

International Conference on Gears 2025

FZG, Garching/Munich, Germany

#vdi_gears

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Key topics:

- AI in gear design and gear failure prediction
- Numerical methods and multiscale simulation tools to improve gear performance
- Optimization of gear design and geometry
- Condition monitoring and predictive maintenance
- Advancements in NVH simulation and optimization
- Innovative gear materials



Gears interactive

- Poster with impulse talks
- Exhibition area
- Speakers meetup
- FZG lab tours
- Two gear community nights

Associated organisations:



Visit parallel conferences free of charge



Gear Production 2025
www.vdiconference.com/02TA411025



High Performance Plastic Gears 2025
www.vdiconference.com/02TA409025



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

1st Conference day Wednesday, September 10, 2025

08:15 Registration

Plenary lectures

09:30 **Common welcome and opening of the**

- International Conference on Gears 2025
- International Conference on High Performance Plastic Gears 2025
- International Conference on Gear Production 2025

Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany
Caroline Körber, Productmanagement, VDI Wissensforum GmbH, Duesseldorf, Germany

Welcome address by

09:55 **Prof. Dr.-Ing. Prof. h. c. Christoph Gehlen**, Dean, TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

10:00 **Prof. Dr.-Ing. Burkhard Pinnekamp**, former Head of Central Technology, RENK GmbH, Augsburg, Germany; President, Research Association for Drive Technology (FVA), Frankfurt, Germany; Honorary Professor, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

10:10 **Matthew E. Croson**, President, American Gear Manufacturers Association (AGMA), Alexandria, USA

10:15 **Keynote session: AI and digitalization – Impact on the future of gears**

Welcome to the age of chaos: Tech-driven, AI-powered, customer-centric, different

Fabian Ziegler, Founder & Managing Director, TEAM23 GmbH, Augsburg, Germany

Powered by AI – Leading the future of drive technology

Dr.-Ing. Jan Reimann, Project Director “Flender One”, Dipl.-Ing. Julia Zundel, Head of Digital Business, Dr.-Ing. Tim Sadek, Head of Technology & Innovation Flender GmbH, Bocholt, Germany

Opportunities and challenges of AI applications in an industrial context

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

Efficient maintenance for safe operation through automated condition monitoring

Dipl.-Ing. (DH) René Maisenhelder, Manager, Service Field Solutions, Condition Monitoring & Analysis, SEW-EURODRIVE GmbH & Co KG, Bruchsal, Germany

+ Discussion with plenary speakers

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 Gear Production
www.vdi-wissensforum.de/02TA411025

International Conference on Plastic Gears
www.vdi-wissensforum.de/02TA409025

Lecture Room A

Lecture Room B

Lecture Room C

Lecture Room D

Lecture Room E

13:30 AI in gear design

Efficiency and friction

Numerical simulation

Challenges in e-mobility: NVH and roughness

Design methods

15:00 **Coffee break** – Meet & greet at the exhibition area, poster presentation area and GearArena

16:00 Digital gear design

Damage detection

Dynamic simulation

Process integrated quality inspection

Testing

17:30 End of the first conference day - Switch to the plenary session-

Program overview

International Conference on Gears and parallel conferences

- 17:35 **Awarding of the best presentation for young engineers by**
Dr.-Ing. Franz Völkel, Sr. Vice President R&D, Business Division Automotive Bearings, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany
Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany
- 17:45 **Dinner Speech: Innovation on fire: When human intelligence and artificial intelligence collaborate**
Dr. Karin Koert-Lehmann, MY InnoTrinsic/Rethink & Move, Krefeld, Germany
- 18:30 **Organized bus transfer to the evening reception**
- 19:30 **Evening reception at the "Löwenbräukeller" in Munich**

2nd Conference day Thursday, September 11, 2025

	International Conference on Gears			International Conference on Gear Production	International Conference on Plastic Gears
	Lecture Room A	Lecture Room B	Lecture Room C	Lecture Room D	Lecture Room E
■ 08:30	Condition monitoring using AI	Tooth flank load capacity	Worm gears: Tooth contact analysis	Improved gear performance: Material and quality inspection	Digital design
☕ 10:00	Coffee break – Meet & greet in the exhibition area, poster presentation area and GearArena				
■ 11:00	Tooth root carrying capacity	Gear failure prediction using AI	Gear design: Special applications	Special machining	Material
🕒 12:30	Time for working lunch – Meet & greet in the exhibition area, poster presentation area and GearArena				
■ 14:00	Planetary gears: NVH	Worm gears: Lubrication and friction	Progress in test methods	Additive manufacturing: Improved operational behavior	Tribosystem
☕ 15:30	Coffee break – Meet & greet in the exhibition area, poster presentation area and GearArena				
■ 16:30	Advancements in tooth root strength	Lubrication	Advancement in gear material	New processes for cutting of bevel and face gears	Wear
■ 18:00	End of the lectures & Get-together: Evening reception at the university				

3rd Conference day Friday, September 12, 2025

	Lecture Room A	Lecture Room B	Lecture Room C	Lecture Room D	Lecture Room E
■ 08:30	Gear analysis & simulation	NVH	Crossed axis gear & differential bevel gears	Micro geometry of gears	Geometry
☕ 10:00	Coffee break – Meet & greet in the exhibition area, poster presentation area and GearArena				
■ 11:00	Advancements in NVH Simulation	Planetary gears: Design	Efficiency improvements	Material quality and heat treatment	Finite element methods
■ 12:45	Awarding of the best presentation for young engineers by Prof. Dr.-Ing. Karsten Stahl , Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany Caroline Körber , Productmanagement, VDI Wissensforum GmbH, Duesseldorf, Germany + Lunchtime snack				
■ 14:15	End of the conferences				

1st Conference day Wednesday, September 10, 2025

08:15 Registration

Plenary lectures

09:30 **Common welcome and opening of the**

- International Conference on Gears 2025
- International Conference on High Performance Plastic Gears 2025
- International Conference on Gear Production 2025



Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany
Caroline Körber, Productmanagement, VDI Wissensforum GmbH, Duesseldorf, Germany

Welcome address by



09:55 **Prof. Dr.-Ing. Prof. h. c. Christoph Gehlen**, Dean, TUM School of Engineering and Design, Technical University of Munich, Garching, Germany



10:00 **Prof. Dr.-Ing. Burkhard Pinnekamp**, former Head of Central Technology, RENK GmbH, Augsburg, Germany; President, Research Association for Drive Technology (FVA), Frankfurt, Germany; Honorary Professor, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany



10:10 **Matthew E. Croson**, President, American Gear Manufacturers Association (AGMA), Alexandria, USA

10:15



Keynote session: AI and digitalization – Impact on the future of gears

12:00

Moderation: **Prof. Dr.-Ing. Karsten Stahl**, FZG, TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

Welcome to the age of chaos: Tech-driven, AI-powered, customer-centric, different

- Tech-Driven: Digitization, automation, IoT increase efficiency and enable new business models
- AI-Powered: AI transforms development and maintenance, unlocking new potentials despite limitations
- Customer-Centric: AI enables tailored solutions and faster, more precise customer responses



Fabian Ziegler, Founder & Managing Director, TEAM23 GmbH, Augsburg, Germany

Powered by AI – Leading the future of drive technology

- The “Digital Engineer”: AI-driven design and optimization of “Flender One” gearboxes
- Closed loop data utilization with AI: Continuous adaptation and right-sizing in gearbox development
- Digital end-to-end backbone for future AI value creation



Dr.-Ing. Jan Reimann, Project Director “Flender One”, Dipl.-Ing. Julia Zundel, Head of Digital Business, Dr.-Ing. Tim Sadek, Head of Technology & Innovation, Flender GmbH, Bocholt, Germany

Opportunities and challenges of AI applications in an industrial context

- The role of AI in production
- Requirements for the implementation of AI in production: Data, models, processing
- Potential of AI applications in production: Deep dive and application examples



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

Efficient maintenance for safe operation through automated condition monitoring

- DriveRadar®: Functional components, innovative forecasts, IT and data security, use-cases
- Contribution on sustainability and future developments
- Potential of smart maintenance: Transparency, early detection of faults, reduced downtimes



Dipl.-Ing. (DH) René Maisenhelder, Manager, Service Field Solutions, Condition Monitoring & Analysis, SEW-EURODRIVE GmbH & Co KG, Bruchsal, Germany

+ Discussion with plenary speakers



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

With digital polls during the speeches

Lecture Room A



AI in gear design

Moderation: Dr.-Ing. Tobias Hertter, BMW AG, Germany / **Luc Amar, Ph.D.**, France

13:30 Accelerating precise gear contact calculations in dynamic multi-body simulations with AI

- Usage of neural network to speed up the calculation time of the gear contact in the dynamic multi-body simulation
- Integration of neural network into a multi-body simulation of a whole gearbox system

Marius Willecke, M. Sc., Research Assistant, Gear Department, Christian Westphal, M. Sc., Head of Gear Technology, Chief Engineer, 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

14:00 AI/ML-accelerated gear durability analysis within gear design optimization


- Multi-attribute optimal design of transmissions
- AI/ML-based structural stress field predictions

Mathijs Vivet, Ph.D., Research Engineering Manager, Strategy and Innovation, Siemens Digital Industries Software NV, Leuven, Belgium

14:30 Application of artificial intelligence tools for optimized design of gears

- Development of AI-driven gear optimization tool
- Case study: eBike transmission optimization

Tobias Jonathan Boschmann, M. Sc., Research and Innovation Project Engineer, Dr.-Ing. Philipp Kauffmann, Director Research and Innovation, Johnson Electric Aachen GmbH, Germany

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

15:30 Poster presentations in the poster exhibition area

Lecture Room B



Efficiency and friction

Moderation: Dr.-Ing. Reiner Vonderschmidt, Georgii Kobold GmbH & Co. KG, Germany

A new approach to friction calculation of internal gears

- Contribution to improving the accuracy of load-dependent power loss calculations for internal gears
- Insight into the local frictional behavior of an internal gear and its conformal tooth contact

Constantin Paschold, M. Sc., Team Leader Efficiency and Heat Balance, 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), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

Proposal of low friction loss gear surface based on correlation map between surface roughness and friction coefficient

- Investigation of gear surface roughness on friction losses
- Measurement of the meshing asperity contact

Yuki Shishihara, Project Manager, Material R&D Department, JTEKT Corporation, Osaka, Japan; Hiroki Maki, Chief of Business Field, Gear Innovation Department, JTEKT Corporation, Kariya, Japan; Dr. Alan Hase, Associate Professor, Department of Mechanical Engineering, Faculty of Engineering, Saitama Institute of Technology, Fukaya, Japan

Quantitative analysis of churning in dip-lubricated gearboxes through computer vision techniques

- New approach for extracting information from oil churning experiments data
- Algorithm comparison for oil motion isolation and velocity distribution inside a gearbox

Bruno Cardozo, M. Sc., Research Assistant, Mechanical and Aeronautical, Prof. Dr. Ronnie Rego, ITA – Aeronautics Institute of Technology, São José dos Campos, Brasil

Lecture Room C



Numerical simulation

Moderation: Dipl.-Ing. Norbert Haefke, FVA GmbH, Germany / **Prof. Daisuke Iba**, Kyoto Institute of Technology, Japan

A study on the crack propagation in the tooth root and its consequences on the tooth root fracture lifetime

- Crack propagation at the tooth root
- Influence of the crack on tooth root fracture lifetime

Lorenzo Valsecchi, M. Eng., Ph.D. Candidate, Dr.-Ing. Luca Bonaiti, Ing. Sergio Sartori, Leonardo Elicotteri, Department of Mechanical Engineering, Politecnico di Milano, Ing. Sergio Sartori, Helicopter Division, Leonardo S.p.A., Cascina Costa, Italy

Simulative evaluation of heat transfer and surface temperature distribution of an industrial gear unit

- Validation of CFD simulation data
- Evaluation of fluid flow and heat transfer of industrial gear units

Dr.-Ing. Claus Kunik, Expert Fluid Flow Simulations, Dipl.-Ing. (FH) Christine Nau, Team leader, Dipl.-Ing. Tobias Goldschmidt, Mechanical engineer, Department of Digital Gear Motors – Simulation, SEW-Eurodrive GmbH & Co. KG, Bruchsal, Germany

Research on the dynamic characteristics of high-speed thin-rimmed gear transmission considering the elasto-hydrodynamic lubrication contact

- Influence of lubrication characteristics on the dynamic characteristic of the gear transmission
- Dynamic stress analysis of thin-rimmed gears under elasto-hydrodynamic lubrication conditions

Jiayu Zheng, M. Sc., Ph.D. student, Prof. Dr. Datong Qin, Full professor, Changzhao Liu, Ph.D., Assoc. Professor, State Key Laboratory of Mechanical Transmission for Advanced Equipment, Chongqing University, China

Lecture Room A



Digital gear design

Moderation: Prof. Dr.-Ing. Oliver Koch, Rheinland-Pfälzische Technische Universität Kaiserslautern-Landau (RPTU), Germany / Prof. Dr.-Ing. Athanassios Mihailidis, Emeritus Professor, Aristotle University of Thessaloniki, Greece

- **16:00** **A method to balance root stresses of planetary geartrains considering nonlinear damage accumulation**
- New design methodology for fatigue damage in planetary gear sets
 - Generalized nonlinear damage consideration
- Isaac Hong, Ph.D.**, Research Assistant Professor, Prof. Ahmet Kahraman, Howard D. Winbigger Professor and Director, Gear and Power Transmission Research Laboratory, Department of Mechanical and Aerospace Engineering, The Ohio State University, Columbus, USA

- **16:30** **Advanced transmission optimization for new design challenges using RIKOR**
- Paper outlines the algorithms within the software suite RIKOR
 - Full system approach
- Jonas-Frederick Berger, M. Sc.**, Research Associate/Team Leader Gear Calculation Software, Dr.-Ing. Michael Otto, Head of Department Calculation and Verification of Transmission Systems, Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

- **17:00** **Automated multi-level nested FE meshing and loaded tooth contact analysis of complex gear geometries**
- Parametric transition mesh in complex gear geometries
 - Efficient contact region detection for loaded tooth analysis
- Martino Gulisano, M. Sc.**, Ph.D. student, Eugeniu Grabovic, Ph.D., Assistant Professor, Marco Gabiccini, Ph.D., Assistant Professor, Department of Civil and Industrial Engineering, University of Pisa, Italy

- **17:30** **End of the first conference day – Switch to the plenary session – (Lecture Room A)**

- **17:35** **Awarding of the best paper by**
- Dr.-Ing. Franz Völkel**, Sr. Vice President R&D, Business Division Automotive Bearings, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany
- Prof. Dr.-Ing. Karsten Stahl**, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

Lecture Room B



Damage detection

Moderation: Prof. Dr.-Ing. Burkhard Pinnekamp, former RENK GmbH & FVA & Technical University of Munich, Garching, Germany / Prof. Ahmet Kahraman, The Ohio State University, USA

- **Influence of surface wear on the meshing stiffness and transmission error of internal spur gears with profile modification**
- A new analytical model for the simulation of the surface wear in internal spur gears
 - A study of the influence of the accumulated wear on the meshing stiffness and transmission error of internal gears with profile modification
- Prof. Dr. Eng. José I. Pedrero**, Full Professor, Dr. Eng. Miguel Pleguezuelos, Associate Professor, Dr. Eng. Miryam B. Sánchez, Associate Professor, Department of Mechanical Engineering, Faculty of Engineering, Universidad Nacional de Educación a Distancia (UNED), Madrid, Spain

- **Electrical impedance-based detection of surface deviations in helical gear meshes**
- Impedance measurement for condition monitoring of gears and lubricant state
 - Analysis of machine elements based on their electrical "fingerprint" to detect surface changes or damage
- Prof. Dr.-Ing. Eckhard Kirchner**, Head of Department, Mechanical Engineering, Chair for Product Development and Machine elements, Technische Universität Darmstadt, Germany

- **Gear damage detection in planetary gearboxes**
- Investigations with high-precision industrial gearboxes
 - Evaluation of high frequency vibration data
- Lukas Merkle, M. Sc.**, Deputy Head, University of Stuttgart, Lisa Binanzer, M. Sc., Research Assistant, Drive Technology Department, Dr.-Ing. Martin Dazer, Head of Reliability & Head of Drive Technology Department, Institute of Machine Components (IMA), University of Stuttgart, Germany

Lecture Room C



Dynamic simulation

Moderation: Dr.-Ing. Franz Völkel, Schaeffler Technologies AG & Co. KG, Germany / Dr.-Ing. Alex Kapelevich, AKGears, LLC, USA

- **Modelling and computation of the torsional stiffness of a planetary gear train**
- Calculation of helicoidal planetary gear train underload static deformation
 - Study of the influence of each planetary gear train parts on global displacements
- Cyril Chevrel-Fraux, Ph.D.**, R&D and Calculation Manager, Pierre Casanova, Eng, Technical and R&D Manager, Morgane Royet, Eng, R&D and Calculation Engineer, Machine Drives Division, REDEX Group, Ferrières en Gatinais, France

- **Error analysis for an improved dynamic model of the herringbone gear transmission system with manufacturing and assembly errors**
- Ying Du**, School of Mechanical Engineering, Northwestern Polytechnical University, Xi'an, China

- **Nonlinear dynamic analysis of herringbone gears under time-varying backlash and double-sided meshing impact: A theoretical and experimental study**
- Gear dynamic model with error-backlash-impact excitation
 - Effects of backlash and impact on gear nonlinear vibration
- Fengfeng Liu**, Ph.D. student, Prof. Dr. Geng Liu, Full Professor, School of Mechanical Engineering, Northwestern Polytechnical University; Director, Shaanxi Engineering Laboratory for Transmissions and Controls, Lan Liu, Associate Professor, Shaanxi Engineering Laboratory for Transmissions and Controls, Northwestern Polytechnical University, Xi'an, China



17:45 Dinner Speech

Innovation on fire: When human intelligence and artificial intelligence collaborate

'We stand on the threshold of an era of extreme productivity – a symbiosis of human developmental power and the computing strength of AI. It is our responsibility to seize this opportunity – while also embracing a commitment: To unlock the 'gold in our minds' and collaborate with AI at eye level. This requires a radical expansion of our neuro-knowledge to develop neuro-loyal modules, processes, and tools in a structured and pragmatic way – and to integrate them strategically into business processes.'

Dr. Karin Koert-Lehmann, MY InnoTrinsic /Rethink & Move, Krefeld, Germany

18:30 Organized bus transfer to the evening reception

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

19:30 Evening reception at the "Löwenbräukeller" in Munich



Source: VDI Wissensforum GmbH



Source: Löwenbräukeller München



Source: VDI Wissensforum GmbH

You are invited!

2nd Conference day
Thursday, September 11, 2025

Lecture Room A

Condition monitoring using AI

Moderation: Dr.-Ing. Todor Radev, Volkswagen AG, Germany / **Dr.-Ing. Toni Weiss**, GanaCon – Gear analysis and Consulting, Germany

08:30 **Transformer for gear fault diagnosis enhancing robustness through physics-informed multitask learning**

- Advanced gear fault diagnosis using deep learning
- Diverse public and in-house datasets and explainable AI

Osamu Yoshimatsu, M. Eng., Guest Researcher, FZG, Germany & NSK Ltd., Kanagawa, Japan & The University of Tokyo, Tokyo, Japan; **Dr.-Ing. Michael Otto**, Head of Department Calculation and Verification of Transmission Systems, Prof. **Dr.-Ing. Karsten Stahl**, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

09:00 **Early detection of critical operating conditions in journal bearings of gearboxes using acoustic emission and machine learning**

- Condition monitoring of planetary journal bearings
- Machine learning for data analysis of acoustic emission signals

Florian Wirsing, M. Sc., Research Assistant, Dr.-Ing. **Florian König**, Head, Tribology, Prof. **Dr.-Ing. Georg Jacobs**, Head of Institute for Machine Elements and Systems Engineering, RWTH Aachen University, Germany

Lecture Room B

Tooth flank load capacity

Moderation: Dr.-Ing. Bernd Pfeiffer, Magna PT B.V. & Co. KG, Germany / **Prof. Dr.-Ing. Christian Brecher**, RWTH Aachen University, Germany

Non-destructive analysis of surface-induced fatigue: Characterisation of micropitting and crack formation

- Non-destructive method for local characterisation of damage features and their progression
- Surface analysis identifies micropitting, associated cracks, and fractured volumes for extended damage assessment

Lennart Schierholz, M. Sc., Research Associate, Dr.-Ing. **Jaacob Vorgerd**, Chief Engineer, Team Leader Cylindrical Gears, Dr.-Ing. **Manuel Oehler**, Head, Chair of Drive Technology (ante), Ruhr University Bochum (RUB), Germany

Micropitting behavior of spur gears in eDrives with a holistic thermal management

- Influence of the gear geometry, surface roughness and heat balance on film thickness behavior
- Planetary gearboxes for trucks

Dr.-Ing. Johannes König, Manager Gear Fundamentals & Digitalization, Corporate R&D, Dr.-Ing. **Mustafa Yilmaz**, Gear Development, Florian **Zerulli**, Gear Development, ZF Friedrichshafen AG, Friedrichshafen, Germany

Lecture Room C

Worm gears: Tooth contact analysis

Moderation: Prof. Dr.-Ing. Manuel Oehler, Ruhr University Bochum (RUB), Germany

Tooth contact analysis of a modified ZK-type double-enveloping worm gear drive

- Mathematical model of the ZK-type double-enveloping worm by a grinding cone
- Influence of modification and assembly misalignment by tooth contact analysis

Prof. Yi-Cheng Chen, Ph.D., Professor and Associate Chair, Department of Mechanical Engineering, National Central University, Taoyuan, Taiwan

Tooth root strength of worm shafts with concave and convex tooth profiles

- Investigation of fracture of worm shafts
- Influence of the tooth profile on bending stress

Johannes Gründer, M. Sc., Research Assistant, Materials and Product Development, Prof. **Dr.-Ing. Alexander Monz**, Prof. **Dr.-Ing. Rüdiger Hornfeck**, Institute for Chemistry, Materials and Product Development, Technische Hochschule Nürnberg, Nuremberg, Germany

09:30 Condition monitoring and remaining useful lifetime prediction of a worm gear based on simulative, lazy learning, and deep learning methods

- Prediction of the remaining useful lifetime based on different machine learning models
- Verification and validation of model accuracy towards reliability in every day usage

Dr. rer. nat Florian Heiland, Technology Expert – Advance Development, IMS Gear SE & Co. KGaA, Donaueschingen, Germany

Scuffing properties of gear pairs with different surface textures (grinding, small-angle-honing and barrelling)

- Gear friction estimation formula using the directional parameters
- Evaluation of gear scuffing limits

Sakyo Hashimoto, Mechanical and Physical Engineering, Tottori University, Japan

TEHL Contact Analysis of a Worm Gear

- Consideration of realistic contact conditions of worm gears, non-Newtonian, thermal, and transient effects
- Analysis of lubricant film formation and breakdown for different percentages of worm wheel hob enlargement

Marko Tosic, 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), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

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

10:30 Poster presentations in the poster exhibition area

Lecture Room A



Tooth root carrying capacity

Moderation: Prof. Dr.-Ing. Manfred Hirt, Past President, Research Association for Drive Technology (FVA), Frankfurt/Main; former board of RENK GmbH, Augsburg, Germany / **Eng. Todd Praneis**, American Gear Manufacturers Association, USA

Lecture Room B



Gear failure prediction using AI

Moderation: Dr.-Ing. Ralf Möllendorf, Flender GmbH, Germany / **Prof. Dr. Eng. Jože Duhovnik**, University of Ljubljana, Slovenia

Lecture Room C



Gear design: Special applications

Moderation: Prof. Dr.-Ing. Georg Jacobs, RWTH Aachen University, Germany / **Dr.-Ing. Carsten Gitt**, Mercedes-Benz AG, Stuttgart, Germany

11:00 Experimental and numerical analysis of fatigue crack growth by means of passive thermography during single tooth bending fatigue tests

- Thermal emissions for the analysis of the fatigue crack growth evolution in gears
- FEM analysis combined with HCF critical plane criteria for fatigue crack prediction

Lorenzo Fraccaroli, M. Sc., Ph.D. student, Teaching Assistant, Faculty of Engineering, Free University of Bolzano, Italy

Pitting damage 2D-position detection system on gear surface using deep learning

- Pitting detection on 2D gear surfaces using CNN and a single low-cost laser sensor
- Real-time, non-contact gear monitoring via laser reflection and instant computer analysis

Prof. Dr.-Ing. Eiichiro Tanaka, Professor, Faculty of Science and Engineering, Graduate School of Information, Production and Systems, Waseda University, Kita-Kyushu, Japan; **Dr. Eng. Masakazu Nakasako**, Professor, Department of Mechanical Engineering, National Institute of Technology Kure College, Japan; **Dr. Eng. Kiyotaka Ikejo**, Assistant Professor, Graduate School of Advanced Science and Engineering, Hiroshima University, Higashi-Hiroshima, Japan

Design strategy for geared rotary actuators based on defined mounting and design conditions

- Determination of macro-geometry parameters in GRAs
- Categorization of solutions based on derived parameters

Dr. Ignacio Gonzalez-Perez, Full Professor, Department of Mechanical Engineering, Materials and Manufacturing, Universidad Politécnica de Cartagena, Spain, **Dr. Alfonso Fuentes-Aznar**, Professor, Rochester Institute of Technology, Rochester, NY, USA

11:30 Tooth root bending strength of different quenched and tempered steels for induction-hardened planetary pinions in wind turbine gearboxes

- Endurance tests of tooth root bending strength
- Influence of the quenching and tempering process

Steffen Hendricks, M. Sc., Research Assistant, Department of Gear Technology, Christian Westphal, M. Sc., Chief Engineer, Head of Gear Technology, Prof. Dr.-Ing. Thomas Bergs, Full Professor, Manufacturing Technology Institute – MTI, Faculty for Mechanical Engineering, RWTH Aachen University, Germany

Thermographic and machine learning approaches for a rapid estimation of gears bending fatigue strength

- Alternative approach for the bending fatigue strength estimation
- Thermographic method integrated with Machine Learning techniques

Luca Corsaro, Ph.D., Researcher, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, Turin, Italy

World's most powerful gearbox with 47 MNm output torque

- Model-based dimensioning and design of multi-motor drives
- Compensation of gearbox limitations compared to direct drives in test bench applications

Dipl.-Ing. (FH) Fabian Renger, Product Manager, RENK Test System GmbH, Augsburg, Germany; **Thomas Stöckl, M. Eng.**, R&D Engineer, Central Technologie, RENK GmbH, Augsburg, Germany

12:00 An experimental analysis of the gear tooth bending strength predictions from ISO 6336 in low and high cycle fatigue

- Behaviour of gears under cyclic elastic and plastic loading
- Analysis of tooth bending fracture location

Lorenzo Pagliari, M. Sc., Ph.D. student, Teaching Assistant, Materials Characterization Lab, Prof. Franco Concli, Associate Professor, Faculty of Engineering, Free University of Bozen-Bolzano, Italy; Isaac Hong, Ph.D., Research Assistant Professor, Mechanical and Aerospace Engineering, Gear and Power Transmission Research Laboratory (GearLab), The Ohio State University, Columbus, USA

Physics-informed neural network in gearbox fault diagnosis

- Gearbox vibration analysis and fault detection
- A novel physics-informed deep learning model

Nastaran Ahmadi Ghouchan Atigh, M. Sc. student, School of Mechanical Engineering, Sharif University of Technology, Tehran, Iran; Ali Moharrami, M. Sc., Doctoral Researcher, Department of Mechanical Engineering, Lappeenranta-Lahti University of Technology, Finland

Research on the loading rate dependence of hysteresis in small-size reducers

- Modeling of reducer hysteresis characteristics and study of rate dependence
- Hysteresis morphology analysis and advances in dynamic lost motion testing

Guangxiang Zuo, Ph.D. Candidate, College of Mechanical and Energy Engineering, Dr. Huiming Cheng, Prof. Shi Zhaoyao, Beijing University of Technology, China

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

13:00 Poster presentations in the poster exhibition area

Lecture Room A



Planetary gears: NVH

Moderation: Dr.-Ing. Carsten Gitt, Mercedes-Benz AG, Germany / **Dr.-Ing. Bernd Pfeifer**, Magna PT B.V. & Co. KG, Germany

Lecture Room B



Worm gears: Lubrication and friction

Moderation: Prof. Dr.-Ing. Oliver Koch, Rheinland-Pfälzische Technische Universität Kaiserslautern-Landau (RPTU), Germany / **Dr.-Ing. Franz Völkel**, Schaeffler Technologies AG & Co. KG, Germany

Lecture Room C



Progress in test methods

Moderation: Prof. Ing. Carlo Gorla, Politecnico di Milano, Italy / **Dr.-Ing. Jens Kunert**, SEW-EURODRIVE GmbH & Co KG, Germany

14:00 Numerical validation of a blocked force measurement approach to determine wind turbine gearbox excitation

- Indirect gear excitation measurement
- Gearbox vibrational response prediction

Bart De Smet, M. Sc., Research Associate, Mechanical Engineering, KU Leuven, Heverlee, Belgium

Improved method for determining the experimental tooth friction coefficient of cylindrical worm gears

- Efficiency calculation of cylindrical worm gears
- Method for determining the tooth friction coefficient

Dipl.-Ing. Wolfgang Gasplmayr, Research Associate, Michael Geitner, M. Sc., Head of Department, Department Worm and Bevel Gears, Fatigue Life Analysis, Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

Investigation and rating of tribological effects on heat dissipation for electric vehicle gearbox

- Guideline proposal for integrated thermal modeling during the design phase to accurately account for component interaction, lubrication dynamics, and geometric constraints
- The relative dominance of each calculated value is demonstrated, and the thermal effects are quantified and evaluated

Bahadır Karba, Ph.D., Reducer Mechanical Design Leader, Power Division/Drive Transmission, VALEO, Hasan Çavuş, Ufuk Çiloğlu, Emir Faruk Yıldırım, all of Bursa Uludağ University, Bursa, Turkey

14:30 Noise reduction of two-stage Planetary gear set based on multi-body dynamics and modal acoustic transfer vector simulations

- Simulation-test validation of Transmission error and NVH
- Making virtual sound from the result of whine noise simulation

Dong Joon Min, M. Sc., Principal Research Engineer, Ho-gil Yoo, M. Sc., Research Engineer, Virtual Simulation Team, Hyundai Mobis Co., Ltd., Yongin-si, Republic of Korea

A new automated highly efficient technology to accurately simulate gearbox lubrication and predict the load independent power losses

- Lubrication simulations of gearboxes
- Automated modeling with high computational efficiency

Prof. Franco Concli, Associate Professor, Faculty of Engineering, Free University of Bozen-Bolzano, Italy

Cost-effective test method for determining the fatigue strength of ring gears

- Development of an alternative test method for ring gears
- Flank bending fracture of ring gears

Christian Eggert, M. Sc., Research Assistant, Gear Technology, Laboratory for Machine Tools and Production Engineering (WZL), Faculty for Mechanical Engineering, RWTH Aachen University, Germany

15:00 Experimental investigation of the influence of axis misalignments in stepped planetary gear stages on the excitation and displacement behavior

- Observation of frequency and amplitude modulations
- Analysis of the sun gear's trochoidal trajectory

Maximilian Stary, M. Sc., Research Assistant, Gear Department, Christian Westphal, M. Sc., Head of Gear Technology, Chief Engineer, Prof. Dr.-Ing. Christian Brecher, Full Professor, Chair of Machine Tools, Laboratory for Machine Tools and Production Engineering (WZL), RWTH Aachen University, Germany

Analytical efficiency calculation for grease lubricated worm gears

- Tribological description of the grease lubricated tooth contact
- Influences on the efficiency of grease lubricated worm gears

Felix Müller, M. Sc., Research Assistant, Prof. Dr.-Ing. Oliver Koch, Full Professor, Head, Chair of Machine Elements, Gears and Tribology (MEGT), Department of Mechanical and Process Engineering, Rheinland-Pfälzische Technische Universität Kaiserslautern-Landau (RPTU), Kaiserslautern, Germany

Resource-efficient determination of the steady-state oil temperature of gearboxes for industrial applications

- Extrapolation of heating curves to predict oil temperature
- Resource-efficient prediction of the oil temperature rise

Finn Swonke, M. Sc., Research and Development Engineer, Dipl.-Ing. Jan Lotz, Team Lead R&D, Nils-Peter Breiholz, B. Sc., Research and Development Engineer, Research and Development Mechanics, Getriebbau Nord GmbH & Co. KG, Bargtheide, Germany

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

Lecture Room A



Advancements in tooth root strength

Moderation: Dr.-Ing. Johannes König, ZF Friedrichshafen AG, Germany / **Prof. Dr.-Ing. Bernd Sauer**, Emeritus, Rheinland-Pfälzische Technische Universität Kaiserslautern- Landau (RPTU), Kaiserslautern, Germany

Lecture Room B



Lubrication

Moderation: Prof. Dr.-Ing. Michael Weigand, TU Wien, Austria

Lecture Room C



Advancement in gear material

Moderation: Dr.-Ing. Toni Weiss, GanaCon – Gear analysis and Consulting, Germany / **Prof. Dr.-Ing. Aleksandar Miltenović**, University of Niš, Serbia

16:30 Size influence on tooth root strength based on testing and simulation

- Effect of shot peening
- Difference between back to back & pulsator testing

Dr.-Ing. Jean-Andre Meis, Head of Technology, Head of Department, Technology & Innovation, Flender GmbH, Bocholt, Germany

Consideration on lubrication of high-speed rotating gear

- Lubrication method based on negative pressure generated during gear meshing
- Lubrication device effect: Oil film and tooth surface temperature

Masayoshi Ohno, B. E., Development Engineer, Product Design Section, Junji Yamada, Development Engineer, Product Development Dept., Kensuke Suzuki, Kensuke Suzuki, Development Engineer, Experiment Sec., UNIVANCE CORPORATION, Kosai-City, Japan

Gear boxes for food and beverage applications with sintered lubricant bound gears – A ready to go into production planetary gear box

- Development of lubricant free planetary gearboxes
- Design options for stainless steel gears with lubricant-bonded sintered gears

Dr.-Ing. Stefan Vonderschmidt, Managing Director, Research and Development, Andrej Wallinger, M. Sc., Development engineer, Rotax GmbH, Hemmingen, Germany; Dr.-Ing. Reiner Vonderschmidt, Shareholder, Georgii Kobold GmbH & Co. KG, Horb am Neckar, Germany

17:00 A hybrid modelling approach to double stage planetary gear dynamics in aeronautical applications

- Two-stage planetary gears with highly flexible planets
- Tooth optimisation to reduce dynamic coupling effects

Sebastian Klein, M. Sc., Ph.D. student, Research and Development, Safran Transmission Systems, Colombes, France, Dr.-Ing. Bérengère Guilbert, Associate Professor, Prof. Dr.-Ing. Philippe Velez, Full Professor, LaMCoS, INSA – Institut National des Sciences Appliquées de Lyon, Villeurbanne Cédex, France

Power loss behavior of aqueous gear lubrication under water evaporation

- Influence of water evaporation on gear friction with aqueous polyalkylene glycols
- Monitoring, controlling and operation strategies for the use of aqueous lubricants

Stefan Hofmann, M. Sc., Team Leader Tribology and Sustainability, Department EHL-Tribological-Contact and Efficiency, 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), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany

Performance of oil-impregnated sintered gears in stationary operating gearboxes

- Innovative and sustainable lubrication method for gearboxes
- Experimental testing of self-lubricating prototype gears

Nicolai Sprogies, M. Sc., Team Leader Innovative and Efficient Lubrication, Department EHL-Tribological-Contact and Efficiency, Dr.-Ing. Thomas Lohner, Head of Department EHL-Tribological-Contact and Efficiency, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany; Dr.-Ing. Bernhard Bouché, Director of Research and Development Mechanics, Getriebebau NORD GmbH & Co. KG, Bargteheide, Germany

17:30 Influence of centrifugal forces on the tooth root load carrying capacity of high-speed gears

- How to test centrifugal force equivalent stress states efficiently
- Experimental test results and recommendations for high-speed gear box design

Yves Johannes Barth, M. Sc., Team Leader Plastic Gears, Lubricants and Innovative Manufacturing Technologies, Department Load Carrying Capacity of Spur Gears, Institute of Machine Elements, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany; Dr.-Ing. Martin Hunkel, Leibniz-Institut für Werkstofforientierte Technologien – IWT, Bremen Germany

Metalocene PAO base stock technology for automotive and industrial gear lubricants

- Enhanced lubricant performance with metalocene PAO
- Improved energy efficiency of mPAO formulations

Dr. Sven Meinhardt, Global Technology Advisor – Synthetics BU, Exxon Mobil Technology, Lindsey Bunting, Market Development, Synthetic Base stocks, Mikhail Fedotov – Market Development, Synthetic Base stocks, ExxonMobil Chemical Central Europe GmbH, Cologne, Germany

The effect of surface integrity instability on rolling contact fatigue

- Residual stress instability along a rolling contact fatigue test
- Surface degradation of isotropic superfinished gears

Prof. Dr. Ronnie Rego, Assistant Professor, Gilberto Martins de Oliveira Gomes, M. Sc., Research Assistant, Naiane Stefani de Souza, Eng., Research assistant, Competence Center in Manufacturing, Aeronautics Institute of Technology, São José dos Campos, Brazil

18:00 End of the lectures

Get-together – 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.

3rd Conference day
Friday, September 12, 2025

Lecture Room A



Gear analysis & simulation

Moderation: Prof. Dr.-Ing. Berthold Schlecht, Technische Universität Dresden, Germany / **Prof. Dr. Geng Liu**, Northwestern Polytechnical University & Shaanxi Engineering Laboratory for Transmissions and Controls, China

08:30 Virtual optimization of gearbox oiling – How reliable are the results

- Multiphase modelling of the oil flow in an oil-sump lubricated gearbox
- Validation of the model through a variety of tests with optical and quantitative measurements

Michael Reichl, M. Sc., Senior Application Engineer CFD, Advanced Simulation Technologies, Philipp Lenz, M. Sc., Application Engineer, AVL Deutschland GmbH, Munich, Germany

09:00 Modelling of high-power geared transmissions with nonlinear dissipative elements

- Vibration control by passive in-built systems
 - Three-dimensional model of thin-rimmed double helical gears
- Prof. Dr.-Ing. Philippe Velez**, Full Professor, Cyril Chevrel-Fraux, Ph.D., Research Engineer Jérôme Bruyère, Habil. Ph.D., Associate Professor, LaMCoS, INSA – Institut National des Sciences Appliquées de Lyon, Villeurbanne Cédex, France

09:30 Detailed and efficient transient simulations of wave gears

- Coupled simulation of load zones of gear and bearing necessary
- Deflection-force approach gains speed at high quality

Dr. rer. nat. Hannes Grillenberger, Product Manager Engineering Tools, Dr. Valery Makhavikou, Specialist Technical Calculation, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany; Dr. Luca Ronchiato, Senior Technical Fellow, RedPoint Vibrations LLC, USA

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

Lecture Room B



NVH

Moderation: Prof. Dr.-Ing. Michael Weigand, TU Wien, Austria / **Dr.-Ing. Rolf Doebereiner**, AVL List GmbH, Austria

Development of split gear solution for a hybrid propulsion system in marine application

- Gear rating of split gears in accordance with marine standards
- Challenges in split gear design

Tim Letzner, M. Sc., CAE Engineer System and Multibody Simulation, Benedikt Scheffler, M. Sc., CAE Engineer Structural Mechanic, Dr. Jan Reger, Vice President Powertrain, Dr. Bernd Somschor, Senior Expert Gearbox, ARRK Engineering GmbH, Munich, Germany

Microgeometry optimization and robustness analysis of an E-Drive Unit for best NVH performance

- Transmission multibody simulation to evaluate NVH performance
- Robustness analysis to mitigate impact manufacturing errors

Jonas Verhoogen, M. Sc., Simcenter Mechanical Product Manager, Simulation & Test, Siemens Digital Industries Software NV, Leuven, Belgium; Dr. Hai Xu, Advanced Propulsion Technical Specialist – Gear Systems, Global Advanced Electrified Propulsion, General Motors Company, Warren, Michigan, USA

Advancing electric powertrain NVH design through transmission error correlation

- Measuring static transmission error in full automotive reducers
- Correlation of test data with numerical TE predictions

Stéphan Magne, Ph.D., NVH Simulation Team Leader, Power Division, Valeo, Redditch, United Kingdom; Ing. Xavier Hauvette, NVH Test Team Leader, Valeo Power Division, Amiens, France; Ing. Balasubramanian Ravichandran, NVH Simulation Team Leader, Valeo Power Division, Chennai, India

Lecture Room C



Crossed axis gear & differential bevel gears

Moderation: Dr.-Ing. Joachim Thomas, ZG Hypoid GmbH, Germany / **Prof. Dr. Datong Qin**, Chongqing Jiaotong University, China

Potentials of enveloping crossed helical gears

- Load-carrying capacity maximization
- Application of BECAL and HyGEARS software adopted for crossed helical gear analysis

Dr.-Ing. Alexander Kapelevich, Consultant, AKGears, LLC, Shoreview, Minnesota, USA; Dr.-Ing. Joachim Thomas, Managing Director, ZG Hypoid GmbH, Aschheim, Germany, Claude Gosse- lin, Ph.D., P.Eng., President, Involute Simulation Softwares Inc., Quebec, QC, Canada

Increasing load capacity of differential gears using a restriction free design method in nextgear

- Conjugation of involute face gear including tooth fillet bulge
- Restriction free design method including NURBS modification

Florian Eigner, M. Sc., Development Engineer, Imk Health Intelligence GmbH, Chemnitz, Germany; Dipl.-Ing. (FH) Richard Röttig, Product Development Engineer, McLaren Engineering Crimmitschau Tech Center GmbH, Crimmitschau, Germany

Tooth contact analysis on differential bevel gears in an elastic environment

- Geometry calculation of forged gears based on a spherical involute
- Local tooth contact simulation based on FEM influence coefficients

Dipl.-Ing. Frederik Mieth, Software Development Engineer, Modeling and Simulation, FVA GmbH, Frankfurt, Germany

Lecture Room A



Advancements in NVH Simulation

Moderation: Prof. Dr.-Ing. Burkhard Pinnekamp, former RENK GmbH & FVA & Technical University of Munich, Garching, Germany / **Robin Olson, M. Sc.**, Regal Rexnord Corporation, USA

11:00 Efficient simulation procedure for NVH evaluation of bevel gear sets

- Noise excitation from bevel gears is generally load-dependent
 - Harmonic excitations can be modelled efficiently by a TCA
- Dr.-Ing. Felix Rudolph**, Development Engineer, Gearing Technology, Dr.-Ing. Jens Kunert, Head of Technology Department Gearing Technology and Heat Management, SEWEURODRIVE GmbH & Co KG, Bruchsal, Germany

11:30 Frequency response analysis of drivetrains based on an iterative approach for efficient prediction of system responses

- Harmonic excitation analysis in the frequency response domain
 - NVH characterization of a real-world gearbox
- Prof. Dr.-Ing. Saeed Ebrahimi**, Senior Software Developer, Dr. rer. nat. Stefan Beermann, CEO, KISSsoft AG, Bubikon, Switzerland; Ing. Andreas Möstl, Head of Technical Office/Engineering, KUMERA Antriebstechnik GmbH, Graz, Austria

12:00 Holistic and statistical approach to the impact of manufacturing deviations on the transmission error, structural vibrations and the acoustic behavior of gearboxes

- Nominal vs. limit value vs. statistical approach
 - Simulation workflow, static and multibody dynamic
- Dipl.-Ing. Dennis Tazir**, Software Developer & Product Manager, Development, Customer Support and Services, FVA GmbH, Frankfurt; Benjamin Abert, M. Sc., Head of Consulting and Service, FVA GmbH, Munich; Dr.-Ing. Denis Werner, Application Engineer, AVL Deutschland GmbH, Munich, Germany

12:30 Closing remarks

12:45 Awarding of the best presentation for young engineers by

Prof. Dr.-Ing. Karsten Stahl, Full Professor, Institute of Machine Elements, Director, Gear Research Center (FZG), TUM School of Engineering and Design, Technical University of Munich, Garching, Germany
Caroline Körber, Productmanagement, VDI Wissensforum GmbH, Duesseldorf, Germany

+ Lunchtime snack

14:15 End of the conference

Lecture Room B



Planetary Gears: Design

Moderation: Prof. i.R. Dr.-Ing. Dr. h.c. Bernd-Robert Höhn, Technical University of Munich, Germany / **Prof. Dr. Eng. Jose I. Pedrero**, Universidad Nacional de Educación a Distancia (UNED), Spain

Automation of high power density gearbox design encompassing layshaft and planetary gear train layouts across a wide range of operating conditions

- High power density gear train design comprising layshaft and planetary assemblies
 - Gear train design to optimize gear train mass, volume, efficiency and NVH performance
- Daehyun Park, Ph.D.**, Senior Research Engineer, Drivetrain solution development, Ali Rezayat, Ph.D., Siemens Digital Industries Software NV, Leuven, Belgium, Yeohyeon Gwon, M. Sc., Hyundai Motor Company, Goyang, Republic of Korea

Automated transmission design

- Software aided transmission design
 - Multiparametric transmission optimization
- Dr.-Ing. Michael Heider**, Head of Calculation & Simulation, Dr.-Ing. Max Fromberger, Team Lead Software Engineering, Rafael Hafner, B. Sc., Software Engineer, Innovation and Technology, RENK AG, Augsburg, Germany

Design and analysis of cycloid planetary gears with transmission error-based flank modification for smaller gear ratios

- New flank modification approach based on transmission error
 - Load and efficiency of cycloid gear with bearing play via LTCA
- Dr.-Ing. Shyi-Jeng Tsai**, Associate Professor, Pei-Chen Cho, M. Sc., Former graduate student, Yi-Hwa Chen, B. Sc., Graduate student, Department of Mechanical Engineering, National Central University, Taoyuan City, Taiwan

Lecture Room C



Efficiency improvements

Moderation: Dr.-Ing. Bernhard Bouché, Getriebebau NORD GmbH & Co. KG, Germany / **Prof. Dr.-Ing. Philippe Velez, LaMCoS, INSA** – Institut National des Sciences Appliquées de Lyon, France

A modified back-to-back geared test-rig for the study of splash and jet lubrication

- Novel test rig for validation of CFD models
 - Lubrication analysis both in jet and splash condition
- Dr.-Ing. Luca Bonaiti**, Assistant professor, Ing. Ugo Mariani, Quality & Safety Systems – Fleet Events – Leonardo Helicopters Division, Prof. Ing. Carlo Gorla, Associate Professor, Department of Mechanical Engineering, Politecnico di Milano, Italy

Approach to determine quantitatively correct load-independent power losses inside turbo gearboxes by flow simulation

- Simulation by finite volume method and moving particle simulation
 - Economical and fast approach for gearbox design and test
- Dr.-Ing. Patrick Neuenfeldt**, Managing Director, Julian Dorffer, M. Sc., Head of Technology, Alexander Steurer, M. Sc., Project Manager, SADEN GmbH, Karlsruhe, Germany

Gearbox efficiency of eDrives: theoretical influence of the lubricant viscosity, gear loss factor and tooth flank roughness on gearbox power losses

- Calculation of gearbox efficiency
 - Potential of different modifications to increase the gearbox efficiency
- Dr.-Ing. Johannes König**, Manager Gear Fundamentals & Digitalization, Corporate R&D, Dr.-Ing Mustafa Yilmaz, Gear Development, Florian Zerulli, Gear Development, ZF Friedrichshafen AG, Friedrichshafen, Germany

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 2025

Technical University of Munich
TUM School of Engineering and Design
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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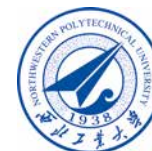


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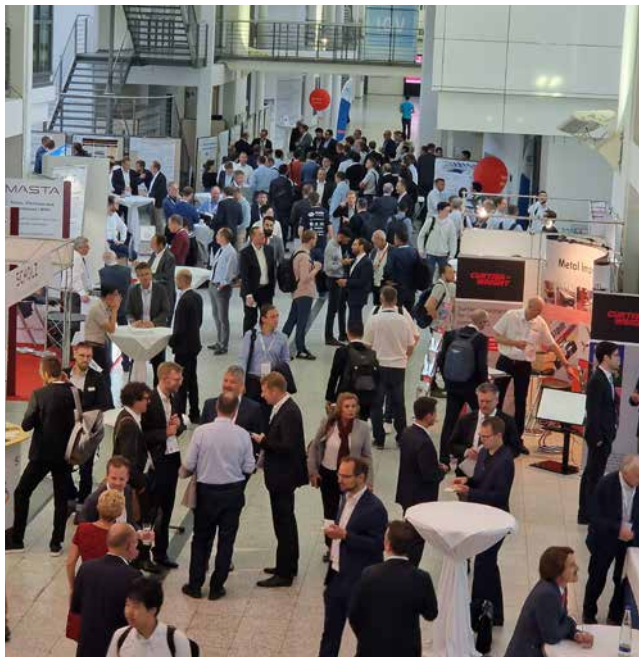
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Meet international speaker from:



Impressions





Combined with
5-minute talks!

P1 Diagnosing the defects of the gears of the transmission using vibration analysis and validating it by the graphs of the HÖFLER Gear Testing Machine

Alireza Mangouri, M. Eng., CEO and GM, R&D, T.P.T. Co. Tauris Power Transmission Company, Tabriz, Iran

P2 Transmission error prediction of gear pair considering constant and variable errors before assembly line

Bahadır Karba, Ph.D., Reducer Mechanical Design Leader, Power Division/Drive Transmission, VALEO, Bursa, Turkey

P3 Introduction and investigation of a secondary profile angle on Hirth-Serrations

Dr.-Ing. Thomas Glaser, Operating Engineer | Gear Technology, Group Division Turbo, J.M. Voith SE & Co. KG, Heidenheim an der Brenz, Germany

P4 Tooth form of a face spline based on a sine function

Dr.-Ing. Thomas Glaser, Operating Engineer | Gear Technology, Group Division Turbo, J.M. Voith SE & Co. KG, Heidenheim an der Brenz, Germany

P5 Application of normal method for tooth surface generation on helical gear & spiral bevel gear

Dr. Jing Lin, Professor & Senior Engineer, Research & Development, Bevelin Transmission Technology Lit. Co., Shanghai, China

P6 Modulation frequency identification of herringbone gear system based EEMD signal decomposition and envelope demodulation: Theoretical and experimental investigation

Hoaiqin Zhang, School of Mechanical Engineering, Northwestern Polytechnical University, Xi'an, China

P7 Improving the efficiency of a wind turbine gearbox with modern CFD methods

Martin Cardaun, M. Sc., Gearbox Engineer, Engineering, NGC Transmission Europe GmbH, Duisburg, Germany

P8 Gear design optimization for a high-power density electric drive unit

Marta Salica, M. Eng., Design Responsible Engineer Coordinator for Rotating Parts, Engineering, FPT (Fiat Powertrain) Industrial S.P.A., Turin, Italy

P9 Development of fatigue life prediction model for bearing with combined ball and roller-shaped rolling elements

Doyeop Kwon, B. Sc., Researcher, Department of Biosystems Engineering, Seoul National University, Republic of Korea

P10 Effects of different manufacturing processes on tooth root stress evaluated by a 3D-FE method

Holger Cermak, M. Sc., Senior Engineer – Global Sales, KISSsoft AG, Bubikon, Switzerland

P11 Estimation of stiffness and damping coefficients in two-stage helical gearbox using genetic algorithm and vibration measurements

Dong-Joo Moon, Researcher, Department of Biosystems Engineering, Seoul National University, Republic of Korea

P12 Method and key technologies of line laser 3d gear measurement

Dr. Yuan Zhu, University Teacher, Beijing Engineering Research Center of Precision Measurement, Beijing University of Technology

P13 Reverse design method of fine-pitch offset face gears based on optimized modified surface

Hui Guo, Ph.D., Teacher, School of Mechanical Engineering, Northwestern Polytechnical University, Xi'an, China

P14 Assessment of wear in wind turbines' gear transmissions considering time series of operation

Maite García Pérez, Mechanical Reliability Department (Mechatronics Area), Ikerlan S.Coop, Arrasate, Spain

P15 Gearing up robotics through lightweight polymer strain wave gearboxes

Ziyuan Ren, Dynamics and Tribology Research Group, Wolfson School of Mechanical, Electrical and Manufacturing Engineering, Loughborough University, United Kingdom

P16 Plastic gears with non-constant curvature of the flank line

Corinna Niedermeier, M. Sc., Lecturer and Research Associate, Construction & Development, Drive Technology/Precision Measurement Laboratory, Faculty of Mechanical Engineering, OTH Regensburg, Germany

P17 Experimental study on the temperature of POM gear with different load conditions

Xin Dong, Manager of Transmission Technology Department, College of Mechanical and Energy Engineering, Beijing University of Technology, China

P18 Eigen analysis of graph laplacian derived from gear shape deviation networks

Shu Takata, Department of Mechanical Engineering, Faculty of Science and Technology, Kyoto Institute of Technology, Japan

P19 Fatigue characterization of POM-C gears on an electrical closed loop test rig

Lorenzo Pagliari, M. Sc., Teaching Assistant, Materials Characterization Lab, Faculty of Engineering, Free University of Bozen-Bolzano, Bozen, Italy

(please check the App for times)

6th International Conference on Gear Production 2025

September 10 - 12, 2025, Garching/Munich, Germany

Visit for free



6th International Conference on High Performance Plastic Gears 2025

September 10 - 12, 2025, Garching/Munich, Germany



Source: © MTI/WZL, RWTH Aachen University

Key topics:

- Challenges in gear production for e-mobility
- Innovative process monitoring and quality inspection
- New materials and heat treatment
- Additive manufacturing of gears
- Bevel and face gear cutting
- Manufacturing of high-order tooth flank modifications

Presidency:

Prof. Dr.-Ing. Thomas Bergs, MTI, RWTH Aachen University, Germany

Prof. Dr.-Ing. Christian Brecher, WZL, RWTH Aachen University, Germany

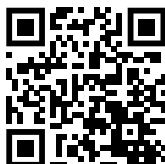
Prof. Dr.-Ing. Karsten Stahl, FZG, Technical University of Munich, Garching, Germany

The conference will give you the answers to these questions:

- What are the challenges and solutions in gear production for e-mobility?
- How can additive manufacturing be applied to produce high-performance gears?
- Which innovations are transforming gear metrology and inspection?
- How do advanced materials and heat treatments affect load-carrying capacity in gear applications?
- How can manufacturing processes for bevel and face gears be optimized?

Further details and the final program can be found here:

www.vdiconference.com/02TA411025



Source: © FZG, Technische Universität München; Scholz HTIK

Key topics:

- Advanced simulation and design optimization
- Lubrication and materials selection
- Testing methods
- Load-carrying capacity and fatigue prediction
- Wear behaviour
- NVH optimization

Presidency:

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

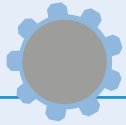
The conference will give you the answers to these questions:

- How can plastic gears be efficiently designed and optimized for performance?
- What are the key challenges and opportunities in modern plastic gear applications?
- Which tools and methods are available for simulation, analysis, and stress calculation?
- How can fatigue and load-carrying capacity be reliably predicted?
- What influences material and lubrication selection for long-term reliability?
- Which factors affect NVH behavior, and what are the current research focus areas?

Further details and the final program can be found here:

www.vdiconference.com/02TA409025





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.

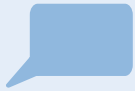


FZG lab tours

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 meetup

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 'Löwenbräukeller' as well as another social event at the university. The 'Löwenbräukeller' is a restaurant with a long tradition offering modern Bavarian cuisine.

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.



Presidency



Conference President

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



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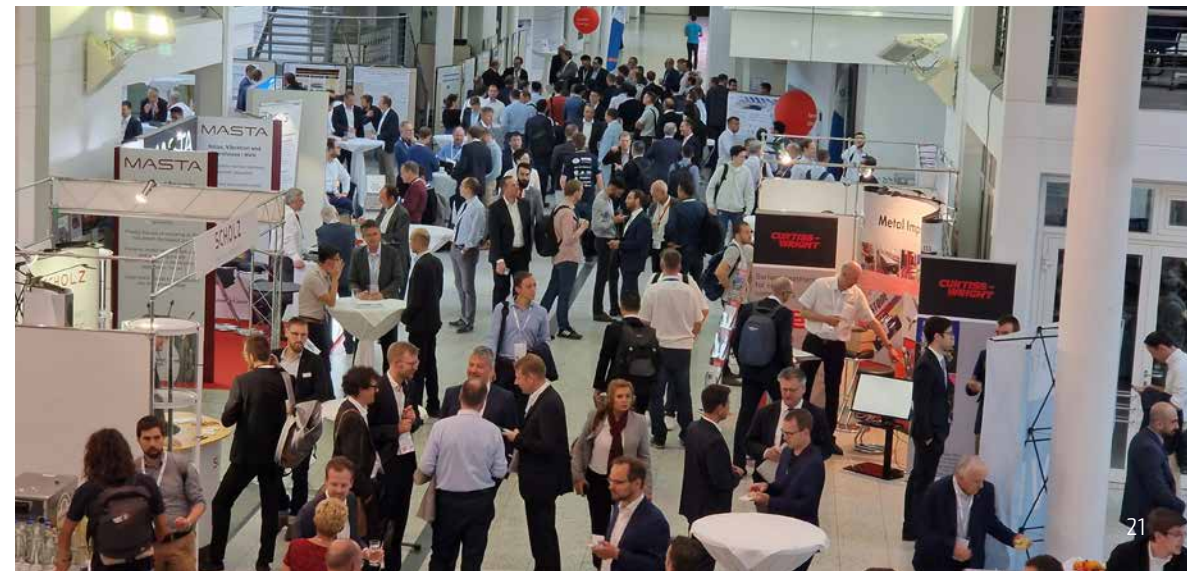
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