Home Of The World´s International Transmission & Drive Community

13th International

CTI Symposium

Plus: Transmission Expo

Automotive Transmissions, HEV and EV Drives

Germany | 8–11 December 2014, Berlin

1,800 Delegates Worldwide in 2013 – The Largest TM & Drive Event Series

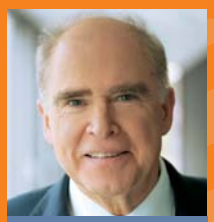
120 Exhibitors @ the Transmission Expo in Berlin

35 % International Participants

>20 Nationalities Meet @ CTI in Berlin

Experts in the Plenum


Bernhard Mattes


Prof. Helmut List


Prof. Dr Herbert Kohler


Uwe Wagner


Terry Nakatsuka


Dr Klaus Badenhausen


Prof. Dr Stefan Pischinger


Prof. Dr Jens Hadler


Dr Robert Plank


Enrico Sedoni

Panel discussion

How will the future drive system look like?


Prof. Dr Ferit Küçükay

Chairman of the CTI Symposium:
Prof. Dr Ferit Küçükay
Director | Institute of Automotive Engineering |
Technical University of Braunschweig

Bernhard Mattes
Chairman | Ford-Werke GmbH

Prof. Helmut List
Chairman and CEO | AVL List GmbH

Prof. Dr Herbert Kohler
Vice President Group Research and Sustainability and
Chief Environmental Officer | Daimler AG

Uwe Wagner
Senior Vice President R&D Automotive |
Member of the Management Board Automotive |
Schaeffler Technologies GmbH & Co. KG

Terry Nakatsuka
CEO | Jatco Ltd.

Dr Klaus Badenhausen
Vice President | Head of Chery Technical Center Shanghai |
Chery Automobile Co., Ltd.

Prof. Dr Stefan Pischinger
Director of the Institute for Combustion Engines |
RWTH Aachen University |
President and Chief Executive Officer | FEV GmbH

Prof. Dr Jens Hadler
General Manager | Automobil-Prüftechnik Landau GmbH

Dr Robert Plank
Chairman of the Board/CEO |
TÜV NORD Mobilität GmbH & Co. KG

Enrico Sedoni
Vice President Driveline Component Product Line |
CNH Industrial

Simultaneous Translation German ◄► English
English Conference Documentation!

German programme available at
www.transmission-symposium.com

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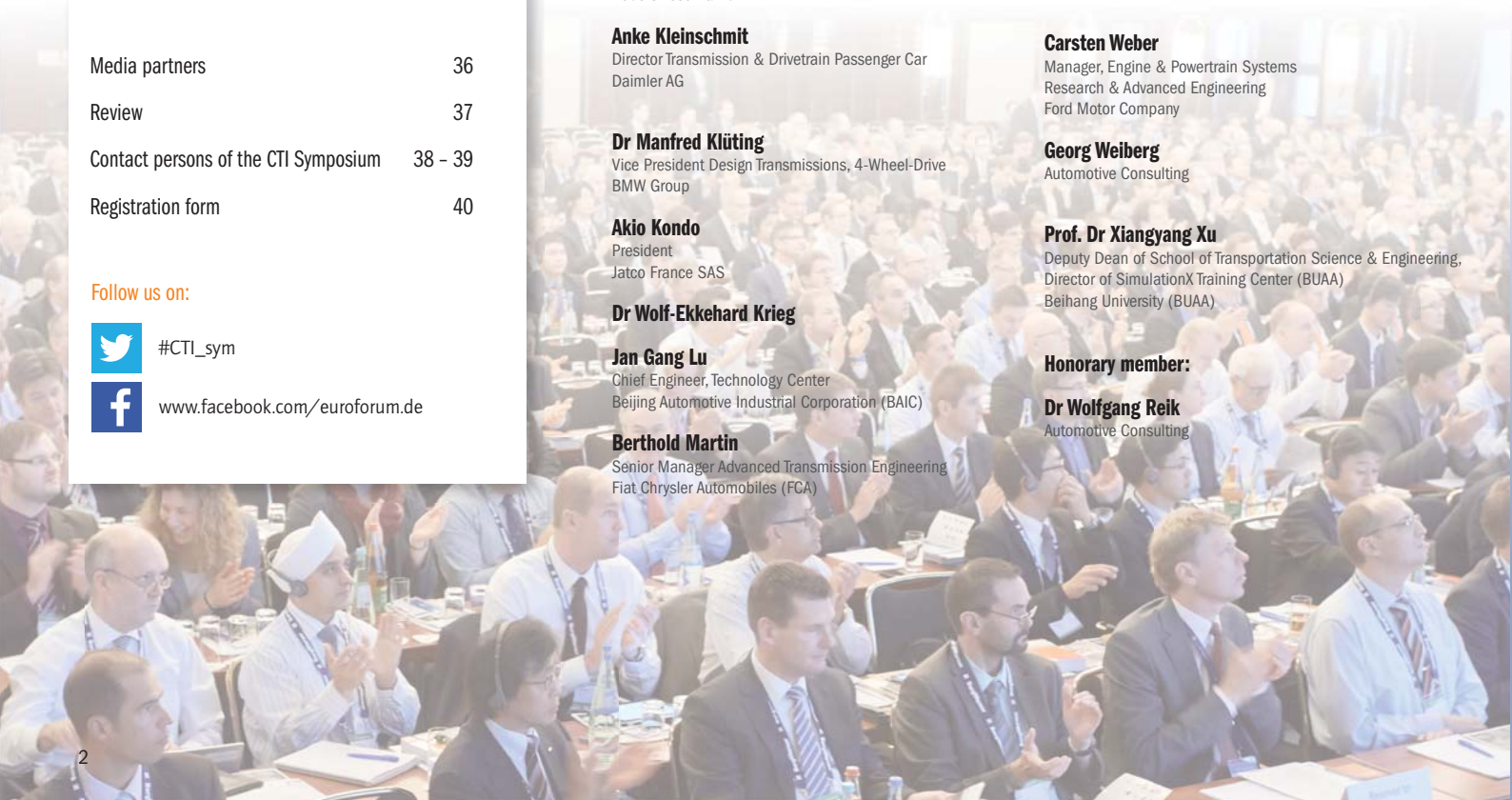


13th CTI Symposium focusing on the diversity of concepts

In the automotive age of globalisation, individualisation, interconnection and efficiency, the competition for the "best" transmission and drive concept has taken on a whole new dimension due to electrification and functional complexity of the drive train.
Drive train and transmission have to be integrated in the overall vehicle concept and interconnected with vehicle, driving environment and driver in such a way that maximises efficiency, comfort and safety. In addition, they have to be cost-efficient, light and compact and, of course, offer advantages in terms of segment and market. Above all, they have to help to meet the tighter CO_2 standards in the near future. Therefore, it is no big surprise that the variety of proposed transmission and drive concepts has shot up. A consolidation is not in sight.

The statutory driving cycles determine energy consumption and CO_2 emissions and, therefore, the costs of the drive concept since electrification is required to meet the future emission standards.
Different concepts at different costs according to need are available: mild hybrids, e.g. with 48V, full hybrids, plug-in hybrids or EVs with or without range extender. Thus, it is more than understandable that the development engineers increasingly focus on the new WLTP (Worldwide Harmonised Light Duty Test Procedure), although the legal constraints are not yet clarified. This particularly applies for the conversion of CO_2 emissions standards from NEDC to WLTP.

Traditionally, the Transmission Symposium covers all important innovations and progress in the field of transmissions, drive trains, components and development methods as well as market-specific requirements and global prospects. This year, we will not only focus on a variety of new **transmission, EV and hybrid drive concepts,** but also on **component-related topics**, which help to optimise the complete drive system:

- Starting and shift elements: how can comfort, dynamics and efficiency be increased?
- NVH and functional safety
- Optimised bearings, lubrication and actuation as needed for better transmission efficiency
- Driveability: Can CVTs enter the European market?
- Optimal dynamics, comfort and efficiency achieved by shifting at the right time
- Impact of the WLTP on transmission and drive train development
- What energy density will batteries have in five or ten years, and what will they cost? What will the infrastructure look like?
- Operating strategy and consumption optimisation based on telematics and new transmission concepts for commercial vehicles

The **"CTI Young Drive Experts Award"** for outstanding student papers and theses in the field of transmission and drive train development is again of special importance this year, true to the motto "the future requires young development engineers".

The new, more extensive conference programme takes account of the above mentioned variety of topics:
105 presentations – plenary presentations, **16 parallel sessions** and **"technology platforms"** – and a **panel discussion.**

The **Transmission Expo,** our "technology market for innovations at your fingertips" with 120 exhibitors this year, has also grown.

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 after the main conference days, the 13th CTI Symposium in Berlin is again an important forum for international transmission and drive experts to exchange opinions and experience and provides a valuable status update.

Last but not least: **the new venue, Hotel Estrel**, the largest conference hotel in Europe, is the perfect location for our "grown" programme.

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

Best regards

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

Supporting Programme

8 December 2014

Introductory Day
Basics and Practice of Automotive Transmissions, Hybrid & Electric Drives

9.00	Registration and hand out of the documents
9.45	Welcome address and introduction by the chairman
11.30	Lunch
12.30	Parallel Sessions: Conventional Drive Train Hybrid and Electric Drives
6.00	End of the introductory day

5.00 – 9.00

Pre-Check-In for the Symposium

Welcome Get Together
Get to know your peers while CTI invites you to a drink.
Generate new business contacts from the very start of the event!
Starting at 9.00 p.m. in the bar of the Estrel Hotel Berlin.

11 December 2014

CTI Test Drive
ADAC Centre of Driving Safety Berlin/Brandenburg

8.30	Departure to Linthe 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 test drive and departure to the Estrel Hotel Berlin
ca. 5.00	Arrival at the hotel

Please be flexible with your return journey!

Limited number of participants!

Main Programme

9 December 2014, Symposium, Day One

7.45	Reception and hand out of the conference documentations Opening of the Transmission Expo
8.30	**Welcome address**
8.50	**Plenary speeches**
11.45	**Panel discussion**
1.00	Lunch
2.45	**Parallel sessions** A: Transmission Concepts: AT, CVT, TVD B: HEV Concepts C: Launch and Shift Elements: Mechanics D: Transmission Components: Actuation, Dog Clutch, NVH E: Oils, Lubrication, Efficiency F: Batteries and Infrastructure G: Commercial Vehicles: Conventional H: Open Technology Forum
6.30	End of the first main day
6.45	Bus shuttle to the evening event

10 December 2014, Symposium, Day Two

8.15	Opening of the Transmission Expo
8.45	**Welcome address**
9.00	**Plenary speeches**
11.40	**6th CTI Young Drive Experts Award**
12.00	Lunch
1.30	**Parallel sessions** I: Transmission Concepts: DCT, AMT, MT, AWD J: HEV, EV, REV, Electric Drives K: Launch and Shift Elements: HEV, Electronics L: Driving Cycles, 48V Technology M: Drivability, Shift Map, Shift Quality, Functional Safety N: E-Motor, Accumulator, KERS O: Commercial Vehicles: HEV, EV, FC P: Open Technology Forum
5.30	**Summary of the Symposium and Outlook on 2015**
6.00	End of the Symposium

1.00 – 5.00

Registration for the CTI Test Drive

Basics and Practice of Automotive Transmissions, Hybrid and Electric Drives

9.00 Reception and hand out of the conference documentations

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

Introductory presentation

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

12.30
Constructive executions I
- Starting devices – clutch, dual-mass flywheel, torque converter
- Transmission concepts (1):
  - Manual transmission (MT) – two and multiple-shaft transmission for front-wheel and standard drive

Florian Schober, Research Associate, Institute of Automotive Engineering, Technische Universität Braunschweig, Germany

1.45 Coffee break

2.15
Constructive executions II
- Transmission concepts (2):
  - Automated manual transmission (AMT) – "add on" and integrated solutions
  - Dual-clutch transmission (DCT) – in production, application, introduced prototypes
  - Automatic transmission (AT) – different gear set arrangements, examples of application
  - Continuously variable transmission (CVT) – layout, chains and belts, driveability
- All-wheel drives

Carl-Philipp Seekamp, Research Associate, Institute of Automotive Engineering, Technische Universität Braunschweig, Germany

3.30 Coffee break

4.00
Drive train management
- Drive train management and operating strategy
  - 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

5.15 Short break
5.30 **Summary of the parallel session: Basics of hybrid and electric drives**
6.00 End of the Introductory Day

Session Hybrid and Electric Drives

12.30
Lithium-ion batteries
- 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 Wolfgang G. Bessler, Professor for Process Simulation, Institute for Energy System Technology, Offenburg University of Applied Sciences, Germany

1.45 Coffee break

2.15
Power electronics for hybrid and electric vehicles
- 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

3.30 Coffee break

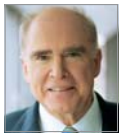
4.00
Electric motors as vehicle drives – design, features, characteristics
- Physical basics
- Design and characteristics of the most important types of electric motors
- Operation of synchronous and induction motors of the frequency converter
- Important technical characteristics

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

5.15 Short break
5.30 **Summary of the parallel session: Basics of conventional drive trains**
6.00 End of the Introductory Day

Bernhard Mattes
Chairman
Ford-Werke GmbH

Bernhard Mattes graduated from the University of Hohenheim/Germany with an MA in Economics. In 1982 he began his professional career at BMW in Munich where he hold several management positions in the dealer operations department and became Director of BMW's German sales organisation. In 1999 Mr Mattes initially joined Ford as a Member of the Board for Marketing and Sales as well as Managing Director of Ford of Germany. Since September 2002 he is Chairman, Ford of Germany and additionally he was appointed Vice President Ford Customer Service Division (FCSD), Ford of Europe in February 2006; in this role he is in charge of the total Aftersales activities of Ford in Europe. In June 2013 Bernhard Mattes was elected president of the American Chamber of Commerce in Germany.



Prof. Helmut List
Chairman and CEO
AVL List GmbH

Prof. Helmut List is Chairman and CEO of AVL List GmbH, the world's largest independent company for development, simulation and testing technology of powertrains (hybrid, combustion engines, transmission, electric drive, batteries and software) for passenger cars, trucks and large engines. He holds a wide range of industrial and public positions on national, European and international levels. Amongst others, he was Vice-Chairman of European Road Transport Research Advisory Council (ERTRAC) and Chairman of the Board of the Technical University Graz. In addition, Prof. List is Honorary Consul of the Republic of Korea for Styria, Honorary Professor at the Universities of Tongji and Jilin in China, SAE Fellow and an Associate Member of the National Academy of Engineering and Technology, USA.

Terry Nakatsuka
CEO
Jatco Ltd.

Teruaki (Terry) Nakatsuka studied Business and Commerce at the Keio University and did his MBA at J.L. Kellogg Graduate School of Management, Northwestern University. He started his professional career at Marubeni Corporation in April 1986. In 1996 he moved to the New York office of Marubani America Corporation where he was responsible for Corporate Planning. From 1999 until 2002 Mr Nakatskua worked for McKinsey & Company Inc.. Afterwards he worked as Director, Business Development at GE Japan. In February 2008 he was appointed General Manager, Japan of GE Aviation and in September 2010 General Manager of the North Asia Pacific Region. In February 2014 Teruaki Nakatsuka started working for Jatco Ltd. as Adviser and is now Board Member, President and CEO since June 2014.

Prof. Dr Jens Hadler
General Manager
Automobil-Prüftechnik Landau GmbH

Prof. Dr Jens Hadler studied Mechanical Engineering at the University of Magdeburg where he also earned his PhD at the Institute of Machine Elements and Design. He gained his first experiences as Research Associate at the University of Magdeburg. In 1996 Prof. Hadler started his professional carrer at Volkswagen AG as Design Engineer. Until 2011 he operated in different positions, lastly as Head of Powertrain Development. Since 2012 Prof. Dr Hadler is General Manager of APL Automobil-Prüftechnik Landau GmbH as well as of the Institute for Automotive Expertise GmbH. Additionally Prof. Dr Jens Hadler took over a honorary professorship at the Technical University of Liberec in 2005. Since 2011 he is also honorary professor at the Technical University of Magdeburg and holding the Chair of Sustainable Automotive Expertise.

Prof. Dr Stefan Pischinger
Director of the Institute for Combustion Engines,
RWTH Aachen University
President and Chief Executive Officer, FEV GmbH

Prof. Dr Stefan Pischinger studied Mechanical Engineering at RWTH Aachen University. From 1985 until 1989, he worked as a Research Assistant at the MIT Sloan Automotive Laboratory until he received his PhD for his work on spark ignition in modern combustion engines. From 1989 until 1997, he held various positions at Daimler-Benz (today: Daimler) working on diesel and gasoline engine development. In his last position at Daimler, Prof. Dr Pischinger was Department Leader Advanced Engineering Diesel Engines and Project Leader for the new Common Rail V8-Diesel engine. Since 1997, he has been Professor at RWTH Aachen University and Director of the Institute for Combustion Engines. At the same time, he was appointed President and Chief Executive Officer of FEV. Since 2010, Prof. Dr Stefan Pischinger is a member of the North Rhine-Westphalian Academy of Sciences, Humanities and Arts.

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

7.45 Reception and hand out of the conference documentations
Opening of the Transmission Expo

8.30 Welcome address by CTI and the chairman

8.50
Improved efficiency by electrification –
Ford electrification strategy for passenger cars
- Development of variety of powertrain systems at Ford: Power of choice
- Different requirements and developments for different markets (NA, EU, China, Asia)
- Outlook into current and future electrification developments at Ford

Bernhard Mattes, Chairman, Ford Werke GmbH, Germany

9.10
The transmission as key for the modern powertrain
- System optimisation as base for the transmission optimisation
- Aligned development of transmission and engine concepts, e. g. common calibration
- Innovative methods for transmission hardware and software development
- Innovative transmission concepts

Prof. Helmut List, Chairman and CEO, AVL List GmbH, Austria

9.30
JATCO's mission towards 2020
- Global transformation in transportation
- What changes transmission can make
- JATCO's vision as a front-runner

Terry Nakatsuka, CEO, Jatco Ltd., Japan

9.50
Contribution of the transmission to the "zero-impact-emission-powertrain"
- Aspects of mobility
- Requirements for the powertrain and the modularity
- Contribution of the transmission to the drive train optimisation

Prof. Dr Jens Hadler, Managing Director, APL Group, Germany

10.10
Transmission systems for future powertrains – A market and vehicle specific challenge
- Requirements of global markets
- Trends on engine side
- Simulation results of new emission cycles
- Solutions for transmission systems

Prof. Dr Stefan Pischinger, President and CEO, FEV GmbH, Germany

10.30 Questions to the speakers and discussion
11.00 Coffee break and visit to the Transmission Expo

11.45 **Panel discussion**
How will the future drive system look like?
- More gears vs. electrification
- Connected drive
- Autonomous driving
- E-mobility

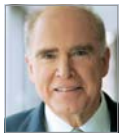
Moderators:

Ulrich Walter
Moderator

Rolf Najork
COO, Heraeus Holding GmbH, Germany

Panelists:

Bernhard Mattes



Prof. Helmut List

Terry Nakatsuka

Prof. Dr Jens Hadler

Prof. Dr Stefan Pischinger

Enrico Sedoni
Vice President Driveline Component Product Line, CNH Industrial, Italy

Live-Poll
Take an active part and vote live to questions around the topic of the panel discussion. Get immediate and representative results from several hundreds of participants!

1.00 Lunch and visit to the Transmission Expo

SESSION A
Transmission Concepts: AT, CVT, TVD

2.45 A1

The modular 9G-TRONIC automatic transmission and advantages in Mercedes-Benz vehicles

- Modular transmission concept
- Adaptation to different engines and vehicles
- Production concept
- Improvements in fuel consumption and comfort

Dr Christoph Dörr, Senior Manager Automatic Transmissions Projects, Daimler AG, Germany

3.15 A2

GM's third generation of 6-speed automatic transmissions (GF6)

- Increased number of gears – Or increased efficiency?
- Evolution of a successful high–volume transmission
- Fuel consumption reduction with introduction of a binary vane pump
- Flexible integration of stop/start-technology due to external accumulator concept

Simon Panek, Application Engineer, GMPT Transmission Engineering Europe, Adam Opel AG, Germany

3.45 A3

Future ICE & CVT – Competitive or complementary technologies?

- Future ICE technologies boosting low end torque and extending efficient operating range
- CVT renaissance due to improved efficiencies and wider ratio spreads
- Synergistic technologies – Future ICE and CVT complements or alternatives?

Dr Stephen Jones, Engineering and Technology Powertrain Systems, AVL List GmbH, Austria

SESSION B
HEV Concepts

2.45 B1

New approach to design a hybrid drive train

- Overview of the existing hybrid drive trains
- Introduction of the approach
- Detail of the criteria used
- Example on an electrical hybrid drive train

Dr Pierre-Emmanuel Dumouchel, Gearbox and Hybrid Functional Architect, PSA Peugeot Citroën, France

3.15 B2

Real world performance of Chevrolet Volt

- Background
- Motivation for Chevy Volt
- Customer options and expected behaviour
- Volt customer real world behaviour
- Implications and conclusions

Roland Matthe, GM Technical Fellow Global Battery Systems, Manager Electrification Architecture, Adam Opel AG, Germany and **V. Prasad Atluri,** Senior Researcher, General Motors Research & Development, USA

3.45 B3

7-speed power split hybrid transmission

- Innovative hybrid transmission concept
- Cost-effective 7-speed hybrid transmission
- Dog clutch elements replacing synchronisers
- Omission of the launch element

Dr Mathias Lutz, Head of System Analysis and Simulation, hofer pdc GmbH, Germany

4.15 Coffee break and visit to the Transmission Expo

5.00 A4

Two mode planetary CVT prototype in a rear drive C-class car

- A new CVT architecture enabled by continuously variable planetary technology
- Design and development progress on a rear wheel drive, high performance CVT
- A novel two mode transmission with CVT driving characteristics

Patrick Sexton, Senior Program Manager, VariGlide Light Vehicle Applications, Dana Holding Corporation, USA

5.30 A5

Test and simulation results of a RotorCVT in a small passenger vehicle

- Modeling of one-way clutches in high frequency lock/unlock cycles
- Modeling of RotorCVT
- Simulation of RotorCVT drive line
- Test vehicle test results vs. simulation

Dr Jan Naude, Managing Director, Varibox CVT Technologies, South Africa

6.00 A6

The torque vectoring differential in the Lexus RC F

- Torque vectoring differential on the rear axle of a 450+ bhp Lexus sports coupe
- Enables anyone to corner at will, like a highly-skilled driver
- Three operating modes ("standard", "slalom" and "track")

Raf Schuermans, Principal Project Manager – Drivetrain Design, Toyota Motor Europe, Belgium

5.00 B4

9-speed DCT for front engine and front drive hybrid vehicle

- Compact package size of 9-speed DCT same as 7 speed DCT, and suitable for FF vehicle
- Commonality of parts on 9-speed DCT and 9-speed HEV
- High drive train efficiency on high gear ratios
- Possibility of easy modification to FR layout

Wataru Ishimaru, Executive Advisor and **Kazuyoshi Hiraiwa,** President, FINEMECH Co. Ltd, Japan

5.30 B5

A modular and self-sustainable parallel hybrid transmission

- Transmission concept for passenger cars and minivans (HEVs & EVs)
- Transmission/drive line analysis and simulation
- Modular, scalable design of full-parallel hybrid transmission
- Efficient cooperation of IC engine, electric motor and transmission

Atul Parab, Business Development Manager, Torque Auto Technologies Pvt. Ltd., India

6.00 B6

12+12V architecture to reduce CO_2 emission through innovative components and functionalities

- 12V board net evolution to a 12+12V
- Energy recovery and electric machine torque assist
- Electric boosting assistance
- Coasting

Dr Olivier Coppin, R&D Innovation Director, Valeo, France

6.30 End of the first main day | **6.45 Start of the bus shuttle to the evening event**

SESSION C
Launch and Shift Elements: Mechanics

2.45 C1

The road towards automatisation: Challenges of coupling and dampening function

- Automated manual transmissions
- Dry and wet dual clutch technology
- Torque converter

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

3.15 C2

The future of the torque converter – There is still potential

- State-of-the-art technology
- Customer requirements and potentials
- Alternative starting devices HCC and HCN – An evaluation
- Evaluation of the starting elements for hybridisation
- Prospects

Patrick Lindemann, Vice President Product Development Transmission Technology, Schaeffler Group North America, USA

3.45 C3

Development of multi-stage damper for automatic transmission

- Investigation of the mechanism of subharmonic vibration
- Effect of damper stiffness setting and damping
- Design method for avoiding subharmonic vibration

Yoichi Oi, Team Leader of Core Component Department, AISIN AW CO., LTD., Japan

SESSION D
Transmission Components: Actuation, Dog Clutch, NVH

2.45 D1

On-demand actuation concept for a new DCT generation with wet clutches

- Advantages of on-demand actuation systems
- Flexible and modular actuator positioning
- Simple and robust layout due to less components

Reiner Castan, Manager Actuation Systems, GETRAG Corporate Group, Germany

3.15 D2

Energy efficient actuation unit for dual-clutch transmissions

- Efficiency comparison of DCT actuation units
- Hydraulic circuit, design and simulation
- Presentation of test validation

Dr Mirko Leesch, Team Manager Transmission Hydraulics and Actuation, IAV GmbH, Germany

3.45 D3

Smoothness of Maybach dog clutch shift in the automotive gearbox

- Maybach dog clutch for automotive gearbox
- External synchronisation
- Description of inertia gearshift test stand
- Results and comparison of gearshift smoothness

Dr Gabriela Achtenová, Associate Professor, Czech Technical University in Prague, Czech Republic

4.15 Coffee break and visit to the Transmission Expo

5.00 C4

Synchronisers follow automatisation in DCTs and e-drives

- Installation space as key factor for synchronisers
- Increase of power density in synchronisers
- Co-operation of synchronisation and control system

Ottmar Back, Head of Product Management, HOERBIGER Antriebstechnik GmbH, Germany

5.30 C5

Role of simulations in wet clutch systems development for predicting durability and performance

- Simulations in wet clutch development
- Clutch temperature simulation
- Clutch life-time prediction model

Viren Saxena, Advanced Product Engineering DTCS, BorgWarner Transmission Systems, Germany

6.00 C6

Methods of system identification applied for adaption of clutch characteristics in practice

- Automated friction clutches in powertrain
- Adaptive clutch control
- Closed-loop function tests
- Analysis of drive tests

Alex Tarasow, Development Engineer, IAV GmbH, Germany

5.00 D4

Optimisation of drive trains with cylinder deactivation for 3-, 5- and 6-cylinder engines

- Requirements with different number of cylinders
- Rolling cylinder deactivation RCD 1.5 and RCD 2.5
- Sequential cylinder deactivation modes SCD with 6 cylinder
- Damper concepts for cylinder deactivations

Dr Hartmut Faust, Senior Vice President R&D Transmission Systems, LuK GmbH & Co. KG, Germany

5.30 D5

The *"silent success"* of the pushbelt CVT

- Visualisation noise behaviour pushbelt CVT by PNAH
- Modeling and validation of the dynamic behaviour of the CVT
- Design solution for CVT noise optimisation

Eric Van der Noll, Product Engineer, Bosch Transmission Technology B.V., The Netherlands

6.00 D6

Design of gearings with low excitation level for electric vehicles

- Design of transmissions with low excitation level
- Vibration analysis on the gearbox of an electric vehicle
- Parameter to evaluate the vibration characteristics

Philipp Gwinner, Research Associate, Gear Research Centre (FZG), Technische Universität München, Germany

6.30 End of the first main day | **6.45 Start of the bus shuttle to the evening event**

SESSION E
Oils, Lubrication, Efficiency

2.45 E1
Lubrication investigation with near-series, fully functional gear sets produced by 3D printing
- New prototyping methods for manufacturing gear sets
- Close-to-production gear sets for initial lubrication tests
- Meaningful results in early stages of development

Marc Kluge, Manager Design Drivetrain and **Jörg Aniol,** Senior Engineer Transmission, Porsche Engineering Services GmbH, Germany

3.15 E2
High-performance ATF on basis of the Gas-to-Liquid (GtL) base oil technology
- Formulation of high-performance lubricants based on GtL
- Influence of these base oils on the product characteristics of automatic transmission fluids (ATF)
- Direct comparison with conventional Group III and Group IV base oils

Dr Torsten Murr, Technology Manager – Transmission Fluids, Projects & Technology, Shell Global Solutions GmbH, Germany and **Dr Rainer Freise,** Research and Development ZF Group, Lubricants and Plastics, ZF Friedrichshafen AG, Germany

3.45 E3
Lubrication system efficiency
- The demand for lubrication efficiency
- Design features for improving lubrication efficiency in transmissions
- Defining the composition of transmission lubricant
- The benefits of addressing lubrication management from the outset of the design process

Sam Thompson, Design Engineer, Drive System Design, UK

5.00 E4
Optimising the gearbox efficiency rate by rolling bearings
- Face to face versus located/non-located bearing arrangements
- Impact of preload and internal geometry based on the NEDC
- Long bearing service life and energy efficiency – A conflict?
- Possible CO_2-reduction potentials based on the NEDC

Thomas M. Wolf, Manager Application Engineering, SKF GmbH, Germany

5.30 E5
Influence of lubricant on friction and deterioration behaviour of synchronisers with carbon friction linings
- Carbon friction linings in synchronisers
- Influence of lubricant and load on durability
- Characterisation of deterioration caused by lubricant
- Test method for lubricants

Robert Acuner, Research Associate, Gear Research Centre (FZG), Technische Universität München, Germany

6.00 E6
Efficient, fast and precise hydraulics combined in one system for DCT applications
- Minimisation of losses in hydraulic components
- Optimized pressure and flow conditions in each driving situation
- Reduced drag torque and optimised clutch cooling flow

Jannick De Landtsheere, Development Engineer Hydraulics, TREMEC, USA

SESSION F
Batteries and Infrastructure

2.45 F1
Next generation batteries: What comes after li-ion batteries?
- Li-S, Me-O_2 and conversion – Understanding alternative battery types
- Potentials, challenges and system impacts

Prof. Dr Ulrike Krewer, Director, Institute of Energy and Process Systems Engineering, Technische Universität Braunschweig, Germany

3.15 F2
Intelligent systems approach for optimising the range of electric vehicles
- Overview about the system components
- Interaction driving style with traffic media
- Infrastructure foresight

Hartmut Schneeweiß, Director Development Motors & Test, BU HEV, Continental AG, Germany

3.45 F3
SafeBatt – More improvements of the safety of lithium-ion batteries for propulsion of electric cars
- New electrolyte-additives and cathode materials improve safety
- Sensors for early-time detection and avoidance
- Modelling of aging and safety
- What-if-measurements substitute pass-fail-tests

Detlef Hoffmann, Business Development Manager, SGS Germany GmbH

4.15 Coffee break and visit to the Transmission Expo

5.00 F4
Lithium-Ion high voltage batteries
- Popular safety myths:
  - Battery safety can be determined at cell level
  - Lithium iron phosphate (LIP) is intrinsically safe
  - HF is most dangerous component in venting gas
  - Do not use water to fight a battery fire

Dr Markus Meiler, Manager Product Safety, Deutsche ACCUmotive GmbH & Co. KG, Germany

5.30 F5
Recycling of lithium-ion-batteries
- Safe disassembly of lithium-ion-battery systems
- Mechanical breakdown and conditioning of battery cells
- Recovery of resources
- Economic and environmental potential

Prof. Dr Arno Kwade, Head of Institute, Institute for Particle Technology, Technische Universität Braunschweig, Germany

6.00 F6
Opportunities and limitation of current charging infrastructure
- Requirements for public and private charging infrastructure
- Conductive charging for fleets operator
- Inductive charging in public transport

Prof. Dr Michael Kurrat, Executive Director, Institute for High Voltage Technology and Electrical Energy Installations – elenia, Technische Universität Braunschweig, Germany

6.30 End of the first main day | **6.45 Start of the bus shuttle to the evening event**

SESSION G
Commercial Vehicles: Conventional

2.45 G1

DCTs for heavy duty applications

- New DCT solutions on the market for commercial heavy duty on- and off-road
- Advantages of DCTs in heavy duty applications compared to AT and AMT
- Modular wet clutch DCT transmission family for heavy duty on-road and off-road applications

Dr Thomas Hackl, Vice President Commercial Powertrain Systems Offroad and Tractors, AVL, Austria

3.15 G2

Development of a novel CVT for medium duty trucks

- Concept and design of the new innovative transmission
- Analysis of an efficient servo-hydraulic actuation system
- Presentation of test bench and vehicle test results

Loek Marquenie, Project Leader, R&D Engineer, Gear Chain Industrial B.V., The Netherlands

3.45 G3

Mechanical architecture and control system for a modern agricultural tractor transmission

- New generation hydro mechanical CVTs for agricultural tractors
- General architecture, layout and transmission control standardisation
- Control system development and automated testing method best practices
- New CNHi T8 tractor transmission

Enrico Sedoni, Vice President Driveline Component Product Line, CNH Industrial, Italy

5.00 G4

Reduction of CO_2 emissions from heavy duty vehicles: The new European simulation tool VECTO

- Overview: CO_2 emissions from heavy duty vehicles, worldwide regulations of CO_2 emissions from HDV
- Overview VECTO: Landmark in the simulation of specific vehicles
- Outlook: The integrated approach as key to succeed

Dr Manfred Schuckert, Senior Manager EA/R, Daimler AG, Germany

5.30 G5

Use of telemetrics for predictive maintenance of the transmission

- Customer benefit of preventive transmission overhaul
- Data mining and data evaluation
- Realization based on modern communication media

Dr Robert Müller, Vice President Aftermarket Development & Regional Support, Voith Turbo GmbH & Co. KG, Germany

6.00 G6

Transmission development in India

- Special requirements
- Trends on Indian market
- Manufacturing trends in India

Adiga Ganesh, Deputy General Manager Transmission Design, Mahindra & Mahindra Ltd., India

SESSION H
Open Technology Forum

2.45 H1

Design approach for transmission control solenoids

- Typical requirements for solenoids
- Introduction to automated construction procedure
- Consideration of constructive boundary conditions
- Integration into engineering processes

Fabian Jonas, Director Engineering Solenoids, Transmission Control, Robert Bosch GmbH, Germany

3.15 H2

Automatic efficiency measurements

- General procedure
- Method of measuring
- Special torque measurement technique
- Handling of zero point
- Determining of start temperature for the measurements
- Discussion of uncertainty of the results

Zeno Nöthig, Key Account Manager, GIF - Gesellschaft für Industrieforschung mbH, Germany

3.45 H3

Modular testing software: software and diagnostics of transmission testing – From start-up to high-speed

- Testing software for all types of facilities and transmission designs
- Interfaces to transmission and measuring systems
- Simple editing of testing procedures with drag & drop
- The same software for R&D, pilot and mass production

Ralph Heckmann, Head of Technical Sales, teamtechnik Maschinen und Anlagen GmbH, Germany

4.15 Coffee break and visit to the Transmission Expo

5.00 H4

Software can make the difference in DCT applications

- Driveline experience „à la carte“
- Fast and precise torque request realisation
- Clutch torque management joins forces with engine control

Nico De Visscher, Controls Development Engineer, TREMEC, USA

5.30 H5

CVT technology contributing to the enhancement of HEV performance

- Optimised CVT shift control
- Optimised CVT control matching to the battery state of charge
- Improvement of regeneration efficiency by CVT shift control
- Optimisation of pulley stiffness to obtain both increased torque capacity and higher efficiency

Kenichi Watanabe, Design Engineer, Jatco Ltd., Japan

6.00 H6

Practical use of CAE for performance design for new CVT

- Aim of practical use of CAE for performance design
- Practical use of systems engineering method
- Practical use of CAE on hydraulic system design

Kyoji Fujino, General Manager, Jatco Ltd., Japan

6.30 End of the first main day | **6.45 Start of the bus shuttle to the evening event**

CTI Networking Night

9 December 2014

Drink, dine and be entertained – All participants, speakers, exhibitors and sponsors are invited to the annual CTI Networking Night, an evening full of highlights. An evening of culinary surprises, a top-class location and an exciting social programme await you in the heart of Berlin. Discuss the topics of the day in a relaxed atmosphere or make new contacts at the CTI Networking Night – A great opportunity to get together again!

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6th CTI Young Drive Experts Award

for Students, Graduates and PhD Students

The award addresses students and graduates of all technical disciplines in the field of automotive powertrain engineering.

Ambitious students and young engineers should apply for the award with a meaningful short version of their extraordinary BSc and MSc, Diploma or PhD theses which points out the innovation character of the work.

Of relevance for the evaluation are as well scientific aspects, industrial feasibility as well as sustainability.

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Free participation and presentation of the work at the 13th CTI Symposium!

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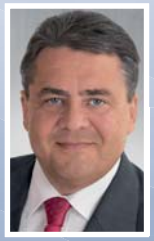

Federal Minister for Economic Affairs and Energy Sigmar Gabriel

Federal Ministry for Economic Affairs and Energy

When they read my name out at the CTI Young Drive Experts Award, I could hardly believe it! A few moments later I was up on stage in front of about 1,000 specialists, being honoured for my work. During the Symposium and at the evening event, I got talking to lots of attendees about my project. Winning the CTI Young Drive Experts Award has confirmed my belief that I'm on the right track. To anyone who has written a student paper or dissertation, all I can say is: enter!

Mark Schudeleit, today Research Associate, Institute of Automotive Engineering, Technische Universität Braunschweig, Germany

Prof. Dr Herbert Kohler
Vice President Group Research and Sustainability
Chief Environmental Officer
Daimler AG

Prof. Dr Herbert Kohler joined what was then Daimler-Benz AG in 1976, working initially in the production plant planning area. He gained his doctorate from the University of Stuttgart in 1982. It was under his leadership that the centre for "Environment, Technology and Traffic" was established in 1992. In 1993 he moved to the Mercedes-Benz Development division, taking on responsibility for Strategic Product Planning, a role which he held until 1999. He was made an Honorary Professor of the University of Stuttgart in 1998. Following a series of roles in passenger car product management/sales and marketing, Prof. Dr Kohler was appointed Director of Vehicle Body and Drive Systems Research in October 2000. From August 2006 until March 2009 he headed up the newly created Group Research and Advance Development unit for Vehicle Body and Drive Systems at Daimler AG. From April 2009 until April 2012 he was the head of a new "E-Drive and Future Mobility" directorate within the Research and Advance Development division, the area responsible, amongst other things, for the development of battery-electric and fuel-cell drive systems. Prof. Dr Kohler has been Director of the newly created Research and Advance Development division for the Daimler Group since May 2012. Since March 2002, Prof. Dr Kohler has also held the position of Chief Environmental Officer for Daimler AG.

Uwe Wagner
Senior Vice President R&D Automotive
Member of the Management Board Automotive
Schaeffler Technologies GmbH & Co. KG

Uwe Wagner studied Mechanical Engineering at the University of Stuttgart and graduated as degreed engineer in 1992. In 1993 he started working for LuK in the Torque Converter development department and took over the department management in 1995. From 1998 until 2003 Mr Wagner was Manager CVT Chain Development and Production. Afterwards he was Manager Productline Automated Gearbox and Double Clutches. In 2007 he was appointed to be Vice President of the business unit Transmission Technologies. Since January 2014 Mr Wagner is Senior Vice President R&D Automotive and Member of the Management Board Automotive.

Dr Klaus Badenhausen
Vice President, Head of Chery Technical Center Shanghai
Chery Automobile Co., Ltd., China

Dr Klaus Badenhausen studied mechanical engineering at the Technische Universität Braunschweig and did his PhD at the University of Kassel in the field of lightweight structures. He started his career at MBB/ERNO GmbH where he worked as a Simulation Engineer "Space Flight Structures". In 1987, he joined Daimler-Benz AG and held different positions until 1999: first as Simulation Engineer "Engine/Drivetrain Vibrations", then as Head of Department "Overall Vehicle Testing C, CLK-Class". In 1999, Dr Badenhausen started working at smart gmbh as Division Manager "B Segment Vehicles", later as Manager "Engineering and Design". He joined the Daimler AG, Mercedes Car Group, again in 2007 where he held the position of Chief Engineer "A/B-Class and smart". Afterwards, he was Vice President "Engineering" at Magna Steyr AG. Since 2012, Dr Badenhausen is Vice President and Manager "Chery Technical Center Shanghai" at Chery Automobile Co., Ltd.

Dr Robert Plank
Chairman of the Board/CEO
TÜV NORD Mobilität GmbH & Co. KG

Dr Robert Plank studied at the Friedrich Alexander University in Erlangen-Nuremberg where he obtained his doctorate in engineering. He started his professional career with Audi AG in 1997, where he worked as a Deputy Manager within vehicle development as an expert for durability of chassis components. In 2000 he joined INA Schaeffler KG, where he took over a management position in corporate testing. In 2004 he switched to FAG, being globally responsible for wheel module development and supporting the integration of FAG automotive into the Schaeffler Group. Returning back to headquarter in 2007 the strategic build up of a corporate research division followed. In 2009 he became Vice President for Corporate Engineering, being globally in charge for all engineering services and tool development within the group. Key achievements during his tenure were the evolution and global alignment of the strategic roadmap for engineering and the set-up of vehicle engineering within the system house e-mobility. From 2010 to 2013 he acted as well as Managing Director for IFT, an engineering service provider for combustion engines. In October 2013 Dr Robert Plank has been appointed as Chairman of the Board of Directors at TÜV NORD Mobility in Hannover. Beside enhancing the international business for type approval, periodical technical inspection and vehicle assessment he is engaged in new technologies and their influence on the technical inspection and certification business within automotive industry.

Chairman: Prof. Dr Ferit Küçükay

8.15 Reception and opening of the Transmission Expo

8.45 Welcome address

9.00
Efficient and connected powertrain – Challenges and potentials

Prof. Dr Herbert Kohler,
Vice President Group Research and Sustainability,
Chief Environmental Officer,
Daimler AG, Germany

9.20
The transmission as a key for the electrification of the powertrain
- Optimisation of the conventional powertrain
- Hybridisation as transition towards electromobility
- New developments in the area of engine/transmission interface

Uwe Wagner, Senior Vice President R&D Automotive, Member of the Management Board Automotive, Schaeffler Technologies GmbH & Co. KG

9.40 Questions to the speakers and discussion

9.55 Coffee break and visit to the Transmission Expo

10.40
China's automotive industry – A time-lapse image of development
- A short view backwards and forward
- Challenges and changes for the Chinese OEMs and their suppliers
- Strategic approaches to increase the competitiveness (in the example of Chery)

Dr Klaus Badenhausen,
Vice President, Head of Chery Technical Center Shanghai,
Chery Automobile Co., Ltd., China

11.00
Regulation, harmonisation, requirement engineering – Contradiction or complement?
- Infulence on Transmissions
- WLTP vs. NEDC
- Real driving emissions
- OBD

Dr Robert Plank,
Chairman of the Board/CEO,
TÜV NORD Mobilität GmbH & Co. KG, Germany

11.20 Questions to the speakers and discussion

11.40

6th CTI Young Drive Experts Award
for Students, Graduates and PhD Students

Presentation of the winners

The authors who submitted the best theses in the field of transmission and drive technology selected by the expert committee will be introduced. The awarded theses will also be presented as poster displays.

Detailed information:
www.transmission-symposium.com/en/award

12.00 Lunch and visit to the Transmission Expo

SESSION I
Transmission Concepts: DCT, AMT, MT, AWD

1.30 I1

The new 7-speed DCT for Changan's C-class vehicle in China – A new standard!

- Changan's first clean sheet DCT
- Integration and assessment of new and proven technologies
- Changan's approach to designing a DCT driven by key China requirements
- Completing the design circle with test data correlation

Mark Ingram, Chief Engineer, Changan UK R&D Ltd, UK

2.00 I2

Dual clutch transmission for motorcycles

- Background of development of DCT for motorcycles
- Unique technologies of DCT for motorcycles
- Future directions of enhanced features of DCT for motorcycle

Tensei Hayashi, Assistant Chief Engineer, Honda R&D Co., Ltd., Japan

2.30 I3

MCA – An AT with an unusual concept: Simple, robust, cost-conscious

- No torque interruption (or reduction) – One dry clutch only
- High efficiency with standard transmission technology
- Perfect automatic shift performance

Günther Priwitzer, Chief Engineer, Driveline and Transmission Systems, Ricardo Deutschland GmbH, Germany

3.45 I4

The new automated 5-speed manual transmission by Opel

- AMT technology – Pros and cons
- Design attributes and new features
- New AMT benchmark in drive and shift quality
- Development methods – Utilisation of simulation and benchmark tools

Konstantin Baron, Assistant Chief Engineer, Adam Opel AG, Germany

4.15 I5

The new "small" 6-speed manual transmission for general motors

- New development of small 6-speed manual transmission
- Benchmark for efficiency, shift ability and cost
- Virtual development and optimisation

Ulrich Kretzschmar, Global Chief Engineer and Global Program Manager Small Manual Transmissions, Adam Opel AG, Germany

4.45 I6

Concept and development of a two-speed transfer case

- Concept and gearset structure
- Mechanical design
- Transmission losses – Sources and minimisation
- Prototypes and future prospect

Paul R. Oberaigner, CTO, Oberaigner Powertrain GmbH, Austria

5.30

Summary of the Symposium and Outlook on 2015

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

SESSION J
HEV, EV, REV, Electric Drives

1.30 J1

Integration of a plug-in hybrid drive into the modular transverse matrix of the MQB of Volkswagen

- Introduction to the MQB
- Presentation of Volkswagen PHEV technology
- Integration into the MQB/processes/systems

Eric Brée, Head of Powertrain Concept Development, Volkswagen AG, Germany

2.00 J2

Plug-in hybrid: ZF's next step in e-mobility

- The new plug-in hybrid transmission 8P75PH
- Comfort and agility like 8HP
- Modular kit approach for cost optimisation
- Ready for series production: Pure electric driving over complete driving cycles

Dr Stefan Kilian, Senior Manager Car Powertrain Technology, ZF Friedrichshafen AG, Germany

2.30 J3

A single hybrid powertrain for HEVs, PHEVs and E-REVs

- The concept: A ravigneaux-based architecture
- Operating modes: 2 EVTs, 2 electric and 4 ICE gears
- Examples of configurations and performance

Matthieu Rihn, New Projects and Intellectual Property Manager, Punch Powerglide Strasbourg, France

3.45 J4

Next generation development – MSYS 3-speed EV transmission

- Power consumption test results (comparison against current technology)
- Developments to power-shift system
- Gear shift evaluation in vehicle
- Extension of the technology into PHEV application

Alex Tylee-Birdsall, Managing Director, Evolute Drives Ltd, UK

4.15 J5

Electric drive system improvement through e-motor design, power inverter and control algorithm

- E-drive system performance requirements at electric powertrain
- Impact of e-motor design on efficiency, power density and NVH
- Impact of power electronics inverter on system capacity and performance
- Impact of mechanical gear, e-motor winding re-configuration etc. on system

Prof. Dr William Cai, CTO, Jing-Jin Electric, China

4.45 J6

Wheel hub drives – Challenges and potentials on the road to mass-production

- Package – The brake clash
- Dimensioning
- Functional integration, universal interface
- Cost-saving production technology

Dennis Bartels, Project Manager, Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM, Germany

5.30

Summary of the Symposium and Outlook on 2015

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

3.00 Coffee break and visit to the Transmission Expo

5.15 Short break, change to plenum

6.00 End of the Symposium

SESSION K
Launch and Shift Elements: HEV, Electronics

1.30 K1

E-clutch – Emission reduction and enhanced comfort achievements at lowest effort

- Clutch actuation automation
- CO_2 reduction
- Driving comfort

Dr Roland Welter, Vice President Product Line Total Clutch System, Schaeffler, Germany

2.00 K2

Manual transmissions with e-clutch – A cost-benefit consideration

- Manual transmissions with e-clutch – benefit and applications
- Variants of e-clutch integration
- Cost-benefit consideration with dry and wet clutches

Dr Frank Casimir, Director MT Platform, GETRAG FORD Transmission GmbH, Germany

2.30 K3

Design methods for hybrid disconnect clutches

- Performance and functional requirements for hybrid systems
- Package constraints facing hybrid disconnect clutch design
- Torsional and control demands for hybrid disconnect clutches
- Design methods for hybrid disconnect clutches

Jason Allen, Senior Engineer, Drive System Design Ltd, UK

3.45 K4

Engine start/stop without accumulator or auxiliary pump

- Transmission requirement for engine start/stop
- Normally-engaged forward clutch design
- Vehicle validation and failure mode analysis

Dongxu Li, Senior Researcher, General Motors Global Research and Development, USA

4.15 K5

Crankshaft integrated starter generator – Magna Powertrain's modular stand-alone unit

- Structure of the modular CISG systems
- Development of the dry disconnect clutch with actuator
- Geometric and thermal integration of the module

Daniel Prix, Engineering Innovation Global, MAGNA Powertrain AG & Co KG, Austria

4.45 K6

Robust 3-element gear shift for electrified powertrains

- Simultaneous 3-element gear shifting
- Manipulation of transmission kinetics
- Robust closed loop shift control strategy

Muammer Yolga, Lead Engineer Transmission, Software and Electronics, AVL List GmbH, Austria

5.30

Summary of the Symposium and Outlook on 2015

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

SESSION L
Driving Cycles, 48V Technology

1.30 L1

The impact of the test procedure WLTP on the design of electric vehicles

- Optimisation of efficiency in charge depleting
- Optimisation of control strategy in charge sustaining
- Comparison of WLTP and costumer requirements

Peter Kropf, Senior Engineer, BMW AG, Germany

2.00 L2

WLTP vs. NEDC – what will change for transmission developers?

- New European Driving Cycle (NEDC)
- Worldwide harmonised light duty test procedure (WLTP)
- Gear shift points and CO_2 emissions in the driving cycle

Helge Schmidt, Manager, Institute for Vehicle Technology and Mobility, TÜV Nord Mobilität GmbH & Co. KG, Germany

2.30 L3

Scalable 48V semiconductor solutions for electrical drive train and DCDC converter

- Motivation for 48V
- Challenges for the semiconductor industry
- Exemplary prototype solutions for inverter and DCDC converter

Michael Scheffer, Field Application Engineer, Infineon Technologies AG, Germany

3.45 L4

48V electric axle-drive for electric maneuvering, recuperation, and torque vectoring

- 48V entry level electrification
- Electric axle drive
- Electromechanical torque vectoring
- Electric all wheel drive

Martin Sattler, Vice President E-Mobility, Schaeffler Technologies GmbH & Co KG, Germany

4.15 L5

Pulley decoupler: Enabler for 48V belt-start-stop

- Downsizing, effect on FEAD
- A/C at standstill
- Reduction in fuel consumption/CO_2
- Shiftable pulley

Dr Andreas Stuffer, Project Manager, LuK GmbH & Co. KG, Germany

4.45 L6

Comparison between air- and water-cooled 48V BSG applications

- Overview 48V system components
- Application conditions for 48V BSG's
- Product optimisation for every use case
- Outlook and trends

Hartmut Schneeweiß, Director Development Motors & Test, BU HEV, Continental, Germany

5.30

Summary of the Symposium and Outlook on 2015

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

3.00 Coffee break and visit to the Transmission Expo

5.15 Short break, change to plenum

6.00 End of the Symposium

SESSION M
Drivability, Shift Map, Shift Quality, Functional Safety

1.30 M1

Development to improve the drivability of CVT vehicle

- Features and challenges of CVT in the European market
- Efforts of the CVT drivability improvement of Nissan
- Example of our activity (1.6L diesel and new CVT in Qashqai)

Hiroaki Katase, Senior Engineer, Nissan Motor Co., Ltd., Japan

2.00 M2

Gear shift map optimisation for a dual clutch transmission

- Gear shift optimisation
- CO_2 emissions reduction
- Genetic algorithm

Thomas Holdstock, Driveline Design & Development Engineer, SAIC Motor UK Technical Centre Limited, UK

2.30 M3

Approaches to objective shift scheduling analysis

- Determining the ideal shift point given the conflict of interest between drivability and fuel consumption
- Objectivation possibilities in the very subjective field "drivability in respect to shift scheduling"
- Offline mature pre-calibration, with focus on drivability and fuel consumption

Falko Pflüger, Calibration Engineer Transmission & Hybrid, AVL List GmbH, Austria

3.45 M4

Model in the loop (MIL) for shift quality evaluation

- Shift quality analysis using simulation
- Engine model details and its impact on shift quality measures
- Individual cylinder torque pulses and combustion variation during shift event
- Results

Dr Hussein Dourra, Senior Tech Fellow, Fiat Chrysler Automobile, USA

4.15 M5

Functional safety using the example transmission control

- Requierements on the electronic development
- Current questions on implementation of ISO 26262
- Potential, avoidable risks of malfunction in transmission control

Dr Thomas Wenzel, Manager of Competence Field, Institute for Vehicle Technology and Mobility, TÜV Nord Mobilität GmbH & Co. KG, Germany

4.45 M6

Model based system engineering for a safe electrical drive train platform

- ISO 26262 technical safety concept
- Model based system engineering
- Electrical drive train platform
- Safety design patterns

Wolfgang Nebe, Department Manager Systems Engineering, Siemens AG, Germany

5.30

Summary of the Symposium and Outlook on 2015

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

SESSION N
E-Motor, Accumulator, KERS

1.30 N1

Assembling, integration and measurement of a hybrid machine with casted coils

- Improvement of the degree of efficiency of an electrical machine
- Increase of the stator slot space
- Improvement of the continuous performance of an electrical machine

Christoph Junginger, PhD Student, Alternative Technical Coil Manufacturing, Volkswagen AG, Germany

2.00 N2

Pareto optimisation of a wound field synchronous machine

- Goal conflict in electrical machine design for (H)EV
- Multi-criteria optimisation of electrical machines
- Massively parallel optimisation of electrical machines
- Minimum-loss control of synchronous machine

Jens Liebold, Development Engineer, IAV GmbH, Germany

2.30 N3

Robust, efficient electrical machine design – A key element in EV/HEV powertrain optimisation

Brian Peaslee, Propulsion Systems Chief Engineer, Magna Electronics, USA

3.45 N4

GKN electric front axle for the BMW i8 – The first 2-speed eAxle on the market

- First 2-speed electric axle on the market
- Unique layout for best packaging, weight and efficiency
- Newly developed actuation for enhanced shift control
- Use of state of the art development tools and processes

Thomas Altenrath, Product Technology Manager, eDrive Systems Europe, GKN Driveline International GmbH, Germany

4.15 N5

Accumulator technology for automatic transmission stop-start readiness

- Integration of stop-start with automatic transmissions
- Technology to enable a hydraulic accumulator as an alternative to an electric auxiliary oil pump
- Unique and demanding control solenoid performance requirements
- Innovative design solutions for realising stop-start system performance

Jeffrey Waterstredt, Senior Engineering Manager, Transmission Systems – Controls, BorgWarner, USA

4.45 N6

Flywheel KERS integration with transverse manual transmission for sports car application

- Setting the scene: What's the engineering challenge?
- Technical targets and expected outcomes
- From sports car to B and C segment

Tobias Knichel, Business Development Manager, Torotrak plc, UK

5.30

Summary of the Symposium and Outlook on 2015

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

3.00 Coffee break and visit to the Transmission Expo

5.15 Short break, change to plenum

6.00 End of the Symposium

SESSION O
Commercial Vehicles: HEV, EV, FC

1.30 01

New Canter Eco Hybrid – Dual clutch transmission parallel hybrid
- Newly developed light commercial vehicle hybrid at Daimler trucks
- Innovative dual clutch transmission integrated with electric motor for commercial vehicle
- Best fuel efficient light duty truck in the class

Genichiro Ishii, Senior Manager/Head of Global Hybrid Center, Mitsubishi Fuso Truck & Bus Corp., Japan

2.00 02

Low cost P3 hybrid system for commercial vehicles
- Mainstream hybrid architecture in commercial vehicles and conflicts
- P3 Hybrid configuration concept for commercial vehicles
- Torque fill in strategy in combination with AMT to imitate seamless shifting
- Fuel savings P3 in comparison to P2 configuration

Helmut Kastler, Lead Engineer System Truck, Software and Controls Systems, AVL Commercial Driveline & Tractor Engineering GmbH, Austria and **Dr Bernd Blankenbach,** Director Electric Machines, AVL TRIMERICS GmbH, Germany

2.30 03

Additional electric drive for hybridization of light-duty commercial vehicles
- Topology of the additional electric drive
- Design characteristics of the intermediate gear
- Description of the gear shift
- Fuse of oiling

Walter Bollinger, Member of the Executive Board, Lauer & Weiss GmbH, Germany

3.45 04

CO_2 scenarios for commercial vehicles – Three technologies for heavy duty long haul trucks
- CO_2 scenarios for commercial vehicles
- E-drive technologies
- Exhaust heat recovery
- Predictive technologies

Roland Dold, Senior Manager Advanced Engineering, Alternative Powertrains, Daimler AG, Germany

4.15 05

High speed electrical drives for mobile machinery – Drive concept and selected components
- TEAM – Development of technologies for energy-saving drives
- Electrical single wheel drives for mobile machinery
- Improved power density of electrical drives
- Design solutions of high speed machine elements

Jan Schröter, Research Scientist, Institute for Machine Elements and Machine Design, RWTH Aachen, Germany

4.45 06

Cost-efficient fuel cell hybrid systems for inner-city transport
- Downsised fuel cell systems for buses and duty vehicles
- Emission free drive trains
- Standardised fuel cell hybrid systems
- Tailor-made emission free drive trains

Manfred Limbrunner, CTO, Proton Motor Fuel Cell GmbH, Germany

5.30

Summary of the Symposium and Outlook on 2015

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

SESSION P
Open Technology Forum

1.30 P1

Sensors trends in response to transmission challenges
- New challenges for OEMs and major tier one suppliers
- Roadmap of different sensing challenges
- Performance and cost evaluation of different sensing solutions
- Review of sensing technologies and common sensing requirements to define standard sub-systems

Philippe Grebert, Transmission Product Line Manager, EFI Automotive, France

2.00 P2

"Make before break" sensor system
- Sensor requirements for gear shifters
- "Make before break" concept
- Advantages with "make before break": Safety and availability
- "Make before break" in field

Mattias Gudasic, Manager System Electronics Engineering, Kongsberg Automotive, Germany

2.30 P3

Influence of calcium detergent on wet clutch durability
- Influence of calcium sulfonate on the durability of
  - wet clutches
  - lock-up clutches
  - multiple disc clutches

Toshiaki Iwai, Team Leader of Drive Train Lubricants Group, Idemitsu Kosan, Japan

3.00 Coffee break and visit to the Transmission Expo

3.45 P4

The 95 million Euro challenge: Efficient transmissions through fluid design
- CO_2 savings by careful lubricant design
- New research on direct efficiency savings from the fluid
- How engineering solutions are enabled by the lubricant
- Electronic compatibility, smaller parts and downsizing

Dr Joseph B. Carroll, R&D Group Leader, Afton Chemical Corporation, USA

4.15 P5

Gear interlocking effect study using CFD
- Finite difference method based CFD solver
- CFD simulation of oil splash lubrication
- Multiphase flow simulation using VoF model
- Studying the load independent loss in gear pair using CFD

Peyman Jafarian, Simulation Engineer, Vicura AB, Sweden

4.45 P6

An automatic, IVT transmission, smaller than its 5-speed manual equivalent
- How it amplifies torque, eliminates the clutch and improves efficiency
- Comparison of weight, size and parts count made with manual transmission
- Launch, acceleration, fuel consumption, compared to manual
- Use with Atkinson or Miller cycle engine without need of hybridisation

Michael Durack, Technology Director, Ultimate Transmissions Pty. Ltd., Thailand

5.15 Short break, change to plenum

5.30

Summary of the Symposium and Outlook on 2015

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

6.00 End of the Symposium

More than 20 cars already confirmed!

CTI Test Drive

ADAC Center of Driving Safety Berlin Brandenburg/Linthe

8.30 Departure with the shuttle service to Linthe
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 test drive
16.00 End of the test drive and departure to the Estrel Hotel Berlin
17.30 Arrival at the hotel

Important!
Please wear comfortable shoes and warm clothes!
Please be flexible when planning your return journey!
Limited number of participants!

You would like to provide a car for the CTI Test Drive?
Please contact us and we will inform you about details.
Contact: maria.forko@car-training-institute.com
Web: www.transmission-symposium.com/testdrive

Check-In for the Test Drive
We kindly ask all registered participants and persons accompanying test vehicles to check-in for the test drive on 10 December 2014 from 1.00 p.m. until 5.00 p.m. at our special Check-In desk at the Maritim Hotel Berlin. Please bring your completed declaration of non-liability (provided by CTI in advance) and your driving license 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 test drive will be handed out at the Check-In.

Normally, the test drive is fully booked at the time of the Symposium.
Additional registrations are not possible. We ask for your understanding.

You can experience these
– and many other – cars in practice*


Chevrolet Corvette C7


Magnum CVX


Gear Chain Industrial B.V. (GCI): Medium duty urban delivery truck, equipped with chain CVT technology


Cadillac ELR


Mazda3 Sportline with Skyactive Diesel engine and 6-speed AT


Changan: C-Class vehicle, 1.5l TGDI engine, 7-speed wet DCT


Mercedes-Benz CLS with 9G-TRONIC


Jatco: Nissan Qashqai with 2l Diesel engine and CVT gearbox


Opel Mokka with AT6 (GF III)


Opel Corsa with MTA

*Available vehicles subject to change

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Your market place with around 120 companies in the exhibition!

- Europe´s No 1 specialist exhibition
- Companies from 14 countries incl. Europe, USA, Asia and Africa
- Covering the whole range from complete systems to single components

www.transmission-expo.de

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.

Visit us at our booth in the Transmission Expo.

AVL List GmbH
Austria
www.avl.com/transmission

BorgWarner Drivetrain Group harnesses a legacy of more than 100 years as an industry innovator in transmission and all-wheel drive technology. The group is leveraging this understanding of powertrain clutching technology to develop interactive control systems and strategies for all types of torque management.

Transmission Systems
Products include one-way clutches, transmission bands, friction plates, torsional vibration dampers and our market leading DualTronic® dual-clutch modules. We also offer a wide range of transmission solenoids, complete electro-hydraulic control modules.

TorqTransfer Systems
We offer a complete line of All-Wheel Drive products for FWD and RWD applications, including transfer cases, actively controlled electro-magnetic and electro-hydraulic AWD couplings as well as electric drive transmissions.

Visit us at our booth in the Transmission Expo.

BorgWarner Drivetrain Engineering GmbH
Germany
www.borgwarner.com

For more than 60 years, **Diehl Metall** has been a successful partner to the international automotive industry when it comes to synchronizer ring production. The long-established company, with its product expertise, sets innovative trends in transmission solutions. The unique diversity of products as well as the combination of long-standing experience and the latest know-how enable efficiency increases in existing technologies.

With the brand Formed@Diehl, the company offers both conventionally forged brass synchronizer rings as well as production of steel synchronizer rings with high-performance coatings. These improve friction and wear behavior and cover the entire performance range. As the global market leader in this area, Diehl Metall is a specialist in optimizing existing transmissions as well as in developing customized solutions for new projects. Furthermore, production sites in Germany, Brazil, China and India ensure supply to the international markets.
Our claim: Precision. Innovation. Quality.

Visit us at our booth in the Transmission Expo.

Diehl Metall Stiftung & Co. KG
Schmiedetechnik
Germany
www.diehl.com/metall

Getrag is one of the largest system suppliers for transmissions worldwide with approximately 13,250 employees at 23 locations. The company is 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 2013, GETRAG reached a turnover of 3.2 billion Euros.

Visit us at our booth in the Transmission Expo.

GETRAG
Getriebe- und Zahnradfabrik
Hermann Hagenmeyer GmbH & Cie KG
Germany
www.getrag.com

Magna is the most diversified global automotive supplier. Magna designs, develops and manufactures automotive systems, modules and components, and engineers and assembles complete vehicles, primarily for sale to original equipment manufacturers ("OEMs") of cars and light trucks.

Our capabilities include the design, engineering, testing and manufacture of automotive interiors; seating; closures; body & chassis; vision systems; electronics; exteriors; powertrain; fuel & battery systems; roof systems as well as vehicle engineering and contract manufacturing.

We have 315 manufacturing operations and 82 product development, engineering and sales centres in 29 countries on five continents as of Q1 2014.

Visit us at our booth in the Transmission Expo.

Magna International
Austria
www.magna.com

PETRONAS Lubricants International (PLI) is the global lubricant manufacturing & marketing arm of PETRONAS, the national Malaysian fully integrated oil and gas company with operations in a broad spectrum of the oil and gas value-chain.
PETRONAS Lubricants International is developing in their global Technology Center in Turin, Italy, tailor made Transmission Lubricants for various OEMs globally 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). PLI is market leader for highly specialized lubricants for the use in Off-Highway applications like fluids for agriculture and construction equipment.

Visit us at our booth in the Transmission Expo.

PETRONAS Lubricants International
Italy
www.pli-petronas.eu

As a leading Tier One global automotive supplier, **AAM** delivers driveline and drivetrain systems and components around the world. Our intense focus on engineering and manufacturing allows us to build value for our customers through quality, technology leadership, and operational excellence. AAM is present in more than 30 locations in 13 countries worldwide.

AAM Germany GmbH
Germany
www.aam.com

Transmissions of the latest generations are driven by a wide range of sensors for position, speed, pressure and temperature detection. Since more than 25 years **TT Electronics – AB Elektronik** is a well-known partner for developing and manufacturing best in class sensing solutions. Our global footprint in sales and local manufacturing resources in India, China and Mexico ensures our customers can access the best expertise available in response to their needs.

AB Elektronik GmbH
Germany
www.abelektronik.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. As the additive provider of the lowest-viscosity transmission oil worldwide, Afton offers "on-demand" solutions for customers to match their hardware needs, and performance that is maintained throughout the lifetime of their transmission.

Afton Chemical Ltd
United Kingdom
www.aftonchemical.com

Aluwag AG – The technology centre for aluminium diecasting
With new materials and ongoing development of current diecasting technology, we are continually pushing back the boundaries of what is possible. Your unique ideas deserve bespoke solutions. This is what makes us the right partner for producing the most sophisticated products and implementing the most sophisticated processes. With state-of-the-art infrastructure and our own materials laboratory, we turn your concepts into reality in our foundry.

Aluwag AG
Switzerland
www.aluwag.ch

AvCarb Material Solutions is a leading manufacturer of woven carbon friction materials, highly engineered for automatic and manual transmissions, rear differentials, wet brakes and other friction applications.

AvCarb Material Solutions
www.avcarb.com

Bomatec is involved for 20 years with magnet-, sensor- and drive technology. Bomatec is a competent, solution-oriented and quality-conscious supplier to automotive, general equipment and machine industry with our own R&D, production and testing laboratory.
Magnets: Permanent magnets, magnet-assemblies, customer-designed solutions. Engineering for magnetic circuits, sensors and e-motors. F/E calculations and simulations, preparation of prototypes. Test laboratory for magnets and sensors. Sensors: Resolver, encoders, MEMS-Gyro.

Bomatec Automotive AG
Switzerland
www.bomatec.ch

Automotive Technology is the largest **Bosch Group** business sector. In 2013, its sales came to 30.6 billion euros, or 66 percent of total group sales. This makes the Bosch Group 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.

Robert Bosch GmbH
Germany
www.bosch.com

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.

Brand KG
Germany
www.brand-group.com

Brose is a partner to the international automobile industry and supplies around 80 car brands and over 30 suppliers with electric motors and mechatronic systems for vehicle doors, liftgates and seat structures. The family-owned company employs close to 22,000 people at 57 locations in 23 countries. Its current business volume totals 5 billion euros. Brose is one of the top 40 automotive suppliers in the world and is the fifth largest family-owned company in the industry.

Brose Fahrzeugteile GmbH & Co.
Germany
www.brose.com

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 1600 employees at eight locations worldwide, we are committed to offering world-class products to help to improve the drivetrain efficiency and performance.

Bühler Motor GmbH
Germany
www.buehlermotor.de

Castrol is a world leading manufacturer of innovative lubricants. High performance gear oils are developed in close cooperation with automotive OEMs. Castrol's Driveline Technology is using their special in-house tests as part of the professional project management programme for developing newest fluids for dual clutch, automatic and manual transmissions, CVT, PTU and rear axles, demonstrating highest reliability.

BP Europa SE
Germany
www.castrol.com

Changan UK R&D Centre Limited (CAUK) is a UK company set up by Changan Automobile in June 2010. CAUK is dedicated for powertrain design and development for Changan's next generation vehicles. Up to now, Changan Automobile has successfully launched a series of classic own brand models such as EADO, CX30, CX20, Yuexiang, Benben and Honor, widely sought after by markets and consumers. In 2010, Changan Automobile's own-brand production ranked No.13 in the world, No.1 in China.

Changan UK R&D Centre Ltd
United Kingdom
www.changanuk.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.

Christian Bauer GmbH + Co. KG
Germany
www.christianbauer.com

The Automotive Group of **Continental** with achieved sales of approximately €20 billion in 2013 is present in more than 170 locations worldwide. The Transmission business unit (BU) is one of five BUs of the division Powertrain, which integrates 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, transfer boxes and all-wheel drive systems.

Continental AG
Germany
www.conti-online.com

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.

Curtiss Wright Surface Technologies
Germany
www.cwst.de

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.

CY Myutec Co.,Ltd.
Korea
www.cymyutec.co.kr

Daimler AG is one of the world's most successful automotive companies. With its divisions Mercedes-Benz Cars, Daimler Trucks, Mercedes-Benz Vans, Daimler Buses and Daimler Financial Services, the Daimler Group is one of the biggest producers of premium cars and the world's biggest manufacturer of commercial vehicles with a global reach. Daimler Financial Services provides financing, leasing, fleet management, insurance and innovative mobility services.

Daimler AG
Germany
www.daimler.com

Dold Kaltfliesspressteile and **Gévelot Extrusion** supply pre finished parts for gear boxes: solid shafts, hollow shafts, gear pinions, bevel gears and planet gears.
Our longtime experience as supplier for automotive manufacturers and system suppliers is our strength. From development to mass production we are your business partner in cold forging, warm forming and machining.

Dold Kaltfliesspressteile GmbH
Germany
www.doldgmbh.de
www.gevelot-extrusion.com

Drive System Design (DSD) is an innovative transmission design and development company. DSD specialises in transmission/driveline design and simulation delivering prototype demonstrators and solutions to production issues. Current technology focus is around robust low noise gear design for volume production, efficiency improvement process for existing axles/transmissions and EV/Hybrid architecture derivation.

Drive System Design
United Kingdom
www.drivesystemdesign.com

DuPont Performance Polymers collaborates with customers worldwide to develop new products, components and systems that help build lightweight transmission solutions with high powertrain efficiency and improved engine performance. DuPont high-performance parts, thermoplastics, elastomers and specialty polymers (Vespel®, Vamac®, Zytel®, Hytrel®, Kalrez®) contribute to reduce frictional loss and reduce weight while extending the durability and reliability of mechanical components.

DuPont International Operations Sàrl
Switzerland
www.vespel.dupont.com
www.plastics.dupont.com

As the service provider in the strong community of the DVS group, **DVS Technology** offers contract manufacturing equipped with everything that is required for a sophisticated series 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
- precision machining
- machining of large parts

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

DVS Technology GmbH
Germany
www.dvs-technology.de

Since 1973 **DYNAX** is partner of global OEM and their Tier1 supplier. We are leading in Research, Development, Design, Production of wet-type friction plates, reaction plates, clutch pack assemblies, lock-up piston assemblies, high-performance synchronizer rings and further components for automobiles, motor cycles, construction machines, industrial vehicles and agricultural machines.

DYNAX Corporation
Germany
www.dynax-j.com

The **EJOT Group** is a medium-sized company which is dedicated to innovative fastening solutions.
The Industrial Fasteners 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.

EJOT GmbH & Co. KG
Germany
www.ejot.de

As a partner to the international automotive industry, our ability to drive innovation is acknowledged in the area of cylinder-head and specialty gaskets, plastic housing modules and shielding components for engine, transmission, exhaust tract, underbody, body and chassis applications. Partially coated control plates, bonded pistons, plastic oil pans as well as piston and guide rings made of PTFE high-performance plastics for transmissions complement our portfolio. **ElringKlinger** currently operates at 42 locations around the globe.

ElringKlinger AG
Germany
www.elringklinger.de

The **Ensinger group** is engaged in the development, manufacture and sale of compounds, semi-finished materials, profiles and technical parts made of engineering and high performance plastics through extrusion, machining and injection moulding. With a total of 1,800 employees at 27 locations, the family-owned enterprise is represented worldwide in all major industrial regions with manufacturing facilities or sales offices.

Ensinger GmbH
Germany
www.ensinger-online.com

Core Competencies: Development and production of non-cutting metal parts and complex construction units with target market gearbox and clutches
Products: Deep drawings, Stampings, Fine blanking parts and assemblies
Customers: Daimler, Behr, Vibracoustic, Bosch-Group, ZF-Group, Schaeffler Group, BorgWarner, Getrag, Valeo, FTE, Continental Automotive Group.

Erdrich Umformtechnik GmbH
Germany
www.erdrich.de

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 GROB AG
Switzerland
www.ernst-grob.com

Ernst Umformtechnik GmbH introduces itself as a recognized, leading partner in the sheet metal forming industry. Core activities are the production of high precision stampings, pressing, deep drawing parts and assemblies as well as the development of prototypes and manufacturing procedures. Product portfolio: Components for synchronization, clutch and transmission technology, processed by laser welding, machining and heat treatment

Ernst Umformtechnik GmbH
Germany
www.ernst.de

Fallbrook's NuVinci® continuously variable planetary (CVP) technology improves the performance and efficiency of transmissions, industrial equipment, and other machines, by transforming design from Gears to Spheres™. The NuVinci technology is less complex, scales and packages more easily, costs less to manufacture, and facilitates optimum performance.

Fallbrook Technologies
United States
www.fallbrooktech.com/inquiries

Favi is the world leader supplier for components in high pressure die cast of copper alloys.
Our main business is the production of gearforks for the gearboxes. We are in this time the leader in a new activity. Favi produces copper rotors for the electric drives for the e-mobility.

Favi S.A.
France
www.favi.com

FCC offers comprehensive solutions for clutch systems, with its leading friction material development capability, integrated production system, and unique manufacturing technology. FCC is located globally with its manufacturing facilities in 10 different countries, and its Research and Development Centre located in Japan.

F.C.C. Co. Ltd
Japan
www.fcc-net.co.jp

Federal-Mogul Holdings Corporation is a leading global supplier of products and services to the world's manufacturers and servicers of vehicles and equipment in the automotive, light, medium and heavy-duty commercial, marine, rail, aerospace, power generation and industrial markets. The company's products and services enable improved fuel economy, reduced emissions and enhanced vehicle safety. Federal-Mogul's Powertrain Division designs and manufactures original equipment powertrain components and systems protection products for automotive, heavy-duty, industrial and transport applications.

Federal-Mogul Holdings Corporation
United States
www.federalmogul.com

FEINTOOL – Your partner for the deciding difference
Feintool is the world's leading technology group specializing in the development of fineblanking systems and the production of precision, ready-to-install fineblanking and forming components, notably for the automotive industry. The Group maintains close partnerships with its customers across the entire fineblanking and forming process – from component design, toolmaking and system construction through to large-scale series parts production.

Feintool International Holding AG
Switzerland
www.feintool.com

The **Felss Group** manufactures under the brand Felss Shortcut Technologies metal processing machines and components for diverse sectors such as the automotive industry. The cold forming processes rotary swaging, axial forming, bending, autofrettage and tube end forming are central to the technology. Based in Königsbach-Stein, Germany, Felss has revenues of approximately 100 Million Euros, and employs approximately 550 people in 4 countries.

Felss Shortcut Technologies
Germany
www.felss.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.

FEV GmbH
Germany
www.fev.com

Fiuka has ranked among the recognised suppliers of the automotive industry. Main focus is the development and manufacture of metal parts in cold forming for the areas of airbag, chassis, engine, transmission and exhaust gas technology. Using forming presses (150 - 1,500 tons) and with the utmost precision, we manufacture components from steel, stainless steel, aluminium and special materials. Engine and transmission parts will be finished on automated production lines. Ancillary plant: Środa Śląska, Poland

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

Freudenberg Sealing Technologies is one of 16 global subsidiaries of the Freudenberg Group. Since 2011, Freudenberg Sealing Technologies has combined the activities of the previous Freudenberg Seals and Vibration Control Technology Europe and the Freudenberg-NOK Sealing Technologies in the Americas, under one organization.

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

GKN has four divisions: GKN Aerospace, GKN Land Systems, GKN Driveline and GKN Powder Metallurgy. GKN Driveline is the world leader in automotive driveline technology. 22,000 people at 56 facilities in 22 countries work in partnership with vehicle manufacturers to develop technologies for the future. GKN Sinter Metals is the world's largest producer of precision powder metal components. An experienced team of 6,500 people supplies automotive markets in more than 30 locations across 5 continents.

GKN Driveline
Germany
www.gkn.com

Great Taiwan Gear provides extensive manufacturing solutions and design support for the production of high precision gears and transmission components. Our engineering and manufacturing capabilities allow us to offer our customers the quality, cost effectiveness and reliability they demand. We have considerable experience in the production of gears and transmission parts for electric vehicles – from prototypes to mass production.

Great Taiwan Gear
Taiwan
www.taiwangear.com

HOERBIGER is globally leading in the fields of compression technology, drive technology, and automation technology. In 2013, its 6,400 employees achieved sales of 1.05 billion euros. The Strategic Business Unit of drive technology is the leading independent provider of synchronizer systems worldwide. OEMs and transmission manufacturers can select the appropriate system from two product lines: the ClassicLine and the entirely newly developed CompactLine offer the right solution for any requirement.

HOERBIGER Antriebstechnik GmbH
Germany
www.hoerbiger.com

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hofer is one of the leading companies with know-how all around the powertrain and energy efficiency. Our developers are passionate car and technology enthusiasts. We know how to handle any powertrain interface, we are specialized in engine, clutch, transmission, electric drive, new energy and we are able to prove our system competence in industrialization and safety production processes.

hofer powertrain GmbH
Germany
www.hofer.de

As the world leader in iron and metal powders, **Höganäs** is continuously extending the market for metal powder technology into new application areas. Cost-efficient and light-weight load-carrying powder metal gears for engine and transmission are one example of high-performing applications developed in close collaboration with customers and end-users.

Höganäs AB
Sweden
www.hoganas.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 350 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.

Hugo Benzing GmbH & Co. KG
Germany
www.hugobenzing.com

As one of the leading development partners to the automotive industry, **IAV** offers 30 years of experience and a range of skills second to none. With our expertise in the entire vehicle we provide technically perfected solutions. Employing 5,000 members of staff and first-class facilities, we assist manufacturers and suppliers in carrying out their projects wherever they are in the world – from concept to start of production.

IAV GmbH
Germany
www.iav.de

IBS Filtran GmbH/Filtran LLC
leading manufacturer of filter system solutions for automatic transmissions.
With our development centers and manufacturing plants in Germany, USA and China we are able to satisfy our global customers' requirements due to innovative system solutions.

IBS Filtran GmbH
Germany
www.ibs-filtran.com

IFA Rotorion ranks among the largest manufacturers of drive shafts worldwide. Being one of the top 50 enterprises in Germany's automotive supply industry, IFA Rotorion manufactures drive shafts, joints and components for premium car manufacturers such as Daimler, Volkswagen and BMW at its international production facilities in Haldensleben (Germany), Charleston (USA) and Shanghai. In addition, IFA provides development services in the fields of powertrain technology and lightweight construction.

IFA ROTORION – Holding GmbH
Gemany
www.ifa-rotorion.com

- 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)

Institute of Automotive Engineering
Automotive Research Center
Niedersachsen Technische
Universität Braunschweig
Germany
www.iae.tu-bs.de

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 a transmission 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.

Jatco Ltd
Japan
www.jatco.co.jp/ENGLISH/index.html

Jing-Jin Electric (JJE) is China's leading supplier of traction electric motors for EV, HEV and PHEV. JJE's R&D center in Beijing, JJE's production center in Shanghai, capacitized at 100,000 units per year. With quality, technology, innovation and teamwork, JJE is taking firm steps toward its goal: making World's Best Electric Motors for the electrification of automobiles.

Jing-Jin Electric Technologies Co., Ltd
China
www.jjecn.com

The **Johnson Electric Group** is the world's leading provider of innovative motion systems and components for automotive applications, domestic equipment, office equipment, industrial products, consumer products and medical devices. The Group is headquartered in Hong Kong and has over 36,000 employees in 23 countries.

Johnson Electric Group
China
www.johnsonelectric.com

The **JOPP Group's** product range comprises gearshift systems and knobs, mechanical components (machining), powder metal parts, plastic components and electronics. There are 10 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.

JOPP Group
Germany
www.jopp.com

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.

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

KACO develops and produces seals for moving parts of machines and vehicles. Its customers today include almost all OEMs and many tier-one suppliers. Long experience and the latest development tools are devoted to finding solutions that are precisely geared to customer requirements. The company has manufacturing plants in Germany and other European countries, in China and North America.

KACO GmbH + Co. KG
Germany
www.kaco.de

EXHIBITORS

KSK offers the next stage of production creation, like new developed plastic binding and one clutch one motor technology. KSK can provide high-precision products to meet any accuracy, or time restriction, and KSK will continue to develop environmentally friendly products with a focus on lower energy consumption, less material use, recycling, and light-weight technology.

Keihin Seimitsu Kogyo Co,.Ltd
Japan
www.ksk-inc.co.jp/

KISSsoft AG is one of the leading providers of calculation software for machine elements, engineering services, know-how and training to the power transmission community. In the last 25 years, over 2600 companies decided to use KISSsoft/KISSsys to their advantage. KISSsoft AG is located in Switzerland with resellers worldwide.

KISSsoft AG
Switzerland
www.KISSsoft.AG

H. Kleinknecht GmbH & Co. KG is an expert in testing technology for gearboxes. The company covers the complete scope such as test stands for manual, automatic, double-clutch, BEV-drives, hybrid gear-boxes, and components, as well as corresponding assembly lines. Due to the self-developed test stand automation system ATS-Advanced the company holds proven know-how in software engineering.

H. Kleinknecht GmbH & Co. KG
Germany
www.kleinknecht.de

... simply shift better. **KOKI** is a leading manufacturer of inner shifting systems.
As a developer and system supplier for the international automotive industry we are your competent and reliable partner when it comes to the development up to the serial production of customized shift modules for automatic and manual transmissions.

KOKI TECHNIK Transmission Systems GmbH
Germany
www.kokitransmission.com

Kongsberg Automotive's business has a global presence. With revenues of close to EUR 1.0 billion and approximately 10.000 employees in 20 countries, Kongsberg Automotive is truly a global supplier. The company is headquartered in Kongsberg, Norway and has 32 production facilities worldwide. The product portfolio includes seat comfort systems, driver and motion control systems, fluid assemblies, and industrial driver interface products developed for global vehicle manufacturers.

Kongsberg Automotive
Sweden
www.kongsbergautomotive.com

Our main application fields are high-precision components with complicated geometries made out of high-performance plastics. As a system supplier **Konzelmann GmbH** develops tribological single and multi-component parts, such as bushings, sliding bearings, thrust washers, seal rings, gear-tooth and guiding components. We design and produce single components and complete assemblies, we supply pro-totypes, test your components on our tribological test stands and supply your series production worldwide.

Konzelmann GmbH
Germany
www.konzelmann-gmbh.de

Kyowa Synchro Technology Europe is responsible to European market as a group of Kyowa Metal Works having expertise of synchronizer. Through our continuous R&D, we have been offering innovative synchronizer system such as Lever Synchronizer as value-added solutions for customers.

Kyowa Synchro Technology Europe SAS
France
www.kyowagokin.co.jp/e/

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.

LEE Hydraulische Miniaturkomponenten GmbH
Germany
www.lee.de

A diversified global manufacturing company of highly engineered powertrain products, world renowned for its precision machining expertise. The newly developed e-axle hybrid power unit offers automakers a modular system for hybrid AWD applications and offers increased safety while reducing vehicle emissions and improving city driving fuel economy by up to 80 %.

Linamar
Canada
www.linamar.com

MELECS Elektronikwerk Siegendorf (EWS), with sales revenue of 113 million euros, is the largest electronics manufacturing service provider (EMS) with Austrian roots. MELECS EWS is part of the MELECS Group and has more than 25 years of experience. 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.

Melecs EWS GmbH & Co KG
Germany
www.melecs.com

Our leading position in the automotive industry is demonstrated by our capabilities in metal components, products and modules for chassis and powertrain, engine and transmissions applications. Our high quality products lead us to our common goal: optimization of resources, reduction of cycle times and therefore, cost reduction and improvement of vehicle quality and performance.

Metaldyne
Germany
www.metaldyne.com

Technological competence, high competitiveness, and international service – those are the core competences that distinguish the Miba Sinter Group and the Miba Friction Group as market and technology leader. **Miba** possesses extensive design and manufacturing experience in sintered components and friction materials for synchronisers in manual, automated and double-clutch transmissions.

Miba Group
Austria
www.miba.com

Michigan Spring and Stamping manufactures a complete range of technical springs, flat springs, precision stampings, wire forms, clutch return springs, and detent assemblies for transmission applications. Cradle to grave philosophy including wire and flat spring design, FEA, prototyping, and component testing and verification services. Significant investment in automated processes and 100% inspection.

Michigan Spring and Stamping
United States
www.msands.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.

Moving Magnet Technologies SA
France
www.movingmagnet.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 %.

Mubea Tellerfedern GmbH
Muhr und Bender KG
Germany
www.mubea.com

Oberaigner Powertrain is a system supplier for gearboxes, drivetrains and vehicle suspension systems.
The core competencies are in the areas of development, prototyping, testing and series production of transfer cases, driven axles as well as special gears for different applications, including reduction gear units, low floor gear boxes, transmissions for electric vehicles.
Oberaigner Powertrain supplies OEMs with all-wheel drive systems, certified to ISO/TS 16949

Oberaigner Powertrain GmbH
Austria
www.oberaigner.com

Oerlikon Friction Systems specializes in manufacturing synchronizers for manual and dual-clutch transmissions, as well as developing customer-focused synchronizer components and modules. Friction Systems is the leader in Carbon friction technology. With a combination of in-house produced stamped steel synchronizers and highly efficient friction materials, Friction Systems offers the ideal solution for maximum gear shifting comfort during the lifetime of the vehicle.
Locations: Germany, USA, Brazil, Italy, China, India, UK, Japan

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

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 passengers 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 Vocis, majority owned by Oerlikon Graziano.

Oerlikon Graziano SpA
Italy
www.oerlikon.com/graziano

Oerlikon Metaplas stands for a unique spectrum in thin film technology. Job-shop-service and system engineering:

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- Plasma Heat Treatment for wear protection (Nitriding IONIT®) and for corrosion protection (IONIT OX®).
- Plasma Combination Treatment: Nitriding plus PVD/PACVD from one source.

Oerlikon Metaplas GmbH
Germany
www.oerlikon.com/metco

P.J. Wallbank Springs, Inc., founded in 1982, exclusively designs and manufactures clutch return spring packs. Our customers, located around the globe, rely on us to design spring packs for their clutched applications that are optimized for both functionality and cost, and then manufactured to the highest quality level.

P.J. Wallbank Springs, Inc.
USA
www.pjws.com

Paul Beier is one of the leading companies in the field of tool manufacturing and mechanical engineering. Our customers are top German and international industrial enterprises. They rely on our precision and professionalism. And value the flexibility and proximity offered by a medium-sized enterprise such as ours.

Paul Beier GmbH
Werkzeug- und Maschinenbau & Co. KG
Germany
www.beier-kassel.de

The **PMG group** is a leading manufacturer of powder metallurgical components and assemblies for the automotive industry. PMG operates six plants in Europe, the U.S.A. and Asia. The most prominent components manufactured by the PMG group for transmission applications are synchronizer hubs, synchronizer rings, sliding sleeves, clutch cones, planetary carriers, gears and components for one way clutches. PMG also supplies ready-to-mount modules.

PMG Füssen GmbH
Germany
www.pmgsinter.com

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.

Porsche Engineering Group GmbH
Germany
www.porsche-engineering.com

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.

Profiroll Technologies GmbH
Germany
www.profiroll.de

REM's ISF® Process provides needed durability and fuel economy relief for vehicle manufacturers and car owners. REM has developed high volume, high speed mass finishing processes to meet the automotive production demands. These processes are robust, easy to automate and are tightly controlled to preserve component geometrical integrity.

REM Surface Engineering
United Kingdom
www.remchem.com

Ricardo is a leading partner in engineering and strategic consulting for the automotive industry worldwide. The company employs over 2,100 professional engineers, consultants and scientists who are committed to delivering outstanding projects and innovations in our core product areas of engine, transmission, vehicle, hybrid and electrical systems. Global 'one-stop' capability from concept to production: design, prototype, test & validation, and low-volume manufacture. Our activities cover a range of market sectors including passenger car, commercial vehicle, motorsport, motorcycle and off-highway.

Ricardo Deutschland GmbH
Germany
www.ricardo.com

EXHIBITORS

Romax Technology provides software and services for gearbox, bearings and driveline systems to automotive, aerospace, off road, rail, marine, bearings and wind energy sectors worldwide.
14 of the world's top 15 auto manufacturers use Romax solutions to help them get better quality products to market faster and at lower cost.

Romax Technology Limited
United Kingdom
www.romaxtech.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 and AS9100.

Rotor Clip LTD
United Kingdom
www.rotorclip.com

Saint-Gobain Performance Plastics L+S GmbH is your global partner for applying high performance polymer materials to solve engineering challenges in advanced transmissions. Design, test and manufacturing expertise in seal rings, axial plain bearings and radial plain bearings allow these engineered components to be used where their compact installation, low mass and easy assembly allow their high performance to be combined with economic efficiency.

Saint-Gobain Performance Plastics L+S GmbH
Germany
www.seals.saint-gobain.com

Schaeffler is a development partner with a comprehensive understanding of powertrain systems both for vehicles with internal combustion engines and for hybrid and electric mobility solutions. Environmentally friendly drives, urban and interurban mobility, and the energy chain are the areas of focus that Schaeffler is actively shaping by carrying out its own research and development in cooperation with its customers and business partners on the path to the mobility of tomorrow.

Schaeffler Technologies GmbH & Co. KG
Germany
www.schaeffler.com

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.

SCHERDEL GmbH
Germany
www.scherdel.de

We are a proactive international systems supplier in the field of cold forming who secured its place in the world market with sophisticated products and commercial success. Our thinking and acting are always orientated to the satisfaction of our customers. The employees have an essential share in the development of the company and an important role in our establishment.

Schondelmaier GmbH Presswerk
Germany
www.schondelmaier.de

SEISSENSCHMIDT is one of the leading suppliers of precision components for drive and chassis applications. SEISSENSCHMIDT employs a range of services: hot forging on fully automatic multi-stage presses, conventional hot forging, heat treatments, cold forging and machining processes.

SEISSENSCHMIDT AG
Germany
www.seissenschmidt.com

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.

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

SETFORGE is recognized as one of the leading suppliers of high-quality forged parts made out of all forgeable materials using all kinds of forging technologies like hot-forging, upset forging, warm and cold forging.
In particular for the transmission business field SETFORGE offers solutions like hollow shafts, parts produced by using different technologies as well as drive components which are the results of a close partnership together with our customers.

SETFORGE
France
www.farinia.com

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.

Shell Deutschland Oil GmbH
Germany
www.shell.com

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. The division sinter production will give you an overview of new material as well as of the form parts for camphaser systems.

SHW Automotive GmbH
Germany
www.shw.de

The **SKF group** is the leading global supplier of products, solutions and services in the area comprising rolling bearings, seals, mechatronics, services and lubrication systems. The Groups service offer includes technical support, maintenance service, condition monitoring and training with focus on energy saving and sustainable solutions.

AB SKF
Sweden
www.skf.com

Smart Manufacturing Technology 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.

Smart Manufacturing Technology
United Kingdom
www.smartmt.com

As part of the Sodecia Group, **Sodecia FSG** 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 break systems.

Sodecia FSG
Germany
www.sodecia.com
www.fsg-automotive.de

SONCEBOZ develops, produces and sells electric motion solutions 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 final product.

SONCEBOZ
Switzerland
www.sonceboz.com

SwePart Transmission AB
The company has long experience of supplying and cooperating with Volvo, Scania, ABB, Atlas Copco and Komatsu. In cooperation with our customers we take overall responsibility for design, engineering and manufacturing of transmission components and solutions. Approved ISO 16949 and ISO 14001.

Swepart Transmission AB
Sweden
www.swepart.se

Swoboda develops and produces in Germany, Czech Republic, the States, China and in Romania 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.

Swoboda KG
Germany
www.swoboda.de

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teamtechnik is an internationally leading company for innovative production technologies. Over 850 highly qualified employees have been developing and building intelligent and reliable automation solutions for assembly and functional testing. In transmission testing, the company supplies development test benches, interlinked serial test systems and complete EOL test facilities.

teamtechnik Maschinen und Anlagen GmbH
Germany
www.teamtechnik.com

Torotrak Group offers a range of innovative fuel saving and performance improving technologies for various vehicle applications. The Group's three core technologies include: Torotrak traction drive, a gearless variable transmission system; V-Charge variable ratio supercharging, offering efficient power boost for downsized engines, and Flybrid KERS, a leading mechanical hybrid technology which offers a highly power dense, affordable and durable alternative to electric hybridisation.

Torotrak
United Kingdom
www.torotrak.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 and automated RWD transmissions, dual clutch transmissions, gears, shafts, clutches, shift controllers, synchronizers, and mechatronic systems with integrated clutch systems and control software.

TREMEC
United States
www.tremec.com

Tribco manufactures Braketex®/Clutchtex® -- the world's ONLY 100% Kevlar® fibered Textile polyimide composite friction lining. It lasts 3 to 5 times LONGER than conventional linings, offers higher energy capacity, withstands higher temperatures and pressures to deliver higher torque. It is ideal for wet and dry clutches, transmissions, brake plates and other friction applications. Tribco's lining also is nonabrasive and won't damage flywheels, rotors and drums.

Tribco, Inc.
United States
www.tribco.com

TRW is among the world's largest automotive suppliers. With over 65,000 employees in 26 countries, TRW offers the broadest product portfolio in the industry. Using our experience with over 35 million oil pumps and motor-pump-units produced for steering and transmission applications, TRW can offer completely integrated system solutions.

TRW Automotive
Germany
www.trw.com

TE Connectivity is a $13 billion world leader in connectivity. The company designs and manufactures products at the heart of electronic connections for the world's leading industries including automotive, energy and industrial, broadband communications, consumer devices, healthcare, and aerospace and defense. With nearly 90,000 employees in over 50 countries, TE Connectivity makes connections the world relies on to work flawlessly every day.

Tyco Electronics AMP GmbH
a TE Connectivity Ltd. company
Germany
www.te.com

Ultimate Transmissions offer Continuously Variable Transmissions exhibiting exceptionally high power densities, efficiencies and ratio spreads. They deliver an automatic transmission that is smaller than its manual equivalent. They are applied to many forms of transmission including those designed for variable volume supercharging for downsizing engines, and flywheel based hybridization systems.

Ultimate Transmissions Pty., Ltd.
Thailand
www.ultimatetransmissions.com

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 & acturators. UNICK holds certification in accordance to TS16949:2009 and ISO14001:2004.

UNICK CORPORATION
Korea
www.unick.co.kr

VACUUMSCHMELZE (VAC) designs, produces and markets advanced materials, particularly with magnetic, but also with other physical qualities as well as related products. VAC's range of products comprises a broad array of advanced semi-finished products, components, parts, magnets and magnet systems for use in a wide variety of fields and industries spanning watch-making and medical technology, regenerative energies, shipbuilding, and the automotive and aviation industries.

VACUUMSCHMELZE GmbH & Co. KG
Germany
www.vacuumschmelze.com

Valeo is an automotive supplier, partner to all automakers worldwide. Valeo proposes innovative products and systems that contribute to the reduction of CO_2 emissions and to the development of intuitive driving, with 124 production sites, 16 Research centers, 35 Development centers and 74,800 people in 29 countries throughout the world.

Valeo
France
www.valeo.com

EXHIBITORS

Varibox CVT Technologies is an IP company specializing in the development of alternative positive drive CVT concepts.
The iCVT is a world first positive drive incremental Continuously Variable Transmission.
The RotorCVT is a ratcheting type CVT. It provides infinite small ratio changes and includes a geared neutral, which eliminates the need for a clutch or torque convertor.

VARIBOX CVT TECHNOLOGIES
South Africa
www.varibox.com

Victrex Polymer Solutions is the leading manufacturer of High Performance PEEK Thermoplastics, supporting transmission engineers in the development of more reliable and more efficient transmissions components. The proven technology for polymer based thrust washers; seal rings and actuation elements save up to 80 % weight and improve shift comfort.

Victrex Europa GmbH
Germany
www.victrex.com

Vicura is a company of engineers, creating entire solutions for drivelines adding value to our customers' products. Through skill, innovation and vast OEM experience, we understand and regard the complete process – from concept to industrialization. Since all good things are three, our technology range includes mechanical and electric drive systems along with control systems. With our responsibility, excellence, passion and overall perspective, we excel at capturing motion.

Vicura AB
Sweden
www.vicura.se

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

Walter Henrich GmbH
Germany
www.walter-henrich-gmbh.de

We are an innovative tooling company and technology leader in the tool and process technology for the forming production of components used in the automatic and hybrid transmission as well as in the powertrain. In addition to component and tool design services, mechanical part testing units and simulation we offer our customers complete tool and process solutions for competitive production.

WEBO Werkzeugbau Oberschwaben GmbH
Germany
www.webo.de.com

The company **„Winkelmann Powertrain Components"** produce among other things drive elements and driveline components by different non-cutting formings, 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.

Winkelmann Powertrain Components GmbH & Co. KG
Germany
www.winkelmann-automotive.com

Zoerkler – the spirit of precision
From exactly made gears to high quality bevel gears and spur gears offers Zoerkler precisely manufactured gearboxes and drive systems worldwide.
Beginning the development with production of prototypes and ending with testing of mounted series production transmissions stands Zoerkler for highest precision, quality and safety.

Zoerkler Gears GmbH & Co KG
Austria
www.zoerkler.at

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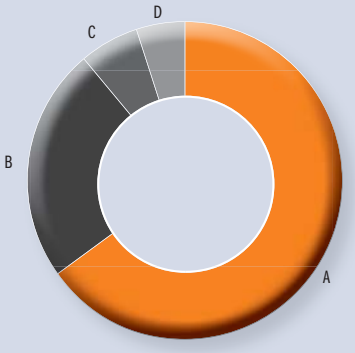
Review of the 12th International CTI Symposium 2013

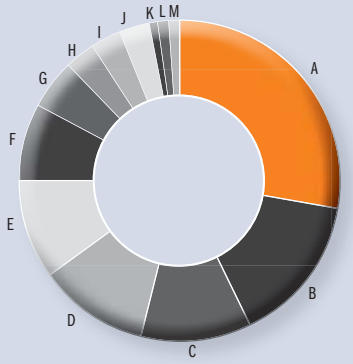
Participant Structure by Country



A	Germany	65 %
B	Europe w/o Germany	24 %
C	Asia	6 %
D	North America	5 %

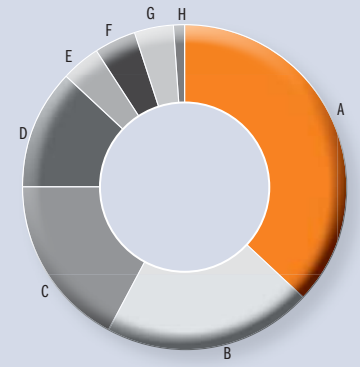
in total 24 countries

Participant Structure by Sector



A	Automotive Supplier w/o Transmission Manufacturer	28 %
B	OEM	15 %
C	Electronics	11 %
D	Transmission Manufacturer	11 %
E	Engineering	10 %
F	Metal Processing	8 %
G	Lubrication and Oil Industry	5 %
H	Mechanical Engineering	3 %
I	Plastics Industry	3 %
J	Universities	3 %
K	Consultancies	1 %
L	Press	1 %
M	Other	1 %

Participant Structure by Function



A	R&D/Transmission/Drive Development	37 %
B	Marketing/Sales	21 %
C	Engineering/Design	17 %
D	Board of Management	12 %
E	Project Management	4 %
F	Other	4 %
G	Business Development	4 %
H	Press	1 %

It is a must for every transmission development engineer to participate, because he can proof his company´s future development products for future needs.
(T. Topolovec, Hyundai Motor Europe Technical Center GmbH)

Perfect forum for getting an overview on new transmission technologies, very good networking forum, high density of suppliers.
(H. Mayer, BMW AG)

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www.transmission-symposium.com/video-english

Highlights and Outcomes from the CTI Symposium 2013

What were the core statements at the CTI Symposium 2013? What were the most interesting developments and insights? What lies ahead, and what will we working on? As always, symposium head Prof. Dr Ferit Küçükay summed up the results at the end of the event. Why not refresh your memories of last year's event – and get in the mood for the CTI Symposium 2014?

Click here for your free download of the highlights 2013:
www.transmission-symposium.com/summary

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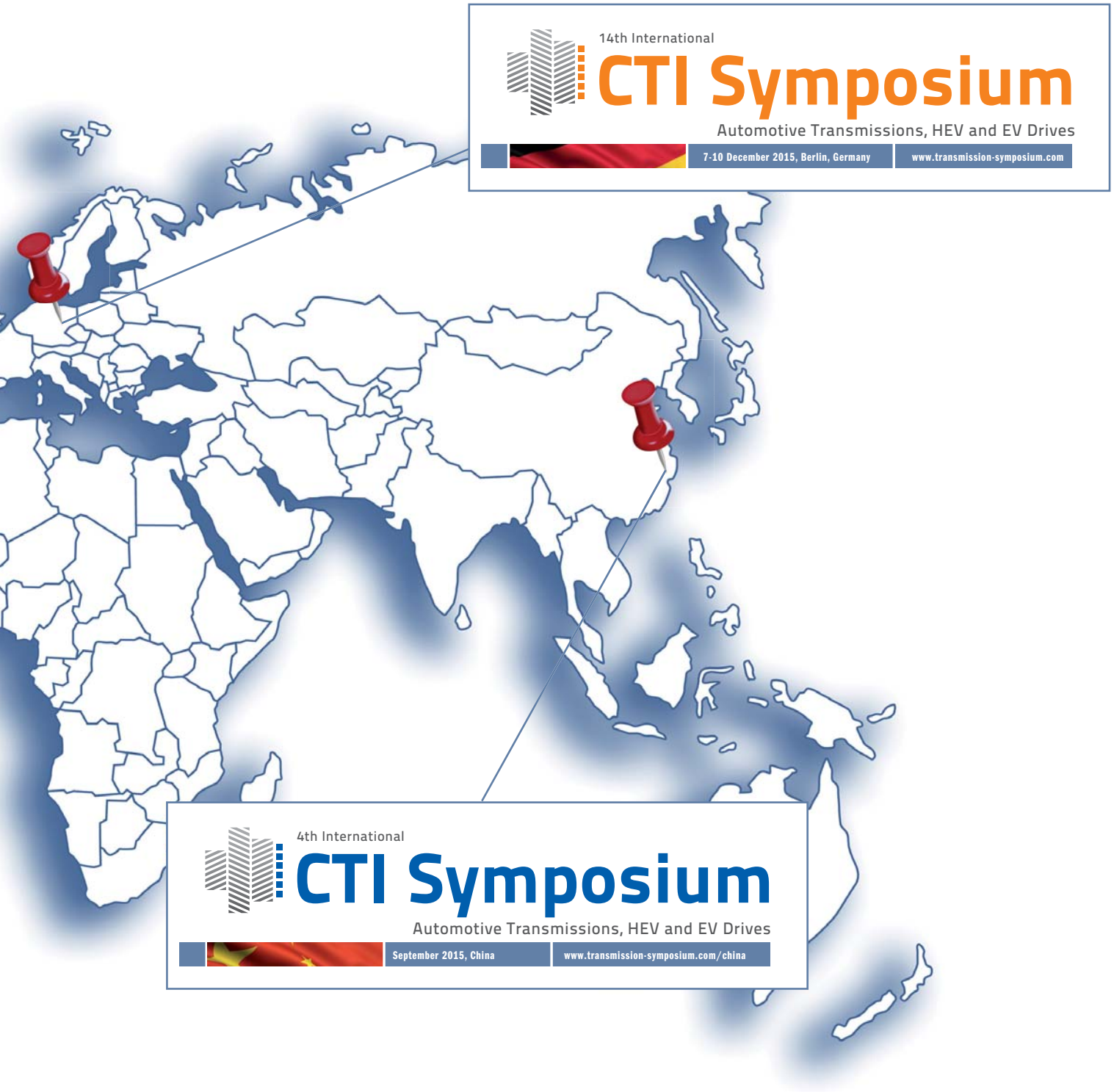

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CONDITIONS OF PARTICIPATION The attendance fee (plus VAT) per person, which includes conference documentation, lunches, tea/coffee and evening dinner, is payable on receipt of the invoice. Once your registration has been received you will be sent a confirmation slip. **Registrations can be cancelled up to 14 days before the conference begins completely free of charge (in writing only).** When a cancellation is made within 14 days of the conference date, half the participation fee will be reimbursed. In the event of cancellation on the day of the conference, or failure to attend, the full fee will be payable. The registered delegate may of course send a substitute at no additional cost. The organisers reserve the right to amend the programme of events if necessary. Discounts on group bookings depend on the number of people booked as delegates on the date of the event.

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Estrel Hotel Berlin
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Registration and information

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