

Parallel Conferences  
free of charge

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# 4th International Conference on High Performance Plastic Gears 2021

## Key topics discussed:

- 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 Centre (FZG), Technical University of Munich (TUM), Garching, Germany

- + Parallel events
- International Conference on Gears 2021
- International Conference on Gear Production 2021

+ Exhibition

## With experts from:



**i** Event organized by VDI Wissensforum GmbH  
[www.vdiconference.com/02TA409021](http://www.vdiconference.com/02TA409021)  
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 #vdi\_gears

September 15 - 17, 2021, Garching/Munich, Germany

**1st Conference day**  
Wednesday, September 15<sup>th</sup>, 2021

08:15 Registration



**Plenary lectures**

09:45 Joint welcome and opening of

- International Conference on Gears 2021
- International Conference on High Performance Plastic Gears 2021
- International Conference on Gear Production 2021

by **Prof. Dr.-Ing. Karsten Stahl**, Gear Research Centre (FZG), Technical University of Munich (TUM), Garching, Germany

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

10:05 Welcome address by

**Dr.-Ing. Burkhard Pinnekamp**, Head of Central Technology, 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?**

**Moderation: Prof. Dr.-Ing. Karsten Stahl**, Gear Research Centre (FZG), Technical University of Munich (TUM), Garching, Germany

**Demands in gear technology in structural change in the economy**

- High performance in inflating the 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. Bernd-Robert Höhn**, TUM emeritus of excellence, Gear Research Centre (FZG), Technical University of Munich (TUM), Garching, Germany

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



**Opening of**  
4th International Conference on High Performance Plastic Gears 2021



**Applications**

**Moderation: Dr.-Ing. Andreas Langheinrich**, Horst Scholz GmbH & Co. KG, Kronach, Germany

13:30 Weight and cost reduction potentials with high performance polymers for gears

- Use in drive elements of air-conditioning systems enables a 40 % weight reduction compared to conventional materials
- The dimensional stability of PA9T over a wide temperature range enables substitution for underperforming materials
- New material developments and further investment in adequate test equipment will support future application developments

**Kazuma Yanagisawa, B. Sc.**, R&D Engineer, Research and Development Department, KURARAY CO., LTD., Tsukuba, Ibaraki, Japan, Dipl.-Ing. (FH) Andreas Weinmann, Business Development Manager, Marketing and Sales Department, KURARAY Europe GmbH, Hattersheim, Nils Gerlach, Senior Technical Sales & Product Manager, Nordmann Rassmann GmbH, Hamburg, Germany

14:00 High performance plastic gear solution in the engine environment

- Balancer gears in a combustion engine
- Challenges in tooth and gear body design
- Benefits when using plastics

**Dipl.-Ing. Stephan Oberle**, Director R&D, Veronica Labriola, B. Eng. Project Engineer, R&D, Egor Melnikov, B.Eng., Project Engineer, R&D, IMS Gear SE & Co. KGaA, Donaueschingen, Germany

14:30 Potential and performance analysis of polymer gears in automotive high speed gearboxes

- Working surface pair analysis of polymer contacts
- Influence of the lubricant on wear and performance in high speed contact
- Design of a high speed test bench

**Friedrich Lagier, M. Sc.**, Research Assistant, Research Group Clutch and Tribology Systems, Dipl.-Ing. Katharina Bause, Head of Research, Drive Systems, Clutch and Tribology Systems, Dipl.-Ing. Sascha Ott, Managing Director, IPEK – Institute of Product Engineering, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany



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



**Material properties**

**Moderation: Dr.-Ing. Ulrich Kissling**, KISSsoft AG, Bubikon, Switzerland

16:00 Dimensional stability of moulded polymer gears in various environmental conditions

- Study of swelling effect on several different polymer materials
- Investigation into the influence of humidity and temperature on dimensional stability
- Prediction of gear swelling for more accuracy in gear design

**Prof. Dr. Mitjan Kalin**, Professor, Head of the Lab, Sebastijan Matkovič, M. Sc., Researcher, Laboratory for Tribology and Interface Nanotechnology – TINT, Faculty of Mechanical Engineering, University of Ljubljana; Dr.-Ing. Aljaž Pogačnik, Plastic Gear Consultant, Bauhar s.p., Bled, Slovenia

16:30 Potential of woven carbon fiber reinforced polymer (CFRP) composite gears

- Long fiber CFRP composite gears were studied
- Increased performance was found compared to polymer gears
- Failure modes were studied under the scanning electron microscope (SEM) and optical microscope

**Damijan Zorko, Ph. D.**, Researcher, Laboratory for Engineering Design LECD, Borut Černe, Ph. D., Researcher, Laboratory for Engineering Design LECD, Assist. Prof. Zoran Bergant, Ph. D., Researcher, Laboratory for heat treatment and materials testing, Faculty of Mechanical Engineering, University of Ljubljana, Slovenia

### 17:00 Predicting static and fatigue performance for fiber reinforced plastic gears

- Static and fatigue measurements on dedicated gear test set-ups
- Predicting strength (short- and long-term) by combining numerical and analytical tools
- Coupled analysis between fiber orientation and anisotropic material model

**Benjamin van Wissen, M. Sc.**, CAE Engineer/Associate scientist, Research and technology: CAE, DSM Engineering Materials, Dr. ir. Marc Kanters, Scientist, Polymer mechanics, fatigue, failure, strength, DSM ASC, Adnan Hasanovic, M. Sc., System Expert Gears and actuators, DSM Engineering Materials, Geleen, The Netherlands

### End of the first conference day

### 18:00 Organized bus transfer to the evening reception



### Get-together

At the end of the first conference day we cordially invite you to our evening reception.

You are invited!

### 19:00 Evening reception at the Hofbräuhaus in Munich

You can look forward to a special evening event. We cordially invite you to our evening reception at the Hofbräuhaus and to enjoy tradition. The Hofbräuhaus is the cradle of Bavarian tavern culture – the origin of tradition, "Gemütlichkeit" and hospitality. Enhance your personal network and use the informal atmosphere for deeper-going discussions.



Source: @ Hofbräuhaus München

### Dinner speech



*"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."*

**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 Thursday, September 16<sup>th</sup>, 2021



### Gear strength testing

**Moderation: Dr.-Ing. Andreas Langheinrich**, Horst Scholz GmbH & Co. KG, Kronach, Germany

### 08:30 In situ measurement of geometric and structural influences on the operating properties of polymer gears

- Basics on the influence of process design on geometry and microstructure formation
- Presentation of a new in situ wear measurement methodology for gears
- Interaction of geometry and polymer microstructure and their influence in gear testing

**Prof. Dr.-Ing. Dietmar Drummer**, Full Professor, Institute of Polymer Technology, Friedrich-Alexander-University FAU, Erlangen, Germany

### 09:00 Operating behavior and performance of oil-lubricated plastic gears

- Unreinforced and carbon fiber reinforced PEEK gears
- Temperature measurements under different operating conditions
- Wear and pitting lifetime evaluation

**Christopher Illenberger, M. Sc.**, Team Leader Plastic Gear, Load Carrying Capacity Cylindrical Gears, Gear Research Centre (FZG), Institute of Machine Elements, Technical University of Munich (TUM), Garching, Germany

### 09:30 Cylinder-on-ring model wear tests as an input data source for the simulation of the friction and wear of plastic gears

- Performance optimisation of manufacturing deviations
- Influence of optimised lubricant fluid technology
- New evaluation criteria for micro gears

**Dipl.-Chem. Andreas Gebhard**, Manager Tribology, Department of Materials Science, Leibniz-Institut für Verbundwerkstoffe GmbH, Kaiserslautern; Jun. Prof. Dr.-Ing. Manuel Oehler, Junior Professor for Mechanical Drive Technology, Wassiem Kassem, M. Sc., Research Assistant, MEGT – Institute of Machine Elements, Gears and Transmission, Department of Mechanical and Process Engineering, Technische Universität Kaiserslautern, Germany



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



### Standardization of strength calculation

**Moderation: Dipl.-Ing. Klemens Humm**, ZF Friedrichshafen AG, Friedrichshafen, Germany; **Prof. Dr.-Ing. Karsten Stahl**, FZG, Technical University of Munich (TUM), Garching, Germany

### 11:00 The future of plastic gear standardization

- Limitations of VDI 2545 and VDI 2736
- Influential parameters affecting plastic gear calculation
- Plastic gear calculation tomorrow

**Dr.-Ing. Aljaž Pogačnik**, Plastic Gear Consultant, Bauhar s.p., Bled, Slovenia; Dr.-Ing. Ulrich Kissling, President, KISSsoft AG, Bubikon, Switzerland

### 11:30 Load-capacity evaluation of polyacetal (POM) internal gears according to JIS B 1759:2019 (Effect of number of teeth of pinion)

- Load capacity of plastic internal gears
- Actual contact ratio and PV integral value
- Tooth form factor for internal gears

**Kota Kobayashi, B. Eng.**, Mechanodesign, Prof. Dr. Eng. Ichiro Moriwaki, Professor, Faculty of Mechanical Engineering, Kyoto Institute of Technology, Kyoto; Dr. Eng. Akio Ueda, President, Amtec Inc., Osaka, Japan

Get a voice – you will be involved by digital polls

**12:00 Standardized methods of load capacity calculation of plastic gears**

- History and overview of methods for calculating the load capacity of plastic gears
- Role and importance of standardized methods in industrial plastic gear design
- What should a modern gear standard contain?

**Prof. Dr.-Ing. Karsten Stahl**, FZG, Technical University of Munich (TUM), Garching; **Dipl.-Ing. Klemens Humm**, Manager Gear Development, Corporate Research and Development, ZF Friedrichshafen AG, Friedrichshafen, Germany

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

**Geometry effects**

**Moderation: Dr.-Ing. Ulrich Kissling**, KISSsoft AG, Bubikon, Switzerland

**14:00 Multit-body simulation of plastic gears**

- Performance optimization of transmissions with plastic gears
- Influence of gear tooth forms (LCR, HCR, asymmetric) on gear dynamics
- Acoustic behaviour of transmission housing

**Dr. Davide Marano**, Senior Transmission Engineer, Advanced Transmission Analysis, Gear Transmission Solutions, Padova, Italy; **Dr.-Ing. Aljaž Pogačnik**, Plastic Gear Consultant, Bauhar s.p., Bled, Slovenia; **Dr.-Ing. Ulrich Kissling**, President, KISSsoft AG, Bubikon, Switzerland

**14:30 A one stage planetary gearbox made of plastic with crossed helical gears**

- An old principle used in a new innovative way
- Challenges in the design and production of plastic gears with special and sophisticated contours
- Correlation between theoretical design and production by means of digitalization

**Dr.-Ing. Jens Fechner**, Director R&D, R&D, Matthias Kieninger, B. Eng., Senior Development Engineer, Simon Albert, B. Eng., Development Engineer, R&D, IMS Gear SE & Co. KGaA, Donaueschingen, Germany

**15:00 Optimized crossed helical gearboxes using non-involute transverse section**

- New program for general calculation of variable flank geometries
- Optimization of Hertzian pressure, efficiencies and sliding paths
- Avoidance of critical pressure values that occur with standard involute geometries

**Linda Becker, M. Sc.**, Research Assistant, Dr.-Ing. Dietmar Vill, Senior Engineer, Prof. Dr.-Ing. Peter Tenberge, Full Professor, Chair of Industrial and Automotive Drivetrains, Ruhr-University Bochum, Germany

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

**Temperature effects**

**Moderation: Dr.-Ing. Marco Baccalaro**, Robert Bosch GmbH, Heilbronn, Germany

**16:30 The effect of temperature on the SN curve for bending stress measured on a new test rig for plastic gears**

- Description of the test-rig
- Post processing of data
- Construction of the SN curve

**Dr. Riccardo Longato**, Development Engineer, Research & development, Longato Riccardo Srls, Rovigo; **Dr. Eng. Massimiliano Turci**, Gear Design Consultant, Studio Tecnico Turci, Cesena, Italy

**17:00 Study of meshing behaviors of plastic gears at different temperatures**

- Introduction of a gear with hybrid plastic material
- Study of plastic gear meshing behaviours at high temperatures by simulation
- Comparison of meshing behaviors of common plastic gears and hybrid plastic gear by simulation

**Ding Hongyu**, master degree, Engineering Manager, Prof. Shi Zhao-yao, Zhang Pan, master degree, Beijing Engineering Research Center of Precision Measurement Technology and Instruments, Beijing University of Technology, China

**17:30 PEEK gears for high power transmissions**

- Performance of PEEK gears in dry-running and oil-lubricated environment
- Influence of temperature, velocity and load on PEEK's tooth root strength
- Examples of PEEK gears in high power transmissions

**Dipl.-Ing. (FH) Philipp Kilian**, Head of Tribology Development, High Performance Polymers, Evonik Operations GmbH, Darmstadt, Prof. Dr. Karl Kuhmann, Director Polymer Technology Department, High Performance Polymers, Evonik Operations GmbH, Marl, Germany

**18:00 Evening reception at the conference venue**

**Dinner speech**



*"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."*

**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**  
Friday, September 17<sup>th</sup>, 2021

**Lubrication**

**Moderation: Dr.-Ing. Marco Baccalaro**, Robert Bosch GmbH, Heilbronn, Germany

**08:30 Lubricated polymer-steel-systems: influence of the surface and interfacial energies of frictional partners on their tribological performance**

- Analysis of a tribo-system based on interfacial energies
- Boundary friction, transition sticking-sliding
- Influence of interaction energies on run-in and wear

**Dr. Raimund Jaeger**, Head of the research group, Dr.-Ing. Christof Koplín, Scientist, Dr. rer. Nat. Bernadette Schlüter, Scientist, Polymer Tribology & Biomedical Materials, Fraunhofer Institute for Mechanics of Materials IWM, Freiburg, Germany

**09:00 Ensuring reliable grease service life in high-temperature plastic gears**

- Higher operating temperatures of heat-stabilized thermoplastic gears increase thermal stress on grease
- Thermo-oxidative degradation of grease can limit service life of gears
- New test method for thermo-oxidative stability of greases

**Dr.-Ing. Markus Matzke**, Senior Expert Lubrication, Dr.-Ing. Alexander Elter, Senior Manager, Fluid Dynamics and Reliability, Technology, Corporate Sector Research and Advance Engineering, Applied Mathematics and Engineering for Future Components, Robert Bosch GmbH, Renningen, Germany

### 09:30 Effect of tribological properties on tooth root fatigue failure of polymer gears

- Tooth root fatigue failure of polymer gears
- Experimental results from both dry and lubricated gear contacts
- FEM study of influential tribological properties in tooth root fatigue

**Sebastjan Matkovič, M. Sc.**, Researcher, Prof. Dr. Mitjan Kalin, Professor, Laboratory for tribology and interface nanotechnology, Faculty of Mechanical Engineering, University of Ljubljana, Slovenia

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

#### Tribological investigation

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

### 11:00 Investigation of the failure mechanisms of plastic materials with and without fiber reinforcement

- Behaviour of plastic gear materials
- Load carrying capacity of plastic gears
- Classification of plastic gear failure modes

**Dr.-Ing. Johannes König**, Development Engineer, Gear Development, Daniel Kehle, M. Sc., R&D Engineer, Testing Engineering, Dipl.-Ing. (FH) Klaus-Peter Heinzle, R&D Engineer, Materials Technology Polymers, ZF Friedrichshafen AG, Germany

### 11:30 Investigation of the time-dependent behavior of plastic gears with local tribological simulation

- Fully coupled finite element analysis with local tribological simulation
- Nonlinear material properties
- Calculation of the coefficient of friction, temperature and wear

**Wassiem Kasseem, M. Sc.**, Research Assistant, Jun. Prof. Dr.-Ing. Manuel Oehler, Junior Professor for Mechanical Drive Technology, Prof. Dr.-Ing. Bernd Sauer, Full Professor, Head of MEGT – Institute of Machine Elements, Gears and Transmission, Department of Mechanical and Process Engineering, Technische Universität Kaiserslautern, Germany

### 12:00 Influence of the tooth flank shape on wear for a steel POM gear pair

- POM gear wear development along the tooth profile
- Comparison of wear depending on the tooth flank shape
- Wear coefficients of POM gears depending on gear geometry

**Dr. Gorazd Hlebanja**, Consultant, Dr. Matija Hriberšek, Project Manager, Dr. Simon Kulovec, Head, Research and Development, Podkrižnik d.o.o., Ljubno ob Savinji, Slovenia

### 12:30 Closing remarks

### 12:45 Awarding of the best presentation for junior engineers by the conference president

**Prof. Dr.-Ing. Karsten Stahl**, Gear Research Centre (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

## The conference will give you the answers to these questions:

- How can the performance of plastic gears be enhanced?
- What are the current and future methods for the standardized strength calculation of plastic gears?
- Do high performance plastic gears require fiber reinforcement?
- How can the NVH-behavior of plastic gears be determined?

## Scientific support:

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[www.vdi.eu](http://www.vdi.eu)

## Presidency



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

## Conference board

Highly committed and with a great passion to succeed, the program committee – consisting of the following experts – draws up the conference agenda for you.



from left to right:

**Dr.-Ing. Marco Baccalario**, 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

## Exhibition & sponsorship

As an exhibitor or sponsor you can position your company with a clearly perceptible presence within a selected circle of participants. Get in contact with top-class attendees at this conference and present your products and services to a specialist audience in your market without any coverage waste. We would gladly provide you with an individual offer.



#### Your contact person:

Vanessa Ulbrich  
Project Consultant Exhibition & Sponsorship  
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## List of exhibitors

- ELTRO Gesellschaft
- Evonik Operations GmbH
- FRESCO GmbH
- GEORGII KOBOLD GmbH & Co. KG
- IMS Gear SE & Co. KGaA
- KISSsoft AG
- Metal Improvement Company Inc.
- SMT
- Telemetrie Elektronik GmbH

(May 2021)

## Gears interactive – new ideas, more added value for your business



### 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 Centre (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 speakers 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 München

#### Venue:



Source: Scharger, Albert/TUM



## Parallel conferences

Visit for free!

### International Conference on Gears 2021

September 15 - 17, 2021, Garching/Munich, Germany



Source: © NORD DRIVESYSTEMS Group

#### Key topics:

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

#### Presidency:

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

**Dr.-Ing. Bernhard Bouché**, Director of Research and Development Mechanics, Getriebebau NORD GmbH & Co. KG, Bargteheide, Germany

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

**Dr.-Ing. Burkhard Pinnekamp**, Head of Central Technology, Renk GmbH, Augsburg; President, Research Association for Drive Technology (FVA), Frankfurt, Germany

#### With experts from:

AKGears | AVL Deutschland | AVL List | Envision COE | dive solutions | Idemitsu Kosan | Jatco | KISSsoft | Nissan Motor | OTEC Präzisionsfinish | Ovako | Robert Bosch | Schaeffler Technologies | SEW-Eurodrive | Siemens Industry Software | Small Innovative Enterprise "Mechanic" | Transmission Dynamics | WEBER | ZG Hypoid

Further details and the final program can be found here:

[www.vdi-gears.eu](http://www.vdi-gears.eu)



## Parallel conferences

### 4th International Conference on Gear Production 2021

September 15 - 17, 2021, 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 to improve 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 Centre (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 | Mitsubishi Heavy Industries Machine Tool | OTTO FUCHS Dülken | Physikalisch-Technische Bundesanstalt | SEW-Eurodrive

Further details and the final program can be found here:

[www.vdicongference.com/02TA411021](http://www.vdicongference.com/02TA411021)

4th International Conference on High Performance Plastic Gears 2021

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Methods for simulation and calculation of plastic gears

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Please contact us!

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Ticket includes entrance to the parallel conferences:  
• Gears 2021  
• High Performance Plastic Gears 2021

✓ Please register for (price per person plus VAT):

4th International Conference on High Performance Plastic Gears 2021	
September 15 - 17, 2021, Garching near Munich, Germany (02TA409021)	
<input type="checkbox"/> Early bird price until July 1 <sup>st</sup> , 2021 EUR 1,490.-	<input type="checkbox"/> From July 2 <sup>nd</sup> , 2021 EUR 1,590.-

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Participation fee for personal VDI members and members of associated organisations of the International Conference on Gears 2021 **save EUR 50,- each conference day** VDI membership no.\*: \_\_\_\_\_

\* For price category 2, please state your VDI membership number or the name of the associated organisation (outlined at the homepage [www.vdi-gears.eu](http://www.vdi-gears.eu))

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**Venue:**

**Conference:** Technische Universität München (Technical University of Munich), Institute of Machine Elements, Gear Research Centre (FZG), Boltzmannstr. 15, 85748 Garching, Germany, [www.fzg.mw.tum.de](http://www.fzg.mw.tum.de)

**Hotel reservation:** A limited number of rooms have been reserved for conference participants. For booking please visit [www.vdi-gears.eu](http://www.vdi-gears.eu) where you will find a link for special room rates.

More hotels close to the conference venue may be found via our HRS service, [www.vdi-wissensforum.de/hrs](http://www.vdi-wissensforum.de/hrs)

**Information:** The price includes conference documents (e-book), coffee breaks and beverages during breaks, lunches and two evening receptions.

**Exclusive offer:** All participants at this event are entitled to a free three-month trial VDI membership. (Offer applies exclusively to new members.)



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