award.com



10.15 Coffee break and visit to the Transmission Expo | Change to parallel sessions

11.00 Parallel sessions

3.30 Coffee break and visit to the Transmission Expo | Change to plenum

4.15 **CVT for the electrification of the drivetrain**

- FE improvement for more affordable electrified drivetrain systems
- Shifting function for enhanced FE and smoothness of EV/Plug-in HEV
- Jatco contributes affordable electrification and EV/Plug-in HEV

Tatsuya Osone, Vice President Advanced Technology Development and CTO, Jatco Ltd, Japan

4.35 **System developments for the electric powertrain**

- Electric powertrain
- System efficiency
- Thermal management

Wolf-Henning Scheider, Chairman of the Management Board and CEO, Mahle Group, Germany

4.55 Q&A

5.10 Summary of the key messages and final discussion with the attendees

Prof. Dr Ferit Küçükay

5.30 End of the lecture programme, day two



Dedicated Hybrid Transmission (DHT)

11.00

Vario.Drive: Dedicated Hybrid Transmission

- Novel active transmission (DHT) with high-performance electric motor and form-fitting coupling elements
- Four fixed ratios (ICE), five EM-gears and two variable ranges
- Reduced mechanical complexity and costs, high functionality

Rainer Petersen, Manager Active Transmission, Volkswagen AG, Germany

11.30

Development of hardware for multi stage hybrid transmission control

- Development objectives
- Structure and basic specifications
- Hardware design for multi stage hybrid transmission control

Kota Fujii, Assistant Manager, Hybrid Vehicle Drivetrain Development, Toyota Motor Corporation, Japan

12.00

The new DHT from Alliance Renault/Nissan

- Presentation of the gearbox (GB) structure: global approach optimisation
- Design presentation of the new electric oil pump (EOP) generation
- Global performance result: position in benchmark

Antoine Vignon, Chief Engineer for Hybrid GB Development, Renault, France

12.30 Lunch and visit to the Transmission Expo

2.00

Cost efficient powertrain for plug-in hybrid electric vehicle (PHEV)

- PHEV powertrain state of the art
- Low cost PHEV approach
- Powertrain design
- Cost analysis and evaluation

Dr Kiarash Sabzewari, Project Manager, Powertrain Technology & Innovation, Continental AG, Germany

2.30

PHEVplus: a unique Dedicated Hybrid Transmission (DHT) for plug-in hybrid applications

- Adaptable DHT for all vehicle classes
- 10 operation modes for highest efficiency and max. performance
- Optimised for costs, weight and packaging

Sven Herber, Programme Manager – Advanced Driveline Systems Development, GKN Driveline International GmbH, Germany

3.00

High-performance Dedicated Hybrid Transmission (DHT) for the future

- Dedicated Hybrid Transmission
- Systematic development toolchain
- Highly integrated electric motor

Jens Liebold, Technical consultant, TS-D3, Transmission, E-Motor & Hybrid Systems, IAV GmbH, Germany

Concepts: DCT, AT

11.00

Development topics of a new single layshaft 7-speed DCT

- Compact 7-speed DCT with large ratio coverage
- Vehicle packaging with the single layshaft topology
- Functional testing of vehicle launch process

Dr Alex Serrarens, Manager Business Development, Punch Powertrain, The Netherlands

11.30

General Motors' all new Global Front 9-speed automatic transmission (GF9)

- New selectable one way clutch
- Small gear steps
- Compact design

Henning Fischer, Chief Engineer and Program Manager/GM Automatic Transmission, Adam Opel GmbH, Germany

12.00

CO₂ potentials for further development of the 8HP transmission kit

- Updated analysis of sources of losses in automatic transmission
- Possible improvements on component level
- Possible potentials in shift sequence
- 8HP concept vs. increase of gears

Andreas Donges, Project Manager, ZF Friedrichshafen AG, Germany

12.30 Lunch and visit to the Transmission Expo

2.00

Aisin AW's new generation 8-speed transverse automatic transmission

- Development concept
- New technologies focusing on fuel economy
- Improved functional performance

Masashi Kito, Deputy General Manager, Aisin AW Co., Ltd, Japan

2.30

The new automatic transmissions for BMW drivetrains in transverse architecture

- First application of a DCT in BMW's UKL (entry class)
- Evolutionary development of the 8-speed torque-converter AT

Dr Nikolaj Klingemann, Head of Development Dual Clutch Transmissions Front-Wheel Drive, BMW AG, Germany

3.00

Innovative technologies and experimental analysis of Toyota's new 8-speed automatic transaxle

- The major features, adopted techniques and performance
- Development that incorporated TNGA (Toyota's New Global Architecture) concept
- Experimental analysis that establish innovative techniques

Yu Sasaki, Assistant Manager, Transmission Experiment & Analysis, Toyota Motor Corporation, Japan

Components: Starting Elements, Damper

11.00

Clutch-by-Wire, a technology for upcoming manual transmission systems

- Motivation for Clutch-by-Wire
- Requirements for Clutch-by-Wire systems
- Additional functions for Clutch-by-Wire systems

Jörg Buhl, Manager Development, Passenger Car Drivetrain Actuator System Design, ZF Friedrichshafen AG, Germany

11.30

Hybrid actuation needs: Energy consumption efficient electro-mechanical clutch actuator

- Hybrid architectures with disconnecting clutch (dry or wet type)
- Enabler for manual transmission hybridisation
- Clutch actuator: typologies and new concepts
- Actuator energy efficiency comparison on RTE & WLTP

Pascal Maurel, eActuation Systems and Control Laws Manager, Valeo, France

12.00

Dual wet clutches for hybrid powertrains, challenges for packaging and fuel efficiency optimisation

- Hybrid architectures general introduction
- Dual wet clutches architectures, and impact on fuel efficiency
- P2 hybrid dual clutches modules architectures
- Packaging, fuel efficiency and modularity challenges

Olivier Simon, R&D Director Dual Clutches Product Line, Valeo Powertrain Systems, France

12.30 Lunch and visit to the Transmission Expo

2.00

The heating and cooling performance analysis of wet clutch with real 3D shape in transmission

- Heating and cooling performance analysis of wet clutch
- Fluid-structure analysis for the optimal clutch shape
- Test verification under transmission shift condition

Sang-Min Park, Research Engineer, Advanced Design Team, Hyundai Powertech, Korea

2.30

Pendulum dampers for transmissions: why should we review some preconceived ideas?

- Pendulum over-tuning/under-tuning
- Tautochronic path
- Clutch friction disk

Dr Hervé Mahe, NVH Senior Expert, Valeo Transmission, France

3.00

Condition monitoring by wear estimation for dry clutches in vehicles

- Wear modelling
- Wear experiments on the transmission test bench
- Health state diagnosis and remaining life time prediction

Daniel Strommenger, Research Assistant, Institute of Energy and Automation Technology, Technische Universität Berlin, Germany

Battery, Energy Storage

11.00

Safety design activities for battery systems

- Battery safety
- Battery system safety development
- Safety testing

Chong Jo Cha, Lead of Development, LG Chem Europe GmbH, Germany

11.30

Electric vehicles battery technology and charging strategies – an optimisation approach

- Newest EV battery technology supports long EV range
- DC fast charge enables long distance travel
- Implications for battery technology and infrastructure
- Balanced approach required for market and business success

Roland Matthé, GM Technical Fellow Global Battery Systems & Manager Electrification Architecture, Adam Opel GmbH, Germany

12.00

Presentation on battery aging

Dirk-Uwe Sauer, Professor for Electrochemical Energy Conversion and Storage Systems, Institute for Current Inverter Technology and Electric Drives (ISEA), RWTH Aachen, Germany

Details tbd

12.30 Lunch and visit to the Transmission Expo

2.00

Competitive cell-production in Europe with the expect of increased performance and falling prices

- The way to sustainable competitiveness in Li-ion cell-production in Europe

Holger Gritzka, CEO, TerraE Holding GmbH, Germany

2.30

Influence of cell size and system design to cost of Lithium-Ion batteries for automotive applications

- Design of battery cells, cost models for batteries

Prof. Dr Thomas Vietor, Head of Institute for Engineering Design, Technische Universität Braunschweig, Germany

3.00

What should the automotive industry learn from other battery application sectors?

- New technology
- New markets
- Producers

Sven Bauer, Founder + CEO, BMZ Group, Germany

Production

11.00

Energy efficiency benchmarking within automotive factories

- Analysis, evaluation and development of existing and new approaches of energy-efficiency-benchmarking within automotive factories
- Outlook for powertrain factories

Dominik Flick, Energy-Management, Adam Opel GmbH, Germany

11.30

Design and production of innovative transmission components with additive manufacturing (AM)

- Application of additive manufacturing in transmission
- Design for additive manufacturing
- Mechanical properties of AM parts

Dr Gerd Kotthoff, Director Advanced Gear Technology, GKN Sinter Metals Engineering GmbH, Germany and
Marc Kluge, General Manager Drivetrain Design, Porsche Engineering Services GmbH, Germany

12.00

Higher integration in xEV powertrains through powder metal

- Concept studies
- Design freedom by near net shaping
- New joining technologies

Dr Philipp Kauffmann, Research and Innovation Manager, Stackpole Powertrain, Germany

12.30 Lunch and visit to the Transmission Expo

2.00

A new non-contact measurement method for moving parts

- Background: motivation for developing the new method
- Measuring method for length of CVT chain pins at rotating
- Measurement result which obtained accuracy for application

Yuji Takahashi, Manager, Advanced Technology Development, Jatco Ltd, Japan

2.30

Investigation of thin film sensor systems for power train applications

- Measurement of load in heavily loaded regions

Dr Saskia Biehl, Head of Group, Micro and Sensor Technology, Fraunhofer IST, Germany

3.30

Autonomous feedback control for process chains in mass production of bearing cages

- The idea of negative hardening distortions
- A shortened process chain
- The elimination of hard machining

Maruan Shanib, Head of Department Machines and Monitoring, Institute for Production Engineering and Machine Tools, Leibniz Universität Hannover, Germany

Commercial Vehicles

11.00

Development of an integrated electric axle for MD trucks for urban distribution traffic

- System specification
- Design of E-axle with integrated components
- Cooling and lubrication system
- Simulation of energy consumption

Jürgen Tochtermann, Lead Engineer, AVL Commercial Driveline & Tractor Engineering GmbH, Austria

11.30

Development of an 8-speed automatic transmission for medium-duty trucks and buses

- Market analysis and identification specific requirements
- Evaluation different transmission concepts
- Implementation and verification in the prototype

Frank Sauter, Head of Design AT, ZF Friedrichshafen AG, Germany

12.00

Development of highly functional dual-clutch transmissions for future commercial vehicles

- Influence of future power train trends on the transmission
- Methodology for defining optimal transmission structures
- Solutions for highly functional dual-clutch transmissions
- Comparison with other transmission technologies

Rico Resch, Project Manager, TS-D3, Transmission, E-Motor and Hybrid Systems, IAV GmbH, Germany

12.30 Lunch and visit to the Transmission Expo

2.00

Mercedes-Benz e-truck – heavy duty distribution for city logistics

- E-mobility for commercial vehicles
- E-truck
- Future distribution

Martin Zeilinger, Director Advanced Engineering Truck, Daimler AG, Germany

2.30

Dedicated e-mobility transmission

- Basic build up
- No torque interruption gearshift
- No friction elements
- Powering PTO and auxiliary

Mikael Bergquist, Senior Engineer, Transmission Development, Scania CV AB, Sweden

3.00

The electric powertrain of the VW e-Crafter

- Electric powertrain for zero emission driving in cities
- Modification of PC BEV modules for LCV
- Passenger compartment air condition with PC comfort assistance systems with electric powertrain in LCV

Dr Andreas Kracke, Head of Development Aggregate, Volkswagen Commercial Vehicles, Germany

CO₂, Markets, RDE

11.00

The future of urban mobility

- New era of urban mobility through digital revolution
- Effects on the city: traffic, air pollution, parking spaces, social integration

Roland Werner, Head of Government Affairs & Policy, DACH, Uber Germany GmbH, Germany

11.30

Comprehensive e-Mobility: what is feasible and what makes sense?

- Scenarios for future personal mobility
- Evaluation of ecological, technical and economic feasibility
- Future penetration of ICE, (P)HEV, BEV

Dr Karsten Wasiluk, Assistant Director Automotive & Transport, Schlegel und Partner, Germany

12.00

RDE: requirements for comparable emission measurements on public roads

- Measurement and installation • Process • Evaluation
- Driver and profile • Boundary conditions

Pascal Mast, Business Line Manager Emissions, TÜV SÜD Auto Service GmbH, Germany

12.30 Lunch and visit to the Transmission Expo

2.00

Megatrends and their impact on development service providers

- Interface and integration complexity of modern drivetrains
- Megatrends in the automotive industry and its impact on the drivetrain
- Future requirements for a modern development service provider

Marc Kluge, General Manager Drivetrain Design, Porsche Engineering Services GmbH, Germany

2.30

Customer vehicle utilisation of Volvo's XC90: analysis of customer diagnostic readout data (DRO)

- Need for DRO and anonymity
- Analysis of customer diagnostic readout data
- Market differences, etc.
- Customer profile and vehicle validation

Sahak Margossian, CAE Engineer, Volvo Car Corporation, Sweden

3.00

Changes in OEM R&D organisations due to electrification of powertrains

- Challenges of HW vs SW development
- Consequences for the development organisation
- Potential solution – function-oriented organisations

Ulf König, Project Manager, Strategy Engineers GmbH & Co. KG, Germany

Concepts: EV

11.00

Electric vehicle automatic 2-speed electric transmission system (2ETS) research and development

- China EV transmission development status • Effect of 2ETS gear ratios on vehicle performance • 2ETS new technology research and application

Prof. Dr Yong Chen, Professor, Senior Chief Engineer, Hebei University of Technology, Geely, China

11.30

A 48V electro-mechanically actuated multi-speed EV transmission with integrated electric machines

- Low-cost actuation of electric vehicle/hybrid drivetrains
- Advanced control methods for mechanical optimisation
- Integrating software functions in one electronic controller

Marco Fracchia, Operations Manager, Vocis Limited, UK

12.00

Presentation of a multispeed gearbox for a BEV increasing the efficiency and power density

- Multispeed gearbox for BEV • Increasing the power density
- Highspeed drivetrain for BEV

Uwe Reichert, Scientific Assistant, IPEK – Institute of Product Engineering, Karlsruhe Institute of Technology (KIT), Germany

12.30 Lunch and visit to the Transmission Expo

1.30

Fully automated EOL e-drive testing

- From pre-production to high-speed serial production
- Automation and modularity for efficient testing solutions
- Solutions and experiences from realised projects

Ralph Heckmann, Vice President Sales Automotive, teamtechnik Maschinen und Anlagen GmbH, Germany

2.00

New type multi-speed e-drive system: introduction and test report

- Advantages and difficulties of the single motor with multi-speed gear reducer
- A scheme introduction to the dual-motors with multi-speed gear reducer
- The control strategy of the dual-motors with multi-speed gear reducer
- Summary of advantages and disadvantages of the dual-motors with multi-speed gear reducer

Chunzhe Sun, Deputy GM, JEE Power Systems Co., Ltd, China

2.30

Holistic investigations on the innovative high-speed power train Speed2E for electric vehicles

- High-speed powertrain for EVs • Efficiency
- NVH • Speed2E

Martin Sedlmair, Research Assistant, Gear Research Centre (FZG), Technical University of Munich (TUM), Germany

3.00

Quiet efficient and power dense traction epicyclic transmission for high-speed motors in EV

- Benefits of a traction epicyclic
- How to design for high efficiency
- A traction epicyclic in an A segment vehicle

David Yates, Senior Design Engineer, Drive System Design Ltd, UK

An ounce of experience is worth a ton of theory

Take the opportunity and experience new types of drives and transmissions yourself at the ride & drive on December 7th. New developments of transmission and drive research can be tried and tested exclusively in up to 25 vehicles on the test track in Linthe. Ask detailed questions to the engineers of the vehicles while driving yourself! The real live experience deepens the conference knowledge and connects theory and practice of the technology.

- 8.30 Departure with the shuttle service from Estrel Hotel Berlin to ADAC Fahrsicherheitszentrum Berlin-Brandenburg GmbH, Am Kalkberg, 14822 Linthe
- 9.30 Arrival at the ADAC Centre of Driving Safety and welcome address
Tour around the proving ground and instruction
- 10.30 Start of the ride & drive
- 4.00 End of the ride & drive and departure to the Estrel Hotel Berlin
- 5.30 Arrival at the hotel



Please be flexible when planning your return journey. Please wear comfortable shoes and warm clothes.

Limited number of participants. Register early!

CHECK-IN FOR THE CTI TEST DRIVE

Wednesday, 6 December 2017

12.00 – 5.00 p.m

We kindly ask all registered participants and persons accompanying test vehicles to check in for the CTI Test Drive at our special Check-In desk at the Estrel Hotel Berlin. Please bring your completed declaration of non-liability (provided by CTI in advance) and a German or an International driving licence with you. Please let us know if you will be using our bus shuttle to Linthe or if you will be making your own travel arrangements. All important information concerning the ride and drive will be handed out at the Check-In.

Would you like to provide a car for the CTI Test Drive?

Please contact us for details!

Contact:



anna.hofmann@car-training-institute.com

www.transmission-symposium.com/testdrive

Experience interesting vehicles in practice*



Impression of 2016



2017 Opel Ampera e



Impression of 2016



2017 Honda Civic

We are here for you!

We are pleased to answer all questions regarding the Symposium.

Project Management CTI Symposium



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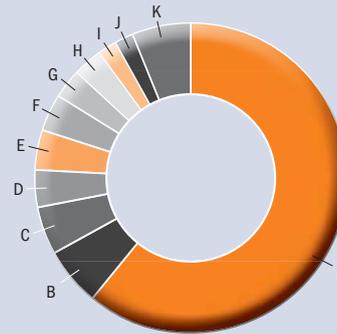


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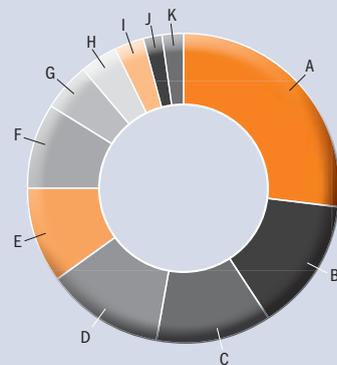
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by country



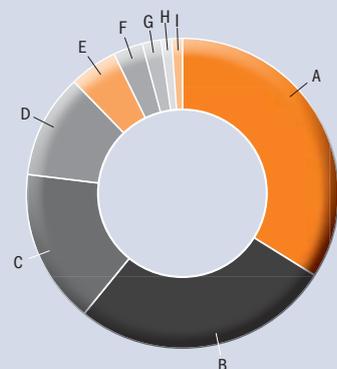
A Germany	61 %	G Japan	3 %
B Austria	6 %	H Belgium	3 %
C Great Britain	5 %	I South Korea	2 %
D USA	4 %	J Sweden	2 %
E Italy	4 %	K Others	6 %
F France	4 %		

by sector



A Automotive Suppliers (without Transmission Manufacturers)	27 %	F Metal Processing	9 %
B OEM	14 %	G Mineral Oil & Chemical Industry	5 %
C Electrics/Electronics Manufacturers	12 %	H Mechanical Engineering	4 %
D Transmission Manufacturers	12 %	I Plastic Industry	3 %
E Engineering/Development Service Providers	10 %	J Universities	2 %
		K Others	2 %

by function



A R&D/Transmission/Drive Development	34 %	F Project Management	3 %
B Marketing/Sales	27 %	G Others	2 %
C Engineering/Design	16 %	H Press/Communication	1 %
D Management Board	11 %	I Purchasing	1 %
E Business Development	5 %		



AVL List GmbH

www.avl.com/transmission

AVL is the world's largest independent company for the development of powertrains (combustion engines, transmissions, control software, electric motors and batteries). The development and integration is fully supported by simulation tools; instrumentation & test systems; as well as the methodology required for passenger cars, trucks and marine engines. AVL offers a complete service portfolio for OEMs and transmission suppliers which contains design, analysis, calibration, transmission control development, hybridization and manoeuvre-based testing. AVL is a leader in developing highly-efficient and flexible Dedicated Hybrid Transmissions to be implemented in AT, 48V or HEV/PHEV systems.

Visit us at our booth at the Transmission Expo.



BorgWarner

www.borgwarner.com

BorgWarner Inc. (NYSE: BWA) is propulsion system leader for combustion, hybrid and electric vehicles with production plants and technical facilities at 32 sites out of a total of 64 locations in 17 countries.

In support of creating solutions for a cleaner, more energy-efficient world, BorgWarner dedicates its passion and expertise to constantly improving the transportation of people and things, creating technologies to improve efficiency, emissions and performance of all types of vehicles. As an industry leader in advanced future-proof propulsion system solutions for combustion, hybrid and electric vehicles, the company identifies strong trends and uses smart science and technology to address a future based on varying regulations, consumer demands and automaker requirements. With passion and creativity, BorgWarner has gained trusted partnerships with customers and suppliers around the world to gain a deeper understanding of their challenges and find the right solutions. The company's strong operations and commercialization expertise result in high volume availability of competitive, efficient technologies that truly drive change.

Visit us at our booth at the Transmission Expo.



Magna Powertrain/GETRAG

www.magna.com

www.getrag.com

Magna Powertrain, 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.

GETRAG is the world's largest independent supplier of transmission systems for passenger cars and light commercial vehicles with approximately 15,200 employees at more than 20 locations. Headquartered in Untergruppenbach/Germany, the company develops and manufactures transmission solutions for the automotive industry. The transmission portfolio comprises manual, automated manual and dual-clutch transmissions. GETRAG also offers a range of hybridization and electrification of transmissions. In 2016, GETRAG was acquired by Magna International and is now part of the Magna Powertrain organization.

Visit us at our booth at the Transmission Expo.



PETRONAS Lubricants International

www.pli-petronas.com

PETRONAS Lubricants International (PLI) is the global lubricants manufacturing and marketing arm of PETRONAS, the national oil corporation of Malaysia. Established in 2008, PETRONAS Lubricants International manufactures and markets a full range of high-quality automotive and industrial lubricants products in over 80 markets globally. Headquartered in Kuala Lumpur, PLI has over 30 marketing offices in 23 countries, managed through regional offices in Kuala Lumpur (Malaysia), Turin (Italy), Belo Horizonte (Brazil), Chicago (USA) and Durban (South Africa).

The Global Technology Center located in Turin, Italy, develops tailor made Transmission Lubricants for several OEMs at global level, both for First Fill and for the Aftermarket same as high performance transmission oils for various motorsport applications (such as Formula 1 and DTM). PLI's portfolio offers a wide range of Manual Transmission Fluids (MTF), Automatic Transmission Fluids (ATF incl. DCTF) and Axle/Differential Fluids for global applications in the automotive sector (Passenger Car and Commercial Vehicles).

Visit us at our booth at the Transmission Expo.



Valeo

www.valeo.com

Valeo is an automotive supplier and partner to automakers worldwide. As a technology company, we design innovative solutions for smart mobility, with a particular focus on intuitive driving and reducing CO₂ emissions. The Group also provides and distributes spare parts for automakers and independent aftermarket operators.





AAM Germany GmbH

www.aam.com

AAM is a premier, global leader in design, engineering, validation and manufacturing of driveline, metal forming, powertrain, and casting technologies for automotive, commercial and industrial markets. Headquartered in Detroit, AAM has over 25,000 associates operating at more than 90 facilities in 17 countries to support our customers on global and regional platforms with a focus on quality, operational excellence and technology leadership. To learn more, visit www.aam.com.



Afton Chemical Ltd

www.aftonchemical.com

Afton Chemical is the market leader for additives used in Automatic and Dual-clutch Transmission Fluids, and is approved by Ford, Daimler, GM, VW & ZF for factory fill. Afton Chemical provides tailored solutions to customers that match their hardware needs, driving increased efficiency and enabling new engineering such as hybridization and e-mobility.



AIDA Germany GmbH

www.aida-global.com

AIDA is a comprehensive manufacturer of press forming systems that, since its founding a century ago, in 1917, has been helping its customers maintain exceptional efficiency and quality in their manufacturing operations, and contributing to their efforts to save resources and energy. With a core of outstanding technological capabilities and product development expertise that have enabled the development of products such as the world's first servo press, we will use our strengths in proposing total solutions encompassing entire production lines, and in providing ongoing after-sales support, to establish a top brand trusted by customers all over the world.

1857 CELEBRATING 160 YEARS 2017



Associated Spring

www.asbg.com

Currently celebrating its 160th Anniversary, **Associated Spring** is a pioneer, leader & innovator in the engineered spring & precision metal component manufacturing industry. With a wealth of engineering capability & manufacturing expertise, the Associated Spring Team solves customers' complex product and process design challenges, to help them achieve superior performance & competitive advantages in the market place.



Associated Spring Raymond

www.asraymond.com

A world leader in the design, manufacture and distribution of highly engineered products & solutions including springs, gas & mechanical struts, precision metal components, functional assemblies and custom hardware solutions. **Associated Spring Raymond** serves the market with both catalog standard products, and custom developed engineered solutions, specifically for customer applications.



ATESTEO GmbH

www.atesteo.com

ATESTEO GmbH – Drivetrain Testing specialist for the automotive and automotive supply industry. With 130 drivetrain test benches and 460 experts, we are represented at 6 locations in Germany and China. Car manufacturers and automotive suppliers rely on our independent testing results, which we can ensure due to the sophisticated and customisable features of our test benches, the flexibility and the high level of expertise of our experienced employees. With more than 30 years of market experience, we are well prepared for your tasks. Take advantage of our promise: Excellence in Drivetrain Testing.



Athena S.p.A.

www.athena.eu

Born in Northern Italy in 1973, **Athena** is today an International Group with 10 plants worldwide. Considered the best partner for solutions which guarantee maximum reliability and quality for Tier 1, Automotive and Powertrain Industries; Athena manufactures and offers high quality gaskets, sealing systems, metal and rubber parts, plugs and valves for hydraulics. Most of these products are made in Italy in our head-quarter. Athena – Manufacturing your Business



AVL List GmbH

www.avl.com/transmission

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Visit us at our booth at the Transmission Expo.



Barnes Engineered Components

www.bginc.com

Barnes Engineered Components (EC) is a world class manufacturer, supplier and distributor to key markets including: Automotive, Medical, Aerospace, HVAC/Refrigeration, High Tech/Telecom, HDT, Construction/Mining, Energy & General Industrial. EC spans 20+ global manufacturing and non-manufacturing strategic locations, with approximately 1,500 employees dedicated to collaborating with customers, adding value through innovation and state-of-the-art technologies.



bdtronic GmbH

www.bdtronic.com

For more than 30 years **bdtronic** has been involved with dispensing technology and the preparation, mixing and dispensing of single and multi-component reactive potting resins, sealing materials, adhesives, foams and thermally conductive pastes. Since then, three additional technologies have extended the portfolio next to dispensing of automotive electronic components, so that plasma pre-treatment, impregnation of e-motors and heat staking of plastics are part of the process know-how.



BorgWarner

www.borgwarner.com

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Visit us at our booth at the Transmission Expo.



BOSCH
Invented for life

Robert Bosch GmbH

www.bosch-mobility-solutions.com

Mobility Solutions is the largest **Bosch Group** business sector. The Bosch Group is one of the leading automotive suppliers. Bosch provides technologies and solutions for the electronic and hydraulic control of all types of automated transmissions and offers key components for CVT.



Bourns Sensors GmbH

www.bourns.com

Bourns designs, develops and manufactures an extensive range of innovative and cost-effective automotive position, speed and torque sensors in its world-class facilities positioned throughout the globe. The company's research and development combined with its close collaboration with customers ensures Bourns customized products meet the strict requirements set for the automotive industry.



Springs & Wireforming

Brand KG

www.federn-brand.de

The **Brand Group** is the specialist for development and manufacturing cold formed technical springs and wire formed parts. In Europe we are the leading producer of damping springs for the powertrain. We offer innovative technology and efficient solutions for constantly increasing requirements. Our customers appreciate since decades our reliability and know-how regarding material, development, prototypes and as well our sophisticated manufacturing technology.



Bühler Motor GmbH

www.buehlermotor.de

Bühler Motor is an independent, globally-active company focused on the development and production of mechatronic drive solutions and electric pumps. A leading supplier in the Automotive industry, with more than 1750 employees at ten locations worldwide, we are committed to offering world-class products to help to improve the drivetrain efficiency and performance.



Christian Bauer GmbH + Co. KG

www.christianbauer.com

With decades of familiarity with the market and solid know-how, **cb** successfully designs flexibility creatively. Wherever disc springs, diaphragm springs and complete subassemblies for vane pumps are involved, we stand for the tightest of production tolerances while being consistently solution-driven. In addition to the DIN disc springs we also support you with tailored and customised developments.



Continental AG

www.continental-automotive.com

With sales of €40.5 billion in 2016, **Continental** is among the leading automotive suppliers worldwide. The Transmission business unit (BU) is one of five BUs of the division Powertrain, which provides innovative and efficient system solutions for the drivetrain. BU Transmission develops and produces electronics and mechatronic systems for controlling the latest automatic transmissions such as stepped automatic transmissions, continuously variable transmissions (CVT), automatic gearshift systems, double-clutch transmissions as well as transfer boxes for all-wheel drive systems.



Curtiss Wright / Metal Improvement

www.cwst.de

CWST – since 1945 known as Metal Improvement Company – with more than 70 global business units is the market leader in the process “Controlled Shot Peening”. The implementation of Engineered Coating Services and the development of our Laser Peening Process expanded our product portfolio to a complete high quality package (One-Stop-Job) for our customers in the global Surface Technology sector.



CY Myutec

www.cymyutec.com

CY Myutec is specialized in development and manufacturing of Synchronizer Rings for Manual and Dual Clutch Transmission. As a total solution provider, the company offers Synchronizer Ring pack design consulting including various tests and simulations. On the basis of self-developed carbon friction material technology, the company’s product portfolio comprises steel stamping & forging and brass alloy Synchronizer Rings.



DAM Group

www.dam.fr

As special machines supplier, our knowledge and skills in mechanical, automation, hydraulic, pneumatic and software technologies are our key to success. We are providing test and measurement solutions and automatic assembly processes (conveyor, robot, fitting, marking, screwing, vision) to support global automotive key players’ industrialization and efficiency. Quality, creativity, robustness and agility are our assets.



Diehl Metall Stiftung & Co. KG

www.diehl.com/metal

For 60 years, **Diehl Metall** has been a successful partner to the automotive industry with production locations in Germany, Brazil, China and India. With the brand Formed@Diehl, the company offers brass and steel synchronizer rings with high-performance coatings. As the global market leader, Diehl Metall is a specialist in optimizing existing transmissions as well as in developing customized solutions for new projects.



Drive System Design Ltd.

www.drivesystemdesign.com

Drive System Design (DSD) is an innovative consultancy specialising in the engineering of transmission and future driveline systems. Celebrating it’s 10th anniversary throughout 2017, DSD’s simulation led approach and growing teams of design, control, test, and development engineers have facilitated it’s growing reputation for technical excellence and agile development capabilities across the world. Current technology focuses include highly efficient transmission design optimisation, eMachine design and control, and EV/Hybrid architecture specification.



DVS Production GmbH

www.dvs-production.de

As the service provider in the strong community of the DVS group, **DVS Production** offers contract manufacturing equipped with everything that is required for a sophisticated serie production. Our areas of expertise:

- turning, gear tooth forming, grinding
- gear honing, gear grinding
- machining before and after heat treatment
- milling of shifterstops and pockets
- bore honing
- skiving
- precision machining
- machining of large parts

The latest machine generations of the DVS group are used for the entire production technology.



ebm-papst St. Georgen GmbH & Co. KG

www.ebmpapst.com

The **ebm-papst Group** is the world's leading manufacturer of fans and motors. As a highly qualified engineering partner of the automotive industry, our innovations have been helping to make the driving experience safer, more comfortable and less stressful for over a decade. A growing number of renowned manufacturers and system suppliers, in both the passenger and commercial vehicle areas, are among our customers.



EFI Automotive

www.efiautomotive.com

As a recognized tier-one automotive supplier, **EFI Automotive** delivers electronic and electromagnetic systems to major carmakers worldwide. These systems improve performance in three major vehicle functions: engine, drivetrain and energy management. Thanks to its 80 years' experience, EFI Automotive offers its customers:

- Unique competencies and industrial know-how
- A approach based on anticipation and innovation, designed to stay one step ahead of customer needs



EJOT GmbH & Co. KG

www.industrie.ejot.de

The **EJOT Group** is a medium-sized company which is dedicated to innovative fastening solutions. The Industrial Division produces thread-forming fasteners for plastics and metal. Cold forming parts are manufactured up to a 6-die/6-blow forming stage. Another group of products are novel fastening elements, especially designed to work with new materials and material combinations.



ElringKlinger AG

www.elringklinger.com

ElringKlinger is one of the leading international automotive suppliers capable of developing and manufacturing technologically sophisticated components for all types of drive systems, whether combustion engines or electric solutions. Specially designed ElringKlinger components for engine, transmission, exhaust system, underbody, and vehicle body applications are used by virtually all car and engine manufacturers as well as many automotive suppliers worldwide.



Erdrich Umformtechnik GmbH

www.erdrich.de

Core Competencies:

- Development and production of complex deep drawing parts and assemblies.
- Experience in changing manufacturing processes.
- Intelligent solutions achieved by our development capability with state of the art equipment.

Products: Deep drawings, Stampings, Fine blanking parts and assemblies

Customers: Daimler, BMW, VW, Vibracoustic, Bosch-Group, ZF-Group, Schaeffler Group, Continental Automotive Group, BorgWarner, Getrag, FTE, Valeo



ERNST GROB AG

www.ernst-grob.com

ERNST GROB AG develops, designs and builds precision machines dedicated to the cold forming of splined and nonsplined workpieces. The manufacture of slotting machines for secondary and finishing operations on cold formed workpieces is yet another core competence of the company.

- Cold forming machines for sheet metal and solid components
- Slotting machines for sheet metal components
- Subcontracting
- Engineering



Ernst Umformtechnik GmbH

www.ernst.de

Ernst Umformtechnik GmbH is a recognized, leading partner in the sheet metal forming industry. Core activities are the production of high precision stampings, deep drawn parts and assemblies as well as the development and production of prototypes. Complementary processes such as laser welding, machining and surface- / heat treatment complete the program.

Product portfolio: components for synchronization-, clutch- and transmission systems, waste gas, automotive safety, automotive electronics and HVAC.



European Powder Metallurgy Association

www.epma.com

The **EPMA** was formed in Brussels in 1989; the European Powder Metallurgy Association has three key missions

- Promoting PM Technology
- Representing the European PM Industry
- Developing the PM Future

The EPMA serves all types of corporate members, from component producers, metal powder manufacturers, equipment producers through to end-users, research centres, universities and individuals who have an interest in powder metallurgy.

More details on EPMA Membership and what powder metallurgy do for you and your components can be found at www.epma.com



FAVI

www.favi.com

FAVI is the provider of your technical solutions in pressure die-casting. Main activity is the development and production of shift forks in brass or aluminium for gear boxes, from single parts to a complete internal shifting system.

Moreover, FAVI is leader in production of die-cast copper rotors for e-mobility and hybrid motors.



Feintool International Holding AG

www.feintool.com

Feintool is a world leader in the development of fineblanking systems and in the production of pre-finished, high-precision fineblanked and formed components for demanding industries, particularly the automotive industry.

Feintool's processes support its current trends toward lighter vehicles, improved transmissions and module types. With locations in Europe, Japan, China and the US, Feintool is represented in the most important automotive markets.



FEV GmbH

www.fev.com

FEV is an independent powertrain systems research, design and development company. From concept to production, FEV offers comprehensive transmission design and development solutions for a variety of applications ranging from electric or hydraulic hybrids to conventional systems. We provide extensive functional/durability testing and benchmarking for all transmissions types.


Fischer & Kaufmann GmbH & Co. KG
www.fiuka.de

FIUKA ranks among the renowned suppliers of the automotive industry. Main focus is the development and manufacture of metal parts in 100% cold forming technology for airbag, chassis, exhaust system, engine and transmission. Using mechanical and servo-presses (150 – 1,600 tons) and with the utmost precision, we manufacture components from steel, stainless steel, aluminium and special materials. Engine and transmission parts are finished on automated production lines.

Sites: D-57413 Finnentrop and PL-55 300 Środa Śląska


Freudenberg Sealing Technologies GmbH & Co. KG
www.fst.com

Freudenberg Sealing Technologies Automotive, a market leader in the auto industry's technology, quality and service segments, provides a wide range of products to all the major automobile and commercial vehicle manufacturers worldwide. The portfolio includes a large assortment of seals – ranging from O-rings to bidirectional, low-friction cassette seals.


FTE automotive GmbH
www.fte.de

The **FTE automotive Group** is your competent partner in the sector of development and production of drive train and brake system applications for the automotive industry. The company is located in all important continents and one of the leading OE-suppliers for passenger cars and commercial vehicles worldwide.


FunctionBay Inc.
www.functionbay.co.kr

FunctionBay is the world's fastest-growing CAE software company developing 'RecurDyn' which is an engineering simulation software based on Multi-body-dynamics (MBD) with the most high-levelled cutting-edge technologies. FunctionBay has been providing many industry customers with various engineering solutions throughout its own software of RecurDyn as well as a cooperative CFD code of Particleworks developed by Prometech Software to help them resolve their engineering challenges in fields of automotive, ship-building, railway, robot, heavy industry, military equipment, and many other areas related to mechanical and electronic fields of engineering.


GKN Driveline
www.gkn.com/driveline

GKN Driveline develops and integrates highly engineered, intelligent conventional and electrified driveline solutions, tuned to meet OEMs' specific requirements.

From city to sports cars and advanced all-wheel drive to refined hybrids, GKN Driveline delivers the driveline systems that redefine vehicle segments and create new, brand-aligned driving experiences.


GKN Sinter Metals Engineering GmbH
www.gknsintermetals.com

GKN Sinter Metals is the world's largest development & production partner of high precision sintered metal products for automotive drivetrain applications. GKN engineers and produces solutions for NVH reduced high performance gears, light-weight for lubrication and actuation systems for DCTs and EV transmissions (hydraulic and electromechanical). The company's metal additive manufacturing capability for prototypes enables to shorten development cycle times.


Hartmann-exact KG
www.hartmann-exact.de

Hartmann-exact KG is a privately owned, global automotive supplier of system solutions for sensors and mechatronics applications. Our skills and experience in the areas of mechatronics, electronics and electrical systems. Hartmann is part of the Swoboda Hartmann Group, a partner of the automotive industry with over 3,500 employees worldwide.



A business of BARNES GROUP INC

Heinz Hänggi Stanztechnik

www.hanggi.ch

A world class partner for ultra-precision microstamping and fine-blanked applications. **Hänggi** offers unique solutions from engineering prototypes to serial production including complete assemblies. They specialize in producing complex metal stampings or by converting machined components into stamped parts gaining significant efficiencies and superior value. Hänggi has unmatched engineering expertise and manufacturing disciplines to provide complex stampings, optimal lifecycle costs & superior quality and service.



the heart of your performance

hGears

www.hgears.com

Born from the merger of two historical brands, Herzog and miniGears, **hGears** is one of the world's leading manufacturers of precision turned parts, drive components, gear kits as well as complex system solutions.

These components can be manufactured either with Powder Metal or Cut Metal technology.

Based in Germany, Italy and China with more than 1000 employees, hGears works with customers to develop and engineer precision gears and components for automotive, motorcycle, power tools, outdoor products, ebike and other industrial applications.



Hilite Germany GmbH

www.hilite.com

Hilite International as a global supplier to the automotive industry achieved a total revenue of 491,4 million Euro in 2016, with 1600 employees at 8 international locations. Our customers profit worldwide on our development and production of VVT-systems, transmission, engine and VCR components to improve fuel consumption and reduce emissions.



HOERBIGER Antriebstechnik Holding GmbH

www.hoerbiger.com

HOERBIGER is the first destination worldwide for drive train solutions. By offering technologically tailor-made system design, the Strategic Business Unit Drive Technology increases the efficiency of synchronizers and shift elements in transmissions, making a crucial contribution to sustainability and resource efficiency.

The product spectrum includes synchronizer systems for transmissions, shift elements for drive trains, and comfort systems for passenger cars and commercial vehicles. HOERBIGER offers all services from one source: from development to the series application of components and complete systems.



hofer powertrain GmbH

www.hofer.de

We are system supplier of efficient powertrain solutions: from conventional, through to hybrid and fully electric. As an established and independent partner of the vehicle industry, **hofer powertrain** has been delivering pioneering technologies and products to companies around the world for more than the past 30 years. Success is achieved by our experienced teams specialized in the design and development, industrialization, and production of powertrain systems.



Höganäs AB

www.hoganas.com

As the world leader in metal powders, **Höganäs** inspires industry to make more with less. Höganäs continuously strives to apply metal powder technology into new applications. Examples of such high performing applications are lightweight, load-carrying transmission gears and electrical motor concepts, all developed in close collaboration with customers and end-users.



Hugo Benzing GmbH & Co. KG

www.hugobenzing.com

As one of world's leading producer of retaining elements **Hugo Benzing** is a Tier-1 supplier for almost every reputable automotive manufacturer. On more than 20.000 square meters we employ about 680 people. Over 22.000 different items are included within our product range of retainers, wire forms, precision stampings and complex designed assemblies. Benzing components are used in numerous applications for example in parking lock systems for torque converters and dual clutch transmissions.



IAV

www.iav.com

Employing over 6,500 members of staff worldwide, **IAV** is one of the world's leading providers of engineering services to the automotive industry. The company has been developing innovative concepts and technologies for future vehicles for more than 30 years. Core competencies include production-ready solutions in all fields of electronics, powertrain and vehicle development. Clients include all of the world's premier automobile manufacturers and suppliers.



IBS Filtran GmbH

www.ibs-filtran.com

IBS Filtran GmbH/Filtran LLC leading manufacturer of filter system solutions for automatic transmissions.

With our development centers and manufacturing plants in Germany, USA, China and Mexico, as well as cooperation partners in Japan and Korea, we are able to satisfy our global customers' requirements due to innovative system solutions.

Ing. Brinkmann

Ing-D.B. GmbH

www.ing-db.de

Ing-D.B. GmbH is your partner for the development and distribution of automation technology. One focus are the setting processing equipment for sealing plugs, blind rivet nuts, rivet screws and blind rivets.

From simple manual workstations, over the use of process monitoring, to a high level of automation with automatic feeding systems and workpiece handling all customer requests can be satisfied.



Institute of Automotive Engineering

www.iff.tu-bs.de

- Shift and launch comfort (objectification, documentation, automated application)
- Requirement engineering and representative load spectra (testing, simulation, requirements based on customer operation and test routes)
- Gearshift and selector lever actuation (objectification, optimization)
- Drivetrain efficiency (measurement, simulation and optimisation of drivetrain components)
- Energy and thermal management
- Electric and hybrid drives (analysis of drivetrain topologies, simulation, customer benefit, control strategy)



Jatco

JATCO Ltd

www.jatco.co.jp/ENGLISH/index.html

JATCO is a dedicated manufacturer of automatic transmission for automobiles including the step automatic transmission (AT) and the continuously variable transmission (CVT). With a mission to provide value to our customers, to automotive culture and to society, we constantly strive to provide high quality transmission units that meet the needs of society to our customers in a speedier manner.

Today, JATCO offers an extensive line that includes step AT, advanced and environmentally friendly CVT and transmissions exclusively for hybrid vehicles.

We are also the only manufacturer of CVT in the world to feature a line up that spans from mini vehicles through to full-size sedans.


Johnson Electric Germany GmbH & Co KG
www.johnsonelectric.com

The **Johnson Electric Group** is the world's leading provider of innovative motion subsystems and components for transmission and driveline applications. We improve fuel economy and driving experience by deploying advanced motion technologies and precision manufacturing processes for global automotive markets. Johnson Electric Group is headquartered in Hong Kong and has over 38,000 employees in 24 countries.


JOPP Group
www.jopp.com

The **JOPP Group's** product range comprises gearshift systems and knobs, mechanical components (machining), powder metal parts, plastic components and electronics. There are 11 production sites worldwide. Own developments include internal and external shifters as well as oil- and water-bearing engine and transmission components. With its various own patents in the shifter sector, JOPP has been a competent partner in the automotive industry for many years.


JTEKT Corporation
www.jtekt.co.jp/e/index.html

JTEKT Corporation was established in 2006 through the merger of Koyo Seiko Co., Ltd., a world-class bearing manufacturer, and Toyoda Machine Works, Ltd., a machine tool manufacturer excelling in world-leading technologies. Combining the most advanced technologies and the manufacturing passion of the two companies, JTEKT is now a trusted systems supplier of automotive components, bearings and machine tools, providing customers with world-class products and technologies that result in ongoing contributions to society.


KACO GmbH + Co. KG
www.kaco.de

KACO develops and produces seals for moving parts of machines and vehicles. The company is strongly development-oriented. Its customers today include almost all OEMs and many tier-one suppliers. High level in automatic production systems, advanced development equipment in-house. Manufacturing plants are in Germany, other European countries, USA and China.


KATE LLC
www.katem.ru

KATE LLC is an independent transmission developer and manufacturer. Company specializes in research and development work as well as production of modern automatic transmissions and Hybrid/EV torque transfer solutions for a wide variety of automotive industry applications. With deep knowledge, classical technical experience and unique innovations we support our Customers during the complete way from concept to smart intelligent industrialization.


KISSsoft AG
www.kisssoft.ch

KISSsoft AG is a market leader in software for the design and analysis of all types of power transmission solutions in automotive. The scope of the software ranges from a single machine element up to the complete gearbox – with a quick and reliable evaluation of total efficiency in a system. KISSsoft/KISSsys provides engineers and designers with extensive optimization options for the entire sizing process as well as engineering services, know-how and training.


H. Kleinknecht GmbH & Co. KG
www.testing-technology.com

Kleinknecht holds the entire expertise in testing technology for gearboxes and e-axle applications. The company covers the complete scope in powertrain testing, such as test stands for manual, automatic, double-clutch, electric-transmission, and hybrid gearboxes, components, and corresponding assembly lines. In close cooperation with the affiliated companies of the Burke Porter Group Kleinknecht covers the entire Powertrain testing technology. Due to the self-developed test stand automation system ATS-Advanced the company owns the proven know-how in software engineering.



KOKI TECHNIK Transmission Systems GmbH

www.kokitransmission.com

KOKI TECHNIK: Both development partner and production company. KOKI initiates and gives support to development processes of transmission systems and produces the components. KOKI's current product range contains shift towers, shift forks and parking lock systems that enable the switching operation as well as the shift feel both of a manual and double clutch transmission.

KOLEKTOR

Kolektor group, d.o.o.

www.kolektor.com

Kolektor is a development and production partner for various Motor Components and Subsystems and due to innovative technology offers key solutions for Motors, Brakes, Gear boxes and Electronics. Through production locations on the European, Asian and the U.S. market, Kolektor utilizes its full technological and developmental potentials to ensure customer satisfaction.



Konzelmann GmbH

www.konzelmann.com

Are you looking to increase efficiency without adding extra costs in your tribological system? Look no further.

At **Konzelmann GmbH**, using global market experience and results from our test laboratory, we design each solution's polymer blend and geometry in order to optimize your application, with price and performance in mind. Our solutions include bushings, axial/radial bearings, thrust washers, seal rings, gears, guiding components, and more.



LEE Hydraulische Miniaturkomponenten GmbH

www.lee.de

For more than 65 years, "The **LEE Company**" has been a leading supplier of high-precision, miniature hydraulic components mainly for the aerospace industry but also used in the Offshore industry, in the racing world and other high end industries.

In the late 80s the portfolio has been extended by an industrial valve program. Formally used in the automotive and truck industry but also used in the medical and pharmaceutical market.



Linamar Corporation

www.linamar.com

Linamar is a diversified global manufacturing company of highly engineered powertrain products. Linamar has extensive product expertise in transmission modules, driveline components and complete AWD systems, including Hybrid e-Axle solutions. Linamar's manufacturing capabilities include Machining & Assembly, Forging, Light Metal Casting and Metal Forming.



Magna Powertrain/GETRAG

www.magna.com

www.getrag.com

Magna Powertrain, 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.

GETRAG is the world's largest independent supplier of transmission systems for passenger cars and light commercial vehicles with approximately 15,200 employees at more than 20 locations. Headquartered in Unterturkheim/Germany, the company develops and manufactures transmission solutions for the automotive industry. The transmission portfolio comprises manual, automated manual and dual-clutch transmissions. GETRAG also offers a range of hybridization and electrification of transmissions. In 2016, GETRAG was acquired by Magna International and is now part of the Magna Powertrain organization.

Visit us at our booth at the Transmission Expo.



Melecs EWS GmbH

www.melecs.com

Melecs Elektronikwerk Siegendorf (EWS), with sales revenue of 162 million euros, is the largest electronics manufacturing service provider (EMS) with Austrian roots and has more than 25 years of experience. All value creation stages from development, validation and industrialization to production and logistics are provided from a single source. Melecs EWS relies on innovative solutions tailored specifically to its customers, such as in the areas of all-wheel drive ECUs (Electronic Control Units) and LED lighting in vehicles.



Methode Electronics International GmbH

www.methode.com

Methode Electronics is a leading developer of custom-engineered products utilizing the latest technologies. From magnetic signature sensing to the revolutionary solid-state touch sensitive switches used in today's appliances and automobiles. We leverage the talents of our over 4,000 employees to serve four market areas: User Interfaces, Sensor and Switches, Power and Data.



Miba AG

www.miba.com

Global presence, years of experience and ongoing technological progress distinguish the **Miba Group** as market and technology leader. Sintered components, friction materials and coatings make vehicles more efficient, more reliable and more environmentally friendly.



Moving Magnet Technologies

www.movingmagnet.com

MMT is an innovative company specialized in the field of electromagnetism. This unique know-how applies in the development of direct drive actuators, non-contact position sensors and electric motors. These mechatronics systems integrating patented technology are then industrialized for mass production in collaboration with the customer under a License agreement. MMT offers a full range of engineering services including magnetic simulation, prototyping and tests, drive electronic and magnetization equipments.



MS-Schramberg GmbH & Co. KG

www.ms-schramberg.de

MS-SCHRAMBERG - EVERYTHING FROM A SINGLE SOURCE FOR MAXIMUM RELIABILITY
MS-Schramberg has been synonymous with problem-solving expertise and quality for 50 years. The company is one of Europe's leading manufacturers of permanent magnets and assemblies. More than 550 employees are developing and producing more than 5,000 customer-specific articles, used successfully worldwide by companies from a wide range of sectors.

Mubea

Mubea Tellerfedern GmbH / Muhr und Bender KG

www.mubea.com

Mubea Tellerfedern GmbH produces highly-stressed transmission springs and separating springs for modern automatic transmissions, CVT- and dual clutch transmissions. The transmission weight and drag torque losses can be reduced significantly by using Mubea disc springs instead of coil springs. Further products in the transmission sector are light weight transmission shafts. The weight of these shafts can be reduced by up to 30 %.



NIDEC GPM Group

www.nidec-gpm.com

The **NIDEC Business** Unit "Automotive Motor & Electronic Control" develops products which improve safety, control, performance and comfort of automobiles. As an expert for advanced mobility, we develop, produce and supply electric motors as well as mechanical and electrical pump systems for all types of drive systems, whatever the renewable motive source.


Oerlikon Friction Systems (Germany) GmbH
www.oerlikon.com

Oerlikon Friction Systems is the global technology leader of Carbon friction materials and components for synchronizers. Today's preferred solution for modern manual and dual clutch transmissions consists of synchronizer components made of stamped steel coated with Carbon friction materials. With our combination of in-house produced stamped steel synchronizers and high performance Carbon friction materials, our products offer the ideal solution for maximum gear shifting comfort during the lifetime of the vehicle. Our modules are used in multiple applications such as passenger cars, trucks and off-road vehicles from Ø 40 to Ø 250 mm ring diameter.

Locations: Germany, USA, Brazil, Italy, China, India, UK, Japan & Thailand


Oerlikon Graziano SpA
www.oerlikon.com/graziano

Oerlikon Graziano is world's no.1 in design, development and supply of transaxles for high performance cars, highly specialised in transmission systems for 4WD (PTU, RDM and transfer case assemblies), electric and hybrid transmissions for passenger cars and commercial vehicles, key player in applying innovative technology, as DCTs, AMTs and their hybrid derivatives to premium supercars. Leading transmission controls technology is provided by the Group Company Vocis.


PETRONAS Lubricants International
www.pli-petronas.com

PETRONAS Lubricants International (PLI) is the global lubricants manufacturing and marketing arm of PETRONAS, the national oil corporation of Malaysia. Established in 2008, PETRONAS Lubricants International manufactures and markets a full range of high-quality automotive and industrial lubricants products in over 80 markets globally. Headquartered in Kuala Lumpur, PLI has over 30 marketing offices in 23 countries, managed through regional offices in Kuala Lumpur (Malaysia), Turin (Italy), Belo Horizonte (Brazil), Chicago (USA) and Durban (South Africa).

The Global Technology Center located in Turin, Italy, develops tailor made Transmission Lubricants for several OEMs at global level, both for First Fill and for the Aftermarket same as high performance transmission oils for various motorsport applications (such as Formula 1 and DTM). PLI's portfolio offers a wide range of Manual Transmission Fluids (MTF), Automatic Transmission Fluids (ATF incl. DCTF) and Axle/Differential Fluids for global applications in the automotive sector (Passenger Car and Commercial Vehicles).

Visit us at our booth at the Transmission Expo.


PMG Füssen GmbH
www.pmginter.com

The **PMG group** is a leading manufacturer of powder metallurgical modules and components for the automotive industry, in particular in the fields of transmissions and shock absorbers, as well as soft magnetic powder composites (SMC) for electrical applications in various industries. With seven production facilities on three continents and more than 50 years of experience in R&D and production, the PMG group covers the world's automotive markets as a leading supplier.


Porsche Engineering Group GmbH
www.porsche.de

Porsche Engineering, a wholly owned subsidiary of sports car manufacturer Dr. Ing. h.c. F. Porsche AG, is a premium engineering services provider for car manufacturers, the automotive parts industry and other sectors. Its engineers work out new unusual ideas for cars, vehicles and industrial products. On behalf of clients they develop a wide range of solutions - from the conception of individual components and the design of complex modules through to the planning and implementation of complete developments including production start-up management.



Possehl Electronics

www.possehlelectronics.de

We specialize in the development and production of complex mechatronic components and systems. We are redefining the limits of technical feasibility, by designing and industrializing smart manufacturing concepts. Precise technologies, the entire value chain consolidated and experienced, competent and committed employees all over the world in to make us one of the most sustainable and long-termed partners for the global automotive industry.



Profiroll Technologies GmbH

www.profiroll.de

Profiroll Technologies is specialized in the development and manufacturing of thread rolling machines, spline rolling machines and cold ring rolling machines. The appropriate process techniques and rolling dies are completing the service.



PUNCH Powerglide Strasbourg SAS

www.punchpowerglide.com

Punch Powerglide, formerly General Motors Strasbourg, brings in more than 50 years of expertise in the development and production of automatic transmissions. Besides its conventional 6-speed automatic variants, with or without "stop & start" option, PUNCH Powerglide product line includes also mild hybrid (BSG) and full hybrid driveline solutions. Its R&D teams are also working on new concepts (DHTs, e-drive). In addition to complete gearboxes, PUNCH Powerglide supplies various components for the automotive sector and offers also engineering services in the areas of testing, software programming, calibration and NVH analysis.



Punch Powertrain NV

www.punchpowertrain.com

Punch Powertrain is an independent Tier1 supplier of continuously variable transmissions (CVT), dual clutch transmissions (DCT), electric and hybrid powertrains for passenger cars. Optimal performance, minimal fuel consumption, low emissions and driving pleasure are key topics in developing the new generation transmissions and hybrid powertrains. Apart from gearbox technologies, Punch Powertrain is leading in the development of magnet free Switched Reluctance Motors (SRM).



Reich GmbH

www.reich-gmbh.com

Integrity, Sustainability and Quality – As a leading manufacturer of turned parts, ball bearings, components for injection systems and other vehicle parts, the name **REICH** stands for quality. Our company was founded 1919 as a family business and even today Reich GmbH is still 100% family owned, we are located in Germany and USA.



Ricardo Deutschland GmbH

www.ricardo.com

Ricardo has a leading, fully integrated design, development and low volume production capability for driveline and transmission systems. Our engineers have been responsible for an extremely wide range of products on a global basis, from cost-optimized manual transmissions to advanced dual clutch transmissions. We also have a wide experience in the provision of testing programmes enabling us to help our customers deliver the latest technologies focused on optimized efficiency, improved driving enjoyment and reduced lifecycle costs.



Romax Technology

www.romaxtech.com

Romax Technology are a global leader in software, analysis and services for gearbox, bearings and driveline systems. Providing unique solutions to key industries including EV, automotive, aerospace, bearings, wind, off road, rail and marine worldwide. Offering an all-in-one, award-winning solution for electrical and conventional driveline systems, Romax supports 14 of the world's top 15 auto manufacturers helping them get better quality products to the market faster and at lower cost, without compromising on design and development accuracy.

**ROTOR CLIP s.r.o.**www.rotorclip.com

Rotor Clip is the leader in the manufacture of tapered, constant section and spiral retaining rings meeting DIN, Inch, ANSI Metric and JIS standards, as well as TRUWAVE wave springs, ROTOR CLAMP hose clamps and custom designs. We support the market with first class Engineering Know-How, expert advice, reliability of delivery and high quality products. Rotor Clip is certified to ISO 9001, TS 16949, ISO 14001 and AS9100.

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DRIVING SUCCESS

RÜBIG GmbH & Co KGwww.rubig.com

RÜBIG GmbH & Co KG encompasses the strategic divisions Die Forge, Heat Treatment, Aluminum and Engineering. The optimized synergies established the group as innovative leader in any metal working industry worldwide. Above all, the Know-How that is reflected in the plants has been gained in the in-house job shop for years.

**Saint-Gobain Performance Plastics L+S GmbH**www.plastics.saint-gobain.de

Saint-Gobain Performance Plastics L+S GmbH specializes in design, manufacturing and testing of seal rings, thrust washers and radial plain bearings. Our innovative solutions are designed to increase efficiency by reducing leakage, drag losses and component wear. In addition these engineered components can be used where their compact installation, low mass and easy assembly allow their high performance to be combined with economic efficiency.

samkee
AUTOMOTIVE

Samkee Automotive Co., Ltd.www.samkee.com

- Aluminum die-casting specialist since 1978, covering entire range of die-cast components for engine, transmission and structural applications
- 50 die-casting machines from 350 to 2,500 tons
- Provides one-stop solutions to customer by operating along the entire value chain of die-casting industry
- ISO/TS 16949, ISO 14001 and OHSAS 18001 certified

SCHAEFFLER

Schaeffler Technologies AG & Co. KGwww.schaeffler.com

The **Schaeffler Group** is a leading global integrated automotive and industrial supplier. The company stands for the highest quality, outstanding technology and strong innovative ability. The Schaeffler Group makes a decisive contribution to "mobility for tomorrow" with high-precision components and systems in engine, transmission, chassis applications and e-mobility as well as rolling and plain bearing solutions for a large number of industrial applications.

SCHERDEL

Scherdelwww.scherdel.de

SCHERDEL, with its 29 locations worldwide, offers a full product range in the area of technical springs and metal forming with extensive knowledge in primary materials, spring calculation, production processes and testing methods. Our product portfolio comprises technical springs, stamping and bending parts, welded and assembled parts as well as in-house tool and machine construction. Our products can be found in power train applications, break systems and the car interior.


Magnetbau Schramme GmbH & Co. KG
www.magnetbau-schramme.de

The **Schramme**-principle is very easy: Simply describe your application, and look forward to receiving your electromagnet, be it for moving, holding, switching or regulating.

Over the course of time, proportional solenoids, linear solenoids, pinch valves, holding solenoids and clutches of all design types and for special applications have been developed.

The Schramme Company has extraordinary competence in the area of proportional solenoids for hydraulic and pneumatic valves. We are the market-leader in this segment.

For decades, we have proven to be a reliable partner for automotive suppliers as well as for many other sectors in the industry and in medical engineering.

1917 CELEBRATING 100 YEARS 2017


SEEGER-ORBIS
www.seeger-orbis.de

Celebrating 100 years of manufacturing excellence, **Seeger-Orbis** is a world leading innovator and manufacturer of retaining and snap rings. Seeger-Orbis offer a large variety of industry standard products, specializing in specific items for customers' unique design applications. Utilizing state-of-the-art manufacturing processes and a wealth of experience, the Seeger team is able to design and manufacture retention solutions to fit individual requirements.


SELZER Fertigungstechnik GmbH & Co. KG
www.selzer-automotive.de

SELZER is one of the first addresses within the automotive industry. We design and manufacture systems and components in the areas transmissions, engines and brakes. In particular SELZER have a large know how for internal shift controls and shift fork systems. From the plants in Germany and Brazil SELZER supplies the customers world-wide.


Shell Lubricants
Shell Deutschland Oil GmbH
www.shell.de

Shell Lubricants are a global leader in the development of fluid solutions for the automotive industry. We work with OEMs and component manufacturers to deliver ATF, MTF and fluids for CVT, IVT, differentials and double-clutch systems for on- and off-road applications, continually improving friction durability, component life and fuel efficiency.


SHW Automotive GmbH
www.shw.de

SHW Automotive is one of the leading European manufacturer for transmissions- and lubricating oil pumps as well as sintered parts for transmissions and engines. SHW presents the latest developments of regulated concepts for oil pumps and E-Pumps. The division sinter production will give you an overview of new material as well as of the form parts for camphaser systems.

SHW is also represented at the booth of the 'Powder Metal Gearbox Initiative'.


Simerics GmbH
www.simerics.de

Simerics offers two state-of-the-art CAE tools: SimericsMP and PumpLinX. These can solve a broad range of flow and thermal applications across industries. Areas of strength include cavitation, aeration, multiphase, transient flows, conjugate heat transfer in complex geometries.


AB SKF
www.skf.com

SKF is a leading global supplier of bearings, seals, mechatronics, lubrication systems, and services which include technical support, maintenance and reliability services, engineering consulting and training. SKF is represented in more than 130 countries and has around 17,000 distributor locations worldwide. Annual sales in 2016 were SEK 72 787 million and the number of employees was 44 868.

**SMT**www.smartmt.com

SMT is an internationally trusted provider of cutting-edge drivetrain design, analysis and simulation software as well as technical consultancy services. SMT has in-depth experience in all industries that involve gear-shaft-bearing systems. Increasing development efficiency, reducing costs and driving innovation has been the core outcome from all of its global projects.

**Sodecia**www.sodecia.com

As part of the Sodecia Group, **Sodecia Powertrain** is a well-known solution provider and manufacturer of precision fine blanking parts and powertrain products with manufacturing facilities in Europe and Asia Pacific. Our precision transmission products range from manual gearboxes up to dual clutch systems and our powertrain specialized products range from shift forks to park brake systems.

**Sonats**www.sonats-et.com

SONATS offers fully customized production floor machines using Ultrasonic Shot Peening (USP) technology (STRESSONIC®). This high-performing process requires shorter treatment cycles, provides better surface finish/roughness and reduces consumption of shot media and energy. Proven applications to enhance fatigue lifetime on engine and transmission parts: output shaft, crankshaft, turbo and compressor wheel ...

**Sonceboz**www.sonceboz.com

SONCEBOZ develops, produces and sells electric motion solutions dedicated to AMT, DCT, CVT applications for the major global equipment manufacturers and OEM's in the automotive industry. Innovative mechatronic concepts and creative ideas are put into practice in partnership with the customer aiming to bring technological added value to the transmission or driveline architecture.

**Springer Vieweg Springer Fachmedien Wiesbaden GmbH**www.springer-vieweg.de

Springer Vieweg, the leading publisher for traditional and digital educational and specialized media in the field of technology in the German-speaking region offers students, practitioners and researchers high-quality content and professional service concerning all aspects of construction | electrical engineering | IT + computer science | mechanical engineering + automotive engineering.

**Stackpole Powertrain International GmbH**www.stackpole.com

Stackpole International is part of the Johnson Electric Group and is a premier global manufacturer of innovative engine and transmission pumps, electric pump modules and powder metal components to the global automotive marketplace.

With products specified into the powertrain platforms of major nameplates worldwide, Stackpole is widely recognized as a technology-driven automotive supplier and global leader.

**Swoboda KG**www.swoboda.de

Swoboda develops and produces in Germany, Czech Republic, the States, China, Romania and in Mexico and is a worldwide leader in the technologically complex area of molding elements (high-precision metal-plastic composite parts). Swoboda develops and manufactures components and assemblies for the automotive industry that form the interface between mechanical parts and electronics.


TE Connectivity Germany GmbH
www.te.com

TE Connectivity is a \$ 12 billion global technology leader. Our connectivity and sensor solutions are essential in today's increasingly connected world. We collaborate with engineers to transform their concepts into creations - redefining what's possible using intelligent, efficient and high-performing TE products and solutions proven in harsh environments.


teamtechnik Maschinen und Anlagen GmbH
www.teamtechnik.com

teamtechnik is an internationally leading company for innovative production technologies. Over 900 highly qualified employees have been developing and building intelligent and reliable automation solutions for assembly and functional testing. In transmission- and E-Drive testing, the company supplies pre-series test benches, stand alone EOL test benches and fully automated EOL test lines. teamtechnik is market leader in modular and highly flexible test systems.


TREMEC Corp.
www.tremec.com

Torque transfer solutions from **TREMEC** are found in products ranging from supercars and high-performance sports cars to severe duty, vocational and commercial vehicles worldwide. The portfolio includes manual RWD transmissions, dual clutch transmissions, gears, shafts, clutches, shift controllers, synchronizers, and mechatronic systems with integrated clutch systems and control software.


UNICK Corporation
www.unick.co.kr

Established in 1971, **UNICK** today produces components for the automotive industry with more than 700 employees in its homeland Korea as well as in China. UNICK supplies hydraulic solenoid valves for automatic transmissions & oil pump to the main Korean OEMs. In addition UNICK also produces EGR-valves & EGR-Bypass valves. UNICK holds certification in accordance to TS16949, QS9000, ISO9001, ISO14001, OHSAS18001, CMMI level 3.


VACUUMSCHMELZE GmbH & Co. KG
www.vacuumschmelze.com

VACUUMSCHMELZE (VAC) with 4,100 employees worldwide, thereof 1,450 employees in Hanau, designs, produces and markets advanced materials, particularly with magnetic, but also other physical properties as well as related products.

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Valeo
www.valeo.com

Valeo is an automotive supplier and partner to automakers worldwide. As a technology company, we design innovative solutions for smart mobility, with a particular focus on intuitive driving and reducing CO emissions. The Group also provides and distributes spare parts for automakers and independent aftermarket operators.


Victrex
www.victrex.com/automotive

Victrex, an innovative world leader in high-performance PAEK polymer solutions, supports engineers in developing cost-effective, durable transmission components enhancing fuel efficiency and driving comfort. That is why for more than three decades, the industry has specified VICTREX™ PEEK-based solutions for demanding transmission applications. In electric drives, APTIV™ films enable cost-effective and reliable insulation solutions with higher energy density and improved thermal management.



Voltabox

www.voltabox.ag

Voltabox develops and manufactures advanced lithium ion battery systems with locations in Delbrück/Germany and Texas/USA. As a reliable and experienced partner for modern electro mobility, Voltabox develops and manufactures system-specific solutions – for the automotive and commercial vehicle industries as well as intralogistics, efficiently and flexibly, perfectly designed for the relevant applications, realized from the Voltabox module kits.

Thanks to a high level of automation in robot-based production, Voltabox offers high-performance battery systems with a short development time and maximum quality. As a premium manufacturer for high-performance batteries, Voltabox covers all relevant cell designs and cell chemistries. In addition to customized battery solutions, Voltabox offers standard batteries such as starter and monoblock batteries.



Walter Henrich GmbH

www.walter-henrich-gmbh.de

The middle-class family business **Walter Henrich GmbH** has specialized in the development and production of precisely cold-formed tubular shafts. The Walter Henrich GmbH offers you the following advantages:

- support in the development of new products
- optimization regarding development time and costs through the own manufacturing of samples and prototypes
- use of efficient production technologies for chipless and chipping processing



Winkelmann Powertrain Components GmbH & Co. KG

www.winkelmann-automotive.de

The company „**Winkelmann Powertrain Components**” produce among other things drive elements and driveline components by different non-cutting forming, for example Grob-forming, profiling, deep drawing and other innovative manufacturing processes. The company is subsidiary company of the “Winkelmann Group”, are established suppliers of the automobile industry, construction equipments industry and agriculture industry, and belong to the world market leaders in these markets.



YASA Motors Ltd.

www.yasamotors.com

YASA's compact and lightweight electric motors enable vehicle hybridization and electrification when there is limited powertrain space. YASA is an OEM supplier and designs and manufactures axial-flux e-motors and generators at its volume manufacturing facility in the UK.



ZF Friedrichshafen AG

www.zf.com

ZF is a global leader in driveline and chassis technology as well as active and passive safety technology. The company has a global workforce of around 137,000 with approximately 230 locations in some 40 countries. In 2016, ZF achieved sales of €35.2 billion. ZF annually invests about six percent of its sales in research & development. ZF is one of the largest automotive suppliers worldwide.



Zoerkler Gears GmbH & Co KG

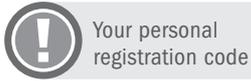
www.zoerkler.at

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From exactly made gears to high quality bevel gears and spur gears offers Zoerkler precisely manufactured gearboxes and drive systems worldwide.

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YOUR VENUE

Estrel Hotel Berlin
 Sonnenallee 225, 12057 Berlin, Germany
 Reservation: +49 (0)30.683122522

In the conference hotel, there is a limited allocation of rooms available at a reduced price. Please arrange the room reservation directly with the hotel quoting the reference "CTI Symposium". In the evening of the first day of the event the hotel cordially invites you to a welcome drink.

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