

60th ISC
Ilmenau Scientific Colloquium
Technische Universität Ilmenau



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»Engineering for a Changing World«



Department of
Mechanical Engineering



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PREFACE

Dear Conference Participants!

After two years of postponement due to the pandemic, we are very pleased to welcome you in person to Technische Universität Ilmenau for the 60th Ilmenau Scientific Colloquium. As the first ISC was held in 1956, this colloquium is one of the longest continuing scientific conferences in bridging disciplines of and around Mechanical Engineering.

In 2023, the Ilmenau Scientific Colloquium is once more organised by the Department of Mechanical Engineering. The title of this year's conference

"Engineering for a Changing World"

refers to limited natural resources of our planet, to massive changes in cooperation between continents, countries, institutions and people – enabled by the increased implementation of information technology as the probably most dominant driver in many fields. The Colloquium, supplemented by workshops, is characterised but not limited to the following topics:

- Precision engineering and measurement technology Nanofabrication
- Industry 4.0 and digitalisation in mechanical engineering
- Mechatronics, biomechatronics and mechanism technology
- Systems engineering
- Productive teaming - Human-machine collaboration in the production environment

The topics are oriented on key strategic aspects of research and teaching in Mechanical Engineering at our university. As always in the long series of ISC conferences, we have invited and encouraged contributions from both academia and industry. We are very much pleased about the overwhelming response. The international high-profile scientific committee selected more than 160 contributions from 14 different countries for the presentation. The range of subjects certainly reflects the interdisciplinary nature of the conference topics and will fruitfully bring together experts from industry and academia. We are confident that the ISC will be the perfect platform for discussion, establishing new contacts and for the beginning or continuation of cooperative projects. No matter whether you are an experienced professional or a novice in mechanical engineering – we are convinced that the 60th Ilmenau Scientific Colloquium will be of benefit to you.

Besides an enriching and interesting conference, we wish you an enjoyable stay in the town of Ilmenau and its surroundings that was already highly appreciated by Johann Wolfgang Goethe who said: "Ilmenau has cost me a lot of time, effort and money; but in return I have learned something and acquired a view of nature that I would not want to exchange at any price."

May this conference leave you in a similarly enriched state.

Professor Kai-Uwe Sattler
President of the
Technische Universität Ilmenau

Professor René Theska
Head of Organisation

Scientific Committee

All contributions submitted to 60th ISC 2023 will be subjected to a peer review process, carried out by the members of the Scientific Committee.

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Table of Contents

IMPRESSUM	II
PREFACE	III
Scientific Committee	IV
Table of Contents.....	VI
Topic 1: Precision engineering and measurement technology	1
Session 1.1 Precision measurement technology	1
Session 1.2 Nanofabrication	2
Session 1.3 Measurement and sensor technology.....	3
Session 1.4 Precision engineering and optics	4
Topic 2: Industry 4.0 and digitalisation in mechanical engineering	7
Session 2.1 Production technology, machinery, digitalisation – State of the art and perspectives.....	7
Session 2.2 Image processing based process and quality control	7
Session 2.3 Plastics technology – Interfaces in materials, processing and manufacturing	8
Topic 3: Mechatronics, biomechatronics and mechanism technology	10
Session 3.1 Mechatronics	10
Session 3.2 Biomechatronics	10
Session 3.3: Mechanism technology.....	11
Topic 4: Systems engineering.....	13
Session 4.1: Components, systems and materials	13
Session 4.2: Systems engineering for demand-oriented products.....	13
Session 4.3: Metallic and hybrid materials and simulation.....	15
Topic 5: Productive teaming - Human-machine collaboration in the production environment.....	17
Session 5.1: Joint cognition.....	17
Session 5.2: Measurement and information collection.....	17
Session 5.3: Information processing.....	18
Session 5.4: Operation and evaluation	18
Index of Authors	19

Topic 1: Precision engineering and measurement technology

Session 1.1 Precision measurement technology

Article ID: 1.1.009

A laser dilatometer setup to characterize dimensionally stable materials from 100 K to 300 K

Hamann, Ines; Kumanchik, Lee; Wanner, Gudrun; Gohlke, Martin; Sanjuan, Josep; Braxmaier, Claus:

DOI: <https://doi.org/10.22032/dbt.58683>

Article ID: 1.1.026

Yatsyshyn, Svyatoslav; Mykyichuk, Mykola; Bubela, Tetiana:

Development of quantum temperature standard and verification of thermoelectricity laws

DOI: <https://doi.org/10.22032/dbt.58678>

Article ID: 1.1.034

Köning, Rainer; Schötka, Eugen; Bergmann, Detlef; Krüger, Jan; Janik, Marcel; Schumann, Matthias; Bodermann, Bernd:

Development of a test setup for the characterization of an optical microscope for high precision length metrology applications

DOI: <https://doi.org/10.22032/dbt.58684>

Article ID: 1.1.039

Wagner, Johannes; Niedermeier, Corinna; Wagner, Andreas:

Study of the effect of matting agents on the measurability of geometrical objects

DOI: <https://doi.org/10.22032/dbt.58676>

Article ID: 1.1.080

Dziomba, Thorsten; Felgner, André; Gao, Sao; Hemmleb, Matthias; Ritter, Martin; Gärtner, Eva; Frühauf, Joachim:

How reliable are optical measurements of surface roughness?

DOI: <https://doi.org/10.22032/dbt.58670>

Article ID: 1.1.081

Yatsyshyn, Svyatoslav; Zeng, Xinyu:

Metrological risks at design stage for multidisciplinary-based objects

DOI: <https://doi.org/10.22032/dbt.58677>

Article ID: 1.1.095

Dai, Gaoliang; Thiesler, Jan; Degenhardt, Johannes; Tutsch, Rainer:

Recent progress and challenges in AFM-based true-3D micro and nanometrology

DOI: <https://doi.org/10.22032/dbt.58681>

Article ID: 1.1.099

Fischer Calderón, Sebastian J.; Straube, Guido; Kissinger, Thomas:

A novel point-to-point length measurement concept based on range-resolved interferometry

DOI: <https://doi.org/10.22032/dbt.58680>

- Article ID:** 1.1.104
Shmagun, Vitalii; Gerhardt, Uwe; Manske, Eberhard; Fröhlich, Thomas; Kissinger, Thomas:
Resolution enhancement in Fabry-Perot interferometers through evaluation of multiple reflection using range-resolved interferometry
DOI: <https://doi.org/10.22032/dbt.58695>
- Article ID:** 1.1.106
Liao, Chen-Yu; Lin, Hsi-Hui; Chen, Liang-Chia:
Development of a compact DFB laser interferometer for high-speed inline displacement measurement
DOI: <https://doi.org/10.22032/dbt.58679>
- Article ID:** 1.1.119
Xu, Xin; Pahl, Tobias; Serbes, Hüseyin; Lehmann, Peter:
Robust reconstruction of the topography of metal additive surfaces based on focus variation microscopy
DOI: <https://doi.org/10.22032/dbt.58697>

Session 1.2 Nanofabrication

- Article ID:** 1.2.015
Rodenberg, Madeline; Münker, Lukas Jonathan; Tutsch, Rainer; Walla, Peter Jomo; Weimann, Thomas:
Using photo-activated localization microscopy (PALM) for imaging fluorophore-doped photoresists
DOI: <https://doi.org/10.22032/dbt.58726>
- Article ID:** 1.2.093
Ma, Tianran; Fahrbach, Michael; Xu, Jiushuai; Boye Anang, Frank Eric; Vergin, Maximilian; Meierhofer, Florian; Brand, Uwe; Waag, Andreas; Peiner, Erwin:
Imaging the mechanical properties of nanowire arrays
DOI: <https://doi.org/10.22032/dbt.58938>
- Article ID:** 1.2.113
Knechtel, Roy; Schwarz, Uwe:
Wafer bonding technologies for nano-, micro- and macro-system realization and integration
DOI: <https://doi.org/10.22032/dbt.58698>
- Article ID:** 1.2.118
Soter, Marcus; Apte, Gurunath; Madkatte, Dikshita; Nguyen, Thi-Huong:
Insights into the writing process of the mask-free nanoprinting fluid force microscopy technology
DOI: <https://doi.org/10.22032/dbt.58725>
- Article ID:** 1.2.121
Huaman, Alex S.; Reger, Johann:
Robust adaptive tracking control for highly dynamic nanoprecision motion systems
DOI: <https://doi.org/10.22032/dbt.58700>

Session 1.3 Measurement and sensor technology

Article ID: 1.3.017

Wittke, Martin; Torres Melgarejo, Mario André; Darnieder, Maximilian; Theska, René:

Investigation of a novel monolithic stiffness-compensated mechanism for high-precision load cells

DOI: <https://doi.org/10.22032/dbt.58735>

Article ID: 1.3.023

Fleischmann, Patrick; Happel, Julius; Gundelsweiler, Bernd:

Analysis and development of a sensor concept for multistable actuators with passive magnetic shape memory alloy

DOI: <https://doi.org/10.22032/dbt.58733>

Article ID: 1.3.055

Chauhan, Jaydeep; Gourishetti, Saichand; Rohe, Maximilian; Sennewald, Martin; Hildebrand, Jörg; Bergmann, Jean Pierre:

Empirical study on DED-Arc welding quality inspection using airborne sound analysis

DOI: <https://doi.org/10.22032/dbt.58732>

Article ID: 1.3.073

Calderón Ch., J. Alan; Barriga G., E. Benjamin; Tafur Sotelo, Julio C.; Lozano J., John H.; Lozano N., Hugo; Iglesias L., José:

Wireless intelligent sensors based in nanostructures with energy self-sufficiency to study the consequences of high temperatures in combustion motors

DOI: <https://doi.org/10.22032/dbt.58731>

Article ID: 1.3.078

Bubela, Tetiana; Yatsuk, Vasyi; Yatsyshyn, Svyatoslav:

Simulation of electrochemical systems by analyzing impedance spectra

DOI: <https://doi.org/10.22032/dbt.58730>

Article ID: 1.3.086

Bubela, Tetiana; Yatsuk, Vasyi; Mykyichuk, Mykola; Yatsuk, Yuriy:

Non-dismantling control possibilities of distributed systems measuring channels in-situ operation place

DOI: <https://doi.org/10.22032/dbt.58729>

Article ID: 1.3.097

Schulze, Sven; Arumugam, Kumar; Schlamming, Stephan; Fitzgerald, Ryan; Verkouteren, R. Michael; Theska, René; Shaw, Gordon:

Development of a high precision electrostatic force balance for measuring quantity of dispensed fluid as a new calibration standard for the becquerel

DOI: <https://doi.org/10.22032/dbt.59188>

Article ID: 1.3.116

Brand, Uwe; Li, Zhi; Popadic, Radovan; Hiller, Karla; Hahn, S.; Peiner, Erwin; Gärtner, Eva; Frühauf, Joachim:

Small force metrology for AFM, stylus instruments, CMM and nanoindenter via reference springs and sensors

DOI: <https://doi.org/10.22032/dbt.58734>

Article ID: 1.3.140

Bader, Oumaima; Ben Amara, Najoua Essoukri; Kanoun, Olfa:
Evaluation of 3D current injection patterns for human lung monitoring in
Electrical Impedance Tomography

DOI: <https://doi.org/10.22032/dbt.58728>

Article ID: 1.3.141

Alasasfeh, Hayat; Hafsa, Mariem; Bader, Oumaima; Kanoun, Olfa:
Machine learning approach to EIT image reconstruction of the human forearm
section for different hand signs

DOI: <https://doi.org/10.22032/dbt.58727>

Session 1.4 Precision engineering and optics

Article ID: 1.4.003

Erbe, Torsten; Linß, Sebastian:
Flexure hinge-based lens manipulators: a concept survey

DOI: <https://doi.org/10.22032/dbt.58737>

Article ID: 1.4.005

Erbe, Torsten:
Basic considerations for circumferential adhesive bonds in order to reduce lens
deformations

DOI: <https://doi.org/10.22032/dbt.58682>

Article ID: 1.4.006

*Hirniak, Yurii; Ivakhiv, Orest; Nevodovskyi, Petro; Vidmachenko, Anatolyi;
Geraimchuk, Mykhailo; Zbrutskyi, Olexandr:*
Developing of the space satellite-based polarimeter

DOI: <https://doi.org/10.22032/dbt.58742>

Article ID: 1.4.008

*Krauhausen, Michael; Priem, Roland; Claßen, Ralf; Prellinger, Günther;
Pollinger, Florian:*
High-resolution absolute range sensors based on the combination of frequency
modulation and laser triangulation for heavy industry application

DOI: <https://doi.org/10.22032/dbt.58842>

Article ID: 1.4.013

Wolf, Matthias; Wittke, Martin; Torres Melgarejo, Mario André; Theska, René:
Scaling of a compliant mechanism for high-precision force measurement
applications

DOI: <https://doi.org/10.22032/dbt.58847>

Article ID: 1.4.021

Zettlitzer, Lucas; Gross, Herbert; Risse, Stefan; Theska, René:
Tolerancing of centering of a reflective dual field-of-view optical system based
on Alvarez-Principle

DOI: <https://doi.org/10.22032/dbt.58848>

- Article ID:** 1.4.025
Weigert, Florian; Wolf, Matthias; Theska, René:
Development of a tool-changing system for nanofabrication machines
DOI: <https://doi.org/10.22032/dbt.58846>
- Article ID:** 1.4.071
Torres Melgarejo, Mario André; Henning, Stefan; Zentner, Lena; Theska, René:
Synthesis of optimized compliant mechanisms for ultra-precision applications
DOI: <https://doi.org/10.22032/dbt.58844>
- Article ID:** 1.4.077
Hahm, Christoph; Erbe, Torsten; Theska, René:
Cement-bound mineral casted parts in precision engineering
DOI: <https://doi.org/10.22032/dbt.58740>
- Article ID:** 1.4.079
Miettinen, Mikael; Vainio, Valtteri; Haverinen, Petteri; Leutonen, Onni; ; Theska, René:
Validation of experimental setup for aerostatic bearing simulation
DOI: <https://doi.org/10.22032/dbt.58841>
- Article ID:** 1.4.082
Layher, Michel; Bliedtner, Jens; Theska, René:
A laser beam deflection system for heat treatments in large scale additive manufacturing
DOI: <https://doi.org/10.22032/dbt.58739>
- Article ID:** 1.4.094
Schaeffer, Daniel; Klenkert, Daniel; Stauch, Julian; Kufner, Maria; Foerg, Raimund; Ebbecke, Jens:
Fabrication of asymmetric multimode splitters in glass by planar ion exchange and laser ablation
DOI: <https://doi.org/10.22032/dbt.58843>
- Article ID:** 1.4.101
Keck, Lorenz; Seifert, Frank; Newell, David; Theska, René; Haddad, Darine:
Preliminary characterization of anelastic effects in the flexure mechanism for a new Kibble balance at NIST
DOI: <https://doi.org/10.22032/dbt.58743>
- Article ID:** 1.4.107
Vainio, Valtteri; Majuri, Jaakko; Haverinen, Petteri; Miettinen, Mikael; Viitala, Raine:
Aerostatic bearing for large rotor
DOI: <https://doi.org/10.22032/dbt.58845>
- Article ID:** 1.4.108
Leutonen, Onni; Haverinen, Petteri; Vainio, Valtteri; Miettinen, Mikael; Majuri, Jaakko; Viitala, Raine:
Aerostatic pump seal
DOI: <https://doi.org/10.22032/dbt.58840>

Article ID: 1.4.112

*Darnieder, Maximilian; Wittke, Martin; Pabst, Markus; Fröhlich, Thomas;
Theska, René:*

Monolithic compliant mechanism for an EMFC mass comparator weighing cell

DOI: <https://doi.org/10.22032/dbt.58738>

Article ID: 1.4.117

Hebenstreit, Roman; Theska, René:

Calibration of positioning microsystems with subatomic accuracy

DOI: <https://doi.org/10.22032/dbt.58741>

Topic 2: Industry 4.0 and digitalisation in mechanical engineering

Session 2.1 Production technology, machinery, digitalisation – State of the art and perspectives

Article ID: 2.1.011

Sturm, Kerstin; Husung, Stephan; Wünsche, Christine:

Error classification as a basis for automating the conformity of production process in the automotive industry

DOI: <https://doi.org/10.22032/dbt.58850>

Article ID: 2.1.036

Reimann, Jan; Rohe, Maximilian; Rauch, Alexander; Hildebrand, Jörg; Bergmann, Jean Pierre:

Directed energy deposition-arc (DED-Arc) and numerical welding simulation as a method to determine the homogeneity

DOI: <https://doi.org/10.22032/dbt.58852>

Article ID: 2.1.045

Jevtić, Adrijana; Pezoldt, Kerstin:

Digital twins: definition, application options in the product life cycle and marketing

DOI: <https://doi.org/10.22032/dbt.58851>

Article ID: 2.1.065

Rohe, Maximilian; Hildebrand, Jörg; Bergmann, Jean Pierre:

Investigation of a quantified sound probe for stud weld quality measurement with numerical simulation data

DOI: <https://doi.org/10.22032/dbt.58853>

Article ID: 2.1.114

Sennewald, Martin; Hasieber, Michael; Szallies, Konstantin; Bergmann, Jean Pierre:

Influence of microstructure and microgeometry of the probe on friction stir welding of AA 6060 T66

DOI: <https://doi.org/10.22032/dbt.58854>

Article ID: 2.1.139

Farahani, Aida; Atoofi, Payam; Vitay, Julien; Hamker, Fred H.:

Implicit neural representations for deep drawing and joining experiments

DOI: <https://doi.org/10.22032/dbt.58849>

Session 2.2 Image processing based process and quality control

Article ID: 2.2.035

Bräuer-Burchardt, Christian; Preißler, Marc; Ramm, Roland; Breitbarth, Andreas; Dittmann, Jan Thomas; Munkelt, Christoph; Verhoek, Michael; Kühmstedt, Peter; Notni, Gunther:

Mobile 3D sensor for documenting maintenance processes of large complex structures

DOI: <https://doi.org/10.22032/dbt.58857>

Article ID: 2.2.037

Vehar, Darko; Nestler, Rico; Franke, Karl-Heinz:

Capturing 3D textured inner pipe surfaces for sewer inspection

DOI: <https://doi.org/10.22032/dbt.58860>

Article ID: 2.2.049

Anding, Katharina; Polte, Galina; Garten, Daniel; Linss, Elske; Notni, Gunther:

Intelligent classification and data augmentation for high accuracy AI applications for quality assurance of mineral aggregates

DOI: <https://doi.org/10.22032/dbt.58855>

Article ID: 2.2.075

Richter, Martin; Rosenberger, Maik; Illmann, Raik; Buchanan, David; Notni, Gunther:

Suitability study for real-time depth map generation using stereo matchers in OpenCV and Python

DOI: <https://doi.org/10.22032/dbt.58859>

Article ID: 2.2.090

Illmann, Raik; Fütterer, Richard; Lummitsch, Sascha; Rosenberger, Maik; Notni, Gunther; Findeisen, Erik:

Investigation into the implementation of a multimodal 3D measurement system for a forestry harvesting process

DOI: <https://doi.org/10.22032/dbt.58858>

Session 2.3 Plastics technology – Interfaces in materials, processing and manufacturing

Article ID: 2.3.002

Mohammadkarimi, Shiva; Neitzel, Benedikt; Puch, Florian:

Influence of the recycling process parameters on CFRTP waste properties

DOI: <https://doi.org/10.22032/dbt.58866>

Article ID: 2.3.010

Hiller, Benedikt T.; Rennert, Mirko; Nase, Michael:

Comparison of the properties of biogenic wine by-products stabilized biocomposites compounded with a miniaturized single-screw extruder and a co-rotating twin-screw extruder

DOI: <https://doi.org/10.22032/dbt.58862>

Article ID: 2.3.012

Trienens, Dorte; Schöppner, Volker:

Investigation regarding the correlation of the relative influences during the extrusion process of cast films on the resulting melt quality

DOI: <https://doi.org/10.22032/dbt.58867>

Article ID: 2.3.043

Köllermeier, Jonas; Schöppner, Volker:

Optimizing the processing performance of a single screw extruder using live simulations based on real time experimental data

DOI: <https://doi.org/10.22032/dbt.58863>

Article ID: 2.3.084

Baumann, Andreas; : :

Effect of high energy radiation on technical polymers

DOI: <https://doi.org/10.22032/dbt.58861>

Article ID: 2.3.110

Krempf, Nina; Shahroodi, Zahra:

Revolutionizing fiber-reinforced thermoplastic composite recycling: The LightCycle project's journey towards energy-efficient upcycling and quality material regeneration

DOI: <https://doi.org/10.22032/dbt.58865>

Topic 3: Mechatronics, biomechatronics and mechanism technology

Session 3.1 Mechatronics

Article ID: 3.1.019

Mauch, Manuel; Gundelsweiler, Bernd:

Optimization of the actuation behaviour of a hybrid electromagnetic switching/holding solenoid

DOI: <https://doi.org/10.22032/dbt.58874>

Article ID: 3.1.028

Hutter, Marco; Holder, Daniel; Maier, Thomas; Gundelsweiler, Bernd:

Multistable setups combining magnetic shape memory alloys with reluctance counterforces

DOI: <https://doi.org/10.22032/dbt.58873>

Article ID: 3.1.030

Mettenleiter, Luca:

Multivariable stability analysis of position-controlled payloads to support shrink in semiconductor manufacturing

DOI: <https://doi.org/10.22032/dbt.58875>

Article ID: 3.1.046

Carrillo Li, Enrique Roberto:

Hybrid fuzzy neural network – genetic algorithm applied to the control of magnetorheological and smart material vehicle semiactive suspensions

DOI: <https://doi.org/10.22032/dbt.58872>

Article ID: 3.1.085

Büchner, Florian; Jestädt, Lukas; Ivanov, Valentin; Bachmann, Thomas:

Self-adapting motion cueing algorithm based on a kinematics reference model

DOI: <https://doi.org/10.22032/dbt.58871>

Article ID: 3.1.092

Büchner, Florian; Rieger, David Benjamin; Purschke, Björn; Ivanov, Valentin; Bachmann, Thomas:

Extending teleoperated driving using a shared X-in-the-loop environment

DOI: <https://doi.org/10.22032/dbt.58870>

Session 3.2 Biomechatronics

Article ID: 3.2.033

Jünemann, Philipp; Mechtenberg, Malte; Schneider, Axel; Waßmuth, Joachim:

Comparative study of a bioinspired sound source localization algorithm and a standard beamformer

DOI: <https://doi.org/10.22032/dbt.59141>

- Article ID:** 3.2.050
Steinz, Josefine; Lutherdt, Stefan; Witte, Hartmut:
Concept for the measurement of vital parameters during the use of an infrared cabin to investigate physiological effects and to individualize the sauna session
DOI: <https://doi.org/10.22032/dbt.58880>
- Article ID:** 3.2.058
Schaeffer, Leon; Herrmann, David; Böhm, Valter:
Theoretical considerations on a 2D compliant tensegrity joint in context of a biomedical application
DOI: <https://doi.org/10.22032/dbt.58879>
- Article ID:** 3.2.062
Figueiredo Soares, Victor; Stoeterau, Rodrigo Lima:
Flow and hemocompatibility study of straight-bladed impeller VADs
DOI: <https://doi.org/10.22032/dbt.58881>
- Article ID:** 3.2.088
Jäger, Max; Helbig, Thomas; Witte, Hartmut:
Control for non-linear compliant actuation of an upper arm exoskeleton
DOI: <https://doi.org/10.22032/dbt.58877>
- Article ID:** 3.2.102
Rincón Ruiz, Carlos Gianpaul; Alencastre, Jorge:
Analytical modelling of a dynamic vibration absorber for Parkinson disease
DOI: <https://doi.org/10.22032/dbt.58878>
- Article ID:** 3.2.144
Uhrhan, Katja; Jäger, Max; Witte, Hartmut:
Threshold based reduction of EMS stimulation artifacts in the electromyogram when stimulation intensity increases
DOI: <https://doi.org/10.22032/dbt.59139>

Session 3.3: Mechanism technology

- Article ID:** 3.3.004
Hermoza-Llanos, Estefania; Rodríguez Hernández, Jorge A.; Zentner, Lena:
Development of a novel synthesis method of a rigid-body four-bar linkage into a compliant mechanism
DOI: <https://doi.org/10.22032/dbt.58886>
- Article ID:** 3.3.014
Rödiger, Silas; Könke, Carsten; Beinersdorf, Heiko; Kugler, Marion:
Weight reduction in lightweight structures of dynamically loaded systems by new energy dissipative elements in bolted joints
DOI: <https://doi.org/10.22032/dbt.58887>
- Article ID:** 3.3.042
Stojiljković, Dušan; Pavlović, Nenad T.:
Design of the compound compliant Scott-Russel mechanism with non-conventional optimization of flexure hinges
DOI: <https://doi.org/10.22032/dbt.58889>

Article ID: 3.3.060

Herrmann, David; Schaeffer, Leon; Zentner, Lena; Böhm, Valter:
Theoretical considerations on 3D tensegrity joints for the use in manipulation systems

DOI: <https://doi.org/10.22032/dbt.58888>

Article ID: 3.3.103

Becker, Sid; Gutschmidt, Stefanie; Rangelow, Ivo W.:
Underlying physics of thermal actuation in composite MEMS

DOI: <https://doi.org/10.22032/dbt.58885>

Topic 4: Systems engineering

Session 4.1: Components, systems and materials

Article ID: 4.1.022

Otto, Christian; Geinitz, Veronika; Kletzin, Ulf; Reich, René:
FEM simulation of wire drawing

DOI: <https://doi.org/10.22032/dbt.58892>

Article ID: 4.1.064

Petrich, Martin; Weimann, Tom-Luis; Thein, Ludwig; Kletzin, Ulf:
Behaviour of FRP-sandwich structures for lightweight composite springs in static and cyclic torsional load cases

DOI: <https://doi.org/10.22032/dbt.58893>

Article ID: 4.1.069

Lavayen Farfan, Daniel; Yarasca Huanacune, Jorge; Butenegro García, José Antonio; López Boada, María Jesús; Rodríguez Hernández, Jorge Antonio:
On the bending collapse behavior of rectangular hollow steel shapes of various thicknesses

DOI: <https://doi.org/10.22032/dbt.58891>

Article ID: 4.1.091

Schleichert, Johannes; Kletzin, Ulf:
Relaxation behavior of (cylindrical) helical compression springs

DOI: <https://doi.org/10.22032/dbt.58890>

Session 4.2: Systems engineering for demand-oriented products

Article ID: 4.2.007

Lipšinić, Zvonimir; Pavković, Neven:
Integrating life cycle assessment in model-based systems engineering

DOI: <https://doi.org/10.22032/dbt.58905>

Article ID: 4.2.029

Li, Zirui; Faheem, Faizan; Husung, Stephan:
Systematic use of model-based solution patterns using the example of a load cell

DOI: <https://doi.org/10.22032/dbt.58904>

Article ID: 4.2.032

Faheem, Faizan; Li, Zirui; Husung, Stephan:
Analysis of potential errors in technical products by combining knowledge graphs with MBSE approach

DOI: <https://doi.org/10.22032/dbt.58898>

Article ID: 4.2.041

Blott, Josua; Buchholz, Christian:
Challenges of implementing MBSE in industry – a tool vendor experience

DOI: <https://doi.org/10.22032/dbt.58895>

- Article ID:** 4.2.044
Panusch, Felix; Brix, Torsten; Rienecker, Maik; Husung, Stephan:
Systematization of existing uncertainties in the context of product development in the automotive supply industry
DOI: <https://doi.org/10.22032/dbt.59012>
- Article ID:** 4.2.052
Grosse, Karl W.; Hirte, Uwe; Brix, Torsten; Einicke, Frank; Hoffmann, Frank; Husung, Stephan; Flüggen, Folker:
Hybrid teaching and learning environment in the context of virtual product development
DOI: <https://doi.org/10.22032/dbt.58902>
- Article ID:** 4.2.053
Steck, Marco; Husung, Stephan; Schmid, Christoph:
Methodical procedure for a surrogate model based fatigue calculation to support the design process of eBike drive units
DOI: <https://doi.org/10.22032/dbt.58909>
- Article ID:** 4.2.057
Gerbet, Daniel; Röbenack, Klaus:
On the observability of embedded polynomial dynamical systems
DOI: <https://doi.org/10.22032/dbt.58901>
- Article ID:** 4.2.059
Geibel, Fabian:
Digital twin in industrial applications - how model-based systems engineering (MBSE) and asset administration shell (AAS) complement each other
DOI: <https://doi.org/10.22032/dbt.58900>
- Article ID:** 4.2.066
Watty, Robert; Brix, Torsten; Hirte, Uwe; Husung, Stephan:
Building agile product design competences in student projects
DOI: <https://doi.org/10.22032/dbt.58911>
- Article ID:** 4.2.067
Martin, Alex; Weidinger, Felicia; Greinert, Matthias; Wagenmann, Steffen; Albers, Albert:
Enhancement of an MBSE-supported methodology for managing engineering changes using the example of a machine tool
DOI: <https://doi.org/10.22032/dbt.58907>
- Article ID:** 4.2.068
Fincke, Sabine; Maschotta, Ralph; Hsu, Yi-Chun; Röckl, Thomas; Roßbach, Clara-Sophie; Augustin, Lydia-Dorothea; Daubner, Lukas; Deupmann, Jan; Lehmann, Marius; Treffurth, Anna Maria:
Competence oriented study in engineering education - examples from the practicing programme
DOI: <https://doi.org/10.22032/dbt.58899>

Article ID: 4.2.083

Salazar Márquez, Marcio B.; Gabash, Aouss; Shardt, Yuri A. W.; Tafur, Julio C.:
Optimal design of a photovoltaic station using Markov and energy price modelling

DOI: <https://doi.org/10.22032/dbt.58910>

Article ID: 4.2.087

Mandel, Constantin; Schwarz, Stefan; Brix, Torsten; Albers, Albert; Husung, Stephan:
Improving system of objectives maturity through systematic reuse of knowledge using ontology-based knowledge representations

DOI: <https://doi.org/10.22032/dbt.58908>

Article ID: 4.2.096

Hartel, Simon; Faber, Christian:
Using geometric algebra to create differentiable models for optimizing camera-based optical metrology systems

DOI: <https://doi.org/10.22032/dbt.58903>

Article ID: 4.2.100

Trentsios, Pascalis; Wolf, Mario; Gerhard, Detlef:
Towards a deep reinforcement learning integration into model-based systems engineering

DOI: <https://doi.org/10.22032/dbt.58912>

Article ID: 4.2.105

Albers, Albert; Hirschter, Tobias; Fahl, Joshua; Tröster, Peter M.; Rapp, Simon:
Understanding the variation of physical elements and their impact on properties and functions: a case study on roll stabilization systems

DOI: <https://doi.org/10.22032/dbt.58894>

Article ID: 4.2.123

Mahboob, Atif; Hussein, Omar; Willrodt, Lennart; Thanga Raj Ashok Raaj, Vinodh Raaj; Takim, Mehmet Berk; Spaans, Arjen; Hasib, Hassan; Birkenfeld, Klaas:
C.Pulse - an industrial demonstrator for a digital twin powered by MBSE for achieving digital continuity during the complete development process

DOI: <https://doi.org/10.22032/dbt.58906>

Article ID: 4.2.125

Brix, Torsten; Bücken, Silvie; Husung, Stephan:
Sustainability strategies and their influence on the product development of machine tools and special machines

DOI: <https://doi.org/10.22032/dbt.58896>

Session 4.3: Metallic and hybrid materials and simulation

Article ID: 4.3.056

Glaser, Marcus; Matthes, Sebastian; Riegler, Sascha Sebastian; Hildebrand, Jörg; Bergmann, Jean Pierre; Schaaf, Peter; Gallino, Isabella:
Characterization of plastic-metal hybrid composites joined by means of reactive Al/Ni multilayers – evaluation of occurring thermal regime

DOI: <https://doi.org/10.22032/dbt.58913>

Article ID: 4.3.111

*Tavares, Michel R. P. M.; Rolón, Daniel A.; Kober, Julian; Kühne, Stefan;
Schroeter, Rolf Bertrand; Oberschmidt, Dirk:*

Molecular dynamics simulation of gallium phosphide zinblend cutting mechanism

DOI: <https://doi.org/10.22032/dbt.58915>

Article ID: 4.3.143

*Sprigode, Toni; Gester, Andreas; Wagner, Guntram; Brückner-Foit, Angelika;
Boudhrra, Boulbaba; Rienäcker, Adrian:*

Improving weld quality with optimized bobbin tools: an innovative approach to friction stir welding of aluminium

DOI: <https://doi.org/10.22032/dbt.58914>

Topic 5: Productive teaming - Human-machine collaboration in the production environment

Session 5.1: Joint cognition

Article ID: 5.1.131

Jahn, Katharina; Kriegelstein, Felix; Chuang, Lewis L.; Rey, Günter Daniel:
Building an appropriate level of trust with conversational agents as team partners for learning

DOI: <https://doi.org/10.22032/dbt.58916>

Article ID: 5.1.132

Noack, Benjamin; Röhrbein, Florian; Notni, Gunther:
Event-based sensor fusion in human-machine teaming

DOI: <https://doi.org/10.22032/dbt.58924>

Article ID: 5.1.133

Mossakowski, Till; Hedblom, Maria; Neuhaus, Fabian; Arevalo Arboleda, Stephanie; Raake, Alexander:
Using the diagrammatic image schema language for joint human-machine cognition

DOI: <https://doi.org/10.22032/dbt.58917>

Article ID: 5.1.137

Puricelli, Leonardo; Brandenburg, Stefan; Wendemuth, Andreas; Husung, Stephan; Armbruster, Diana; Meyer, Bertolt; Ragni, Marco:
Going one step further: towards cognitively enhanced problem-solving teaming agents

DOI: <https://doi.org/10.22032/dbt.58925>

Session 5.2: Measurement and information collection

Article ID: 5.2.070

Junger, Christina; Notni, Gunther:
Investigations of closed source registration method of depth sensor technologies for human-robot collaboration

DOI: <https://doi.org/10.22032/dbt.58927>

Article ID: 5.2.127

Rother, Anne; Notni, Gunther; Hasse, Alexander; Noack, Benjamin; Beyer, Christian; Reißmann, Jan; Zhang, Chen; Ragni, Marco; Arlinghaus, Julia; Spiliopoulou, Myra:
Human uncertainty in interaction with a machine: establishing a reference dataset

DOI: <https://doi.org/10.22032/dbt.58928>

Article ID: 5.2.136

Treybig, Lukas; Höbel-Müller, Juliane; Werner, Stephan; Nürnberger, Andreas:
Acoustic inter- and intra-room similarity based on room acoustic parameters

DOI: <https://doi.org/10.22032/dbt.58929>

Article ID: 5.2.142

Barioul, Rim; Ben Atitallah, Bilel; Kissinger, Thomas; Kanoun, Olfa:

Synergy of nanocomposite force myography and optical fiber-based wrist angle sensing for ambiguous sign classification

DOI: <https://doi.org/10.22032/dbt.58941>

Session 5.3: Information processing

Article ID: 5.3.063

Milošević, Maša; Cvetković, Aleksandra; Tomić, Nevena; Petrović, Emina:

Outage minimization of energy-harvesting wireless sensor network supported by UAV

DOI: <https://doi.org/10.22032/dbt.58932>

Article ID: 5.3.128

Altschaffel, Robert; Dittmann, Jana; Scheliga, Daniel; Seeland, Marco; Mäder, Patrick:

Model-based data generation for the evaluation of functional reliability and resilience of distributed machine learning systems against abnormal cases

DOI: <https://doi.org/10.22032/dbt.58936>

Article ID: 5.3.135

Hempel, Thorsten; Al-Hamadi, Ayoub:

On contextual perception of workers in complex production environments

DOI: <https://doi.org/10.22032/dbt.58931>

Session 5.4: Operation and evaluation

Article ID: 5.4.129

Raake, Alexander; Broll, Wolfgang; Chuang, Lewis; Domahidi, Emese; Wendemuth, Andreas:

Cross-timescale experience evaluation framework for productive teaming

DOI: <https://doi.org/10.22032/dbt.58930>

Article ID: 5.4.138






Hasse, Alexander; Campanile, Lucio Flavio; Husung, Stephan:

An AI-driven design method as basis for teaming

DOI: <https://doi.org/10.22032/dbt.58937>

Index of Authors

A







Alasasfeh, Hayat	4
Albers, Albert	
 0000-0001-5432-704X.....	14, 15
Alencastre, Jorge	11
Al-Hamadi, Ayoub	
 0000-0002-3632-2402.....	18
Altschaffel, Robert.....	18
Anding, Katharina.....	8
Apte, Gurunath.....	2
Arevalo Arboleda, Stephanie	
 0000-0001-5577-4407.....	17
Arlinghaus, Julia	
 0000-0002-0287-2086.....	17
Armbruster, Diana	
 0000-0001-8649-6227.....	17
Arumugam, Kumar	3
Atoofi, Payam.....	7
Augustin, Lydia-Dorothea	14

B


Bachmann, Thomas	10
Bader, Oumaima.....	4
Barioul, Rim	
 0000-0003-1954-5396.....	18
Barriga G., E. Benjamin	
 0000-0002-7781-6177.....	3
Baumann, Andreas	
 0000-0003-0040-5262.....	9
Becker, Sid	12
Beinersdorf, Heiko	11
Ben Amara, Najoua Essoukri	4
Ben Atitallah, Bilel	
 0000-0003-2808-5002.....	18
Bergmann, Detlef.....	1
Bergmann, Jean Pierre	
 0000-0001-7583-8332.....	3, 7, 15
Beyer, Christian	
 0000-0001-8604-9523.....	17
Birkenfeld, Klaas	15
Bliedtner, Jens	
 0000-0002-0824-1509.....	5
Blott, Josua	13
Bodermann, Bernd.....	1









Böhm, Valter.....	11, 12
Boudhraa, Boulbaba	16
Boye Anang, Frank Eric	2
Brand, Uwe	
 0000-0002-4293-4982.....	2, 3
Brandenburg, Stefan	
 0000-0002-7628-5247.....	17
Bräuer-Burchardt, Christian	
 0000-0002-1352-6672.....	7
Braxmaier, Claus	
 0000-0002-5640-1634.....	1
Breitbarth, Andreas	
 0000-0002-9840-0410.....	7
Brix, Torsten.....	14, 15
Broll, Wolfgang.....	18
Brückner-Foit, Angelika.....	16
Bubela, Tetiana	
 0000-0002-2525-9735.....	1, 3
Buchanan, David.....	8
Buchholz, Christian.....	13
Büchner, Florian	
 0000-0002-5839-1193.....	10
Bücker, Silvie.....	15
Butenegro García, José Antonio.....	13














C

Calderón Ch., J. Alan	
 0000-0002-6486-5105.....	3
Campanile, Lucio Flavio	
 0000-0002-3553-1667.....	18
Carrillo Li, Enrique Roberto	
 0000-0002-0900-1937.....	10
Chauhan, Jaydeep	
 0000-0003-1592-4436.....	3
Chen, Liang-Chia.....	2
Chuang, Lewis L.	
 0000-0002-1975-5716.....	17, 18
Claßen, Ralf	4
Cvetković, Aleksandra	
 0000-0003-3737-7656.....	18

D

Dai, Gaoliang	
 0000-0002-1611-0074.....	1

Darnieder, Maximilian	
 0000-0002-7254-6585	3, 6
Daubner, Lukas	14
Degenhardt, Johannes	1
Deupmann, Jan	14
Dittmann, Jan Thomas	7
Dittmann, Jana	18
Domahidi, Emese	
 0000-0003-3530-797X	18
Dziomba, Thorsten	1
E	
Ebbecke, Jens	5
Einicke, Frank	14
Erbe, Torsten	
 0000-0002-3032-9283	4, 5
F	
Faber, Christian	15
Faheem, Faizan	
 0009-0009-1014-5389	13
Fahl, Joshua	15
Fahrbach, Michael	2
Farahani, Aida	
 0000-0002-1758-0924	7
Felgner, André	1
Figueiredo Soares, Victor	11
Fincke, Sabine	14
Findeisen, Erik	8
Fischer Calderón, Sebastian J.	1
Fitzgerald, Ryan	3
Fleischmann, Patrick	3
Flüggen, Folker	14
Foerg, Raimund	5
Franke, Karl-Heinz	8
Fröhlich, Thomas	
 0000-0002-6060-7248	2, 6
Frühauf, Joachim	1, 3
Fütterer, Richard	8
G	
Gabash, Aouss	
 0000-0002-3720-7203	15
Gallino, Isabella	15
Gao, Sao	1
Garten, Daniel	8
Gärtner, Eva	1, 3
Geibel, Fabian	
 0000-0002-3360-6717	14
Geinitz, Veronika	13

Geraimchuk, Mykhailo	
 0000-0002-8987-0867	4
Gerbet, Daniel	
 0000-0002-8527-8727	14
Gerhard, Detlef	
 0000-0002-3266-7526	15
Gerhardt, Uwe	2
Gester, Andreas	16
Glaser, Marcus	
 0000-0003-3488-6252	15
Gohlke, Martin	1
Gourishetti, Saichand	3
Greinert, Matthias	14
Gross, Herbert	4
Grosse, Karl W.	14
Gundelsweiler, Bernd	3, 10
Gutschmidt, Stefanie	IV, 12
H	
Haddad, Darine	
 0000-0002-9716-3310	5
Hafsa, Mariem	4
Hahm, Christoph	5
Hahn, S.	3
Hamann, Ines	
 0000-0002-6688-2582	1
Hamker, Fred H.	7
Happel, Julius	3
Hartel, Simon	15
Hasib, Hassan	15
Hasierber, Michael	
 0000-0001-5435-5008	7
Hasse, Alexander	
 0000-0002-6737-5152	17, 18
Hausmann, Joachim	
 0000-0002-7646-582X	9
Haverinen, Petteri	5
Hebenstreit, Roman	
 0000-0002-1302-7718	6
Hedblom, Maria	
 0000-0001-8308-8906	17
Helbig, Thomas	
 0000-0002-3909-3078	11
Hemmler, Matthias	1
Hempel, Thorsten	
 0000-0002-3621-7194	18

Henning, Stefan	
 0000-0003-3125-4073	5
Hermoza-Llanos, Estefania	
 0000-0003-2764-4861	11
Herrmann, David	11, 12
Hildebrand, Jörg	
 0000-0003-2247-8358	3, 7, 15
Hiller, Benedikt T.	
 0009-0001-6018-9461	8
Hiller, Karla	3
Hirniak, Yurii	
 0000-0002-4835-230X	4
Hirschter, Tobias	15
Hirte, Uwe	14
Höbel-Müller, Juliane	17
Hoffmann, Frank	14
Holder, Daniel	
 0000-0002-3088-1182	10
Hsu, Yi-Chun	14
Huaman, Alex S.	2
Husseini, Omar	
 0009-0003-8176-2495	15
Husung, Stephan	
 0000-0003-0131-5664	IV, 7, 13, 14, 15, 17, 18
Hutter, Marco	
 0000-0001-6945-9168	10
I	
Iglesias L., José	
 0009-0007-4542-2089	3
Illmann, Raik	
 0000-0001-9660-579X	8
Ivakhiv, Orest	
 0000-0003-3299-9798	4
Ivanov, Valentin	
 0000-0001-7252-7184	10
J	
Jäger, Max	
 0000-0003-2203-4140	11
Jahn, Katharina	
 0000-0002-9943-5279	17
Janik, Marcel	1
Jestädt, Lukas	10
Jevtić, Adrijana	
 0000-0002-6870-5790	7

Jünemann, Philipp	
 0000-0002-5890-928X	10
Junger, Christina	
 0000-0002-5310-495X	17
K	
Kanoun, Olfa	
 0000-0002-7166-1266	4, 18
Keck, Lorenz	
 0000-0002-2052-1546	5
Kissinger, Thomas	
 0000-0003-1832-7143	IV, 1, 2, 18
Klenkert, Daniel	
 0000-0003-3528-8975	5
Kletzin, Ulf	IV, 13
Knechtel, Roy	
 0000-0002-2272-6924	2
Kober, Julian	16
Köllermeier, Jonas	8
Köning, Rainer	
 0000-0003-2706-7013	1
Könke, Carsten	11
Krauhausen, Michael	
 0009-0003-6702-6352	4
Krempl, Nina	9
Krieglstein, Felix	
 0000-0002-1324-3816	17
Krüger, Jan	1
Kufner, Maria	5
Kugler, Marion	11
Kühmstedt, Peter	7
Kühne, Stefan	16
Kumanchik, Lee	1
L	
Lavayen Farfan, Daniel	
 0000-0003-2932-0238	13
Layher, Michel	
 0000-0002-5433-7720	5
Lehmann, Marius	14
Lehmann, Peter	2
Leutonen, Onni	5
Li, Zhi	3
Li, Zirui	
 0009-0007-7983-7901	13
Liao, Chen-Yu	2
Lin, Hsi-Hui	2
Linss, Elske	8

Linß, Sebastian
 iD 0000-0002-7139-4858 4

Lipšinić, Zvonimir
 iD 0000-0002-0920-8495 13

López Boada, María Jesús 13

Lozano J., John H.
 iD 0000-0002-8430-9480 3

Lozano N., Hugo
 iD 0000-0003-3264-2908 3

Lummitsch, Sascha 8

Lutherdt, Stefan
 iD 0000-0002-8904-9163 11

M

Ma, Tianran
 iD 0009-0009-6884-7439 2

Mäder, Patrick
 iD 0000-0001-6871-2707 18

Madkatte, Dikshita 2

Mahboob, Atif
 iD 0000-0002-1629-4301 15

Maier, Thomas 10

Majuri, Jaakko 5

Mandel, Constantin
 iD 0000-0002-7073-2763 15

Manske, Eberhard
 iD 0000-0002-1672-2978 2

Martin, Alex 14

Maschotta, Ralph
 iD 0000-0001-8447-3996 14

Matthes, Sebastian 15

Mauch, Manuel 10

Mechtenberg, Malte
 iD 0000-0002-8958-0931 10

Meierhofer, Florian
 iD 0000-0002-5578-7731 2

Mettenleiter, Luca 10

Meyer, Bertolt
 iD 0000-0003-4695-9252 17

Miettinen, Mikael
 iD 0000-0002-9722-6756 5

Milošević, Maša
 iD 0000-0002-5399-2870 18

Mohammadkarimi, Shiva
 iD 0000-0002-2128-6250 8

Mossakowski, Till
 iD 0000-0002-8938-5204 17

Munkelt, Christoph 7

Münker, Lukas Jonathan 2

Mykyichuk, Mykola . *Siehe Mykyychuk, Mykola*
 Mykyychuk, Mykola
 iD 0000-0002-0591-6304 1, 3

N

Nase, Michael
 iD 0000-0002-8017-4849 8

Neitzel, Benedikt
 iD 0000-0001-8987-9194 8

Nestler, Rico
 iD 0009-0002-6551-6692 8

Neuhaus, Fabian
 iD 0000-0002-1058-3102 17

Nevodovskiy, Petro
 iD 0000-0002-7958-2255 4

Newell, David 5

Nguyen, Thi-Huong
 iD 0000-0002-9237-3482 2

Niedermeier, Corinna 1

Noack, Benjamin
 iD 0000-0001-8996-5738 17

Notni, Gunther
 iD 0000-0001-7532-1560 V, 7, 8, 17

Nürnberg, Andreas 17

O

Oberschmidt, Dirk V, 16

Otto, Christian 13

P

Pabst, Markus 6

Pahl, Tobias 2

Panusch, Felix 14

Pavković, Neven
 iD 0000-0002-1291-0429 13

Pavlović, Nenad T.
 iD 0000-0001-5986-5023 11








Peiner, Erwin
 iD 0000-0001-5801-813X 2, 3

Petrich, Martin 13

Petrović, Emina 18

Pezoldt, Kerstin
 iD 0000-0002-9301-1459 7

Pollinger, Florian
 iD 0000-0002-8494-4687 4




Polte, Galina	
 0000-0002-0255-4133	8
Popadic, Radovan	3
Preißler, Marc	7
Prellinger, Günther	
 0000-0003-4919-0258	4
Priem, Roland	
 0009-0006-5654-3356	4
Puch, Florian	
 0000-0002-7668-2138	8
Puricelli, Leonardo	
 0009-0000-0717-9822	17
Purschke, Björn	10
R	
Raake, Alexander	
 0000-0002-9357-1763	17, 18
Ragni, Marco	
 0000-0003-2661-2470	17
Ramm, Roland	
 0000-0003-2326-2081	7
Rangelow, Ivo W.	
 0000-0002-1487-1486	12
Rapp, Simon	15
Rauch, Alexander	7
Reger, Johann	
 0000-0002-6756-0008	2
Reich, René	13
Reimann, Jan	
 0000-0001-6995-752X	7
Reißmann, Jan	
 0009-0000-2825-9725	17
Rennert, Mirko	
 0000-0001-6663-1954	8
Rey, Günter Daniel	
 0000-0001-9717-8478	17
Richter, Martin	8
Rieger, David Benjamin	10
Riegler, Sascha Sebastian	15
Rienäcker, Adrian	16
Rienecker, Maik	14
Rincón Ruiz, Carlos Gianpaul	11
Risse, Stefan	4
Ritter, Martin	1
Röbenack, Klaus	
 0000-0002-3347-0864	14
Röckl, Thomas	14

Rodenberg, Madeline	
 0009-0008-8945-7328	2
Rödiger, Silas	11
Rodríguez Hernández, Jorge Antonio ...	11, 13
Rohe, Maximilian	
 0000-0003-4621-2458	3, 7
Röhrbein, Florian	
 0000-0002-4709-2673	17
Rolón, Daniel A.	16
Rosenberger, Maik	8
Roßbach, Clara-Sophie	14
Rother, Anne	
 0000-0002-6768-5871	17
S	
Salazar Márquez, Marcio B.	15
Sanjuan, Josep	
 0000-0002-3570-5735	1
Schaaf, Peter	
 0000-0002-8802-6621	15
Schaeffer, Daniel	
 0000-0003-2573-1128	5
Schaeffer, Leon	11, 12
Scheliga, Daniel	18
Schlamming, Stephan	3
Schleichert, Johannes	13
Schmid, Christoph	14
Schneider, Axel	
 0000-0002-6632-3473	10
Schöppner, Volker	8
Schötka, Eugen	1
Schroeter, Rolf Bertrand	16
Schulze, Sven	3
Schumann, Matthias	1
Schwarz, Stefan	15
Schwarz, Uwe	2
Seeland, Marco	
 0000-0001-7204-3972	18
Seifert, Frank	5
Sennewald, Martin	
 009-0004-0169-4689	3, 7
Serbes, Hüseyin	2
Shahroodi, Zahra	9
Shardt, Yuri A. W.	
 0000-0002-9311-7739	15
Shaw, Gordon	3
Shmagun, Vitalii	
 0000-0002-3343-2673	2




Soter, Marcus	2
Spaans, Arjen.....	15
Spiliopoulou, Myra	
ID 0000-0002-1828-5759	17
Sprigode, Toni	
ID 0000-0001-6295-5441	16
Stauch, Julian	5
Steck, Marco.....	14
Steinz, Josefine	
ID 0000-0002-6205-3277	11
Stoeterau, Rodrigo Lima	11
Stojiljković, Dušan	
ID 0000-0002-6787-4533	11
Straube, Guido	1
Sturm, Kerstin	
ID 0009-0008-1374-2800	7
Szallies, Konstantin.....	7
T	
Tafur Sotelo, Julio C.....	15
ID 0000-0003-3415-1969	3
Takim, Mehmet Berk.....	15
Tavares, Michel R. P. M.	
ID 0000-0002-0070-3633	16
Thanga Raj Ashok Raaj, Vinodh Raaj.....	15
Thein, Ludwig	13
Theska, René	
ID 0000-0003-0589-8270	V, 3, 4, 5, 6
Thiesler, Jan	1
Tomić, Nevena	18
Torres Melgarejo, Mario André	
ID 0000-0003-1713-6273	3, 4, 5
Treffurth, Anna Maria	14
Trentsios, Pascalis	
ID 0000-0002-9557-8731	15
Treybig, Lukas.....	17
Trienens, Dorte	8
Tröster, Peter M.	15
Tutsch, Rainer	
ID 0000-0003-0940-379X.....	1, 2
U	
Uhrhan, Katja	
ID 0000-0003-2556-063X.....	11
V	
Vainio, Valtteri.....	5
Vehar, Darko	
ID 0009-0006-3230-1934.....	8

Vergin, Maximilian	
ID 0009-0006-3319-1714.....	2
Verhoek, Michael	
ID 0000-0003-2343-9326	7
Verkouteren, R. Michael.....	3
Vidmachenko, Anatoly	
ID 0000-0002-0523-5234.....	4
Viitala, Raine	
ID 0000-0003-1672-1921	5
Vitay, Julien	7
W	
Waag, Andreas	
ID 0000-0002-2724-1686	2
Wagenmann, Steffen.....	14
Wagner, Andreas	1
Wagner, Guntram.....	16
Wagner, Johannes	1
Walla, Peter Jomo	2
Wanner, Gudrun	
ID 0000-0001-5578-1471	1
Waßmuth, Joachim	
ID 0009-0006-1863-1275	10
Watty, Robert	
ID 0009-0002-0704-7672	14
Weidinger, Felicia	14
Weigert, Florian	
ID 0000-0003-3848-586X.....	5
Weimann, Thomas	2
Weimann, Tom-Luis	13
Wendemuth, Andreas	
ID 0000-0001-6917-8198	17, 18
Werner, Stephan.....	17
Willrodt, Lennart.....	15
Witte, Hartmut	
ID 0000-0001-6055-2921	V, 11
Wittke, Martin	
ID 0000-0002-2743-1770	3, 4, 6
Wolf, Mario	
ID 0000-0002-0628-7570	15
Wolf, Matthias	
ID 0009-0002-1446-882X.....	4, 5
Wünsche, Christine	7
X	
Xu, Jiushuai	2
Xu, Xin.....	2

Y

Yarasca Huanacune, Jorge	13
Yatsuk, Vasyl	
 0000-0002-4213-4862	3
Yatsuk, Yuriy	
 0000-0003-3915-3058	3
Yatsyshyn, Svyatoslav	
 0000-0002-4874-1866	1, 3

Z

Zbrutskyi, Olexsandr	4
Zeng, Xinyu	1
Zentner, Lena	
 0000-0003-4219-9006	V, 5, 11, 12
Zettlitzer, Lucas	
 0000-0001-5515-2931	4
Zhang, Chen	
 0000-0001-8942-4624	17

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