

Tuesday, March 8, 2016 - Morning

	Great Hall	Hall 4	Hall 5
9:00	Welcome and Opening Address Jürgen Weber, TU Dresden, IFD, Germany		
	Digital Hydraulics Chairman: Prof. Dr. R. Scheidl A-1: High-Performance Digital Hydraulic Tracking Control of a Mobile Boom Mockup Kalevi Huhtala, Tampere University of Technology, Finland A-2: High-response hydraulic linear drive with integrated motion sensor and digital valve control Marko Simic, Faculty of mechanical engineering, University of Ljubljana, Slovenia A-3: Architecture, Control and NVH Development of Digital Hydraulics for Off-Highway Vehicle Applications QingHui Yuan, Eaton, USA	Intelligent Control Chairmen: Prof. J.-C. Maré B-1: Active Vibration Control of Axial Piston Machine using Higher Harmonic Least Mean Square Control of Swash Plate Taeho Kim, Purdue University, USA B-2: Modiciency - Efficient industrial hydraulic drives through independent metering using optimal operating modes Giacomo Kolks, TU Dresden, IFD, Germany B-3: A Machine Learning Approach for Tracking the Torque Losses in Internal Gear Pump - AC Motor Units Emad Ali, Bosch Rexroth AG, Germany	Valves Chairmen: Dr.-Ing. H. Lausch C-1: Advanced Proportional Servo Valve Control with Customized Control Code using White Space Peter Lauer, Eaton Corporation, USA C-2: Improvement of the Vibration Prediction of a Poppet Valve in a Cavitation State Kento Kumagai, Hitachi Construction Machinery Co., Ltd., Japan C-3: Characteristics of Proportional Flow Control Poppet Valve with Pilot Pressure Compensation Jiahai Huang, Taiyuan University of Technology, China
10:30	Break		

11:00	Fundamentals Chairman: Prof. A. R. Plummer D-1: Hydraulic fluids with new, modern base oils - composition and differences in comparison to conventional hydraulic oils Wolfgang Bock, Fuchs Schmierstoffe GmbH, Mannheim, Germany D-2: Experimental investigation of the Bunsen and the diffusion coefficients in hydraulic fluids Philipp Kratschun, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany D-3: Experimental measurements of bulk modulus of two types of hydraulic oil at pressures to 140MPa and temperatures to 180°C Shudong Yang, Huazhong University of Science and Technology, China D-4: Innovative Duplex Filter for hydraulic applications Klaus Mössinger, Argo-Hytos, Germany	Mobile Hydraulics Chairman: Dr. B. Welschof E-1: A hydraulic test stand for demonstrating the operation of Eaton's energy recovery system Meng Wang, Eaton Corporation, USA E-2: Pressure compensator control - a novel independent metering architecture Jan Lübbert, TU Dresden, IFD, Germany E-3: Potential in hydrostatic drive by intelligent mechanical solutions Fabian Schmid, SAUER BIBUS GmbH, Germany E-4: Reduction of System Inherent Pressure Losses at Pressure Compensators of Hydraulic Load Sensing Systems Jan Siebert, Karlsruher Institute of Technology, FAST, MOBIMA, Germany	Pumps Chairman: Prof. Dr. M. Ivantysynova F-1: Validation of the physical effect implementation in a simulation model for the cylinder block/valve plate contact supported by experimental investigations Stephan Wegner, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany F-2: An Investigation of the Impact of the Elastic Deformation of the Endcase/Housing on Axial Piston Machines Cylinder Block/Valve Plate Lubricating Interface Rene Chacon, Purdue University, USA F-3: Optimization of axial piston units based on demand driven relief of tribological contacts Stefan Haug, Bosch Rexroth AG, Germany F-4: Active Fluid Borne Noise Reduction for Aviation Hydraulic Pumps Arne Waitschat, Institute of Aircraft Systems Engineering, Hamburg University of Technology (TUHH), Germany
12:45	Lunch		

	Great Hall	Hall 4	Hall 5
13:45	<p>Fundamentals Chairman: Prof. Dr.-Ing. P. Pelz</p> <p>G-1: Simulation of the cavitating flow in a model oil hydraulic spool valve using different model approaches Michel Schümichen, TU Dresden, Institute of Fluid Mechanics, Germany</p> <p>G-2: Visualization of cavitation and investigation of cavitation erosion in a valve Dominik Krahl, TU Dresden, IFD, Germany</p> <p>G-3: Comparison of spool radial grooves influence between water and oil hydraulics Franc Majdic, University of Ljubljana, Slovenia</p> <p>G-4: Effects of air dissolution dynamics on the behavior of positive-displacement vane pumps: a simulation approach Francesca Furno, Siemens Industry Software S.A.S., France</p>	<p>Mobile Hydraulics Chairman: J. Knobloch</p> <p>H-1: Performance of an electro-hydraulic active steering system Eric Fischer, TU Dresden, IFD, Germany</p> <p>H-2: Energy-efficient steering systems for heavy-duty commercial vehicles Torsten Winkler, Weber-Hydraulik GmbH, Germany</p> <p>H-3: Automated calibration of the control unit for a power split tractor transmission Christopher Körtgen, RWTH Aachen University, IME, Germany</p> <p>H-4: A tele handler vehicle as mobile laboratory for hydraulic hybrid technology development Lorenzo Serrao, Dana Off-Highway Driveline Technologies, Italy</p>	<p>Pumps Chairman: Dr.-Ing. P. Achten</p> <p>I-1: Development of innovative solutions for displacement variation in hydrostatic machines Karl Hartmann, TU Braunschweig - IMN, Germany</p> <p>I-2: Experimental loss analyses of displacement controlled pumps Jan Lux, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany</p> <p>I-3: A General Method to Determine the Optimal Profile of Porting Grooves in Positive Displacement Machines: the Case of External Gear Machines Andrea Vacca, Purdue University, USA</p> <p>I-4: A Lumped Parameter Approach for GEROTOR Pumps: Model Formulation and Experimental Validation Matteo Pellegrini, Purdue University, USA</p>
15:30	Break		

16:00	<p>Fundamentals Chairman: Prof. K. Huhtala</p> <p>K-1: Slip length of the tribo system steel-polyalphaolefin-steel determined by a novel tribometer Tobias Corneli, Technische Universität Darmstadt, Institute for Fluid Systems, Germany</p> <p>K-2: Reducing Friction and Leakage by Means of Microstructured Sealing Surfaces - Example Mechanical Face Seal Stephan Neumann, RWTH Aachen, Institute for Machine Elements and Machine Design (IME), Germany</p> <p>K-3: Heat Exchanger Design in Mobile Machines Alex Magdanz, ITI GmbH, Germany</p> <p>K-4: Numerical Simulation of Transient Diabatic Pipe Flow by using the Method of Characteristics Enrico Pasquini, FLUIDON GmbH, Aachen, Germany</p>	<p>Mobile Hydraulics Chairman: Prof. Dr.-Ing. M. Geimer</p> <p>L-1: Development of a Simulation Model of a Self-Energizing Hydraulic Brake to Actively Compensate Brake Torque Oscillations Matthias Petry, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany</p> <p>L-2: Hydraulic Energy Recovery System Utilizing a Thermally Regenerative Hydraulic Accumulator Implemented to a Reach Truck Henri Hänninen, Aalto University, Finland</p> <p>L-3: A Study on Integration of Energy Harvesting System and Semi-Active Control for a Hydraulic Suspension System Mao-Hsiung Chiang, Department of Engineering Science and Ocean Engineering, National Taiwan University, Taiwan</p> <p>L-4: Design and Realization of an Adjustable Fluid Powered Piston for an Active Air Spring Philipp Hedrich, TU Darmstadt, Institute for Fluid Systems, Germany</p>	<p>Hydraulic Components Chairman: Prof. Dr.-Ing. G. Jacobs</p> <p>M-1: Dirt Ingress Behaviour of Wipers for Hydraulic Cylinders Gonzalo A. Barillas, Freudenberg Sealing Technologies GmbH & Co. KG, Germany</p> <p>M-2: Experimental Investigation of the Air Release in Hydraulic Reservoirs Marco Longhitano, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany</p> <p>M-3: An approach to optimize the design of hydraulic reservoirs Alexander Wohlers, HYDAC FluidCareCenter GmbH, Germany</p> <p>M-4: Development of hydraulic tanks by multi-phase CFD simulation Thees Vollmer, TU Braunschweig - Institute of Mobile Machines and Commercial Vehicles, Germany</p>
17:45	Get Together and Opening of the Exhibition		
19:30	Get Together and Opening of the Exhibition		

Great Hall

Hall 4

9:00

Welcome and Opening Address

Prof. Dr.-Ing. habil. DEng/Auckland Dr. h.c./Brno Dr. h.c./Dankook
Hans Müller-Steinhagen
Rector of Technische Universität Dresden

Michael Kretschmer, Member of the German Bundestag
Deputy Chair of the CDU/CSU Parliamentary Group

Christian H. Kienzle
Chairman of the Board of the Fluid Power Association within VDMA
CEO of ARGO-HYTOS GMBH, Kraichtal

Novel System Structures

Chairman: Dr.-Ing. T. Kunze

1-0: General Lecture: Novel System Architectures by Individual Drives

Jürgen Weber, TU Dresden, IFD, Germany

1-1: Green Wheel Loader - improving fuel economy through efficient drive and control concepts

Markus Schneider, TU Dresden, IFD, Germany

1-2: Decentralized energy-saving hydraulic concepts for mobile working machines

Johann Lodewyks, HSLU, CC Mechanical Systems, Switzerland

11:00

Break

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11:30

Novel System Structures

Chairman: Dr.-Ing. T. Kunze

2-1: Electric hydrostatic actuation - modular building blocks for industrial applications

Achim Helbig, Moog GmbH, Germany

2-2: Pressure Impulse Generation with Energy Recovery

Siegfried Rotthäuser, IgH GmbH, Germany

2-3: Increased energy efficiency of hydraulic hybrid drives by means of a multi-chamber accumulator

Frank Bauer, HYDAC Technology GmbH, Germany

2-4: A complete analysis for single rod electro hydrostatic actuators

Hakan Çalışkan, Middle East Technical University, Turkey

Pumps

Chairman: Dr.-Ing. M. C. Krieg

3-0: General Lecture: Technologies and Innovations for Hydraulic Pumps

Monika Ivantysynova, Purdue University, Maha Fluid Power Research Center, USA

3-1: Swash plate pumps - the key to the future

Gordon Mohn, Rexroth (Bosch Group), Germany

3-2: Customer focused development of a variable bent-axis pump/motor for open circuit hydrostatic transmissions, e.g. in hydraulic hybrid drives


Conny Hugosson, Parker Hannifin Manufacturing Sweden AB, Sweden


3-3: The control of an open-circuit, floating cup variable displacement pump

Peter Achten, INNAS, Netherlands

13:00

Lunch

		Great Hall	Hall 4
<p>14:00</p>  <p>16:00</p>		<p>Thermal Behaviour Chairman: Prof. Dr.-Ing. M. Beckmann</p> <p>4-0: General Lecture: Thermo Energetic Design of Machine Tools and Requirements for Smart Fluid Power Systems Christian Brecher, RWTH Aachen University, Laboratory for Machine Tools and Production Engineering (WZL), Germany</p> <p>4-1: Thermo-energetic Analysis of the Fluid Systems in Cutting Machine Tools Juliane Weber, TU Dresden, IFD, Germany</p> <p>4-2: Comparison of Heat-Properties and its Implications between Standard-Oil and Bio-Oil Marcel Rückert, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany</p> <p>4-3: Prediction of the thermo energetic behaviour of an electrohydraulic compact drive Sebastian Michel, TU Dresden, IFD, Germany</p> <p>4-4: Thermal analysis of Direct Driven Hydraulics Tatiana Minav, Aalto University, Finland</p>	<p>Pumps Chairman: Prof. Dr.-Ing. H. Murrenhoff</p> <p>5-1: Tribolayer Formation on Bronze CuSn12Ni2 in the Tribological Contact between Cylinder and Control Plate in an Axial Piston Pump with Swashplate Design Andreas Paulus, Bosch Rexroth AG, Germany</p> <p>5-2: A Flow Control System for a Novel Concept of Variable Delivery External Gear Pump Andrea Vacca, Purdue University, USA</p> <p>5-3: Brimming bubbles? On an Innovative Piston Design of Dosing Pumps Axel Müller, Thomas Magnete GmbH, Germany</p> <p>5-4: The Impact of Micro-Surface Shaping and Configuration of the Piston/Cylinder Interface of an Axial Piston Machine Ashley Wondergem, Purdue University, USA</p> <p>5-5: Bulk Modulus and Traction Effects in Hydraulic Pump and Motors Paul Michael, Milwaukee School of Engineering, USA</p>
	Break		

<p>16:30</p>  <p>18:20</p> <p>19:00</p>		<p>Industrial Hydraulics Chairman: Prof. Dr.-Ing. P. Anders</p> <p>6-1: Consistent automation solutions of Electrohydraulic Drives as contribution to Industry 4.0 Albert Köckemann, Bosch Rexroth AG, Germany</p> <p>6-2: Adaptive process control for stabilizing the production process Reinhard Schiffers, KrausMaffei Technologies GmbH, Germany</p> <p>6-3: On the compensation of dynamic reaction forces in stationary machinery Tobias Radermacher, TU Dresden, IFD, Germany</p> <p>6-4: Improvement of hydraulic control quality for deep drawing presses through retrofit Marcus Helmke, TRsystems GmbH, Germany</p> <p>6-5: Potentials of Speed and Displacement Variable Pumps in Hydraulic Applications Johannes Willkomm, Bosch Rexroth, Germany</p>	<p>Hydraulic Components Chairman: Dr.-Ing. M. Fischer</p> <p>7-0: General Lecture: Electrohydraulic servovalves - past, present, and future. Andrew Plummer, University of Bath, Department of Mechanical Engineering, UK</p> <p>7-1: A new energy saving load adaptive counterbalance valve Bernd Zähe, Sunhydraulik Deutschland, Germany</p> <p>7-2: Development of an Electronically Controlled Self Teaching Lift Valve Family Eneko Goenechea, Bucher Hydraulics AG, Switzerland</p> <p>7-3: Development of an innovative diaphragm accumulator design and assembly process Thorsten Hillesheim, Freudenberg Sealing Technologies GmbH & Co. KG, Germany</p> <p>7-4: Potential and application of lightweight hydraulic components Daniel Barfuss, TU Dresden, Institute of Lightweight Engineering and Polymer Technology (ILK), Germany</p>
	Conference Banquet		

	Great Hall	Hall 4
09:00	<p>Mobile Hydraulics Chairman: Dr.-Ing. T. Fedde</p> <p>8-0: General Lecture: Efficient and High Performing Hydraulic Systems in Mobile Machines Ludger Frerichs, TU Braunschweig, Institute of Mobile Machines and Commercial Vehicles, Germany</p> <p>8-1: ZF cPower - hydrostatic-mechanical powersplit Transmission Jürgen Legner, ZF Friedrichshafen AG, Germany</p> <p>8-2: High Performance Drivetrains for Powerful Mobile Machines Andreas Schumacher, Danfoss Power Solutions GmbH & Co OHG, Germany</p> <p>8-3: Power split Hydro-mechanical Variable Transmission (HVT) for off-highway application Stefano Mercati, Dana Rexroth Transmission Systems S.r.l, Italy</p>	<p>Pneumatics Chairman: Dr.-Ing. M. Fiedler</p> <p>9-0: General Lecture: Trends in Vacuum Technology and Pneumatics in the Context of Digitalization Kurt Schmalz, J. Schmalz GmbH, Germany</p> <p>9-1: Pneumatic or electromechanical drives - a comparison regarding their exergy efficiency Stephan Merkelbach, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany</p> <p>9-2: EXonomy analysis for the Inter-domain comparison of electric and pneumatic drives Elvira Rakova, TU Dresden, IFD, Germany</p> <p>9-3: Servopneumatic Clamping System for the Assembly of Battery Cells in the Area of Electric Mobility Wolfgang Gauchel, Festo AG & Co. KG, Germany</p>
10:40	Break	

11:10	<p>Mobile Hydraulics Chairman: Dr.-Ing. O. Martens</p> <p>10-1: STEAM - a hydraulic hybrid architecture for excavators Milos Vukovic, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany</p> <p>10-2: Toward Supervisory-Level Control for the Energy Consumption and Performance Optimization of Displacement-Controlled Hydraulic Hybrid Machines Enrique Busquets, Purdue University, USA</p> <p>10-3: Application of Power Regenerative Boom system to Excavator Martin Stangl, Bosch Rexroth, Germany</p> <p>10-4: Hydraulic Hybrid Excavator: Layout Definition, Experimental Activity, Mathematical Model Validation and Fuel Consumption Evaluation Federico Campanini, Università degli studi di Parma, Italy</p> <p>10-5: Generator Speed Control Utilizing Hydraulic Displacement Units in a Constant Pressure Grid for Mobile Electrical Systems Thomas Dötschel, Liebherr-Werk-Nenzing GmbH, Germany</p>	<p>Pneumatics Chairman: Prof. Dr.-Ing. P. Post, Dr.-Ing. P. Saffe</p> <p>11-1: Remote Pressure Control - Considering Pneumatic Tubes in Controller Design David Rager, Festo AG & Co. KG, Germany</p> <p>11-2: On the origin and measurement of noise emission in pneumatics Maximilian Waerder, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany</p> <p>11-3: Optimization of pneumatic vacuum generators - heading for energy-efficient handling processes Jan Gauß, J. Schmalz GmbH, Germany</p> <p>11-4: Optimal pressure control using switching solenoid valves Oussama Alaya, IMI Precision Engineering, Germany</p> <p>11-5: Experimental and CFD Study of Flow Phenomenon in Flowrate-amplified Flotation Element Wang Xinzhe, Zhejiang University, China</p>
13:00	Lunch	

	Great Hall	Hall 4
14:00	<p>Special Applications Chairman: Prof. Dr.-Ing. habil. K.-U. Graw</p> <p>12-1: Jacking and Equalizing Cylinders for NASA- Crawler Transporter Ingo Rühlicke, Walter Hunger GmbH & Co. KG, Germany</p> <p>12-2: Optimization of hydraulic drives for parabolic troughs Andreas Nocker, HAWE Hydraulik SE, Germany</p> <p>12-3: System Analysis for Hydrostatic Transmission for Wave Energy Applications - Simulation and Validation Dominic Dießel, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany</p> <p>12-4: Multi-operated HIL Test Bench for Testing the Underwater Robot Buoyancy Variation Systems Salimzhan Gafurov, Samara State Aerospace University, Germany</p> <p>12-5: Latest Technology Advancements in Hydraulic Systems for Refuse Vehicle Applications: The Case of an Automated Side Loader Gabriele Altare, Parker Hannifin Corporation, USA</p>	<p>Actuators and Sensors Chairman: Dr.-Ing. A. Müller</p> <p>13-0: General Lecture: Actuators and Sensors for Smart Systems Rudolf Scheidl, Johannes Kepler University Linz, Institute of Machine Design and Hydraulic Drives, Austria</p> <p>13-1: Smart control of electromagnetically driven dosing pumps Thomas Kramer, TU Dresden, IFD, Germany</p> <p>13-2: The Liebherr Intelligent Hydraulic Cylinder as building block for innovative hydraulic concepts Paolo Leutenegger, Liebherr-Elektronik GmbH, Germany</p> <p>13-3: The Hydraulic Infinite Linear Actuator – properties relevant for control Martin Hochwallner, Linköping University, Sweden</p> <p>13-4: Data-based condition monitoring of a fluid power system with varying oil parameters Nikolai Helwig, Centre for Mechatronics and Automation Technology (ZeMA), Germany</p>
16:00	Break	
16:30	<p>System Integration and Safety Chairman: Dr.-Ing. T. Neubert</p> <p>14-1: An integrated System Development Approach for Mobile Machinery in consistence with Functional Safety Requirements Erik Lautner, HYDAC Systems GmbH, Germany</p> <p>14-2: Model-Based Systems Engineering in Mobile Applications Oliver Koch, TU Dresden, IFD, Germany</p> <p>14-3: Fail Operational Controls for an Independent Metering Valve Michael Rannow, Eaton Corporation, USA</p>	<p>Actuators and Sensors Chairman: Dr.-Ing. A. W. Schultz</p> <p>15-1: Energy efficient multistable valve driven by a magnetic shape memory alloy Thomas Schiepp, ETO MAGNETIC GmbH, Germany</p> <p>15-2: Electromechanical actuator concept for the controlled and direct actuation of a hydraulic main stage Jörg Schneider, Thomas Magnete GmbH, Germany</p> <p>15-3: Design of a High Performance Energy Coupling Actuated Valve (ECAV) Jordan Garrity, Purdue University, USA</p>
17:50	<p>Verabschiedung / Farewell Address Jürgen Weber, TU Dresden, IFD, Germany</p>	
19:00	Laboratory Party	

Further Publications in the conference proceedings

Digital Hydraulics

[The control of multiple actuators using single IEHEC pump/motor](#)
Rafael Åman, Lappeenranta University of Technology, Finland

Mobile Hydraulics

[Series Hybrid mining loader with zonal hydraulics](#)
Tatiana Minav, Aalto University, Finland

[Test Bench for Experimental Research and Identification of Electrohydraulic Steering Units](#)
Alexander Mitov, Technical University - Sofia, Bulgaria

Pumps

[Energy efficiency improvement by the application of nano-structured coatings on axial piston pump slippers](#)
Giuseppe Rizzo, IMAMOTER – C.N.R., Italy

Hydraulics Components

[CFD Simulation and Measurement of Flow Forces Acting on a Spool Valve](#)
Patrik Bordovsky, RWTH Aachen University, Institute for Fluid Power Drives and Controls (IFAS), Germany

Industrial Hydraulics

[Condition Monitoring for Hydraulic Power Units - the user-oriented Step into industry 4.0](#)
Martin Laube, Bosch Rexroth AG, Germany

Actuators and Sensors

[From reliable sensors to cylinder intelligence](#)
Leo Caspers, Bosch Rexroth B.V., Netherlands

[Nondestructive quality inspection of solenoid valves](#)
Andrey Gadyuchko, Kendrion Mechatronics Center GmbH, Germany

System Integration and Safety

[Customer-specific configuration of hydraulic controls for mobile applications: complexity management](#)
Martin Krüßmann, Bosch Rexroth AG, Germany