DDMC2025

Fraunhofer Direct Digital Manufacturing Conference

PROGRAM

Berlin | March 12 – 13, 2025

CONTENT

Dr. Bernhard Mueller

Fraunhofer DDMC Conference Chairman
Spokesperson Fraunhofer Competence Field Additive Manufacturing

WELCOME TO DDMC 2025

Welcome to the 7th Fraunhofer Direct Digital Manufacturing Conference DDMC 2025 in Berlin, Germany! This biennial conference on Additive Manufacturing (AM) and 3D Printing (3DP) is organized by the **Fraunhofer Competence Field Additive Manufacturing**, which integrates twenty Fraunhofer institutes across Germany that are involved with applied R&D in the field of AM & 3DP.

At DDMC 2025, well-known national and international speakers present the latest developments in AM and 3DP, focusing on the topics of Product Development, Technologies, Materials, Quality, Post Processing and Software. The conference program has been broken up into **21 sessions with a total of 59 oral presentations and a dedicated poster session**. We continue to present latest trends not only from science and research, but also from the AM industry. These presentations are highlighted again in the program as **Industrial Contributions** and are not accompanied by a full paper in the conference proceedings.

We gladly announce our six excellent **keynote-speakers: Prof. Enrico Stoll** (TU Berlin, Germany), **Prof. Wojciech Matusik** (MIT, USA), **Ben Hartkopp** (Quantica, Germany), **Prof. Bianca Colosimo** (Politecnico di Milano, Italy) and, as a tandem keynote, **Dr. Sebastian Piegert** and **Dr. Cynthia Wirth** (Siemens Energy, Germany). Be excited to hear their very individual points of view on Additive Manufacturing and its application today, from a broader and prominent perspective.

The Fraunhofer DDMC **conference dinner** on Wednesday evening will be held in the "Waiting Hall" of a historic local Berlin train station, in walking distance from the conference hotel. Benefit from the great opportunity to make new contacts and to meet the speakers and other participants from all over the world in this historical location, in a relaxed atmosphere! This evening promises excitement for all, who are involved with Additive Manufacturing in their professional life!

The traditional **DDMC Best Paper, Best Poster & Best Presentation Awards**, which honor the best paper, poster and oral presentation submitted to or presented at Fraunhofer DDMC 2025, will be awarded at conclusion of the second conference day.

In addition, a collection of the renowned **Springer Nature journal "Progress in Additive Manufacturing" (PIAM)** once again accompanies this year's DDMC, again containing the nine best papers submitted to Fraunhofer DDMC 2025. We are happy and delighted to continue our collaboration with PIAM as our scientific media partner and publishing medium for the most outstanding DDMC submissions. Our thanks go out to PIAM's Editor-in-Chief, Prof. Eujin Pei, and the entire PIAM team at Springer Nature! Please enjoy a complimentary printed copy of the "Direct Digital Manufacturing" collection of PIAM, which you can find in your conference bag, handed out during registration!

We also thank our industrial media partners **x-Technik IT & Medien GmbH** and **Inovar Communications**. Please enjoy reading the brand-new issue of "**Additive Fertigung**", which you can find in your conference bag, and learn how to get access to "**Metal AM Magazine**" and "**PIM International**" from the brochures in your conference bag.

We express our thanks to this year's DDMC Sponsor **ALD Vacuum Technologies GmbH**.

Finally, I express my gratitude to DDMC's **Scientific Committee** for supporting the conference, by reviewing so many submitted papers and helping us to maintain the high scientific standard of Fraunhofer DDMC!

You are cordially invited to meet the additive manufacturing community in the vibrant heart of **Berlin, Germany**! I am convinced that all conference participants will learn more about the latest trends in additive manufacturing and will benefit from new ideas and contacts.

Please enjoy Fraunhofer DDMC 2025!

Dr. Bernhard Mueller
Fraunhofer DDMC Conference Chairman
Spokesperson of the Fraunhofer Competence Field Additive Manufacturing

PROGRAM OVERVIEW

		DOEBLIN I	DOEBLIN II	EHRLICH
Wednesday, March 12, 2025	8.30 am – 9.15 am	Check-in		
	9.15 am – 10.30 am	Opening & Plenary Keynotes		
	10.30 am – 11.15 am	Coffee Break		
	11.15 am – 12.30 pm	1.1 Use Cases	1.2 Sustainability in AM	1.3 AI and Machine Learning for AM
	12.30 pm – 2.00 pm	Lunch Break		
	2.00 pm – 3.15 pm	2.1 Metal AM (LPBF) 1	2.2 Polymer AM	2.3 AM of Ceramics
	3.15 pm – 4.00 pm	Poster Session (Room Einstein) & Coffee Break		
	4.00 pm – 5.15 pm	3.1 Microstructure and Mechanical Properties of AM Parts	3.2 Sinter-based AM	3.3 Quality in AM
	5.30 pm – 6.00 pm	Closing Keynote		
	7.30 pm – 11.00 pm	Conference Dinner		
Thursday, March 13, 2025	9.00 am – 10.15 am	Plenary Keynotes II		
	10.15 am – 10.45 am	Coffee Break		
	10.45 am – 12.00 pm	4.1 Design for AM	4.2 Novel AM Materials	4.3 Digital AM Workflow
	12.00 am – 1.30 pm	Lunch Break		
	1.30 pm – 2.45 pm	5.1 Metal AM (DED)	5.2 Metal AM (LPBF) 2	5.3 Metal AM (EBM)
	2.45 pm – 3.15 pm	Coffee Break		
	3.15 pm – 4.30 pm	6.1 AM Process Monitoring	6.2 AM Process Innovations	6.3 AM Process Simulation
	4.30 pm – 4.55 pm	Closing & Best Paper, Best Poster and Best Presentation Award		

GENERAL INFORMATION

CONFERENCE REGISTRATION

The conference registration fee includes admission to all conference sessions and the poster session. The conference package includes an electronic copy of the proceedings, a printed version of the "DDMC 2025 Collection" of Springer Nature Journal "Progress in Additive Manufacturing" (PIAM), a list of registered conference participants and authors, lunch and refreshments during breaks. Regular participants have free admission to the conference dinner.

THE COUNTER AND REGISTRATION DESK IS OPEN

Wednesday, March 12, 2025 08.30 am – 05.30 pm
Thursday, March 13, 2025 08.30 am – 05.00 pm

DOOR REGISTRATION FEE

Regular 990 EUR

LUNCH AND COFFEE BREAKS

Coffee breaks will be taking place outside the main conference room. Lunch will be served in the Restaurant Spargos on the ground floor on both days.

DIETARY REQUIREMENTS

The rich buffet lunch is designed to cater for all dietary requirements and all tastes. When in doubt, please consult one of the chefs serving the food, they will be able to give you detailed information.

INTERNET ACCESS

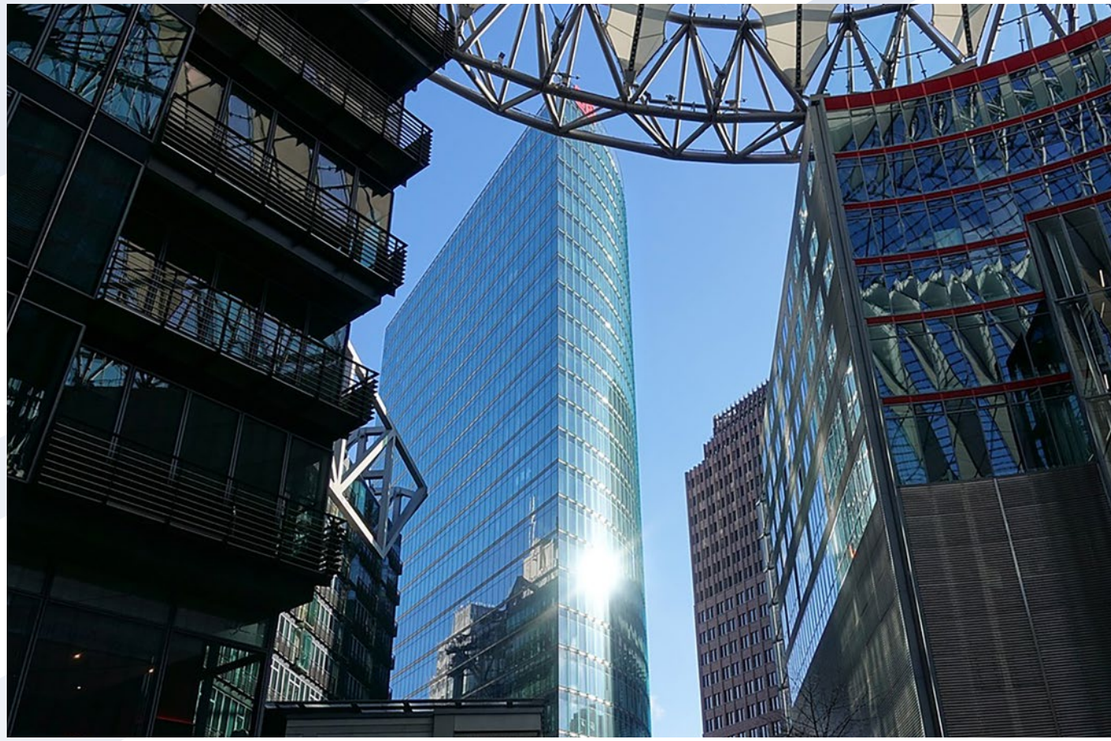
Park Inn by Radisson kindly provides free Internet access for all conference participants.
The password is available at the hospitality desk.

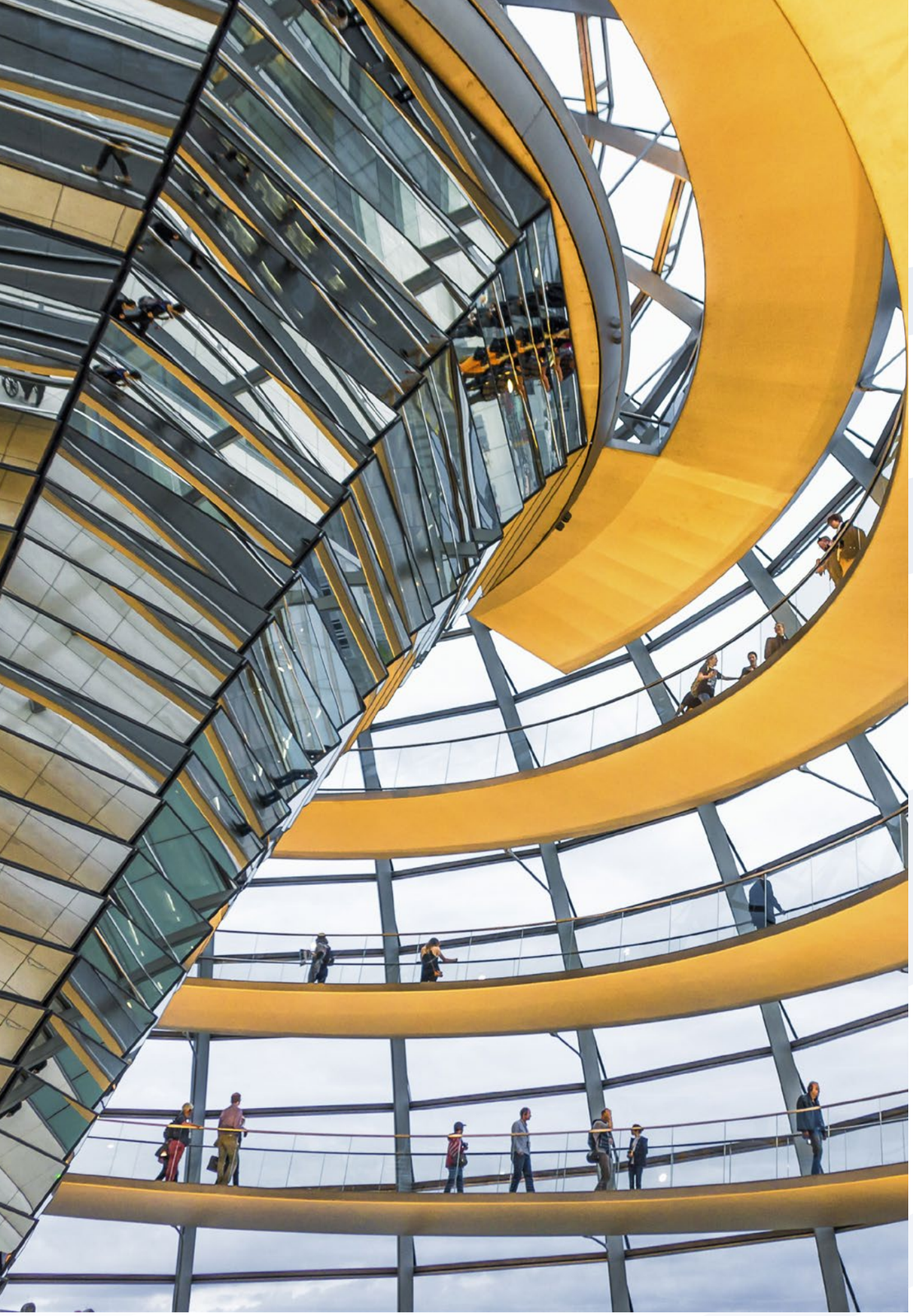
CONFERENCE LANGUAGE AND PROCEEDINGS

The official language of all presentations is English. The conference package will be handed out at the registration desk upon check-in.

CONTACT INFORMATION AND ASSISTANCE DURING THE CONFERENCE

Please do not hesitate to contact us if you have any questions or requests. Our counter and registration desk is located next to the entrance to the main conference room. We can assist you with any technical questions regarding your presentation and generally any problems that might come up.





CONFERENCE VENUE

The DDMC 2025 will be taking place at the Park Inn by Radisson - Berlin Alexanderplatz, which combines the qualities of a first-class hotel with a new conference center in the heart of downtown Berlin.

Park Inn by Radisson Berlin Alexanderplatz
Alexanderplatz 7
10178 Berlin, Germany
Phone +49 30 2389-0

The DDMC will be taking place on the 2nd and 3rd floor of the hotel. The session overview on page 8 – 9 is designed to help you find your way around. Please note that the opening, keynote and closing sessions will be taking place at Doeblin I and Doeblin II on the 3rd floor.

SPONSORS & EXHIBITORS

The DDMC Organizers gratefully acknowledge the support of the following sponsor, exhibitor and media partners:

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Martin Schaefer, Siemens AG, DE
Dr. Bart van der Schueren, Materialise NV, BE
Prof. Mihaela Vlasea, University of Waterloo, CA
Dr. Oezlem Weiss, Expertants GmbH, DE
Dr. Cynthia Wirth, Siemens Energy AG, DE
Prof. Katrin Wudy, TU München, DE

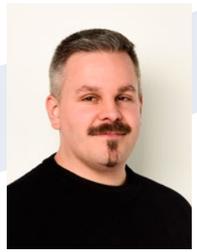
KEYNOTE SPEAKERS

PROF. ENRICO STOLL
TU Berlin, Germany // Chair of Space Technology

»The Challenges of In-space Manufacturing and Assembly Using Small Satellites«

Prof. Enrico Stoll holds the Chair of Space Technology at TU Berlin since February 2021. He holds a diploma engineering degree (2004) in aerospace engineering from the Technical University of Dresden after studies at MAI, Moscow and UNSW, Sydney. He received a PhD from the Institute of Astronautics at TU Munich in 2008. Thereafter, he was a postdoctoral research fellow of MIT's Space Systems Laboratory.

Subsequently, he joined RapidEye/Blackbridge as a systems engineer for their remote sensing satellite constellation. During that time he was also a guest lecturer at FU Berlin and received a bachelor's degree in mathematics from the University of Hagen. He was the head of the Institute of Space Systems at TU Braunschweig from 2014 to 2021.



BEN HARTKOPP
Quantica, Berlin, Germany // Technology Manager & Founder

»The Building Blocks of Digital Manufacturing: Functional Materials and Precise Deposition«

Ben Hartkopp is a founder, technology manager, and inventor of innovative digital printing technology designed to jet extremely viscous materials. With a background in physics research, he has been co-developing the NovoJet™ printhead since 2016.

Ben focuses on patent writing and strategy, leading to the creation of seven patent families, with two patents granted. He is also leading confidential R&D projects shaping the future of the technology.

KEYNOTE SPEAKERS

DR. SEBASTIAN PIEGERT & DR. CYNTHIA WIRTH
Siemens Energy, Berlin, Germany // Department Lead Additive Manufacturing

»The Future of Additive Manufacturing – Vision and Challenges on Setting up a Global Manufacturing Network at Siemens Energy«

Additive Manufacturing (AM) is revolutionizing the energy sector by enabling OEM's to accelerate the energy transition. Siemens Energy is at the forefront of this transformation, leveraging AM to enhance the efficiency and performance of energy systems as well as improving the maintenance and repair of traditional infrastructure. In this talk, we will explore Siemens Energy's global AM footprint, addressing the challenges and strategic vision in three critical areas: material cross-site qualification, machine fleet consistency and the contribution of the digital thread to quality assurance in serial production.

By adopting AM, Siemens Energy is not only driving down product costs and mitigating internal supply chain issues but also contributing to a more sustainable and resilient energy landscape. Sebastian Piegert is leading the global Additive Manufacturing Technology Development function within the Additive Manufacturing organization of Siemens Energy Gas Services out of the gas turbine plant in Berlin since 2022. In a similar function he was leading the Additive Manufacturing Technology and Materials team for Siemens Energy Generation Large Rotating Equipment since 2014. He started his career within Siemens as development engineer for joining and repair processes for hot gas path components of large gas turbines in 2008.

Mr. Piegert studied mechanical engineering at the Technical University of Braunschweig (Germany). In order to deepen his expertise in high temperature materials and their applications, he subsequently conducted a doctorate at the Institute of Materials of the Technical University of Braunschweig exploring »Modern high temperature brazing processes for turbine blade and vane repair«.

Dr. Cynthia Wirth leads the Digitalization and Innovation Team for Additive Manufacturing at Siemens Energy since October 2022. She joined Siemens Energy in 2015 and has worked since then in different roles. She holds a diploma engineering degree (2003) in Materials Science and Engineering from the Federal University of Paraiba, Brazil. She received a master's degree and PhD also in Material Science and Engineering at the Federal University of Santa Catarina in 2005 and 2008, respectively. During her PhD, she spent one year as DAAD scholarship holder at the Friedrich-Alexander University of Erlangen-Nuremberg, in Erlangen, Germany. She has been working since then with Additive Manufacturing, focusing on different applications. After her PhD, she joined the Additive Manufacturing group for Ceramic Processing at the FAU Erlangen-Nuremberg for her postdoctoral, working with FDM of metal-filled filaments, robocasting of ceramics, laminated object manufacturing of ceramic tapes. In 2011, she joined the Federal Institute for Materials Research and Testing, BAM, in Berlin, where she supported building the group of binder jetting of bio-resorbable ceramic implants.

KEYNOTE SPEAKERS

PROF. WOJCIECH MATUSIK
MIT, Cambridge, MA, USA // Department of Electrical Engineering and Computer Science

»Can Computers Beat Humans at Design?«

Design is everywhere: high-performance turbines, polymers with outstanding material properties, unmanned aerial vehicles, metamaterials, or computer algorithms. However, the best designs are a product of tremendous work of high-skilled domain experts. I will show that we are on the verge of a transition where computational methods start beating humans at design. I will describe a series of questions that need to be addressed to move the field of computational design forward: how to represent a design, how to represent design space, how to find designs with optimal performance, and how to bridge the gap between simulation and reality.

Wojciech Matusik is a professor in MIT's Department of Electrical Engineering and Computer Science, and leads the Computational Design and Fabrication Group at the Computer Science and Artificial Intelligence Laboratory. His research interests are in computer graphics, computational design and fabrication, computer vision, robotics and human-computer interaction. Before coming to MIT, he worked at Mitsubishi Electric Research Laboratories, Adobe Systems and Disney Research Zurich. He has received a Ruth and Joel Spira Award for Excellence in Teaching, a DARPA Young Faculty Award and a Sloan Foundation fellowship. He has been named one of the world's top 100 young innovators by MIT Technology Review and received a Significant New Researcher Award from ACM Siggraph.

PROF. BIANCA MARIA COLOSIMO
Politecnico di Milano, Italy // Department of Mechanical Engineering

»In-situ Monitoring in AM: Challenges and Opportunities to Unlock Real-time Qualification«

Bianca Maria Colosimo is a Professor in the Department of Mechanical Engineering at the Politecnico di Milano (Italy), where she co-leads the AddMe Lab, a top-tier European research lab in Additive Manufacturing. Prof. Colosimo received her MSc and PhD in Industrial Engineering from the Politecnico di Milano, followed by a postdoctoral fellowship at Pennsylvania State University.

Her research interests primarily focus on smart manufacturing, with a particular emphasis on big data mining, monitoring, and control for additive manufacturing and bioprinting. She has authored over 130 contributions, most of which have been published in peer-reviewed international journals and books. She has served as Editor-in-Chief and Department Editor for several scientific journals, including the Journal of Quality Technology, IISE Transactions, INFORMS Journal of Data Science, Progress in Additive Manufacturing, and Additive Manufacturing Letters.

WEDNESDAY MARCH 12, 2025

9:15 am – 10:30 am **OPENING & PLENARY KEYNOTES**
Location: Döblin I + II

Keynote 1
The Challenges of In-space Manufacturing and Assembly Using Small Satellites
Prof. Enrico Stoll
TU Berlin, Germany

Keynote 2
Can Computers Beat Humans at Design?
Prof. Wojciech Matusik
MIT, Cambridge, MA, USA

5:30 pm – 6:00 pm **CLOSING KEYNOTE**
Location: Döblin I

Keynote 3
The Future of Additive Manufacturing – Vision and Challenges on Setting up a Global Manufacturing Network at Siemens Energy
Dr. Sebastian Piegert & Dr. Cynthia Wirth
Siemens Energy, Berlin, Germany

7:30 pm – 11:00 pm **CONFERENCE DINNER**

ASK AN EXPERT I

What do you find most exciting about Additive Manufacturing?

DR. CYNTHIA WIRTH:

Additive Manufacturing (AM) is a transformative technology that offers countless possibilities. One of the most exciting aspects of AM is its ability for the individualization and personalization of products, zero inventory with on-demand printing, and the ability to design and manufacture anywhere. For manufacturing industries, AM can mitigate very fast the volatility in supply chain caused by disruptive events.

PROF. ENRICO STOLL:

Additive Manufacturing is a game-changer for aerospace engineering because it enables innovative solutions that traditional manufacturing simply cannot achieve. One of the most interesting ideas is using AM for in-space or on other celestial bodies. Future missions could use local materials (like lunar regolith) to 3D print habitats, tools, and spare parts, reducing dependence on Earth-based supply chains.

SESSION 1.1

Session 1.1: AM Use Cases

Room: Döblin I
Session Chair: Philipp Imgrund, Fraunhofer IAPT

11:15 am **Additive Manufacturing of Certified Pressure Equipment – Certifications, Opportunities & Challenges *Industrial Contribution***
Philipp Schwarz
Rosswag GmbH, Germany

11:40 am **Enhancing Tool Longevity and Cost Efficiency with Wire Arc Additive Manufacturing (WAAM) *Industrial Contribution***
Sebastian Recke[1], Tom Lüders[2]
[1]GEFERTEC GmbH, Germany, [2]B.I.G. Holding SE, Germany

12:05 pm **Additive Manufacturing of Ceramics for Dental and Biomedical Applications**
Franziska Schmidt, Florian Beuer, Alexey Unkovskiy
Charité Universitaetsmedizin Berlin, Germany

12:30 pm – 2:00 pm **LUNCH BREAK**

SESSION 1.2

Session 1.2: Sustainability in AM

Room: Döblin II
Session Chair: Bianca Maria Colosimo, Politecnico di Milano

11:15 am **Design for Additive Manufacturing and Design for Sustainability, Synergies and Conflicts**
Ligeia Paletti[1,2]
[1]DLR – German Aerospace Center, Hamburg, Germany; [2]University of Patras, Patras, Greece

11:40 am **Promoting Sustainability in Binder Jetted Steels through Adopting Black Water-atomized Powders without Post-annealing**
Mingzhang Yang[1], Mihaela Vlasea[1], Mohsen Keshavarz[1], Amin Molavi-Kakhki[2], Chantel LeClercq[2]
[1]University of Waterloo, Canada; [2]Rio Tinto, Canada

12:05 pm **Evaluating the Environmental Impact of a PBF-IR/P Process: A Cradle-to-Gate Life Cycle Assessment for PA11**
Chantal Rietdorf, David Torres, Jan Christoph Janhsen, Jonas Göser, Sophia Marie Giunta, Steffen Kiemel
Fraunhofer IPA, Stuttgart, Germany

12:30 pm – 2:00 pm **LUNCH BREAK**

SESSION 1.3

Session 1.3: AI and Machine Learning for AM

Room: Ehrlich
Session Chair: Enrico Stoll, TU Berlin

11:15 am **AI based Surrogate Model for Property Linkages Prediction in Additive Manufacturing (AM)**
Victor Rodrigo Iza Teran, Daniela Steffes-lai, Tom Niklas Klein
Fraunhofer SCAI, Germany

11:40 am **Quality Assurance via a Cyber-physical System of a PBF-LB/M Machine**
Konstantin Poka[1], Sozol Ali[1], Waleed Saeed[1], Benjamin Merz[1,2], Martin Epperlein[1], Kai Hilgenberg[1]
[1]Bundesanstalt für Materialforschung und -prüfung, Germany; [2]Technische Universität Berlin, Germany

11:05 pm **Learning Automatic Part Orientation for Powder Bed Fusion of Metal from Part Data**
Sebastian Wenger[1], Iryna Shevchenko[1], Joschka zur Jacobsmühlen[2], Jörg Krüger[1], Eckart Uhlmann[1]
[1]Department Industrial Automation Technology, TU Berlin, Germany; [2]Materialise GmbH, Bremen, Germany

12:30 pm – 2:00 pm **LUNCH BREAK**

SESSION 2.1

Session 2.1: Metal AM (LPBF) 1

Room: Döblin I
Session Chair: Karl-Heinz Dusel, MTU Aero Engines AG

2:00 pm **Innovative Optical and Digital Solutions: The Key to Metal Additive Manufacturing Breakthroughs *Industrial Contribution***
Hossein Ghasemi, Andreas Burn, Sébastien Lani
Swiss Advanced Manufacturing Center (SAMC), Switzerland Innovation Park Biel / Bienne, Switzerland

2:25 pm **Parametric Effect of Contours on Powder Bed Fusion Laser Beam Downskin Surface Roughness**
Olutayo Adegoke
Siemens Energy, Sweden

2:50 pm **Characterization of Ring Beam Profiles for High-power Lasers Used in Laser Additive Manufacturing**
Norbert Pirch, Wilhelm Meiners, Marvin Kippels
Fraunhofer ILT, Aachen

3:15 pm – 4:00 pm **POSTER SESSION & COFFEE BREAK**
Room Einstein

SESSION 2.2

Session 2.2: Polymer AM

Room: Döblin II
Session Chair: Russell Harris, Manchester Metropolitan University

2:00 pm **Multi-axis, Multi-material Extrusion Printing of Filaments, Granules, Fibers and Fluids: Potentials, Challenges and Implications**
Daniel Omidvarkarjan, Daniel Aeschbacher, Fabian Duft, Cedric Kundert, Dario Schafroth
OST Ostschweizer Fachhochschule, Switzerland

2:25 pm **A Systematic Approach to Evaluate Jetability of High-viscosity Resins for 3D Inkjet Printing Applications**
Antonia Götz[1], Jan Christoph Janhsen[2], Stefan Güttler[1], Oliver Refle[2], Olivia Ronczka[2]
[1]Hochschule der Medien, Stuttgart, Germany; [2]Fraunhofer IPA, Stuttgart, Germany

2:50 pm **Study of the Piezoresistive Response in 3-dimensional Conductive Patterns Obtained by Material Extrusion Techniques (FFF and DIW)**
Joaquim Minguella Canela[1],[2], Irene Buj Corral[1]
[1]Universitat Politècnica de Catalunya – BarcelonaTECH, Barcelona, Spain; [2]Centre CIM Fundació Privada, Barcelona, Spain

3:15 pm – 4:00 pm **POSTER SESSION & COFFEE BREAK**
Room Einstein

SESSION 2.3

Session 2.3: AM of Ceramics

Room: Ehrlich
Session Chair: Özlem Weiss, Expertants GmbH

2:00 pm **Vat Photopolymerization of Highly Dielectric and Piezoceramic Materials *Industrial Contribution***
Martin Schwentenwein, Dominik Brouczek, Altan Altun, Christoph Hofstetter
Lithoz GmbH, Austria

2:25 pm **A New Approach of Shaping Dark Ceramics with High Density by Means of Simultaneous Material Extrusion and Green Machining *Industrial Contribution***
Siddharth Tiwari[1], Johannes Abel[2], Uwe Scheithauer[2], Axel Müller-Kühn[2], Alejandro Lejtman Rotberg[1]
[1]3DCeram Sinto Tiwari GmbH, Berlin, Germany; [2]Fraunhofer IKTS, Dresden, Germany

2:50 pm **Strength Testing of Additive Manufactured Ceramics – A Round Robin Using the CharAM-Methodology**
Maximilian Staudacher[1], Uwe Scheithauer[2], Maria Reichel[2], Nadine Lorenz[2], Martin Schwentenwein[3], Tanja Lube[1]
[1]Montanuniversität Leoben, Austria; [2]Fraunhofer IKTS Dresden, Germany; [3]Lithoz GmbH, Austria

3:15 pm – 4:00 pm **POSTER SESSION & COFFEE BREAK**
Room Einstein

POSTER SESSION

Room: Foyer
Session Chair: Uwe Scheithauer, Fraunhofer IKTS Dresden

01 **Comparative Evaluation of PBF-IR/P and PBF-LB/P for PA12**
David Torres, Simon Höhn, Jan Christoph Janhsen, Johannes Walz, Patrick Springer, Oliver Refle
Fraunhofer IPA, Stuttgart, Germany

02 **Highly Filled Conductive Polymer Composites for 3D-Printing**
Dirk Godlinski, Arne Haberkorn
Fraunhofer IFAM, Germany

03 **Comparison in Terms of Manufacturing and Microstructure of L-PBF-, Cold Spray-, and WAAM-additively Manufactured 17-4PH Steel**
Elisa Guimaraens[1], Stefan Gräfe[2], Ismail Ünsal[3], Aron Pfaff[1], Klaus Hoschke[1]
[1]*Fraunhofer EMI, Germany;* [2]*Fraunhofer IPT, Germany;* [3]*: Fraunhofer IGCV, Germany*

04 **Effects of Laser Angle and Melt Pool Dynamics on Mechanical Properties and Surface Quality in Overhang Areas of LPBF**
Michael Berghaus[1], Steffen Florian[1], Hilmar Apmann[1], Gerhard Gevelmann[1], Carolin Zinn[2], Axel von Hehl[2]
[1]*FH Münster, Germany;* [2]*Universität Siegen, Germany*

05 **Determination of Process Parameters Using Free Form Machine Control and Voxel-based Simulations**
Jan Scheumann, Vishnuu Jothi Prakash, Matthias Brueck
Fraunhofer IAPT, Germany

06 **Advanced Planning and Scheduling in the L-PBF Process Chain Using Reinforcement Learning**
Johannes Helmholz, Maximilian Vogt, Matthias Brück
Fraunhofer IAPT, Germany

07 **Synthetic Data Powered Computer Vision-based Applications in Additive Manufacturing**
Maximilian Vogt[1], Johannes Helmholz[1], Rafael Salgueiro Neves[2], Matthias Brück[1]
[1]*Fraunhofer IAPT, Germany;* [2]*Hamburg University of Technology TUHH, Germany*

08 **Optimizing Kinetic Energy Absorbers by Additive Manufacturing**
Aaron Pfaff, Konstantin Kappe, Markus Linnenberg
Fraunhofer EMI, Germany

SESSION 3.1

Session 3.1: Microstructure an Mechanical Properties of AM Parts

Room: Döblin I
Session Chair: Maximilian Staudacher, Montanuniversität Leoben

4:00 pm **Analysis of the Surface Finish on the Fatigue Strength of Additive Manufactured 16MnCr5 (1.7131) Steel**
Malte Kroeger[1], Maja Lehmann[1], Jochen Tenkamp[2], Frank Walther[3], Georg Schlick[1]
[1]Fraunhofer IGCV, Augsburg, Germany; [2]MAN Energy Solutions, Oberhausen, Germany; [3]Chair of Materials Test Engineering (WPT), TU Dortmund, Dortmund, Germany

4:25 pm **Investigating the Mechanical Properties of MEX-Composite PEEK Components for Cardiovascular Stentgrafts**
Marius Raphael Meyer[1], Lars Meyer[1,2], Stefan Kleszczynski[1,3]
[1]Chair of Manufacturing Technology, University of Duisburg-Essen, Duisburg, Germany; [2]AM Filament GmbH, Mülheim an der Ruhr, Germany; [3]CENIDE – Center for Nanointegration Duisburg-Essen, Germany

4:50 pm **Nanoalloyed Al5254 Alloy Manufactured by Powder Bed Fusion – Laser Beam: Microstructure and Mechanical Properties Analysis**
Wojciech Stopyra[1], Konrad Gruber[1], Karol Kobiela[1], Michał Karoluk[1], Emilia Grochowska[1], Marcin Kasprowicz[1,2], Iryna Smolina[1]
[1]Faculty of Mechanical Engineering, Wrocław University of Science and Technology, Poland; [2]WADIM PLAST Sp. z o. o., Poland

SESSION 3.2

Session 3.2: Sinter-based AM

Room: Döblin II
Session Chair: Cynthia Wirth, Siemens Energy Global GmbH & Co. KG

4:00 pm **Topography-driven Fluid Distribution for Improved Strength in Binder Jetting**
Lucas van den Bosch, Minjeong Choi, Christoph Hartmann, Patricia Erhard, Daniel Günther
Fraunhofer IGCV, Germany

4:25 pm **Investigation of the Flank Load Capacity for Binder Jetting Gears Made of 17-4PH**
Emil-Elias Breuer[1,2], Lukas Klee[1,2], Mareike Davidovic[1,2], Christian Westphal[1,2], Thomas Bergs[2,3]
[1]Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, Germany; [2]Manufacturing Technology Institute (MTI) of RWTH Aachen University, Germany; [3]Fraunhofer IPT, Germany

4:50 pm **Additive Manufactured High Frequency Filters for Future Communication Systems**
Thomas Studnitzky, Kay Reuter, Chongliang Zhong, Thomas Weißgärber
Fraunhofer IFAM Dresden, Germany

SESSION 3.3

Session 3.3: Quality in AM

Room: Ehrlich
Session Chair: Karl-Heinz Dusel, MTU Aero Engines AG

4:00 pm **Residual Stress Analysis by Neutron Diffraction – Nondestructive Measurement for Quality Control of Metal Additive Manufactured Parts**
Industrial Contribution
Sin Ting Cynthia Chang[1], Jan Capek[1,2], Florencia Malamud[1,2], Dario Puccio[3], Thomas Etter[4], Silke Ursula Bramann[3], Jan Schwerdtfeger[4]
[1]ANAXAM, Switzerland; [2]Paul Scherrer Institut, Switzerland; [3]Inspire AG, Switzerland; [4]Lincotek Additive, Switzerland

4:25 pm **Effect of Part Geometry on Thermal History and Mechanical Properties of Additively Manufactured 316L**
Michael Berghaus[1], Steffen Florian[1], Keyur Solanki[2], Carolin Zinn[2], Hongcai Wang[2], Benjamin Butz[2], Hilmar Apmann[1], Axel von Hehl[2]
[1]FH Münster, Germany; [2]Universität Siegen, Germany

4:50 pm **Assessment of Triply Periodic Minimal Surfaces Utilizing a Cutting Edge Process Chain**
Alex Selbmann[1], Leonhard Stampa[1,2], Emely Bortel[3], Moritz Valentino Huber[4], Deekshitha Kancharla[1,2], Moritz Greifzu[1], Sebastian Schettler[1], Bernhard Hesse[3], Elena López[1]
[1]Institute for Material and Beam Technology IWS, Fraunhofer IWS, Germany; [2]Institute of Materials Science, TU Dresden, Germany; [3]XPLORAYTION GmbH, Germany; [4]Hyperganic Pte. Ltd., Singapore

ASK AN EXPERT II

Which key developments have taken place in AM over the last 5 years (in terms of technology, materials or applications)?

DR. CYNTHIA WIRTH:

1) Higher number of lasers for L-PBF/M, bigger build envelops.
2) Support-free printing
3) Improved machine / sensor connectivity triggered significant improvements in in-printing quality.
4) More freedom for Laser (power and shape control.

PROF. ENRICO STOLL:

3D-Printed Rocket Engines are developed by several companies. They heavily on AM for thrust chambers, injectors, and entire rocket components. NASA has tested 3D printers on the ISS, paving the way for in-orbit manufacturing of tools and replacement parts. The Chair of Space Technology at TU Berlin performed some AM experiments under lunar gravity in a drop tower.

CONFERENCE DINNER @ WARTEHALLE

Wednesday, March 12, 2025, 7:30 pm

The DDMC 2025 conference dinner will take place at Wartehalle Berlin, a venue in the heart of Berlin that seamlessly blends historic charm with contemporary elegance.

Originally built in 1897 as part of a railway station, the Wartehalle has been carefully restored to preserve its industrial character while offering a stylish and modern setting. High ceilings, exposed brick walls, and warm lighting create an inviting atmosphere, setting the perfect stage for fine dining and engaging conversations. Guests can look forward to a culinary experience that fuses regional ingredients with international flavors. The evening promises to be a lively highlight of the conference and an excellent opportunity for mingling and networking with conference delegates from all over the world.

Meet us outside the hotel on the side of Alexanderplatz and join us on a 30-minute walk through old parts of the city of Berlin to the dinner location. Alternatively you can get there by public transport:

Take any west-bound city train (S-Bahn) to Friedrichstrasse (2 stops) and from there the north-bound underground train U6 to the station Naturkundemuseum (two stops). From there it's only a 5-minute walk to the Wartehalle.

Detailed information about different options will be available at the counter.

Meeting point, 6:45 pm
Outside the Park Inn Hotel facing Alexanderplatz

Address
Wartehalle Berlin
Julie-Wolfthorn-Straße 1
10115 Berlin

THURSDAY
MARCH 13, 2025

9:00 am – 10:15 am **PLENARY KEYNOTES II**
Location: Döblin I + II

Keynote 4
The Building Blocks of Digital Manufacturing: Functional Materials and Precise Deposition
Ben Hartkopp
Quantica, Berlin, Germany

Keynote 5
In-situ Monitoring in AM: Challenges and Opportunities to Unlock Real-time Qualification
Prof. Bianca Maria Colosimo
Politecnico di Milano, Italy

4:30 pm – 4:55 pm **CLOSING & BEST PAPER, BEST POSTER AND BEST PRESENTATION AWARD**
Location: Döblin I + II

ASK AN EXPERT III

What big challenges is AM facing in coming years?

PROF. ENRICO STOLL:

Autonomous AM in space or on planetary surfaces must operate under extreme environmental conditions without direct human intervention. Unlike terrestrial factories, these robotic AM systems will face challenges such as vacuum exposure, intense radiation, extreme temperature fluctuations, and abrasive planetary dust. To function effectively, these systems must integrate advanced AI-driven monitoring and error correction to detect print defects, adjust parameters in real time, and even repair failed components autonomously.

DR. CYNTHIA WIRTH:

Get rid of the "one software for all" solutions and allow more system integration of software, machine platforms, etc.

Better interoperability of systems: as manufacturing industry the adoption of distinct systems is key to address demand from different customers demand, which means operating a network of machines from different vendors.

SESSION 4.1

Session 4.1: Design for AM

Room: Döblin I

Session Chair: Russell Harris, Manchester Metropolitan University

10:45 am **On Resource Efficient and Individualized Tree Support Structures for PBF-LB/M by Process Simulation**

Jan Hünting[1], Jochen Michael[2], Claus Emmelmann[1], Tim Röver[1]

[1]Institut für Laser- und Anlagensystemtechnik (iLAS) der Technischen Universität Hamburg (TUHH); [2]Cenit AG, Germany

11:10 am **Towards Functional Lightweighting in Binder Jetting Additive Manufacturing**

Daniel Robert Juhasz[1,2], Mohsen K. Keshavarz[1], Amin Molavi-Kakhki[3], Mihaela Vlasea[1,2]

[1]Multi-Scale Additive Manufacturing Laboratory, Waterloo, Canada; [2]University of Waterloo, Waterloo, Canada; [3]Rio Tinto, Fer et Titane, Sorel-Tracy QC, Canada

11:35 am **Microstructure and Tensile Behavior of Ti6Al4V Gyroid TPMS Lattices: Influence of Unit Cell Size in LPBF Manufacturing**

Shivank A Tyagi, Manjaiah M

National Institute of Technology Warangal, India

12:00 pm – 1:30 pm **LUNCH BREAK**

SESSION 4.2

Session 4.2: Novel AM Materials

Room: Döblin II
Session Chair: Ligeia Paletti, DLR

10:45 am **The Influence of Multifunctional Dendritic Oligomers on Material Properties for Vat Polymerization**
Maximilian Frederick Flesch[1], Julius Alexander Funke[1], Klaus Kreuels[2]
[1]Fraunhofer ILT, Germany; [2]Chair for Laser Technology, RWTH Aachen University, Germany

11:10 am **Directed Energy Deposition of Functionally Graded Metal Matrix Composites: Ti6Al4V and TiC**
Maria Montero-Sistiaga, Maiana Michelena Arburua, Timo Osinga, Marc de Smit
NLR- Royal Netherlands Aerospace Centre, The Netherlands

11:35 am **Development of Bronze-bonded High-performance Diamond Grinding Tools Using the Additive Manufacturing Process Laser Powder Bed Fusion**
Eckart Uhlmann[1,2], Duc Anh Khuc[1]
[1]Institute for Machine Tools and Factory Management, Technische Universität Berlin, Berlin, Germany; [2]Fraunhofer IPK, Berlin, Germany

12:00 pm – 1:30 pm **LUNCH BREAK**

SESSION 4.3

Session 4.3: Digital AM Workflow

Room: Ehrlich
Session Chair: Cynthia Wirth, Siemens Energy Global GmbH & Co. KG

10:45 am **Exploring the Impact of Titanium Powder Aging through a Holistic Data Management *Industrial Contribution***
Peter Lindecke[1], Maximilian Kluge[2], Jan Eggert[3]
[1]amsight GmbH, Germany; [2]Fraunhofer IAPT, Germany; [3]implantcast GmbH, Germany

11:10 am **Development of an Automated and Continuous Data Extraction and Input Pipeline in AM for Simulation Processes Using Ontology-based Knowledge**
Florian Zumpe[1], Omid Safari[1], Marc Münnich[1], Yen Mai Thi[2], Ralph Riedel[2], Mario Callefi[3], Pierre Grzona[3], Daniel Seifert[3], Matthias Thürer[3]
[1]Fraunhofer IWU, Chemnitz, Germany; [2]Westsächsische Hochschule Zwickau, Germany; [3]Technische Universität Chemnitz, Germany

11:35 am **Material-driven Topology Optimization of Cold Plates and Heatsinks *Industrial Contribution***
Nicola Casari
ToffeeX, United Kingdom

12:00 pm – 1:30 pm **LUNCH BREAK**

SESSION 5.1

Session 5.1: Metal AM (LPBF) 2

Room: Döblin I
Session Chair: Ligeia Paletti, DLR

1:30 pm **Investigation of Repeatability of Flow Properties of PBF-LB/M Manufactured Channels *Industrial Contribution***
Patrick Luca Findeklee, Julius Schurb, Amirhossein Zayergolhin, Andreas Kreutzer
Siemens Energy AG, Germany

1:55 pm **Efficient LPBF-process Development by Design of Experiment**
Florian Bittner, Bernhard Müller, Juliane Thielsch
Fraunhofer IWU, Germany

2:20 pm **Model-based Process Optimisation Framework for Variable Process Parameters towards Homogeneous Ti6Al4V L-PBF Aerospace Components**
Tim Koenis[1], Emilio Haumahu[2], Maria Montero-Sistiaga[1], Marc De Smit[1], Wouter Van den Brink[1]
[1]Royal Netherlands Aerospace Centre (NLR), The Netherlands; [2]Eindhoven University of Technology (TU/e), The Netherlands

2:45 pm – 3:15 pm **COFFEE BREAK**

SESSION 5.2

Session 5.2: Metal AM (DED)

Room: Döblin II
Session Chair: Elena López, Fraunhofer IWS

1:30 pm **Application of Inherent Strain Simulation for DED-arc**
Industrial Contribution
Mareike Peschel, Robin Blank
GEFERTEC GmbH, Berlin, Germany

1:55 pm **Thermally Optimized Injection Molds through Multi-material and Conformal Cooling Using DED**
Thore Gericke, Sira Görns, Simon Hagemann, Alexander Mattes
Fachhochschule Kiel, Germany

2:20 pm **Development of Heating Strategies to Reduce Crack Formation in the Manufacturing Process of Tool Components Using Directed Energy Deposition**
Eike Tim Koopmann[1], Tim Jäger[1], Christoph Kaminsky[1], Henning Zeidler[2]
[1]Mercedes-Benz AG, Sindelfingen, Germany; [2]Institute for Machine Elements, Design and Manufacturing, TU Bergakademie Freiberg, Freiberg, Germany

2:45 pm – 3:15 pm **COFFEE BREAK**

SESSION 5.3

Session 5.3 Metal AM (EBM)

Room: Ehrlich
Session Chair: Karl-Heinz Dusel, MTU Aero Engines AG

1:30 pm **Electron Beam Powder Bed Fusion Technology for Mass Production**
Industrial Contribution
Ulric Ljungblad, Per Woxenius, Seshendra Karamchedu
Freemelt, Sweden

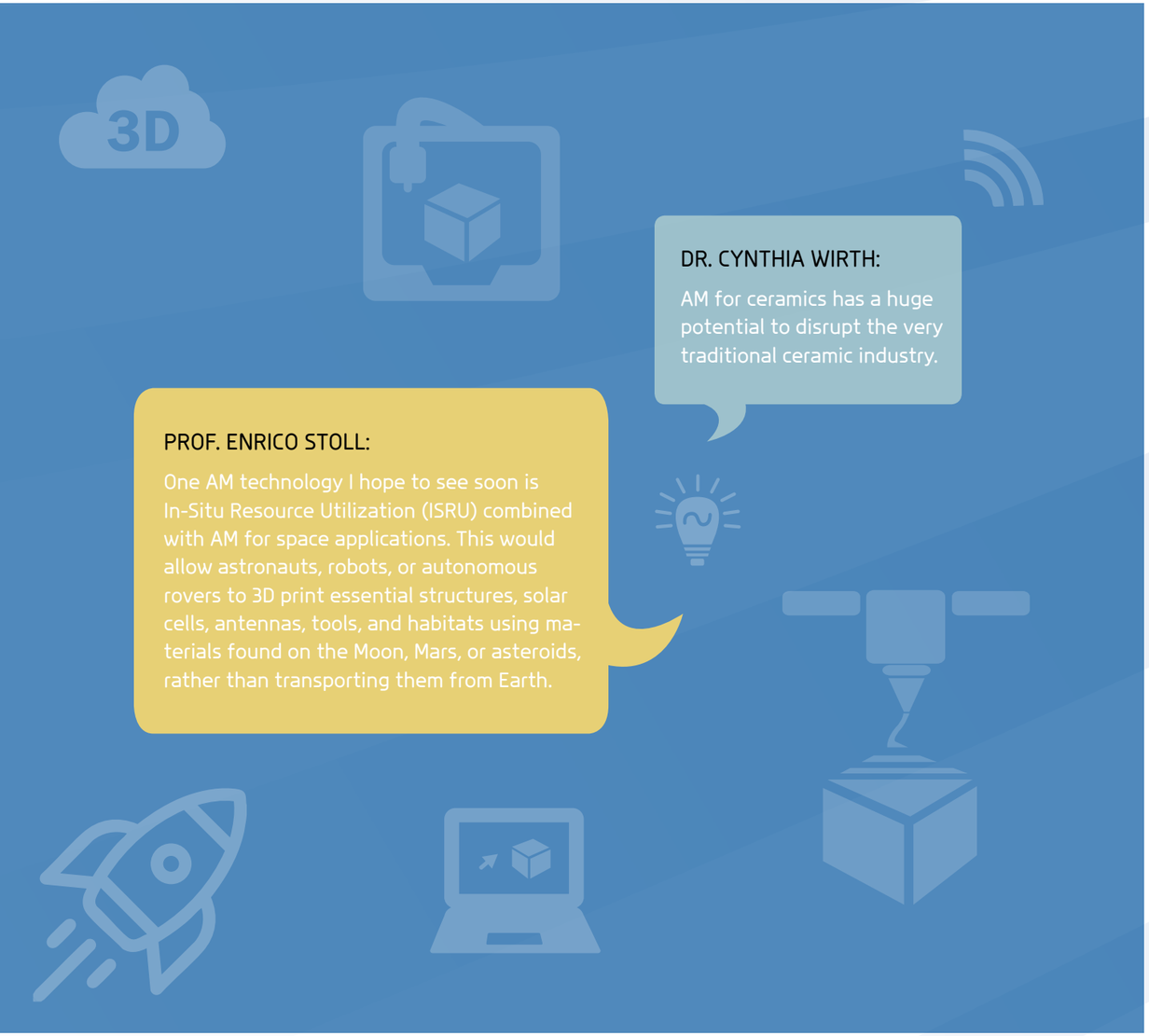
1:55 pm **In Situ CT Tensile Testing of PBF-EB Additively Manufactured Ti-5553 a Process-microstructure-defect Properties Study**
Julius Hendl[1,2], Axel Marquardt[1,2], Stepien Lukas[2], Elena Lopez[2], Frank Brückner[2,3], Christoph Leyens[1,2]
[1] Institute of Materials Science, Technische Universität Dresden, Germany; [2]Fraunhofer IWS, Dresden, Germany; [3]Luleå University of Technology, Sweden

2:20 pm **Additive Fabrication of Wear Resistant Components**
Alexander Kirchner[1], Marie Franke-Jurisch[1], Chongliang Zhong[1], Thomas Weißgärber[1,2]
[1]Fraunhofer IFAM, Dresden, Germany; [2]TUD Dresden University of Technology, Germany

2:45 pm – 3:15 pm **COFFEE BREAK**

ASK AN EXPERT IV

Of the many possibilities for AM technology, which one do you expect or hope to really break through in the near future?



SESSION 6.1

Session 6.1: AM Process Monitoring

Room: Döblin I
Session Chair: Claus Aumund-Kopp, Fraunhofer IFAM

3:15 pm **Application of Eddy Current Technology for In-situ Process Monitoring of Lattice Structures Manufactured by Powder Bed Fusion**
Industrial Contribution
Bernard Revaz[1], Jonatan Wicht[1], Fabian Rieß[2], Maximilian Heinz[2], Elija von Le Suire[2]
[1]AMiquam SA, Switzerland; [2]TH Rosenheim, Germany

3:40 pm **A Study on the Use of Computer Vision for Fault Monitoring in Polymer-based Additive Manufacturing**
Milad Sedaghat Herfeh, Peter Engel
Ostfalia, Germany

4:05 pm **Development of Process Monitoring Tools Using Open Software for LPBF Systems**
Isidro Rivero, Sergi Bafaluy, Pilar Cartejon
Leitat, Spain

4:30 pm – 4:55 pm **CLOSING & BEST PAPER, BEST POSTER AND BEST PRESENTATION AWARD**

SESSION 6.2

Session 6.2: AM Process Innovations

Room: Döblin II
Session Chair: Elena López, Fraunhofer IWS

3:15 pm **Extending the Value Chain of Industrial LPB-F Systems – Insights into the Industrialization of a Powder Bed-based Hybrid Repair Process via Minimally IInvasive Retrofit Technology *Industrial Contribution***
Simon Feicks, Clemens Miaskowksi
additiveStream4D GmbH, Germany

3:40 pm **Prediction of Aluminium Alloy Printability by Molten Metal Jetting with Piezo-actuation Using Dimensionless Numbers**
Julia Förster[1], Lukas Graf[1], Chandrew Aseervatham[2], Arne Mendel[2], Ismail Ünsal[1], Georg Schlick[1]
[1]Fraunhofer IGCV, Germany; [2]Gutmann Aluminium Draht GmbH, Germany

4:05 pm **Predicting Powder Spreadability for Metal AM *Industrial Contribution***
Hassoun Ishak
Granutools, Belgium

4:30 pm – 4:55 pm **CLOSING & BEST PAPER, BEST POSTER AND BEST PRESENTATION AWARD**

SESSION 6.3

Session 6.3: AM Process Simulation

Room: Ehrlich
Session Chair: Ligeia Paletti, DLR

3:15 pm **Optimizing Polymer 3D Printing: A One-dimensional Simulation Approach to Enhance PBF-LB/P Process Efficiency**
Claas Bierwisch[1], Bastien Dietemann[1], Moritz Grünewald[2], Christian Schlör[3], Johannes Rudloff[3]
[1]Fraunhofer IWM, Germany; [2]Fraunhofer IPA, Germany; [3]German Plastics Center SKZ, Germany

3:40 pm **Part-scale Thermomechanical Modeling of Directed Energy Deposition**
Vaibhav Nain
IREPA LASER, France

4:05 pm **Mesoscopic Homogenization Method of Mechanical Parameters of Fused Filament Fabrication Structures Considering Void Shapes and Filament Interfaces**
Marlies Springmann, Peter Middendorf
Institute of Aircraft Design, University of Stuttgart, Germany

4:30 pm – 4:55 pm **CLOSING & BEST PAPER, BEST POSTER AND BEST PRESENTATION AWARD**

ABOUT BERLIN

BERLIN… DISCOVER THE CITY!

Some call it wild, colorful, and full of surprises, while others find it a little too hectic and gruff. Berlin is intriguing because it is so versatile and so multi-faceted. Differences are more extreme, conflicts more tangible, and problems larger than they are elsewhere. Yet even Berlin's contradictions are part of its appeal.

Since the fall of the wall in 1989, the city center around Potsdamer Platz has been completely rebuilt and rehabilitated to its former position as the city's governmental and commercial center. Many iconic buildings pepper the area, including the "Bundeskanzleramt", presently home to Chancellor Angela Merkel, and a new central railway station, Europe's largest crossing station. Germany's parliament, the Reichstag, was restored and the inclusion of its famous glass dome, designed by Sir Norman Foster, was considered by some as intended to signal a new era of social and governmental transparency.

Over 4.5 million people live in Berlin; the majority in single-person households. Berlin is Germany's, if not melting pot, then salad bowl of cultures, religions and lifestyles. Berlin counts as its own residents from more than 150 nations and is home to the largest Turkish community outside Turkey, which has led to the Kreuzberg district's nickname »Little Istanbul«.

Take a walk around the 12 districts to get the size of this multicultural city, or do like the locals and hop on a bicycle – Berlin is arguably second only to Amsterdam as Europe's cycling capital. Traditional sightseeing tours in an open double-decker bus start at Alexanderplatz, right around the corner from the conference venue.

Berlin is a leading center of science, academics, and research, not least thanks to its 39 institutions of higher education, including four universities, with more than 160,000 students. And science and industry cooperate closely at the two technology parks in Adlershof and Berlin-Buch. Germany's national research organizations are represented in Berlin with a number of institutes, among them seven Fraunhofer institutes.

IMPRINT

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