Stephan **Düsterhaupt**

Graduated Mechatronics Engineer · Project Developer · Mentor

Institute for Process Technology, Process Automation and Measurement Technology | Theodor-Körner-Allee 16 | 02763 Zittau, Germany

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"Wow! It's technology."

Summary

Mechatronics Engineer and Project Developer at the Institute for Process Technology, Process Automation and Measurement Technology. Led interdisciplinary teams of up to 5 engineers and managed major R&D projects with budgets ranging from €250,000 to €2.5 million in the emerging fields of magnetic bearings, flywheel energy storage systems and functionally integrated lightweight construction in energy technology. Serving as lead engineer. Over 19 years of diverse engineering experience with a focus on mechatronic system design, simulation, commissioning and technical project leadership. 5 major projects were delivered on time and within budget. Passionate about mentoring young talent – supervised more than 15 student thesis projects – and advancing innovative technologies. Presented research at 3 international conferences and contributed to the development of a 10 MW magnetically levitated turbine and high-speed flywheel systems (up to 16,500 rpm). Enthusiastic about hands-on problem solving, optimizing engineering workflows and exploring new technologies. A current focus is on integrating artificial intelligence methods into established engineering practices to develop pioneering, intelligent systems and further optimize technical processes.

Work Experience

Hochschule Zittau/Görlitz - University of Applied Sciences

Zittau, Germany

Lecturer | Mentor — *July 2013 - present*

- Comprehensive instruction in specialist knowledge and practical experience in the lecture series Magnetic Bearing Technology, Sensor Technology and Fundamentals of Mechatronics.
- Mentored and supervised over 15 student thesis projects, actively recruiting and developing young talent for ongoing research initiatives.

Institute of Process Technology, Process Automation and Measurement Technology (IPM)

Zittau, Germany

Member of Scientific Staff — *April 2007 - present*

- Design, modeling and dynamic simulation of mechatronic systems, especially active magnetic bearings
- Development of (international) projects with industry and public research institutions; Presentation of research results at international conferences (ISMB13/ISMB14/ISMB15)
- Design, construction and commissioning of a large-scale test facility for the testing of active magnetic bearings and backup bearings (Active Magnetic and Backup Bearing Test Facility MFLP)
- Technical project coordination (project volume 250,000 to 2.5 million euros, duration 1 to 3 years) as team leader

Institute of Surface Technology (IOT)

Zittau, Germany

Member of Scientific Staff — *June 2006 - March 2007*

- Preparation of a project outline and project description for a research project between the industry and the Zittau/Görlitz University of Applied Sciences; Project was applied in the Central Innovation Program for Medium-sized Companies (ZIM); R&D subject was a device for the controlled incremental coating of test substrates for post-process analysis (CoatingWatch)
- Collaboration in the development of substrate layer composite systems using PVD technology

Education

University of Technology Chemnitz

Chemnitz, Germany

Graduate Student of Traction Technology, Magnetic Bearing Technology and Power Electronics — *April 2010 - April 2015*

Institute of Process Technology, Process Automation and Measurement Technology

Zittau, Germany

Graduate student (Diploma) — *March 2005 - August 2005*

- Topic: Investigations concerning the Optimization of the Active Radial Magnetic Bearings for a Flywheel Storage System

Institute of Process Technology, Process Automation and Measurement Technology

Zittau, Germany

Internship — *September 2003 - April 2004*

- Topic: Creation of a Concept for the Alternating Operation of Two Kinetic Energy Recovering Systems

Hochschule Zittau/Görlitz - University of Applied Sciences

Zittau, Germany

Graduate Engineer in Mechatronics, Robotics and Automation Engineering (Diploma) — *September 2001 - December 2005*

Project Experience

Industrial R&D

Manufacturing, Commissioning and Calibration of alpha-beta Filter Assemblies

Germany

Team Leader | Member of Scientific Staff

2013

- Developed and implemented alpha-beta filters for fault detection in active magnetic bearing systems.
- Produced manufacturing-ready technical documentation and coordinated with local industry partners.
- Led commissioning, calibration, and deployment in magnetically levitated gas compressors (mobile and permanent solutions).

Partner	Siemens AG, Drive Technologies Division, Erlangen
	INNOTAS GmbH
Keywords	Alpha-Beta Filter, Magnetic Bearing Systems, Circuit Design for Manufacturing (DFM), Calibration, Commissioning, Frequency Response
Skills	Mechatronics, Circuit Design, PCB Design, Filter Design

Development of a Lubricant-free Industrial Steam Turbine (SFDT)

Germany

Member of Scientific Staff

January 2007 - January 2018

- Designed and tested a 10 MW industrial steam turbine with active magnetic bearings for high-stress environments.
- Modeled and simulated rotor dynamics; validated results through experimental testing.
- Enabled continuous operation of a fully magnetically levitated turbine in a large-scale power plant.

Partner	Siemens Energy Global GmbH & Co. KG - Turbinenwerk Görlitz
	EAAT GmbH Chemnitz
Keywords	High-power Turbomachinery, Magnetic Bearings, Design Verifivation, MADYN 2000
Skills	Rotor Dynamics, Modeling and Simulation

Public R&D

Lightweight Functional Structures for Efficient Energy Supply & Storage (LuE)

Germany

Project Developer | Team Leader | Member of Scientific Staff

May 2021 - present

- Developed high-speed flywheel energy storage (3–10 kWh, up to 16,500 rpm) and advanced fiber-reinforced turbine blades.
- Achieved high energy and power density through functionally integrated lightweight design.
- Coordinated cross-institutional R&D with Fraunhofer partners for grid stabilization and industrial applications.

Partner	Fraunhofer Institute for Machine Tools and Forming Technology IWU - Fraunhofer Plastics Technology Center Oberlausitz
Keywords	CFRP, CAE Pipeline, Energy Conversion, Renewable Power
Skills	Creativity, Team Lead, Mechatronics, Sensor Technology

Improving Turbomachinery Efficiency with Innovative Bearing Concepts (MFLP)

Germany

Project Developer | Team Leader | Member of Scientific Staff

September 2011 - March 2015

- Developed modular test infrastructure for high-temperature magnetic and backup bearings.
- Expanded operational temperature range of bearing actuators by optimizing design and materials.
- Led successful commissioning and extensive testing of the MFLP test bed, including new sliding backup bearing concepts.

Partner	Siemens Energy Global GmbH & Co. KG - Turbinenwerk Görlitz
	EAAT GmbH Chemnitz
Keywords	High-Temperature Bearing Design, Magnetic & Bearing Test Bed (MFLP), Integrated Cooling Solutions, Modular Bearing Test Infrastructure
Skills	Project Development, Project Coordination, Team Lead, Mechatronics, Rotor Dynamics, AMB System, Sensor Technology

Pilot Studies – Student Mentoring

Modeling and Dynamic Simulation of a Direct Methanol Fuel Cell using AI Methods

China-Germany

Mentor | Member of Scientific Staff

June 2023 - August 2023

- Topic: Cellular Autonomous Energy Systems/Energy Converters – Modeling and Dynamic Simulation of a Direct Methanol Fuel Cell (DMFC) using AI methods
- Provided technical guidance on the development and implementation of an LSTM model for dynamic simulation of a direct methanol fuel cell (DMFC) using PyTorch.
- Advised on model initialization and training with trajectories generated via a physical DMFC model.
- Supported validation via inference, demonstrating comparable model accuracy between LSTM and the physical model.
- Contributed to material and power balancing as a foundation for future lifetime analysis.

	Bachelor
	Tianci LIU
	Tongji University School of Sino-German Engineering
Keywords	Fuel cell, LSTM, Control Technology, Python

Research Publications

Hyblerová, Š., Černíková, M., Düsterhaupt, S., *Economic evaluation of kinetic energy storage systems as key technology of reliable power grids*. PLoS One, PUBLIC LIBRARY SCIENCE, 29 pages, ISSN: 1932-6203, n. 10, San Francisco, USA, 2024.

Düsterhaupt, S., Neumann, H., Rottenbach, T., Vanek, C., Worlitz, F., *High temperature active magnetic bearings in industrial steam turbines*. The 15th International Symposium on Magnetic Bearings (ISMB15), Kitakyushu, Japan, 2016.

Düsterhaupt, S., Neumann, H., Panescu, C., Rottenbach, T., Worlitz, F., *Test Field for Magnetic Bearing Applications under Extreme Conditions*. The 14th International Symposium on Magnetic Bearings (ISMB14), Linz, Austria, 2014.

Düsterhaupt, S., Worlitz, F., *Complex and Integrated Methods for the Reliability Analysis of Contactless Magnetic Bearings*. The 13th International Symposium on Magnetic Bearings (ISMB13), Virginia, USA, 2012.

Düsterhaupt, S., Gronek, M. Worlitz, F., *Advantages of a Hybrid Magnetic Bearing Concept for the Suspension of Blower Rotors*. 5th International Topical Meeting on High Temperature Reactor Technology (HTR2010), Prague, Czech Republic, 2010.

Professional Experience

Mechatronics and Cyber-physical Systems

AMB Design	★★★★☆	Static and dynamic design of active magnetic bearings
Filter Design	★★★★☆	Analog and digital
Control Design	★★★★☆	Design and stability analysis/verification
Power Electronics	★★★☆☆	R&D of power amplifiers
Surface Technology	★★★☆☆	R&D of functional and decorative coating systems
Sensor Technology	★★★☆☆	In-house development and design of measurement concepts
FEM Analysis	★★★★☆	Magnetic, electrical, thermal, mechanical
Rotordynamics	★★★★☆	Theoretical eigenvalue investigations on magnetically levitated turbomachinery rotors

AI-Driven Engineering

Dynamic Simulation	★★★★☆	Direct Methanol Fuel Cell – Utilized AI for simulating and analyzing fuel cell performance
Forecasting	★★★★☆	Experience in using AI to predict energy usage
Recognition	★★★★☆	Applied AI to assess and monitor crop health and vitality

Computer Aided Engineering Competencies

Matlab	★★★★☆	Model development and dynamic simulation (also) using Simulink
KiCAD	★★★★☆	Circuit and PCB design
NX	★★★☆☆	Components design and assemblies
Linux	★★★★★	Setting up and applying even complex IT structures
C/C++	★★★★☆	Microcontroller and DSP programming
Python	★★★★☆	Applying Python within frameworks as Tensorflow and pyTorch

Project Development and Management

Creativity	★★★★★	Draft of project activities on trend and future fields
Team Lead	★★★★☆	Technical and personal responsibility
Communication	★★★★☆	Cultivating the team spirit

Language Abilities

German	★★★★★	Native speaker
English	★★★★☆	Unicert II, Business fluent

Honors & Awards

2015 **Prof. Hans-Joachim Hildebrand-Award,** Inauguration of the Zittau power plant laboratory *Zittau, Germany*

References

IPM	**Prof. Dr.-Ing. Frank Worlitz**	f.worlitz@hszg.de	Head of department, project manager, immediate supervisor
TUL	**Ing. Lukáš Hubka, Ph.D.**	lukas.hubka@tul.cz	Colleague in the context of bilateral project activities
TUM, IM MOTORS	**Kejia Gao**	kejia.gao@outlook.com	Master's student, AI engineer, former Bachelor's student