Program

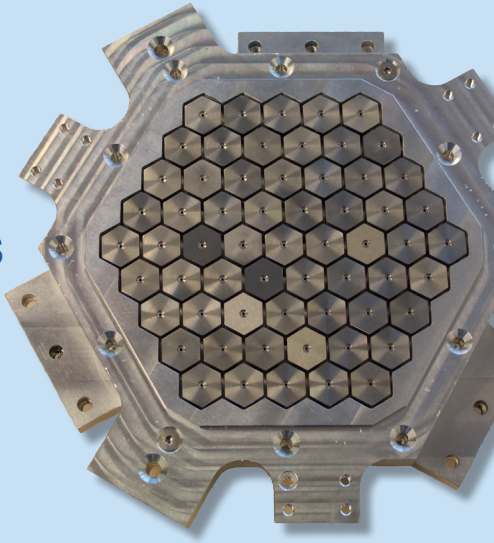
www.gas-bearing-workshop.com

7TH GAS BEARING WORKSHOP

April 5, 2027

Courtyard Hotel
Düsseldorf Seestern

- LECTURES
- POSTERS
- TABLE TOPS



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ORGANIZING INSTITUTIONS

VDE VDI GMM

Bond voor Materialenkennis

DSPE
YOUR PRECISION PORTAL

ORGANIZER

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IN COOPERATION WITH

Dutch Society for Precision Engineering (DSPE)
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POSTERS AND EXHIBITION

All attendees are invited to show a poster representing their field of competence.

We invite companies to join the workshop with a table top exhibition. The fee of 500 Euro (plus VAT) for the table top exhibition includes one ticket for workshop admittance.

For further information please contact the organizer.

FOREWORD

7th Gas Bearing Workshop in Düsseldorf on April 5, 2027

The Gas Bearing Workshop is a most specific forum for the gas bearing community. Experts, scientists, research engineers, users and manufacturers/vendors in this field are invited. Experts in gas bearings are going to present new applications and leading edge R&D - there will be space and time for discussion and personal contacts.

Again the program reflects the wide range of activities in the field of gas bearings. Papers will be representing new simulation models or approaches to deal with different media. Subjects beyond the classical textbook gas bearing theory will be covered, e.g. the impovement of stiffness of vacuum perloaded bearings or the effect of crash-induced damage on bearing stability will be analyzed.

Again, we have tried to represent important contributions to the state of the art from all over the world. In the keynote presentation an overview of recent research and development on gas bearings in South Korea will be given.

The program committee has be expanded by two gas bearing experts. Jürg Schiffmann and Marius Nabuurs, both also well-known as attendees and speakers of the GBW, are new members of the team.

I look forward to meeting you at the 7th GBW 2027 in Düsseldorf. We hope that this workshop will give impulses and inspiration for scientists and engineers. In addition to that, the program committee hopes that new personal, scientific and business contacts will be established.

Wolfram Runge
Chairman of the 2027 Gas Bearing Workshop

PROGRAM COMMITTEE AND CHAIRMEN

Wolfram Runge (General Chair)
Berliner Hochschule für Technik

Jos Gunsing (Chairman Program Committee)
MaromeTech/Dutch Society for Precision Engineering

Farid Al-Bender
KU Leuven

Marius Nabuurs
NabTech B.V., Overloon, The Netherlands

Ron A.J. van Ostayen
Delft University of Technology

Jürg Schiffman
Ecole Polytechnique Fédérale de Lausanne

Ronald Schnabel
VDE/VDI GMM, Offenbach am Main

09.30 **Welcome Reception / Poster Session; Table Top Exhibition**

10.00 **Opening Word**
Wolfram Runge, Chairman, Berliner Hochschule für Technik, Germany

10.15 **KEYNOTE**
A 25-Year R&D Perspective on Gas Bearing Technology for High-Performance Turbo-machinery
Keun Ryu, Hanyang University, Seoul, South Korea
The evolution of gas-lubricated bearing technology has driven substantial advancements in the power density, thermal efficiency, and mechanical reliability of high-performance turbomachinery. Over two decades of research and industrial development, this work synthesizes practical engineering insights, predictive modeling frameworks, and experimental validations across diverse bearing architectures, The presentation also covers persistent rotordyna-mic and thermal management challenges, offering a forward-looking perspective on emerging mate-rials and next-generation oil-free turbomachinery architectures.

11:00 Coffee Break / Poster Session / Table Top Exhibition

11:30 **Advances in Hydrodynamic Gas Bearings: Groove Optimization, Flow Visualization, and Foil Bearing Design**
Masayuki Ochiai, Tokai University, Kanagawa, Japan
This presentation reviews hydrodynamic gas bearing research conducted at Tokai University, Japan, including groove optimization and experimental validation of grooved gas bearings, flow visualization studies of dry gas seals, and recent developments in gas foil bearing design. Common challenges in prediction, design, and experimental verification are also discussed

12.00 **Development of a numerical tool for the design and prediction of the technical behavior of aerostatic gas bearings in compressors of various designs**
Yi Zhong, Martin Böhle, Technical University of Kaiserslautern, Germany

The developed numerical tool predicts the performance of radial and axial tilting-pad aerostatic bearings by solving the Reynolds equation. As the discharge coefficient of the nozzle has a significant impact on prediction accuracy, the coefficient used in this tool varies according to the operating conditions. The study of discharge coefficient is investigated through CFD simulations and experiments.

12.30 Lunch Break / Poster Session / Table Top Exhibition

14.00 **Identification of negative bearing stiffness as a failure mechanism in aerostatic bearings through parametric damage modeling and uncertainty quantification**
Mouhriz Boulgalgh[2], Jelle Snieder[1], Joep Nijssen[1], Ron van Ostayen[2]
[1] ASML, Veldhoven, The Netherlands
[2] TU Delft, The Netherlands

A stochastic finite-element model, informed by surface measurements of real crashed and failed bearings, assesses how crash-induced damage affects aerostatic bearing performance. The analysis reveals negative stiffness as a new failure mechanism. Bearing instability strongly depends on damage geometry and location, with protruding damage ridges playing a critical role.

14.30 **Effects of an Anti-Vibration-Isolation system on air bearing stage performance**
Lennart Lange, Toon Van de Genachte, Jarnick Van As, Lab Motion Systems, Leuven, Belgium

Air bearings allow frictionless motion in high precision motion stages, yet their low friction damping makes them sensitive to floor vibrations and slows settling after a move. LAB Motion Systems presents a six-degree-of-freedom active vibration isolation system designed for planar XY air bearing stages. We show the system concept, integration with the stage, and measured settling-time improvements compared with passive isolation.

15.00 Coffee / Tea Break / Poster Session

15.30 **Vacuum Groove Bearings: A new kind of vacuum preloaded air bearing without the preloading**
Janis Wortmann, Eitzenberger GmbH, Wessobrunn,Germany

In conventional vacuum-preloaded air bearings, large vacuum pockets provide an approximately constant preload force but contribute little to bearing stiffness. This presentation introduces a novel vacuum-groove air bearing concept that utilizes the entire bearing surface to generate stiffness while retaining the ability to exert attractive forces. This enables significantly improved bearing performance without sacrificing bidirectional load capacity.

16.00 **Inertia-Corrected Reynolds Equation and Case Study on Static/Dynamic Performance of Radial Gas Bearing using Various Gases in High Pressure Environments**
Daejong Kim, University of Texas at Arlington, USA

The classical Reynolds equation neglects fluid inertia. Here, we introduce an inertia-corrected Reynolds equation and couple it with a 3D energy equation. We use the model to examine how inertia affects the performance and stiffness of journal bearings lubricated with R1234ze, air, helium, argon, and CO_2.

16:30 **Wrap up / Closure**
Ron van Ostayen, TU Delft, The Netherlands

16:45 **Informal Discussion and Networking**

WORKSHOP REGISTRATION

To register for the Gas Bearing Workshop 2027, please visit the homepage under www.gas-bearing-workshop.com.

REGISTRATION FEE

workshop attendance	390 €
table top exhibition (Including one ticket)	500 € + VAT

Payment for registration, including bank charges and processing fees, must be made in Euro. The workshop fee has to be fully paid in advance by credit card. Your registration can only be confirmed if VDE Conference Services has recorded receipt of your full payment.

In case of cancellation, provided that written notice has been given to VDE Conference Services before February 27, 2027, the registration fee will be refunded less a handling fee of € 80.00. After February 27, 2027, no refund will be made.

WORKSHOP VENUE

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SPEAKERS LIST

- *Keun Ryu, Hanyang University, Seoul, South Korea*
- *Masayuki Ochiai, Tokai University, Kanagawa, Japan*
- *Yi Zhong, Martin Böhle, Technical University of Kaiserslautern, Germany*
- *Mouhriz Boulgalgh [2], Jelle Snieder [1], Joep Nijssen[1], Ron van Ostayen [2]*
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- *Lennart Lange, Toon Van de Genachte, Jarnick Van As, Lab Motion Systems, Leuven, Belgium*
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- *Daejong Kim, University of Texas at Arlington, USA*

