



Editorial

Adrian Rienäcker¹

Published online: 24 September 2018
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Dear readers,

the term “tribology”, an artificial word derived from the Greek verb ‘tribo’ (rubbing) and ‘logia’ (study of, knowledge of), was introduced in 1966 in England by Peter Jost as part of a survey concerned with the economic importance of friction and wear. Since then tribology is the international term for the study and application of the principles of friction, lubrication and wear used in science and technology.

For nearly 60 years now the German Society of Tribology (GfT) has promoted science and research in this interdisciplinary field, has thus extended and propagated tribological knowledge and made it available for systematic application in all fields of technology.

The 59th German Tribology Conference (September 24–26, 2018 in Göttingen) intends to inform about newest advances in science and technology by means of about 80 oral presentations from industry and research institutes. The poster exhibition and technical exhibition included show new and established products around tribology. This year, the program committee has decided to present a small number of selected research articles in this special issue of the journal “Forschung im Ingenieurwesen” (“Engineering Research Journal”) to make tribological progress visible to a broader audience and to promote exchange between research and development.

In a fundamental research paper a theoretical study of a one spring model with Coulomb friction in sliding motion and in the presence of normal or lateral vibrations is presented. Even with the simple model and the neglect of system dynamical feedback, a broad wealth of macroscopic friction values and energy efforts evolve in the system.

In a second contribution the authors develop effective Finite Element Methods to determine heat generation and temperature distributions in conformal lubricated contacts. Efficiency requirements and emissions regulations will ne-

cessitate the consideration of local thermal effects in tribological systems in the future.

Along with the increasing complexity and accuracy of simulation models, demands for a better and more accurate description of material behavior arise. This can often only be achieved with a combined effort from test and simulation. Two contributions cover this interesting field.

One paper is concerned with the shear thinning often encountered with modern lubricants under high shear rates. The critical shear stress can be derived from the measurements in a two disk machine and serves as an input for the simulations, which allow to determine local pressures and stresses.

In another contribution a simple capillary test setup is used to determine pressure and temperature dependency of viscosity. Nonlinear inverse parameter identification methods are employed to derive viscosity laws for lower pressures, which are shown to be applicable for higher pressures (up to 3000 bar) as demonstrated by comparison between test and simulation. Experiment and simulation results are successfully compared in the paper concerned with form and position deviations in the cam-and-roller contact, where a detailed simulation method is developed and validated, that includes the secondary movement of the valve train and allows to evaluate valve train design details in the early stage of the product development process.

One paper investigates the behavior of an axial bearing, a shaft with an integrated raceway, a bearing bushing/angular contact ball bearing and a bevel gear wheel, that have been reinforced in highly stressed area with a high strength material.

One contribution utilizes CFD (computational fluid dynamics) methods to predict oil distributions following the question, where the model can be simplified and coarsened without giving up too much accuracy.

Last but not least, white etching cracks (WECs) were investigated in an interdisciplinary study to identify mechanical, thermal and chemical mechanisms driving premature bearing failures.

The wealth in scientific and application problems presented in this special issue, along with the solution ap-

✉ Adrian Rienäcker
adrian.rienaecker@uni-kassel.de

¹ Universität Kassel, Kassel, Germany

proaches show the variety and interdisciplinarity in the field of tribology. It seems, that a good fifty years after the word tribology was coined, we have just started to put serious effort in bridging the gaps between disciplines and dimensional scales and to understand the interactions in tribological systems.

It is my hope, that you, valued readers, enjoy studying this special issue of the “Engineering Research Journal” and find food for thought for your own education and projects.

With best regards,
Adrian Rienäcker