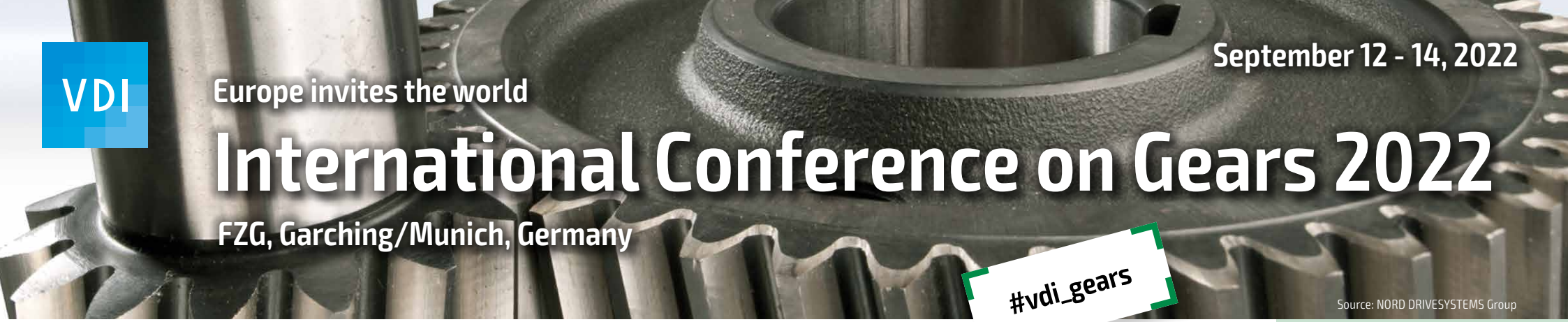

VDI

Europe invites the world

International Conference on Gears 2022

FZG, Garching/Munich, Germany

September 12 - 14, 2022

#vdi_gears

Source: NORD DRIVESYSTEMS Group

Key topics:

- Improved simulation methods
- Lubrication for enhanced efficiency
- Condition monitoring with smart gear system
- Multi-body simulation and NVH prediction
- Improved calculation methods for strength and efficiency

Gears interactive

GearArena
Speakers meet up
FZG lab tours
Poster exhibition
Two gear community nights

Associated organisations:

American Gear Manufacturers, USA

ARTEMA, France

ASSIOT, Italy

BAPT

British Gear Association

Chinese Mechanical Engineering Society

Canadian Society for Mechanical Engineering

CSVTS, Czechia

Drive Technology Research Association, Germany

Gear Research Institute, USA

Scientific Society of Mechanical Engineers, Hungary

IFToMM

Institution of Mechanical Engineers, United Kingdom

The Korean Society of Mechanical Engineers, Korea

SICE, Japan

Romanian Association of Mechanical Transmissions

Technical Chamber of Greece

WiGeP, Germany

Visit parallel conferences free of charge

+ **Gear Production 2022**
www.vdiconference.com/02TA411022

+ **High Performance Plastic Gears 2022**
www.vdiconference.com/02TA409022

An event organized by VDI Wissensforum
www.vdi-gears.eu

1st Conference day
Monday, September 12th, 2022

08:15 Registration

Plenary lectures

09:30 Joint welcome and opening of
- International Conference on Gears 2022
- International Conference on High Performance Plastic Gears 2022
- International Conference on Gear Production 2022

Prof. Dr.-Ing. Karsten Stahl, FZG, Technical University of Munich (TUM), Garching, Germany

09:55 Welcome address by
Prof. Dr. sc. tech. Gerhard Kramer, Senior Vice President Research and Innovation, Technical University of Munich (TUM), Germany

10:05 Welcome address by
Dr.-Ing. Burkhard Pinnekamp, Head of Central Research and Development, Renk GmbH, Augsburg; President, Research Association for Drive Technology (FVA), Frankfurt, Germany

10:15 **Keynote session: Innovation flashlights: What will be the next game-changing innovations and technologies?**

Demands in gear technology in structural change of economy
Prof. h. c. Dr.-Ing. Aizoh Kubo, General Manager, Research Institute for Applied Sciences, Kyoto, Japan

The innovator's DNA
Sonja Goris, M. Sc. Mech Eng., IP & Innovation Manager, ZF Wind Power Antwerpen NV, Antwerpen-Berchem, Belgium

New ways to lubricate
Dr. Lutz Lindemann, Member of the Executive Board (CTO), FUCHS PETROLUB SE, Mannheim, Germany

High performance plastic gears in future applications
Prof. Dr.-Ing. Karl Kuhmann, Head of Polymer Technology Development, High Performance Polymers, Evonik Operations GmbH, Marl, Germany

Roller pairings with lubricant-impregnated sintered material
Prof. i.R. Dr.-Ing. Dr. h.c. Bernd-Robert Höhn, TUM emeritus of excellence, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

With digital polls during the speeches

12:00 Time for working lunch – meet & greet in the exhibition area, poster presentation area and GearArena

Parallel sessions

	International Conference on Gears			Parallel conferences – free of charge –	
				International Conference on Plastic Gears www.vdiconference.com/02TA409022	International Conference on Gear Production www.vdiconference.com/02TA411022
	Lecture Room A	Lecture Room B	Lecture Room C	Lecture Room D	Lecture Room E
13:30	Determining tooth root strength	NVH	EHL contact	Applications	Manufacturing of internal gears
15:00	Coffee break – meet & greet in the exhibition area, poster presentation area and GearArena				
16:00	Loaded tooth contact analysis	Non-involute and asymmetric gears	Condition monitoring/smart gears	Material properties	Innovative manufacturing processes

18:00 Organized bus transfer to the evening reception

19:00 **Evening reception at the Hofbräuhaus in Munich**
Dinner Speech: Prof. Dr. Dr. h. c. mult. Wolfgang A. Herrmann, President Emeritus, Technical University of Munich (TUM), Garching & Chairman of the Founding Board, Deutsches Zentrum Mobilität der Zukunft (DZM), Munich, Germany

2nd Conference day
Tuesday, September 13th, 2022

	International Conference on Gears			International Conference on Plastic Gears	International Conference on Gear Production
	Lecture Room A	Lecture Room B	Lecture Room C	Lecture Room D	Lecture Room E
08:30	Gear strength	Wear	Bevel and Hypoid Gears	Gear strength testing	Gear soft machining
10:00	Coffee break – meet & greet in the exhibition area, poster presentation area and GearArena				
11:00	Planetary gears	Gear geometry optimization	Enhanced testing methods	Standardization of strength calculation	New concepts for machine and manufacturing processes
12:30	Time for working lunch – meet & greet in the exhibition area, poster presentation area and GearArena				
14:00	Gear dynamics	Operating data acquisition	FEM analysis	Geometrical effects	Advances in special gearings
15:30	Coffee break – meet & greet in the exhibition area, poster presentation area and GearArena				
16:30	Gear strength – flank properties	CFD – churning and windage losses	Quality assurance and measurement	Friction and temperature effects	Modeling in gear production

18:00 **Evening reception at the conference venue**
Dinner Speech: Prof. Dr.-Ing. Sebastian Bauer, President, German Federation of Industrial Research Associations "Otto von Guericke" e. V. (AiF), Cologne & Managing Director (Research and Development), BAUER Maschinen GmbH, Schrobenhausen, Germany

3rd Conference day
Wednesday, September 14th, 2022

	International Conference on Gears			International Conference on Plastic Gears	International Conference on Gear Production
	Lecture Room A	Lecture Room B	Lecture Room C	Lecture Room D	Lecture Room E
08:30	Friction	Simulation and optimization	Worm and crossed helical gears	Lubrication	Measurement technology
10:00	Coffee break – meet & greet in the exhibition area, poster presentation area and GearArena				
11:00	Multiparameter optimization	Material and heat treatment	High speed gears	Tribological investigation	Gear hard machining
12:30	Closing remarks	Closing remarks	Closing remarks	Closing remarks	Closing remarks

12:45 Awarding of the best presentation for junior engineers by **Prof. Dr.-Ing. Karsten Stahl,** FZG, Technical University of Munich (TUM), Garching, Germany
Awarding of the best paper by **Dr.-Ing. Franz Völkel,** Sr. Vice President R&D, Business Division Transmission Systems, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany
+ Lunchtime snack

14:15 End of the conferences

Gears 2022

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10:15 - 12:00 **Keynote session: Innovation flashlights: What will be the next game-changing innovations and technologies?**
Moderation: **Prof. Dr.-Ing. Karsten Stahl,** FZG, Technical University of Munich (TUM), Garching, Germany

Demands in gear technology in structural change of economy
- High performance in the inflating structure of the economy
- Motive force behind human activity is desire
- Necessary performance in sustainable structure of the economy

Prof. h. c. Dr.-Ing. Aizoh Kubo, General Manager, Research Institute for Applied Sciences, Kyoto, Japan

The innovator's DNA
- Exploration
- Acceleration
- Serendipity

Sonja Goris, M. Sc. Mech. Eng., IP & Innovation Manager, ZF Wind Power Antwerpen NV, Antwerpen-Berchem, Belgium

New ways to lubricate
- Sustainability requirements change in raw material landscape
- Sensor technologies – what's possible
- New basefluids – why not water

Dr. Lutz Lindemann, Member of the Executive Board (CTO), FUCHS PETROLUB SE, Mannheim, Germany

High performance plastic gears in future applications
- Intelligent plastics material design
- Processing and design freedom of plastic gears
- Evaluation of plastic gears for new mobility vehicles

Prof. Dr.-Ing. Karl Kuhmann, Head of Polymer Technology Development, High Performance Polymers, Evonik Operations GmbH, Marl, Germany

Roller pairings with lubricant-impregnated sintered material
- Lubrication of the contact by escaping lubricant
- Separation of the contact of the Roller pairings, without metallic contact
- Influence of the surface structure

Prof. i.R. Dr.-Ing. Dr. h.c. Bernd-Robert Höhn, TUM emeritus of excellence, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

12:00 **Time for a working lunch** – meet & greet in the exhibition area, poster presentation area and GearArena

Every participant gets a voice – you will be involved via digital polls during the speeches.

– Conference will continue in parallel sessions –

Lecture Room A

Determining tooth root strength

Moderation: Dr.-Ing. Hartmut Faust, Schaeffler Automotive Buehl GmbH & Co. KG, Germany/**Prof. Prof. Bingkui Chen,** Chongqing University, China

13:30 Gear root bending strength: statistical treatment of single tooth bending fatigue tests results

- Statistical analysis of STBF (Single Tooth Bending Fatigue Test) data
- Gear SN-curve estimation via maximum likelihood estimation (MLE) and statistic of extremes

Luca Bonaiti, M. Sc., Prof. Ing. Carlo Gorla, Associate Professor, Prof. Dr.-Ing. Francesco Rosa, Assistant Professor, Department of Mechanical Engineering, Politecnico di Milano, Italy

14:00 Improved method for the determination of tooth root endurance strength

- Load increment procedure for the precise estimation of the load capacity of each test tooth
- Evaluation of the influencing geometry parameters for an accurate calculation of fatigue strength

Ahmad Alnahlaui, M. Sc., Research Assistant, Prof. Dr.-Ing. Peter Tenberge, Full Professor, Chair of Industrial and Automotive Drivetrains, Ruhr-University Bochum, Germany

14:30 A comparison of gear tooth bending fatigue lives from single tooth bending and rotating gear tests

- Discussion of statistical regression techniques for single tooth bending and rotating gear tests
- Translation factors for converting single tooth bending data to rotating gear data are introduced

Isaac Hong, Ph. D., Research Scientist, Zach Teaford, Graduate Research Associate, Prof. Ahmet Kahraman, Howard D. Winbigler, Professor and Director, Gear and Power Transmission Research Laboratory, Department of Mechanical and Aerospace Engineering, The Ohio State University, Columbus, USA

Lecture Room B

NVH

Moderation: Prof. Dr.-Ing. Berthold Schlecht, Technical University of Dresden, Germany/**Dr.-Ing. Aleksandar Miltenović,** University of Niš, Serbia

NVH calculations for drivetrains – how to select the best suitable calculation method for a specific purpose

- Calculation process for NVH using transmission design- and MBS-Software
- Effect of the low-contact-ratio (LCR) and high-contact-ration (HCR) gear designs on gear loads and NVH

Dipl.-Ing. Jürg Langhart, Senior Engineer – Global Sales, Prof. Dr.-Ing. Saeed Ebrahimi, Software Developer, KISSsoft AG, Bubikon, Switzerland; Dr.-Eng. Davide Marano, Senior Transmission Engineer, Gearlab srl., Modena, Italy

Gear mesh excitation and non-uniform rational B-splines

- Tooth contour derived by shaping simulation
- Numerical modeling with isogeometric analysis

Andreas Beinstingel, M. Sc., Chair of Vibroacoustics of Vehicles and Machines, Technical University of Munich (TUM), Garching & Computational Engineer, Renk GmbH, Augsburg; Dr.-Ing. Michael Heider, Head of Calculation Department, Renk GmbH; Prof. Dr.-Ing. Steffen Marburg, Chair of Vibroacoustics of Vehicles and Machines, TUM, Garching, Germany

NVH-performance vs. costs – coherent R&D for gears, system and manufacturing

- Interaction between NVH-performance of transmissions, gear quality/-costs, technology and process in gear manufacturing
- Big data analysis

Dipl.-Ing. Andreas Hessler, Development Engineer, Transmission Gears, Dr.-Ing. Benedikt Neubauer, Director Gears, Business Division E-Mobility, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

Lecture Room C

EHL contact

Moderation: Prof. Dr.-Ing. Bernd Sauer, Technische Universität Kaiserslautern, Germany/ **Dr.-Ing. Toni Weiss,** Gear Consultant, ret. from Renk GmbH, Augsburg, now GanaCon – Gear analysis and Consulting, Germany

Effectiveness of Roelands formula with constant viscosity-pressure coefficient (VPC) in the EHL solution of higher pair contact

- Effect of the different constant VPC on EHL results
- Comparisons between constant VPC and variable VPC

Jiajia Zhang, Ph. D.,Yumei Hu, Professor, Huan Zhang, Master, State Key Laboratory of Mechanical Transmission, Chongqing University, Chongqing City, China

Local pitting fatigue concept with EHL simulation for case hardened gears

- Consideration of surface roughness and sliding motion
- Analysis of stress history at different gear flank positions

Aleksandar Eric, M. Sc., Gear Development and Test Conception/Realization, Chassis Systems Control, Robert Bosch GmbH, Heilbronn; Prof. Dr.-Ing. habil. Volker Schulze, Director of Manufacturing and Materials Technology, wbk Institute of Production Science, Karlsruhe Institute of Technology (KIT), Germany

2x2-disc tribometer for various tests on sliding/rolling contacts with tribological loads such as in tooth flank contacts

- Simple test machine for micro-pitting and pitting tests with the same paths of local tribological stress as on the tooth flanks
- Tribometer which allows to analyze the stepwise progress of wear and fatigue without destroying the specimens

Prof. Dr.-Ing. Peter Tenberge, Full Professor, Chair of Industrial and Automotive Drivetrains, Ruhr-University Bochum, Germany

15:00 Coffee break – meet & greet in the exhibition area, poster presentation area and GearArena

15:30 - 15:50 Poster presentations in the poster exhibition area

Lecture Room A

Loaded tooth contact analysis

Moderation: Prof. Dr.-Ing. Christian Brecher, RWTH Aachen University, Germany/**Dr.-Ing. Reiner Vonderschmidt,** Georgii Kobold GmbH & Co. KG, Germany

16:00 Design, strength calculation by ISO10300 and loaded tooth contact analysis (TCA) of forged differential bevel gears

- Full design of forged differential gear sets
- Loaded tooth contact analysis of forged differential gear sets

Dr.-Ing. Joachim Thomas, Managing Director, ZG Hypoid GmbH, Aschheim, Dipl.-Ing. Frederik Mieth, Research Assistant, Institute of Machine Elements and Machine Design, Faculty of Mechanical Science and Engineering, Technical University of Dresden, Germany; Claude Gosselin, P. Eng., Ph. D., Managing Director/CEO, Involute Simulation Softwares Inc., Quebec, Canada

16:30 Innovative tooth contact analysis with non-uniform rational b-spline (NURBS) surfaces

- Comparison of NURBS and Bézier approach in tooth contact analysis (TCA)
- Potential of flank and root description regarding stress and lifetime prediction

Dipl.-Ing. Felix Müller, Research Assistant, Dr.-Ing. Stefan Schumann, Chief Engineer, Prof. Dr.-Ing. Berthold Schlecht, Full Professor, Institute of Machine Elements and Machine Design, Faculty of Mechanical Science and Engineering, Technical University of Dresden, Germany

17:00 Developing a digital tread linking gar design to manufacturing simulation and metrology

- Demonstrating data flow across gear design & manufacturing
- Benefits delivered to the component manufacturer

MA M. Eng C. Eng MIMechE, Barry James, Head of Research and Innovation, System Dynamics, MSc CEng MIMechE Stewart Hughes, Team Leader, Hexagon Applied Solutions, Romax Technology Ltd., Nottingham, United Kingdom

17:30 End of the first conference day

18:00 Organized bus transfer to the evening reception

19:00 Evening reception at the Hofbräuhaus in Munich

You can look forward to a special evening event. Enhance your personal network and use the informal atmosphere for deeper-going discussions.

Lecture Room B

Non-involute and asymmetric gears

Moderation: Prof. Dr.-Ing. Manfred Hirt, Past President, Research Association for Drive Technology (FVA), former board of Renk GmbH, Germany/**Dr. Alex Kapelevich,** AKGears, LLC, USA

Experimental validation of an analytical calculation method for determining the tooth root bending strength of asymmetric gears

- Systematic experimental investigations on the tooth root bending strength of asymmetric gears
- Validation of an analytical calculation method for standardization

Christian Weber, M. Sc., Mechanical Engineer, WEBER GMBH & Co. KG, Bodman, Dr-Ing. Thomas Tobie, Head of Department, Department Load-Capacity Cylindrical Gears, Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

Practical application of asymmetric tooth root geometry for downsizing automotive transmission gears

- Development of a hob design method for asymmetric tooth tip geometry
- Validation of the effect on improving the tooth root strength for CVT gears

Kunihiko Fukanoki, Development Engineer, Hardware System Development Department, Jatco Ltd., Atsugi City, Dr.-Ing. Yoshitomo Suzuki. Engineering Management Department, Koji Matsuo, Development Engineer, Hardware System Development Department, Fuji Chity, Jatco Ltd., Japan

Contact characteristic of cycloid planetary gear drives considering relevant backlashes and clearances

- Analysis for cycloid gear drives with bearing clearances
- Influences of the clearances on contact characteristics

Ling-Chiao Chang, M. Sc., Dr.-Ing. Shyi-Jeng Tsai, Associate Professor, Department of Mechanical Engineering, National Central University, Taoyuan City, Taiwan, Ching-Hao Huang, Ph. D., Transmission Machinery Co., Ltd., Tainan City, Taiwan

Lecture Room C

Condition monitoring/smart gears

Moderation: Prof. Dr.-Ing. Dr. h. c. Albert Albers, Karlsruhe Institute of Technology (KIT), Germany/**Prof. Dr. Datong Qin,** Chongqing University, China

Sensor-integrated gears: wear detection by in-situ MEMS acceleration sensors

- Integration of MEMS acceleration sensors directly on gear
- Optimization of wear detection by machine-learned regression

Julian Peters, M. Sc., Research Assistant, Dr.-Ing. Thomas Gwosch, Head of Research Department Mechatronic Machine Elements and System Reliability, Univ.-Prof. Dr.-Ing. Sven Matthiesen, Chair of Power-Tools and Machine Elements at IPEK – Institute of Product Engineering, Karlsruhe Institute of Technology (KIT), Germany

Application of genetic algorithms for parameter identification in a developing smart gear system

- Parameter identification for the smart gear system
- Optimizing error of parameter identification by genetic algorithms

Thanh-Tung Mac, M. Sc., Faculty of Mechanical Engineering, Kyoto Institute of Technology, Kyoto, Japan

Feasibility study of measuring instantaneous angular speed of spur gears with magnetoresistive (MR) sensors

- Evaluation of measuring positions for condition monitoring of spur gears
- Comparison of instantaneous angular speed (IAS) with accelerometer measurements

Yanik Koch, M. Sc., Research Assistant, Prof. Dr.-Ing. Eckhard Kirchner, Director, Institute of Product Development and Machine Elements, Technische Universität Darmstadt; Dr.-Ing. Rolf Slatter, CEO, Sensitec GmbH, Wetzlar, Germany

You are invited!

Dinner speech

Prof. Dr. Dr. h. c. mult. Wolfgang A. Herrmann, President Emeritus, Technical University of Munich (TUM), Garching & Chairman of the Founding Board, Deutsches Zentrum Mobilität der Zukunft (DZM), Munich, Germany

"Mobility is not only an essential feature of freedom – without it, living nature is unimaginable. The key to mobility of humankind and its communities has always been innovation, shaped by our engineers,coming full circle back to living freedom."

Source: @ Hofbräuhaus München

2nd Conference day
Tuesday, September 13th, 2022

Lecture Room A

Gear strength
Moderation: Dr.-Ing. Ralf Hess, Flender GmbH, Germany/ **Robin Olson, M. Sc.,** Rexnord Industries, LLC, USA

08:30 Material influence on mechanical properties of gears with alternative microstructures
- Investigations on the influence of different microstructures on the gear load carrying capacity (tooth root breakage and pitting)
- Evaluation of the potential of alternative case layer structures compared to conventionally carburized and case-hardened gears

Niklas Blech, M. Sc., Research Associate, Dr-Ing. Thomas Tobie, Head of Department, Department Load-Capacity Cylindrical Gears, Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

09:00 Advanced use of DOE in gear macro-geometry optimization
- Optimization of NVH-behavior, gear durability and efficiency
- Quality and robustness improvement for gear performance

Nikolaus Hessinger, Simulation Engineer Transmission, Michael Braunstingl, B. Sc., Simulation Engineer Transmission, Hemant Bansal, M. Eng., Lead Engineer Transmission Simulation, Passenger Car Transmission Simulation and Testing, AVL List GmbH, Graz, Austria

09:30 Influence of grinding zones on the tooth root bending strength of case carburized cylindrical gears
- Experimental investigations and grinding zone measurement analysis
- Gears of different sizes and different shot blasting treatments

Michael Geitner, M. Sc., Research Associate, Teamleader materials and heat treatment, Dr.-Ing. Thomas Tobie, Head of Department, Department Load-Capacity Cylindrical Gears, Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

Lecture Room B

Wear
Moderation: Prof. Dr.-Ing. Peter Tenberge, Ruhr-University, Germany/**Prof. Ing. Carlo Gorla,** Politecnico di Milano, Italy

Analysis of the mechanisms of action within the dry lubricated rolling-sliding contact of coated surfaces
- Characterization of the friction behavior
- Local wear analysis of the coating

Sebastian Sklenak, M. Eng., Research Assistant, Dr.-Ing. Jens Brimmers, M. Sc., Chief Engineer, Gear Department, Prof. Dr.-Ing. Christian Brecher, Full Professor, Chair of Machine Tools, Laboratory for Machine Tools and Production Engineering, Faculty for Mechanical Engineering, RWTH Aachen University, Germany

Improving pitting durability by introducing the non-linear wear propagation property of helical gears
- Mechanism of pitting durability deviations at high loads
- Influence of tooth-edge modifications on wear

Dr.-Ing. Koji Kumagai, Development Engineer, Powertrain Production Engineering and Development Division, Nissan Motor Co., Ltd., Kanagawa, Japan

Wear simulation of worm gears based on an energetic model
- Transient simulation of friction and wear of worm gears
- Experimental determination of wear model parameters

Dipl.-Ing. Kevin Daubach, Research Assistant, Jun. Prof. Dr.-Ing. Manuel Oehler, Junior Professor for Mechanical Drive Technology, Prof. Dr.-Ing. Bernd Sauer, Full Professor, MEGT – Institute of Machine Elements, Gears and Tribology, Department of Mechanical and Process Engineering, Technische Universität Kaiserslautern, Germany

Lecture Room C

Bevel and hypoid gears
Moderation: Prof. Dr.-Ing. Michael Weigand, TU Wien, Austria/ **Prof. Dr. Eng. Ichiro Moriwaki,** Kyoto Institute of Technology, Japan

Development of IP-bevel gears for industrial operation
- Gear features in design and manufacturing
- Performance in transmission error and in load carrying capability

Prof. h. c. Dr.-Ing. Aizoh Kubo, General Manager, Research Institute for Applied Sciences, Kyoto, Japan; Dr.-Ing. Akio Ueda, President, AMTEC Inc, Osaka, Japan; Dipl.-Ing. Hiroya Ishiyama, Productengineer, DMG/MORI Co. Ltd., Iga, Japan

Enhanced loaded tooth contact analysis of hypoid gears within a multi-body-system simulation
- Enhanced load distribution calculation with reduced number of contact points
- Stress analysis with speed improvements on hypoid gears

Dipl.-Ing. Wolf Wagner, Research Assistant, Dr.-Ing. Stefan Schumann, Chief Engineer, Prof. Dr.-Ing. Berthold Schlecht, Full Professor, Institute of Machine Elements and Machine Design, Faculty of Mechanical Science and Engineering, Technical University of Dresden, Germany

A standardizable approach to tooth flank fracture
- Application of Dang Van criterion to the prediction of TFF
- Focusing exclusively on surface-parallel material planes

Dipl.-Ing. Stephan André Böhme, Department of Mechanical and Industrial Engineering, Norwegian University of Science and Technology (NTNU), Trondheim, Norway, Joni Keski-Rahkonen, M. Sc., Manager Product Support, PE – Thruster Systems, Kongsberg Maritime Finland Oy, Rauma, Tami Komssi, M. Sc., Sales Director, ATA Gears Oy, Tampere, Finland

10:00 Coffee break – meet & greet in the exhibition area, poster presentation area and GearArena

10:30 - 10:50 Poster presentations in the poster exhibition area

Lecture Room A

Planetary gears

Moderation: Dipl.-Ing. Zsolt Roth, J. M. Voith SE & Co. KG | VTA, Germany/**Dr.-Ing. Kai Lubenow,** Eickhoff Antriebstechnik GmbH, Germany

11:00 Dynamic load distribution of planetary gear sets subject to both internal and external excitations

- Dynamic response and contact stress distribution in planetary gears
- Influence of input torsional excitations

Lokaditya Ryali, Graduate Research Associate, Dr. David Talbot, Assistant Professor, Gear and Power Transmission Research Laboratory, Department of Mechanical and Aerospace Engineering, The Ohio State University, Columbus, USA

11:30 Experimental investigation of the dynamic load sharing of planetary gearboxes

- High speed double-helical planetary gearbox
- Influence of load and speed on load sharing behavior

Joshua Götz, M. Sc., former Research Associate, Team Leader Gear Dynamics, Department Calculation and Verification of Gearbox Systems, Marius Fürst, M. Sc., Research Associate, Felix Siglmüller, M. Sc., Research Associate, Institute of Machine Elements, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

12:00 Influences on the excitation behavior of lightweight planetary gearboxes

- Influences of misalignments and flexible ring gears on the transmission error
- Extension and validation of a tooth contact analysis

Julian Theling, M. Sc., Team Leader Gear Acoustics, Gear Department, Dr.-Ing. Jens Brimmers, M. Sc., Chief Engineer, Gear Department, Prof. Dr.-Ing. Christian Brecher, Full Professor, Chair of Machine Tools, Laboratory for Machine Tools and Production Engineering, Faculty for Mechanical Engineering, RWTH Aachen University, Germany

Lecture Room B

Gear geometry optimization

Moderation: Prof. Dr.-Ing. Gerhard Poll, Leibniz University Germany/**Prof. Dr. Geng Liu,** Northwestern Polytechnical University & Shaanxi Engineering Laboratory for Transmissions and Controls, China

Parametric study of hypocycloidal involute gears

- Definition of the tip/tip interference condition in the internal gearing with a low tooth number difference
- Definition of the effective contact ratio of hypocycloidal involute gears under load.

Dr.-Ing. Alex Kapelevich, Consultant, Yuriy V. Shekhtman, Senior Researcher, AKGears, LLC, Shoreview, Minnesota, USA

Pitch error analysis on gear rolling-forming with radial-feeding

- Pitch error analysis of gear rolling-forming process with radial feeding
- Experiment validation of pitch error with two sets of tooth numbers

Dr.-Ing Peng Bo, Yuanxin Luo, Chengsheng Li, College of Mechanical and Vehicle Engineering, Chongqing University, China

Very fast tooth root optimization – general tool geometry for much smaller tooth root stresses

- Stepwise modification of the hobbing tool geometry and fast simulation of the hobbing process
- Using a new FEM calibrated analytic function for a fast optimization process to minimize the maximum tooth root stress

Prof. Dr.-Ing. Peter Tenberge, Full Professor, Chair of Industrial and Automotive Drivetrains, Ruhr-University Bochum, Germany

Lecture Room C

Enhanced testing methods

Moderation: Dr.-Ing. Carsten Gitt, Mercedes-Benz AG, Germany/**Prof. Dr.-Ing. José I. Pedrero,** Universidad Nacional de Educación a Distancia (UNED), Spain

Suitability of the test results of micropitting tests acc. to FVA 54/7 for modern practical gear applications

- Influence of the material of case-hardened gears on the test results
- Influence of geometry (use of flank modifications and helical gears) and grinding method (profile grinding) of test gears on the test result

Nadine Sagraloff, M. Sc., former Research Associate, Dr-Ing. Thomas Tobie, Head of Department, Department Load-Capacity Cylindrical Gears, Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

Test rig concept for high power very high cycle fatigue (VHCF) gear testing

- Concept for tooth root testing at high rotational speeds
- Challenges for high-speed gear testing under reversed bending

Moritz Trippe, M. Sc., Research Assistant, Gear Department, Dr.-Ing. Jens Brimmers, M. Sc., Chief Engineer, Gear Department, Prof. Dr.-Ing. Christian Brecher, Full Professor, Chair of Machine Tools, Laboratory for Machine Tools and Production Engineering, Faculty for Mechanical Engineering, RWTH Aachen University, Germany

Mode III threshold under rolling contact fatigue (RCF) and development of a test gearbox for planet gears

- Determining mode III threshold under RCF for thin-rimmed gears
- Development of test rig for testing 3-gear train planet gears layout

Prasad Mahendra Rao, M. Sc., Prof. Dr.-Ing. Stefano Foletti, Associate Professor, Prof. Ing. Carlo Gorla, Associate Professor, Department of Mechanical Engineering, Politecnico di Milano, Italy

12:30 Time for a working lunch – meet & greet in the exhibition area, poster presentation area and GearArena

13:00 - 13:20 Poster presentations in the poster exhibition area

Lecture Room A

Gear dynamics

Moderation: Dr.-Ing. Todor Radev, Volkswagen AG, Germany/ **Prof. Dr.-Ing. Philippe Velex,** INSA – Institut National des Sciences Appliquées de Lyon, France

14:00 An experimental study of parametric resonances of a spur gear pair at speeds above its primary resonance

- Experimental demonstrations of parametric resonances of a spur gear pair
- High-speed spur gear set-up and associated instrumentation

Prof. Ahmet Kahraman, Professor and Director, Cihan A. Celikay, Graduate Research Associate, Ata Donmez, Graduate Research Associate, Gear and Power Transmission Research Laboratory, The Ohio State University, Columbus, Ohio, USA

14:30 Application of gear profile dynamic modification on a three-axis integrated transmission system for vibration reduction

- Performance optimisation of manufacturing deviations
- Design, simulation and analysis of gears and transmissions

Pu Gao, Ph. D., Research Assistant, Prof. Hui Liu, Professor, Vehicle Research Center, Beijing Institute of Technology, Prof. Dr. Changle Xiang, Vice-President, Beijing Institute of Technology, Director, National Key Lab of Vehicle Transmission, Beijing, China

15:00 Influence of thin rimmed/-webbed gears on transmission dynamic behavior – approximate dynamic factor formula

- Dynamic factor formula for the 3D FE gear hybrid model
- Web/mesh dynamic coupling in a thin-rimmed/-webbed gear

Dr.-Ing. Bérengère Guilbert, Associate Prof., Prof. Dr.-Ing. Philippe Velex, Full Professor, LaMCoS, INSA – Institut National des Sciences Appliquées de Lyon, Villeurbanne Cédex, France

Lecture Room B

Operating data acquisition

Moderation: Dr.-Ing. Burkhard Pinnekamp, Renk GmbH, Augsburg & Research Association for Drive Technology (FVA), Germany/**Prof. Prof. Dr.-Ing. Athanassios Mihailidis,** Aristotle University of Thessaloniki, Greece

Generation of torque spectrum from measured torque-speed-time data

- "Rainflow method" when torque has both positive and negative signs
- Duty cycle acc. ISO6336-6 with added mean stress influence factor

Dr.-Ing. Ulrich Kissling, President, KISSsoft AG, Bubikon, Switzerland

Trouble shooting of abnormal gearbox noise

- Trouble shooting and analysis under high time pressure
- Root cause identification by comprehensive analysis mainly of one microphone signal
- Development of a monitoring strategy for the gearbox

Dr. sc. techn. Frank May, Senior Expert Machinery Dynamics & Acoustics, TÜV SÜD Schweiz AG, Winterthur, Switzerland

Improved rotorcraft drivetrain safety and related research with special focus on improved lubricants for rotorcraft transmissions

- Technical improvements of rotorcraft drive trains, improvements of the design process
- Novel lubricants for transmissions for aviation

Prof. Dr.-Ing. Michael Weigand, Full Professor and Head of Research Unit Machine Elements and Transmissions for Aviation, Univ.-Prof. Dipl.-Ing. Dr.-Ing. Carsten Gachot, Full Professor and Head of Research Unit Tribology, Institute for Engineering Design and Product Development, TU Wien, Vienna, Austria

Lecture Room C

FEM analysis

Moderation: Dipl.-Ing. Norbert Haefke, Research Association for Drive Technology (FVA), Germany/**Prof. Wenzhong Wang,** Beijing Institute of Technology, China

Dynamic modeling and accuracy evaluation method for complex irregular components of aviation transmissions

- Multi-method interactive verification of irregular components modeling
- Quantitative accuracy evaluation method of condensation model

Dr. Aiqiang Zhang, Research Assistant, Jing Wei, Ph. D./Professor, The State Key Laboratory of Mechanical Transmissions, Chongqing University, China

Stress calculation on bevel gears with FEM influence vectors

- Loaded tooth contact analysis with bevel gears
- Subsurface stress state and load capacity of bevel gears

Dipl.-Ing. Frederik Mieth, Research Assistant, Dipl.-Ing. Carsten Ulrich, Research Assistant, Prof. Dr.-Ing. Berthold Schlecht, Full Professor, Institute of Machine Elements and Machine Design, Faculty of Mechanical Science and Engineering, Technical University of Dresden, Germany

Finite element tooth contact analysis of crossed helical gear drives considering misalignments and deviations

- Impact of deformation, misalignment and manufacturing deviations
- Tooth contact analysis

Prof. Dr.-Ing. Athanassios Mihailidis, Full Professor, Head of the School of Mechanical Engineering, Laboratory of Machine Elements and Machine Design, Aristotle University of Thessaloniki, Greece

15:30 Coffee break – meet & greet in the exhibition area, poster presentation area and GearArena

16:00 - 16:20 Poster presentations in the poster exhibition area

VDI

Lecture Room A

Gear strength – flank properties

Moderation: Prof. Ing. Carlo Gorla, Politecnico di Milano, Italy, **Dr.-Ing. Johannes König,** ZF Friedrichshafen AG, Germany

16:30 Combining improved gear efficiency and improved fatigue performance through mass finishing

- Friction modified by enhanced topography and microstructure
- Fatigue modified by introduced compressive stress

Florian Reinle, M. Sc., Advanced Development Engineer, Advanced Development & Tribology, OTEC Präzisionsfinish GmbH, Straubenhardt, Germany; Ing. Enrico Morgano, Powertrain Materials Engineering Manager, Product Development, CRF Centro Ricerche Fiat S.C.p.A., Orbassano, Italy

17:00 Influence of material roughness, hardness and lubricant additives on the micropitting behaviour of gears

- Influence of material properties on the micropitting process
- Effect of lubricant additives for suppressing micropitting

Takuya Ohno, B. Eng., Lubricants Researcher, Lubricants Research Laboratory, Idemitsu Kosan Co., Ltd., Ichihara-shi, Japan; Dr.-Ing. René Greschert, Testing Engineer, Dr.-Ing. Jens Brimmers, M. Sc., Chief Engineer, Gear Department, Chair of Machine Tools, Laboratory for Machine Tools and Production Engineering (WZL), Faculty for Mechanical Engineering, RWTH Aachen University, Germany

17:30 Increased load carrying capacity of gears through optimized steel performance, surface conditions and processes

- Back-to-back testing of three steel performance levels
- Steel performance influence on high quality manufacturing

Elias Löthman, M. Sc., Application Engineer, Industry Solutions Development, Ovako AB, Hofors, Sweden, Dr.-Ing. Michael Hein, Head of Department Worm gears and Bevel gears, Fatigue life analysis, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany, Urs Steiner, M. Eng., Team leader, Research and Testing, Humbel Zahnräder AG, Kradolf, Switzerland

Lecture Room B

CFD – churning and windage losses

Moderation: Dr.-Ing. Rolf Döbereiner, AVL List GmbH, Austria/ **Prof. Dr. Eng. Jože Duhovnik,** University of Ljubljana, Slovenia

Prediction of churning losses in an industrial gear box with spiral bevel gears using the smoothed particle hydrodynamic method

- Oil distribution and churning losses with SPH simulations
- Churning loss distribution per component

Dipl.-Ing. Benjamin Legrady, Customer Success Engineer, Markus Taesch, M. Sc, Customer Success Engineer, dive solutions GmbH, Berlin, Germany; Dipl.-Ing. Frederik Mieth, Research Assistant, Institute of Machine Elements and Machine Design, Faculty of Mechanical Science and Engineering, Technical University of Dresden, Germany

On windage power loss reduction achieved by flanges

- Efficiency of high-speed gears
- Windage power loss – mitigation strategies using flanges

Dr.-Ing. Michal Ruzek, Assistant Professor, Prof. Fabrice Ville, Professor, LaMCoS, INSA – Institut National des Sciences Appliquées de Lyon, Villeurbanne Cedex, France, Dr. Yann Marchesse, Associate Professor, ECAM, Lyon, France

CFD analysis on the oil flow of a gear stage with guide plate

- Numerical modeling of gearbox oil flow and validation
- Influence of a guide plate on oil distribution and no-load power-loss

Lucas Hildebrand, M. Sc., Research Assistant, Dr.-Ing. Thomas Lohner, Head of department EHL-Tribological Contact and Efficiency, Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

Lecture Room C

Quality assurance and measurement

Moderation: Dr.-Ing. Jörg Hermes, SEW-Eurodrive GmbH & Co. KG, Germany/**Eng. Amir Aboutaleb,** American Gear Manufacturers Association, USA

Measurement of profile deviation parameters for characterizing statically loaded gears

- Test rig for lightweight gears
- Gear deformation characterization

Marc Pillarz, M. Sc., Research Assistant, Dr.-Ing. Axel von Freyberg, Research Assistant, Prof. Dr.-Ing. habil. Andreas Fischer, Institute Director, Institute for Metrology, Automation and Quality Science, University of Bremen, Germany

Effect of a multi-stage grinding process on the Barkhausen noise signal

- Impact of roughing and finishing on Barkhausen noise
- Contribution to a reliable detection of grinding burn

Dr.-Ing. Tobias Hüsemann, Head of division "Abrasive Processes and Gear Technology", Dr.-Ing. Daniel Sackmann, former Research Fellow, Abrasive Processes and Gear Technology, Prof. Dr.-Ing. habil. Prof. h. c. Dr. h. c. Dr. h. c. Bernhard Karpuschewski, Director, Manufacturing Technologies, Leibniz Institute for Materials Engineering – IWT, Bremen, Germany

Tooth profile error detection using only a small spot type of laser sensor

- Tooth profile error tendency can be obtained from laser beam reflection
- This method is very simple, low cost, able to quickly do many times

Prof. Dr. Eng. Eiichiro Tanaka, Professor, Graduate School of Information, Production and Systems, Faculty of Science and Engineering, Waseda University, Kita-kyushu, Prof. Dr. Eng. Masakazu Nakasako, Professor, National Institute of Technology, Kure College, Dr. Eng. Kiyotaka Ikejo, Assistant Professor, Hiroshima University, Hiroshima, Japan

18:00 Evening reception at the university

Enhance your personal network and use the relaxed and informal atmosphere for deeper-going conversations with other participants and speakers.

You are invited!

Dinner speech

Prof. Dr.-Ing. Sebastian Bauer, President, German Federation of Industrial Research Associations "Otto von Guericke" e. V. (AiF), Cologne & Managing Director (Research and Development), BAUER Maschinen GmbH, Schrobenhausen, Germany

"Despite all digitalization in the world, also in future real forces will have to be transmitted. Thus, developing and manufacturing transmission systems which aim at the best efficiency factor as well as the lowest possible lifetime costs will always be a challenge for all people involved."

3rd Conference day
Wednesday, September 14th, 2022

Lecture Room A

Friction
Moderation: Dr.-Ing. Andreas Klein, Flender GmbH – Winergy, Germany/**Dr. Michel Octrue,** former CETIM (Technical Center for Mechanical Engineering Industries), Senlis, France

08:30 Minimum friction losses in wind turbine gearboxes
- Optimal shift coefficients of wind turbine gearboxes for minimum friction losses
- Minimum friction losses, with regard to bending and pitting strength requirements

Prof. Dr.-Ing. José I. Pedrero, Full Professor, Dr.-Ing. Miguel Pleguezuelos, Associate Professor, Department of Mechanics, Faculty of Engineering, Universidad Nacional de Educación a Distancia (UNED), Madrid, Spain; Ing. José Calvo-Irirsarri, Gearbox Section Manager, Gamesa Energy Transmission – SGRE ON, Zamudio, Spain

09:00 Holistic friction optimization of transmissions – a significant contribution to sustainability
- Universal friction model for bearings and gears
- Friction reduction in transmissions with an optimization algorithm

Philipp Rödel, M. Sc., Senior Specialist – Engineering Methods, Dipl.-Ing. Roland Spieler, Expert - Engineering Methods & Tool Development, R&D Analysis Tools & Methods Development, Schaeffler Technologies AG & Co. KG, Schweinfurt; Dipl.-Technomat. Tobias Nuißl, Senior Specialist Engineering Methods & Tools Development, R&D Analysis Tools for Digital Services, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

09:30 Coefficient of friction behavior of gear oils and significance for the meshing process of spur gears
- Base oil and type of VI improver determine friction
- Low friction leads to lower noise emissions of the gearbox

Dr.-Ing. Axel Baumann, Head of Application Support, Instrumentation and Test Systems, AVL Deutschland GmbH, Mainz-Kastel, Germany

Lecture Room B

Simulation and optimization
Moderation: Dipl.-Ing. Christian Hartmann, Magna PT B.V. & Co. KG, Germany/**Prof. h. c. Dr.-Ing. Aizoh Kubo,** Research Institute for Applied Sciences, Kyoto, Japan

Study electromechanically coupled dynamic characteristics of the transmission system of wind turbines
- Establishing the electromechanical coupling model considering the internal excitation of gear system and the electromagnetic characteristics of the generator
- Effects of different structural parameters of the generator on the dynamic characteristics of the gear system

Ruibo Chen, Ph. D., The State Key Lab of Mechanical Transmissions, Chongqing University, China

Light in the black box: Identifying unknown mechanisms of action with AI software and solving acoustic/NVH problems of gears – practical example of car power train
- Design parameter set for low-noise power train using AI
- Enlarge tolerances based on AI-produced prediction models

Dipl.-Ing. (FH) Frank Thurner, Managing Director, Dipl.-Ing. Peter Stirnweiß, Leitender Ingenieur, mts Consulting & Engineering GmbH, Fürstenfeldbruck, Germany

Automation of gearbox design
- Automation through knowledge-based shaft design and load capacity calculation
- Automated selection of suitable machine elements in gearbox design

Marius Fürst, M. Sc., Research Associate, Institute of Machine Elements, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

Lecture Room C

Worm and crossed helical gears
Moderation: Prof. Dr.-Ing. Georg Jacobs, RWTH Aachen University, Germany/**Dr.-Ing. Joachim Thomas,** ZG Hypoid GmbH, Germany

Calculation method for the tooth thickness of cylindrical worm gears
- Research into tooth thickness characteristics
- Drawing of tooth profile of cylindrical worm gears

Prof. Dr. Yaping Zhao, College of Mechanical Engineering and Automation, Northeastern University China, Shenyang City, China

Investigation of the meshing friction heat generation of worm gears and the influence of the contact shape
- Transient thermal behaviour among different pinion machine-setting parameters
- Influence of worm gear contact pattern on heat generation

Prof. Dr.-Ing. Aleksandar Miltenović, Professor, Department for mechanical design, development and engineering, Prof. Dr-Ing. Milan Banić; Faculty of Mechanical Engineering, University of Niš, Serbia

Scuffing load capacity calculation of worm gears
- Contact temperature calculation
- Safety factor determination

Philipp Roth, M. Sc., Team Leader Worm Gears, Dr. Michael Hein, Department Head Worm and Bevel Gears, Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

10:00 Coffee break – meet & greet in the exhibition area, poster presentation area and GearArena

VDI

Lecture Room A

Multiparameter optimization

Moderation: Prof. i.R. Dr.-Ing. Dr. h.c. Bernd-Robert Höhn, TUM emeritus of excellence, Technical University of Munich (TUM), Germany/**Prof. Ahmet Kahraman,** The Ohio State University, USA

11:00 A comprehensive, fully parametrized calculation model for improved helical-hypoid gearbox efficiency

- Automated multi-parameter sensitivity study via digital twin
- Enhanced efficiency and life span for a modular gearbox system

Dipl.-Ing. (FH) Ermalt Lamaj, M. Sc., Computational Engineer, Dipl.-Ing. (FH) Jens Blömeke, Development Engineer, Dipl.-Ing. Felix Rudolph, Development Engineer, Development Gear Units, SEW-Eurodrive GmbH & Co. KG, Bruchsal, Germany

11:30 Simulation of high torque density gearbox noise excitation

- Holistic simulation approach for full drive train analysis
- Small-scale test rig with enhanced elastic deformations
- Validation of simulation approach by measurements

Christian Schönke, M. Eng., Managing director, COMPOSE GmbH i. G., Kiel, Germany, Dipl.-Ing. Kevin Daubach, Research Assistant, Prof. Dr.-Ing. Oliver Koch, Full Professor, Head of Institute, Chair of Machine Elements, Gears and Tribology, Technische Universität Kaiserslautern, Germany

12:00 Gear design optimization for multi-mesh and multi-power flow transmissions under a broad torque range incorporated with multi-body simulations

- Complex gear train system design optimization with a wide range of torques
- Mulit-body simulation for accurate gear contact analysis

Daehyun Park, Ph. D., Research Engineer Advanced, Gear Train System Design and Analysis, Tommaso Tamarozzi, Ph. D., Senior Research Engineering Manager, 3D Motion Research and Technology Development, Siemens Industry Software NV, Leuven, Belgium; Yeohyeon Gwon, M. Sc., Senior Research Engineer, DCT Development, Hyundai Motor Company, Gyeonggi-Do, Korea

Lecture Room B

Material and heat treatment

Moderation: Dr.-Ing. Bernhard Bouché, Getriebebau NORD GmbH & Co. KG, Germany/**Ir. J.J. Bos,** Bos Gear Solutions, The Netherlands

Influence of case hardness depth on tooth interior fatigue fracture

- Parameter study of flank fracture
- Comparison of different influences such as case hardness depth, material quality

Dipl.-Ing. Jean-André Meis, Senior Sprecialist Simulation and Data Analytics, Gearbox Development, Dr.-Ing. Matthias Walkowiak, Chief Engineer, Envision Energy CoE GmbH, Dortmund, Germany

Deep nitriding – contact and bending strength of gears with increased nitriding hardening depth

- Increasing the load carrying capacity by deep nitriding
- Influence of case properties after nitriding

André Sitzmann, M. Sc., Research Associate, Institute of Machine Elements, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany; Dr.-Ing. Stefanie Hoja, Senior Research Fellow, Leibniz Institute for Materials Engineering – IWT, Bremen, Germany; Dr.-Ing. Stefan Schurer, Head of Industrial Engineering, Department for Driven Axles and Transfer Gear Boxes, MAN Truck Bus SE Munich, Germany

Heat treatment development for the new steel grade X20NiCrAl-MoV6-5-2-1 for high performance gear wheel application

- Increasing the strength by nitriding combined with precipitation hardening mechanisms
- Improving fatigue life performance by a tailored combination of carburization and nitriding treatment

Dr.-Ing. Matthias Steinbacher, Department Head, Heat Treatment, Materials Science, Prof. Dr.-Ing. habil. Rainer Fechte-Heinen, Managing Director, Leibniz Institute for Material-Oriented Technologies – IWT, Bremen, Germany; Gerrit Hellenbrandt, M. Sc., Research Assistant, Laboratory for Machine Tools and Production Engineering (WZL), Chair of Manufacturing Technology, Faculty for Mechanical Engineering, RWTH Aachen University, Germany

Lecture Room C

High speed gears

Moderation: Dr.-Ing. Burkhard Pinnekamp, Renk GmbH, Augsburg & Research Association for Drive Technology (FVA), Germany/**Luc Amar, Ph. D.,** CETIM (Technical Center for Mechanical Engineering Industries), France

Scuffing of cylindrical gears with pitch line velocities up to 100 m/s

- Influence of pitch line velocity on the scuffing load capacity
- Improved approach to calculate scuffing

Jaacob Vorgerd, M. Sc., Research Assistant, Prof. Dr.-Ing. Peter Tenberge, Full Professor, Chair of Industrial and Automotive Drivetrains, Ruhr-University Bochum; Dr.-Ing. Manuel Joop, Development engineer, Envision Energy CoE GmbH, Dortmund, Germany

Dynamic characteristics of high-speed train gearboxes

- Influence of the wheel-rail excitation on the gearbox
- Influence of the curve radius of railway line

Dr. Hao Wu, Assistant Researcher, College of Mechanical and Vehicle Engineering, Prof. Jing Wei, College of Mechanical and Vehicle Engineering, Chongqing University, China; Prof. Pingbo Wu, State Key Laboratory of Traction Power, Southwest Jiaotong University, China

FE analysis and predication on the traveling wave resonance of aero-gears

- FE modelling strategy for high-speed gears
- Vibration reduction technology for high-speed meshing

Xingyuan Zheng, Dr. Yumei Hu, Professor, State Key Laboratory of Mechanical Transmission, Chongqing University, China

12:30 Closing remarks

12:45 Awarding of the best presentation for junior engineers by Prof. Dr.-Ing. Karsten Stahl, FZG, Technical University of Munich (TUM), Garching, Germany

Awarding of the best paper by Dr.-Ing. Franz Völkel, Sr. Vice President R&D, Business Division Transmission Systems, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

+ Lunchtime snack

14:15 End of the conference

Location/Venue

The Gear Research Center (FZG) of the Technical University of Munich has comprehensive facilities for examination and testing of machine elements, such as gears, bearings, synchronizations and couplings. Based on the research results developed here during the past decades, FZG is the leading international research institute for gears and transmissions today. Development and validation of methods and tools of reliable determination of fatigue life, efficiency, and vibration characteristics of gears and transmission elements are in focus of research activities at FZG. Implementation of the research is carried out in close cooperation with industry and standardization organizations, funded either through public research grants or industrial collective and contract research.

International Conference on Gears 2022

Technische Universität München
(Technical University of Munich)

Institute of Machine Elements
Gear Research Center (FZG)
Boltzmannstr. 15
85748 Garching, Germany

How to find us

Find all travel information at a glance!

www.mec.ed.tum.de/en/fzg/contact-and-directions/fzg/

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Poster Exhibition

P1 Integrated optimization of structural and control parameters for a hybrid electric system
Lin Bo, B. E, School of Mechanical Engineering, Beijing Institute of Technology, China

P2 Efficiency improvement and surface protection by using particle-based phyllosilicate-additive
Dipl.-Ing. Stefan Bill, Managing Director, REWITEC GmbH (Croda International PLC.), Lahnau, Germany

P3 An approach on contact analysis for micro geometry optimization of the gear unit HypoGear
Florian Eigner, M. Sc., Professur Montage- und Handhabungstechnik (MHT), Institut für Füge- und Montagetechnik (IFMT), Technische Universität Chemnitz, Germany

P4 Material database for the mechanical design of components made of powder metallurgy material
Miao Jiacheng, M. Sc., State Key Laboratory of Mechanical Transmission, Chongqing University, China

P5 Plastic gear remaining useful life prediction using artificial neural network
Bui Huy Kien, M. Sc., Faculty of Mechanical Engineering, Kyoto Institute of Technology, Japan

P6 Thermal deformation characteristic of gear hobbing based on multivariable integrated model
Zheyu Li, B. Eng., State Key Laboratory of Mechanical Transmission, Chongqing University, China

P7 Online high resolution wear measurement – a powerful tool for the analysis of initial stages of wear
Dr.-Ing. Dominic Linsler, Deputy group leader, Mikrotribologie Centrum µTC, Fraunhofer Institute for Mechanics of Materials IWM, Karlsruhe, Germany

P8 Research into the optimization of tooth profile modification based on a high precision three-dimensional finite element model of helical gears
Dr. Yanping Liu, Research Assistant, College of Mining and Safety Engineering, Shandong University of Science and Technology, Qingdao, China

P9 Quality inspection of common step gearings – overview of different types and their assessment
Dr.-Ing. Karsten Lübke, Software development special geometries, Hexagon Metrology GmbH, Wetzlar, Germany

P10 A novel concept of nested cycloidal speed reducer
Lorenzo Maccioni, Ph.D., Assistant Professor (RTD), Faculty of Science and Technology Free University of Bozen-Bolzano, Bolzano, Italy

P11 Calculating component temperatures in gearboxes for transient operation conditions
Constantin Paschold, M. Sc., Research Associate, Department EHL-Tribological-Contact and Efficiency, Institute of Machine Elements, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

P12 Dynamic Simulation of a Rotor System with Variable Speed for application in High-Speed Helicopters and Tiltrotor-/Tiltwing Aircraft
Prof. Dr.-Ing. Michael Weigand, Full Professor and Head of Research Unit Machine Elements and Transmissions for Aviation, Institute for Engineering Design and Product Development, TU Wien, Vienna, Austria

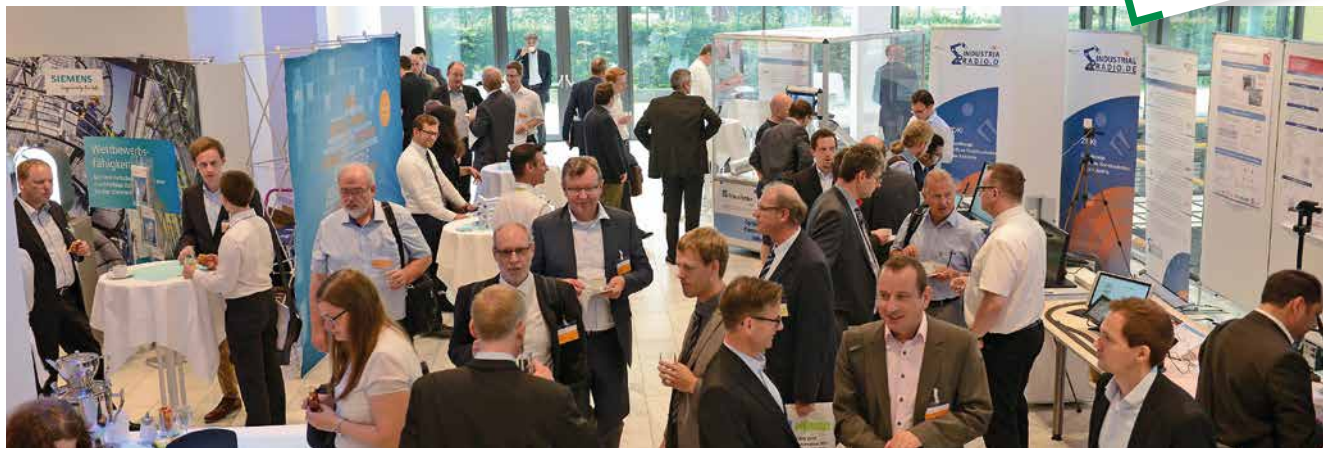
P13 Smart and intelligent chip detectors using machine learning to monitor wear particles and dangerous degradation of critical powertrain components
Prof. Dr.-Ing. Michael Weigand, Full Professor and Head of Research Unit Machine Elements and Transmissions for Aviation, Institute for Engineering Design and Product Development, TU Wien, Vienna, Austria

P14 Calculation of weight and center of gravity of rotorcraft drive trains in the early design phases
Prof. Dr.-Ing. Michael Weigand, Full Professor and Head of Research Unit Machine Elements and Transmissions for Aviation, Institute for Engineering Design and Product Development, TU Wien, Vienna, Austria

P15 Vibration characteristics of gear system with a cracked gear tooth: modelling and experiments
Songtao Zhao, M. Eng., Development Engineer, School of Aerospace Engineering and Applied Mechanics, Tongji University, Shanghai, China

P16 Research into tooth flank twist compensation in continuously generating grinding gear based on a flexible electronic gearbox
Lei Zhou, Research Center, School of Mechanical Engineering, Hefei University of Technology, China

Combined with 5-minute talks!



Free of charge
for participants of the "International Conference on Gears 2022"

4th International Conference on Gear Production 2022

September 12 - 14, 2022, Garching/Munich, Germany

Source: © WZL, RWTH Aachen/Ahmad

Key topics:
- Increasing productivity in gear skiving
- Higher tool life for hard finishing processes
- Improved gear-quality inspection
- Methods for designing and manufacturing face, bevel and worm gears
- Improved tribo system within the manufacturing process
- Enhanced simulation methods for improving the gear manufacturing process

Presidency:
Prof. Dr.-Ing. Thomas Bergs, Full Professor, Laboratory for Machine Tools and Production Engineering (WZL), Chair of Manufacturing Technology, Faculty for Mechanical Engineering, RWTH Aachen University, Germany
Prof. Dr.-Ing. Christian Brecher, Full Professor, Chair of Machine Tools, Laboratory for Machine Tools and Production Engineering (WZL), Faculty for Mechanical Engineering, RWTH Aachen University, Germany
Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

With experts from:
Applied Nano Surfaces Sweden | Balance Drive | Georgii Kobold | Gleason Corporation | Hexagon Metrology | Involute Simulation Softwares | Nidec-Shimpo | OTTO FUCHS Dülken | Physikalisch-Technische Bundesanstalt | SEW-Eurodrive

Further details and the final program can be found here:
www.vdiconference.com/02TA411022

4th International Conference on High Performance Plastic Gears 2022

September 12 - 14, 2022, Garching/Munich, Germany

Source:© Firmenarchiv Scholz-HTIK

Key topics:
- Latest developments for the enhanced performance of plastic gears
- Status and future of standardized plastic gear strength calculation
- High performance plastic gear applications
- Potential of composite gears with fiber reinforcement
- Lubrication and tribology of plastic gears

Presidency:
Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), Technical University of Munich (TUM), Garching, Germany

Conference Board:
Dr.-Ing. Marco Baccalaro, Chassis Systems Control, Gear Development and Test Conception/Realization, Robert Bosch GmbH, Heilbronn, Germany
Dipl.-Ing. Klemens Humm, Manager Gear Development, Corporate Research and Development, ZF Friedrichshafen AG, Friedrichshafen, Germany
Dr.-Ing. Ulrich Kissling, President, KISSsoft AG, Bubikon, Switzerland
Dr.-Ing. Andreas Langheinrich, Development Drive Technology, Horst Scholz GmbH & Co. KG, Kronach, Germany

With experts from:
DSM Engineering Materials | Evonik Operations | IMS Gear | KISSsoft | KURARAY | Leibniz-Institut für Verbundwerkstoffe | Longato Riccardo | Podkrižnik | Polyplastics | Robert Bosch | ZF Friedrichshafen

Further details and the final program can be found here:
www.vdiconference.com/02TA409022

GearArena

Gather hands-on experience in the transmission world!

Take a look at individual gear components, gain an insight into how the different components interact and compare design and workmanship! You will find an on-site contact person from the exhibitor to answer all your questions.

FZG lab tours

Get the chance to visit innovative laboratory facilities!

Seize the opportunity and visit the nearby test and laboratory facilities at the Gear Research Center (FZG). Several guided tours with different core topics offer opportunities of gaining deeper insights into a variety of innovative gear test rigs and laboratory equipment.
For registration meet at the FZG information desk during the conference.

Speakers meet up

Do you still have unresolved questions?

You can address your questions to the speakers right after the lecture during the coffee break. Take the chance to say hello to your favorite speaker and to connect with them. They will be available for at least 15 minutes after their session.

Poster exhibition with impulse talks

The poster exhibition is combined with a 5-minute talk.

The compact style of presentation called the '5-minute rapid' presentation, will provide you with all information in a clear, succinct manner. Poster presentations are scheduled during the coffee breaks. Presentation times will be announced on-site.

Two gear community nights

Your networking hotspot for the international gear community!

Enjoy the evening reception at the Hofbräuhaus as well as another social event on the second conference day at the university. The Hofbräuhaus is the cradle of Bavarian tavern culture – the origin of tradition, "Gemütlichkeit" and hospitality.
Both – the get-together at the FZG and the brewery visit – offer you an excellent opportunity to network with your peers and catch up on trends.

Source: Hofbräuhaus Munich, Germany

Program Committee

Presidency

Conference president

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