Forsch Ingenieurwes (2017) 81:57–58
DOI 10.1007/s10010-017-0248-7

EDITORIAL

Foreword

Karsten Stahl[1]

Talking about the design of modern high-performance power train applications, one of the essential components to focus on are the gears. Gears convert torque and speed in a very wide power range, at low cost and with minimal losses and noise emission. However, the demands regarding cost, power density, NVH-behavior and efficiency are steadily increasing. Demands, which can only be met using modern gearing technologies that allow combining individual materials, heat treatment and manufacturing processes. Particularly in the industrial sector, the requirements for the reliability and service life of the gear units have increased. Therefore, more and more accurate calculation methods are required for the load bearing capacity, life expectancy and failure probability as well as better test methods. This aspect is also becoming more important with regard to Industry 4.0 and Predictive Maintenance. In addition, the potentials of innovative production methods like powder metal sintering, plastic molding and gear cutting on universal 5-axis-CNC-machines are getting into the focus.

At the VDI International Conference on Gears 2017 in Garching/Munich, the latest developments and research results in the powertrain industry and research are presented and discussed by more than 600 leading international experts within more than 144 contributions. These contributions cover a wide range of applications, from small to large gears, from slowly running to turbo gears, from metal to plastics material, from hobbed to sintered gears and more.

One focus of the conference is the NVH-behavior of geared transmissions. Especially for automotive powertrains, the NVH-behavior gets more and more into the focus due to the reduced ambient noise level in the cabin. Several contributions to the conference address the subject of modelling and simulating the noise behavior of geared transmissions and describe methods to reduce gear noise.

Since energy consumption and CO2-emission are crucial challenges for our society, efficiency remains a key topic for gear research and development. In modern gearbox systems, methods for the efficiency optimization according to the state of the art, like the application of tailored synthetic and low viscosity oils or reduced oil levels, are usually implemented already. Several contributions to the conference will discuss additional possibilities for further improvement.

Finally, the demand for weight saving will continue to increase, not only because of the progressive electrification of automotive powertrains. High-speed electric motors with high ratio transmissions are a promising approach. Besides, the use of plastics for power train components offer favorable properties such as low friction, dry-running capabilities or good damping at minimal costs. High-performance plastic materials offer the opportunity of substantial improvements, but the limited knowledge about the performance of the material restricts their direct application to machine elements at the present. Here, focused research is required to set the bar higher.

Furthermore, a wide variety of gears and gearbox systems for different fields of applications will be discussed. Several contributions will talk about new results from theoretical and experimental investigations as well as experience from the field. These talks confirm that the performance and efficiency of gears will continue to play an important role.

Additional to the complete arrangement of proceedings of the presentations during the VDI International Con-

✉ Karsten Stahl
stahl@fzg.mw.tum.de

[1] Institute of Machine Elements, Gear Research Centre (FZG), Technical University of Munich (TUM), Garching, Germany

ference on Gears 2017 within the VDI Berichte, in this booklet, titled "Best of Gears 2017", you will find 31 full papers, thoroughly selected with the support of the guest editors Prof. Dr. Bernd-Robert Höhn and Dr. Bernhard Bouché utilizing a double-blind peer review process with international experts from industry and academia. Thanks to the authors, guest editors and to the many reviewers we were able to publish this Special Issue concurrent to the VDI International Conference on Gears 2017. I wish you an instructive and enjoyable reading of this Special Issue – stimulating and motivating for your own work.

On behalf of the editors of the Special Issue

Your
Prof. Dr.-Ing. Karsten Stahl