



ICAM2022

ASTM INTERNATIONAL CONFERENCE ON ADDITIVE MANUFACTURING

RESEARCH TO APPLICATION THROUGH STANDARDIZATION

FULL PROGRAM AGENDA

OCTOBER 31 – NOVEMBER 4, 2022
ORLANDO, FL

JW MARRIOTT ORLANDO
BONNET CREEK RESORT & SPA

WWW.AMCOE.ORG/ICAM2022

PROGRAM OVERVIEW

Ballroom	Time	Monday	Tuesday	Wednesday	Thursday	Friday
Griffin A Level 1	A.M.	Electronics	Defense	Keynote Presentations and Panel Discussion	Non-destructive Evaluation	Non-destructive Evaluation
	P.M.	Electronics	Defense	Economics & Sustainability	Non-destructive Evaluation	Non-destructive Evaluation
Griffin B Level 1	A.M.	Polymers	Aviation	Keynote Presentations and Panel Discussion	Microstructural Aspects of AM	Microstructural Aspects of AM
	P.M.	Polymers	Aviation	Aviation	Microstructural Aspects of AM	Microstructural Aspects of AM
Griffin C Level 1	A.M.	Fatigue & Fracture	Fatigue & Fracture	Keynote Presentations and Panel Discussion	Space	Directed Energy Deposition
	P.M.	Fatigue & Fracture	Fatigue & Fracture	Fatigue & Fracture	Space	Directed Energy Deposition
Cypress Level 1	A.M.	General Topics in AM	General Topics in AM	—	Design, Modeling, and Simulation	Industry 4.0: Artificial Intelligence/Machine Learning
	P.M.	General Topics in AM	General Topics in AM	General Topics in AM	Design, Modeling, and Simulation	Design, Modeling, and Simulation
Dogwood Level 1	A.M.	Ceramics	Construction	—	Process Control/ In-Situ Monitoring	Industry 4.0: Cyber Security
	P.M.	—	Construction	Construction	Process Control/ In-Situ Monitoring	Process Control/ In-Situ Monitoring
Cardinal Level 1	A.M.	Student Presentation Competition	Medical	—	Environmental Aspects of AM	Energy/Maritime/Oil & Gas
	P.M.	Student Presentation Competition	Medical	Medical	Environmental Aspects of AM	Energy/Maritime/Oil & Gas
Ibis Level 2	A.M.	Student Presentation Competition	Mechanical Testing	—	Sinter-Based AM	—
	P.M.	Student Presentation Competition	Mechanical Testing	Mechanical Testing	Sinter-Based AM	—
Osprey Level 2	A.M.	Student Presentation Competition	Industry 4.0: Data Management	—	AM Feedstock	Transportation/ Heavy Machinery
	P.M.	Student Presentation Competition	Industry 4.0: Data Management	Robotics & Automation	AM Feedstock	AM Feedstock
Griffin D Level 1	A.M.	—	10:30 Panel: Feedstock	Keynote Presentations and Panel Discussion	10:30 Panel: Aviation	10:30 Panel: Space
	P.M.	1:30 Panel: Medical 3:30 Panel: Construction	1:30 Panel: Economics	1:30 Panel: In-Situ Monitoring 3:30 Panel: Defense	1:30 Panel: Energy	—

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WELCOME TO ICAM 2022

Before additively manufactured parts can be used in safety-critical applications, a clear understanding and predictive capabilities of the entire process chain and feedstock-process-structure-property-performance relationships must be established. ICAM 2022 will be the largest ASTM International scientific conference and intended to provide a forum for the exchange of ideas and to transition the research to applications, focusing on the need for industry-specific standards and design principles as well as challenges with qualification and certification.

The first event, a May 2016 workshop, was sponsored by the committee on fatigue and fracture (E08) in San Antonio, Texas. The second event, a November 2017 symposium, was sponsored by E08 committee and the committee on additive manufacturing technologies (F42) in Atlanta, Georgia. The third event in November 2018, sponsored by the F42, E08, and E07 (nondestructive testing) committees, was held in the Washington, D.C. After the creation of ASTM International Additive Manufacturing Center of Excellence (AM CoE) in 2018 and the growth of the additive manufacturing industry, the 4th event, held in Washington, D.C. area in 2019, was led by the AM CoE and dozens of involved additional technical committees. In 2020, the ASTM AM CoE decided to offer this gathering as a major conference. The ASTM International Conference on Additive Manufacturing (ICAM 2020) included 19 symposia and 10 panels, held over 5 days with 5 parallel sessions. Due to the pandemic, the ICAM 2020 was organized virtually with over 300 presentations and close to 600 participants. ICAM 2021 grew to a hybrid event held in Anaheim, CA and online, in November 2021 with over 850 participants, including 26 symposia, 11 panel discussions, and 7 keynote addresses.

This year's event, the ASTM International Conference on Additive Manufacturing (ASTM ICAM 2022), will have a broader scope related to standardization, qualification, and certification of AM products. This event will involve even more ASTM committees and external stakeholders, setting the stage to bring experts from around the world to exchange the latest developments in the field of additive and advanced manufacturing towards the 4th industrial revolution. We invite the entire community to join us for the exchange of ideas, to learn about the most recent advancements in the field, and to be a part of the journey for transitioning research to application through standardization.

ICAM Co-Chairs



Nima Shamsaei
Auburn University



Mohsen Seifi
ASTM International

SCIENTIFIC ORGANIZING COMMITTEE

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Kareem Aggour
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Johnson &
Johnson, Ireland

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Louisiana State
University, USA

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EWI, USA

Ajay Krishnan
EWI, USA

Aaron LaLonde
US Army, USA

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General Motors, USA

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University London, UK

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Systems Command, USA

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Relativity Space, USA

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Doug Wells
NASA MSFC, USA

Brian West
NASA, USA

Mark Yampolskiy
Auburn University, USA

ICAM TIMETABLE (EASTERN TIME)

OCT/NOV 2022						
S	M	T	W	T	F	S
30	31	1	2	3	4	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

ICAM Conference

Monday – 8 a.m. to 5 p.m.

Tuesday – 8 a.m. to 5 p.m.

Wednesday – 8 a.m. to 5 p.m.

Thursday – 8 a.m. to 5 p.m.

Friday – 8 a.m. to 5 p.m.

OCT/NOV 2022						
S	M	T	W	T	F	S
30	31	1	2	3	4	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Exhibit Hours

Monday – 8 a.m. to 5 p.m.

Tuesday – 8 a.m. to 6 p.m.

Wednesday – 8 a.m. to 6 p.m.

Thursday – 8 a.m. to 6 p.m.

Friday – 8 a.m. to 11 a.m.

OCT/NOV 2022						
S	M	T	W	T	F	S
30	31	1	2	3	4	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Registration Hours

Sunday – 2 p.m. to 5 p.m.

Monday – 7 a.m. to 5 p.m.

Tuesday – 7 a.m. to 5 p.m.

Wednesday – 7 a.m. to 5 p.m.

Thursday – 7 a.m. to 5 p.m.

Friday – 7 a.m. to 12 p.m.

OCT/NOV 2022						
S	M	T	W	T	F	S
30	31	1	2	3	4	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Networking Events

Tuesday

Happy Hour – 5 p.m. to 6 p.m.

Women in 3D Printing

Happy Hour – 6 p.m. to 7:30 p.m.

Wednesday

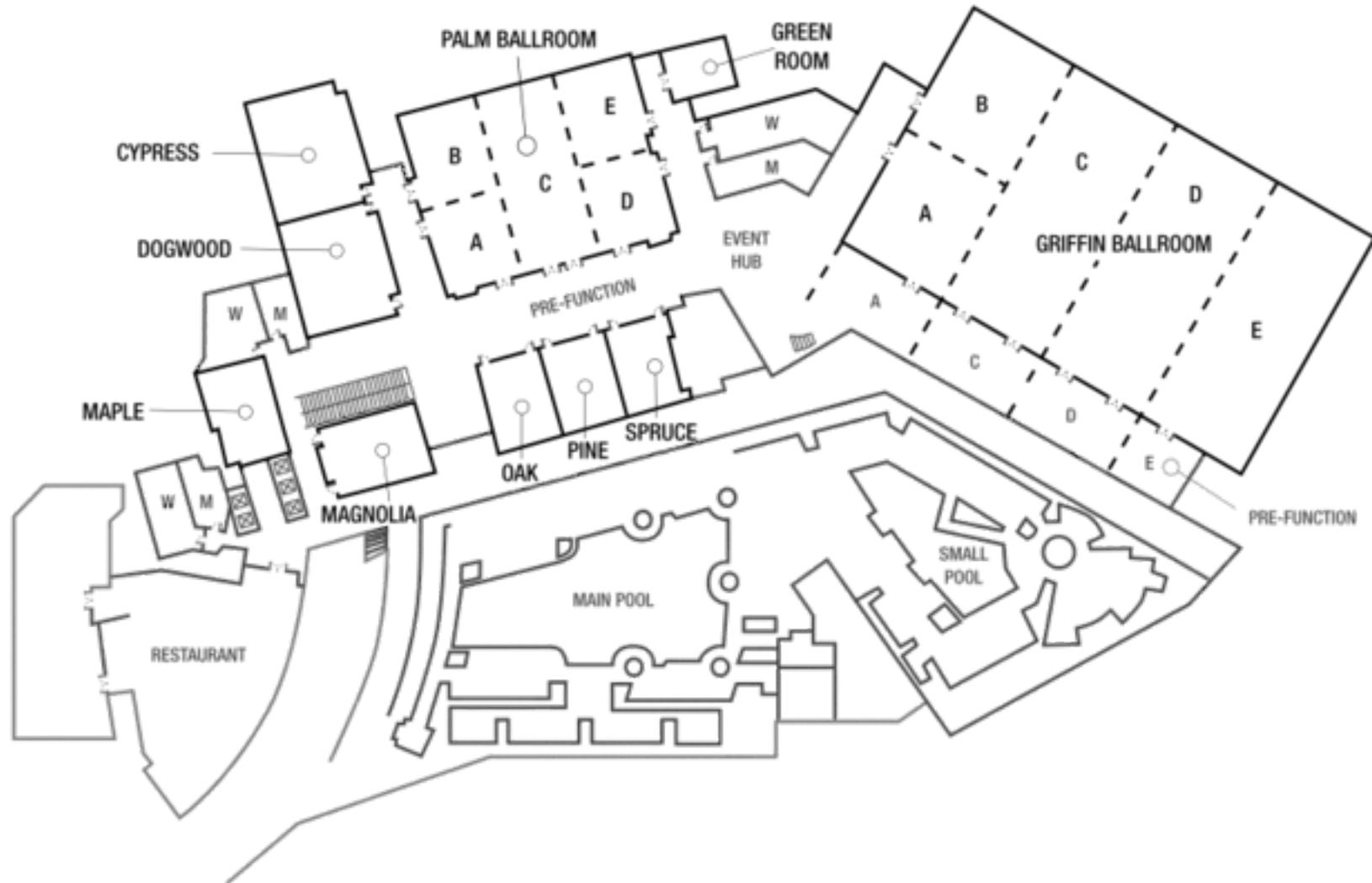
Happy Hour – 5 p.m. to 6 p.m.

ICAM 2022 Awards Ceremony
and Networking Reception –
6 p.m. to 7:30 p.m.

Thursday

Happy Hour – 5 p.m. to 6 p.m.

LEVEL 1



LEVEL 2



ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



PROGRAM OVERVIEW & TIMETABLE

Click on any symposium/panel title to jump directly to the list of presentations and program schedule.

MONDAY 31 OCTOBER 2022		TUESDAY 1 NOVEMBER 2022		WEDNESDAY 2 NOVEMBER 2022		THURSDAY 3 NOVEMBER 2022		FRIDAY 4 NOVEMBER 2022	
AM PM	STUDENT PRESENTATION COMPETITION 01	AM PM	AM APPLICATIONS IN AVIATION	PM	AM APPLICATIONS IN AVIATION	AM PM	NON-DESTRUCTIVE EVALUATION METHODS FOR AM	AM PM	NON-DESTRUCTIVE EVALUATION METHODS FOR AM
AM PM	STUDENT PRESENTATION COMPETITION 02	AM PM	APPLICATION OF AM IN CONSTRUCTION ON EARTH AND BEYOND	PM	APPLICATION OF AM IN CONSTRUCTION ON EARTH AND BEYOND	AM PM	MICROSTRUCTURAL ASPECTS OF AM	AM PM	MICROSTRUCTURAL ASPECTS OF AM
AM PM	STUDENT PRESENTATION COMPETITION 03	AM PM	APPLICATION OF AM IN THE MEDICAL INDUSTRY	PM	APPLICATION OF AM IN THE MEDICAL INDUSTRY	AM PM	DESIGN, MODELING, AND SIMULATION METHODOLOGIES AND CONCEPTS FOR AM	PM	DESIGN, MODELING, AND SIMULATION METHODOLOGIES AND CONCEPTS FOR AM
AM PM	AM FOR ELECTRONIC APPLICATIONS	AM PM	MECHANICAL TESTING OF AM MATERIALS	PM	MECHANICAL TESTING OF AM MATERIALS	AM PM	PROCESS CONTROL AND IN-SITU MONITORING TECHNIQUES IN AM	PM	PROCESS CONTROL AND IN-SITU MONITORING TECHNIQUES IN AM
AM PM	3D PRINTED POLYMERS AND POLYMER MATRIX COMPOSITES	AM PM	AM FOR DEFENSE APPLICATIONS	PM	ECONOMICS AND SUSTAINABILITY OF AM	AM PM	AM FEEDSTOCK: CHARACTERIZATION, SPECIFICATION AND REUSE	PM	AM FEEDSTOCK: CHARACTERIZATION, SPECIFICATION AND REUSE
AM PM	AM OF CERAMICS: CHALLENGES & OPPORTUNITIES	AM PM	INDUSTRY 4.0: DATA MANAGEMENT FOR AM	PM	ROBOTICS, AUTOMATION AND ADDITIVE MANUFACTURING	AM PM	AM FOR SPACE APPLICATIONS	AM PM	DIRECTED ENERGY DEPOSITION TECHNIQUES
AM PM	FATIGUE AND FRACTURE OF AM MATERIALS AND PARTS	AM PM	FATIGUE AND FRACTURE OF AM MATERIALS AND PARTS	PM	FATIGUE AND FRACTURE OF AM MATERIALS AND PARTS	AM PM	ENVIRONMENTAL EFFECTS ON AM PARTS	AM PM	APPLICATION OF AM IN ENERGY, MARITIME AND OIL & GAS
AM PM	GENERAL TOPICS IN AM: MATERIALS AND PROCESSING, POST-PROCESSING, & SAFETY	AM PM	GENERAL TOPICS IN AM: MATERIALS AND PROCESSING, POST-PROCESSING, & SAFETY	PM	GENERAL TOPICS IN AM: MATERIALS AND PROCESSING, POST-PROCESSING, & SAFETY	AM PM	SINTER-BASED AM TECHNOLOGIES	AM	INDUSTRY 4.0: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN AM
AM	PANEL – MEDICAL [13:30 PM]	AM	PANEL – FEEDSTOCK [10:30 AM]	AM	KEYNOTES	AM	PANEL – AVIATION [10:30 AM]	AM	INDUSTRY 4.0: CYBER SECURITY ASPECTS OF AM
AM PM	PANEL – CONSTRUCTION [15:30 PM]	PM	PANEL – ECONOMICS [13:30 PM]	PM	PANEL – MONITORING [13:30 PM]	PM	PANEL – ENERGY [13:30 PM]	AM	AM APPLICATIONS FOR AUTOMOTIVE TRANSPORTATION/ HEAVY MACHINERY
-	-	-	-	PM	PANEL – DEFENSE [15:30 PM]	-	-	AM	PANEL – SPACE [10:30 AM]
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

Note: This agenda features a list of accepted presenters for ICAM 2022 and their presentation timeslots. The order of presentation for each symposium is also as per the order reflected on the agenda. Please contact us at icam@astm.org if you need more information.

ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



CENTER of
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STUDENT PRESENTATION COMPETITION

31ST OCT 2022 (MON)
CARDINAL (LEVEL 2)

31ST OCTOBER 2022

SESSION CHAIR (AM SESSION):

Nik Hrabe, NIST

SESSION CHAIR (PM SESSION):

Joy Gockel, Colorado School of Mines

08:00 AM STUDENT **Fatigue Behavior and Modeling of Additively Manufactured IN718: The Effect of Surface Treatments and Surface Measurement Techniques**

Seungjong Lee¹; Shuai Shao¹; Douglas Wells²; Miroslav Zetek³; Miloslav Kepka³; Nima Shamsaei¹; ¹Auburn University; ²NASA - Marshall Space Flight Center (MSFC); ³University of West Bohemia

08:15 AM STUDENT **Microstructure and Mechanical Properties of Additively Manufactured Duplex Stainless Steel**

Maxime Piras¹; Anis Hor¹; Eric Charkaluk²; ¹Institut Clément Ader (ICA, CNRS UMR 5312); ²Laboratoire de Mécanique des Solides (LMS, CNRS UMR 7649)

08:30 AM STUDENT **Corrosion Performance of Additively Manufactured 316L Stainless Steel Produced by Feedstock Modification**

Venkata Bhuvaneshwari Vukkum¹; Rajeev K. Gupta¹; Jijo Christudasjustus¹; Ahmed A. Darwish¹; Furkan Ozdemir¹; Steven Storck²; ¹North Carolina State University; ²Johns Hopkins University - Applied Physics Laboratory (JHU - APL)

08:45 AM STUDENT **Influence of the L-PBF Bead Dimensions on Part Dimensional Accuracy**

Lucas Fournet-Fayard^{1,2}; Charles Cayron¹; Imade Koutiri²; Anne-Françoise Obaton¹; ¹Laboratoire National de Métrologie et d'Essais (LNE); ²Arts et Métiers ParisTech - PIMM

09:00 AM STUDENT **In-Situ Failure Analysis of Lattice Structures**

Elliott Jost¹; Christopher Saldana¹; ¹Georgia Institute of Technology

09:15 AM STUDENT **HCF and VHCF Fatigue Behavior of Additively Manufactured Inconel 718: Effects of Stress-Relieving, Surface Roughness, and Build Orientation**

Muztahid Muhammad¹; Palmer Frye²; Jutima Simsiriwong²; Shuai Shao¹; Nima Shamsaei¹; ¹Auburn University; ²University of North Florida

09:30 AM STUDENT **The Effects of Perturbation on the Energy Absorption Properties of Single and Dual-Phase Cellular Structures**

Irving E. Ramirez-Chavez¹; Dhruv Bhate¹; ¹Arizona State University

09:45 AM STUDENT **Characterization of Pure Photopolymers and Suspensions for Digital Light Processing (DLP)**

Rajat Chaudhary¹; Carlo Antonini¹; ¹Università degli Studi di Milano-Bicocca

10:00 AM BREAK

10:30 AM STUDENT **Using Machine Learning to Model the Influence of Porosity and Build Parameters on Fatigue of AM IN718**

Alexander N. Caputo¹; Rick Neu¹; Chaitanya Vallabh²; Xiayun Zhao²; ¹Georgia Institute of Technology; ²University of Pittsburgh

10:45 AM STUDENT **High Cycle Fatigue Fractographic Pattern Recognition for Additively Manufactured and Rolled Inconel 718**

Nicole Van Handel¹; Paul Paradise¹; Shenghan Guo¹; Dhruv Bhate¹; ¹Arizona State University

11:00 AM STUDENT **In Situ Process Monitoring of Powder Bed Fusion of Metals using Eddy Current Testing**

Marvin Spurek¹; Adriaan Spierings¹; Bernard Revaz²; Gilles Santi²; Marc Lany²; Jonatan Wicht²; Konrad Wegener³; ¹inspire - ETH Zürich; ²AMIQUM; ³ETH Zürich

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- | | | | |
|---|--|---|---|
| <p>11:15 AM
STUDENT</p> | <p>Field Driven Design of TPMS Cellular Structures for Energy Absorption
Mandar Shinde¹; Irving E. Ramirez-Chavez¹; Dhruv Bhate¹; ¹Arizona State University</p> | <p>14:15 PM
STUDENT</p> | <p>Alumina Microlattice/Epoxy Composites with Ultrahigh Strength and Energy Absorption
Yida (Ryan) Zhao¹; Zehui Du²; Chee Lip Gan¹; ¹Nanyang Technological University (NTU); ²Temasek Laboratories@NTU</p> |
| <p>11:30 AM
STUDENT</p> | <p>Texture Dependent Micromechanical Anisotropy of Laser Powder Bed Fused Inconel 718
Jakob Schröder¹; Jan Čapek²; Giovanni Bruno¹; Gunther Mohr¹; Itziar Serrano-Munoz¹; Alexander Evans¹; Efthymios Polatidis²; ¹Bundesanstalt für Materialforschung und -prüfung (BAM); ²Paul Scherrer Institut (PSI)</p> | <p>14:30 PM
STUDENT</p> | <p>Accelerated Creep Testing of Electron Beam Melted Ti-6Al-4V
Jacob T. Pellicotte¹; Md Abir Hossain¹; Jaime Cano¹; David Alexander¹; Calvin M. Stewart¹; ¹University of Texas at El Paso</p> |
| <p>11:45 AM
STUDENT</p> | <p>Effect of Post Processing Treatments on the Stress Corrosion Cracking Behavior of AM 7050 Aluminum Alloy
Rupesh Rajendran¹; Crosby T. Owens²; Jeffrey D. Eisenhaure²; David Spain²; Brant E. Stoner²; Alex H. Kinsey²; Preet M. Singh¹; ¹Georgia Institute of Technology; ²Northrop Grumman</p> | <p>14:45 PM
STUDENT</p> | <p>The Development of a Standard Measurement Practice for the Load-Bearing Cross-Sectional Areas of Mechanical Testing Coupons Fabricated by Additive Manufacturing
Sarah G. Bennett¹; Jorge Ramirez Lujan¹; Garrison Hommer¹; Joy Gockel¹; ¹Colorado School of Mines - ADAPT</p> |
| <p>12:00 PM
STUDENT</p> | <p>A Novel Robust Machine Learning Approach for In-Situ Detection of Complex Shape Deviations in AM
Matteo Bugatti¹; Bianca Maria M. Colosimo¹; Marco Grasso¹; ¹Politecnico di Milano</p> | <p>15:00 PM</p> | <p>END OF DAY</p> |
| <p>12:15 PM</p> | <p>LUNCH</p> | | |
| <p>13:30 PM
STUDENT</p> | <p>Effects of Various Post-Processing Methods on the Fatigue Life of Laser Powder Bed Fused Ti-6Al-4V
Lauren Ednie¹; Robert Lancaster¹; Mahesh Mani²; ¹Swansea University; ²GKN Aerospace</p> | | |
| <p>13:45 PM
STUDENT</p> | <p>Relationships between Melting Behavior and Resulting Surface Roughness for Laser Powder Bed Fusion
Edwin Glaubitz¹; Joy Gockel¹; Jason Fox²; Orion L. Kafka²; ¹Colorado School of Mines; ²NIST</p> | | |
| <p>14:00 PM
STUDENT</p> | <p>Additive Manufactured Composite Parts with Tailored Properties in Each Layer
Gary Mac¹; Nikhil Gupta¹; ¹New York University - Tandon School of Engineering</p> | | |

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STUDENT PRESENTATION COMPETITION

31ST OCT 2022 (MON)
IBIS (LEVEL 2)

31ST OCTOBER 2022

SESSION CHAIR (AM SESSION):

Alberto Bordin, ASTM International

SESSION CHAIR (PM SESSION):

Swee Leong Sing, NUS

- 08:00 AM STUDENT** **From Lattice Sub-Unit Elements toward Fatigue-Optimized Spinal Implants**
[Simone Murchio](#)¹; [Raffaele De Biasi](#)¹; [Gianluca Zappini](#)²; [Damiano Pasini](#)³; [Devid Maniglio](#)¹; [Matteo Benedetti](#)¹; ¹Università di Trento; ²Lincotek Medical; ³McGill Univeristy
- 08:15 AM STUDENT** **Crack Reduction in Selective Laser Melting Fabricated Inconel 939 with Si Addition**
[Huan Ding](#)¹; [Bin Zhang](#)¹; [Congyuan Zeng](#)¹; [Wen Jin Meng](#)¹; [Shengmin Guo](#)¹; ¹Louisiana State University
- 08:30 AM STUDENT** **Heat Treatment Effects on Metallographic and Mechanical Characteristics of Additive-Manufactured Anterior Cervical Interbody Fusion Cage with Bone-like Porous Structure**
[Jinju Jang](#)^{1,2}; [Dohyung Lim, Sr.](#)^{1,3}; [Taeyang Kwak](#)⁴; [Young Chul Kim](#)⁵; ¹RNX; ²Yonsei University; ³Sejong University; ⁴Ruantech; ⁵Kyungpook National University
- 08:45 AM STUDENT** **Optimizing Bending Strength of CF-PEKK for Fracture Fixation**
[Aliza Rabinowitz](#)¹; ¹Drexel University
- 09:00 AM STUDENT** **Additive Manufacturing of Highly Filled Resins with Tailored Particle Size Distribution via the Digital Light Processing Technique**
[Antoine Delarue](#)¹; [Amy M. Peterson](#)¹; [Christopher J. Hansen](#)¹; ¹University of Massachusetts Lowell

- 09:15 AM STUDENT** **Impact of Usage Cable Driven Parallel Robot for Large Scale Concrete 3D Printing**
[Suad A. Alhaj Mustafa](#)¹; [Rashid Abu Al-Rub](#)¹; [Bashar Khasawneh](#)²; [Federico Renda](#)²; ¹Khalifa University - ADAM Center; ²Khalifa University
- 09:30 AM STUDENT** **Optimization of 3D-Printing Parameters to Minimize Shape Error in the Fabrication of Micro-Sized and Irregular Ti-6Al-4V Porous Structure for Orthopedics**
[Hunyeong Ban](#)^{1,2,3}; [Dohyung Lim, Sr.](#)^{1,2}; [Jong-Chul Park](#)³; [Joohee Son](#)²; [Nara Youn](#)²; ¹RNX; ²Sejong University; ³Yonsei University
- 09:45 AM STUDENT** **Optimisation of Processing Parameters for LPBF of NdFeB Permanent Magnets for Aerospace Applications**
[Yong Rong Chan](#)¹; [Jerry Ying Hsi Fuh](#)²; [Heow Pueh Lee](#)²; [Sankaranarayanan Seetharaman](#)¹; ¹A*STAR - Advanced Remanufacturing and Technology Centre (ARTC), ²National University of Singapore (NUS)
- 10:00 AM BREAK**
- 10:30 AM STUDENT** **Effect of Microstructure Control on Mechanical Properties of 3D-Printed Zr-Cu-Al-Co Bulk Metallic Glass**
[Yu-Ping Wang](#)¹; [Che-Nan Kuo](#)¹; ¹National Sun Yat-sen University
- 10:45 AM STUDENT** **Relationships between Powder Rheology and Powder Feeder Configurations in Cold Spray**
[Jack Grubbs](#)¹; [Bryer Sousa](#)¹; [Aurélien Neveu](#)²; [Filip Francqui](#)²; [Danielle Cote](#)¹; ¹Worcester Polytechnic Institute; ²Granutools
- 11:00 AM STUDENT** **Design and Optimization of High Energy Absorption Ti6Al4V Alloys with Gradient Porosity Structure Fabricated by Laser Powder Bed Fusion**
[Yu-Yao Chan](#)¹; [Che-Nan Kuo](#)¹; ¹National Sun Yat-sen University

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Updated as of 28th October 2022



CENTER of
EXCELLENCE
Research to Standards

11:15 AM
STUDENT **An Investigation into the Tensile and Fatigue Behaviors of Additively Manufactured Titanium Alloys**
[Mohammad Salman Yasin](#)¹; Arash Soltani-Tehrani¹; Shuai Shao¹; Nima Shamsaei¹; ¹Auburn University

11:30 AM
STUDENT **A Comparison of Mechanical Properties for As-Built and HIP'd Additively Manufactured Stainless Steel 316L**
[Rory J. Douglas](#)¹; Robert Lancaster¹; Jack Adams²; ¹Swansea University; ²Rolls-Royce

11:45 AM
STUDENT **Microstructure Evolution and Mechanical Response of 3D Printed Cu-Cr-Nb Alloys**
[Dong Han Liu](#)¹; Che-Nan Kuo¹; ¹National Sun Yat-sen University

12:00 PM
STUDENT **Impact of Porosity Levels on the Mechanical Properties of Laser Powder Bed Fused Gyroid Structures**
[Bharath Bhushan Ravichander](#)¹; Sumanth Theeda¹; Shweta Hanmant Jagdale¹; Golden Kumar¹; ¹University of Texas at Dallas

12:15 PM **LUNCH**

13:30 PM
STUDENT **Additively Manufactured Inconel 718 in Thin-Wall and Narrow Flow Channel Geometries: Effects of Post-Processing and Geometry on Tensile and Fatigue Behaviors**
[Nabeel Ahmad](#)¹; Shuai Shao¹; Nima Shamsaei¹; ¹Auburn University

13:45 PM
STUDENT **Cracking Sensitivity Reduction of Directed Energy Deposited Cobalt-Based Superalloys by a Microstructure Control**
[Thibaut Froeliger](#)¹; Louise Toualbi¹; Didier Locq¹; Thomas Elcrin²; Rémy Dendievel³; ¹ONERA (The French Aerospace Lab); ²AddUp; ³Science et Ingénierie des Matériaux et Procédés (SIMaP)

14:00 PM
STUDENT **Interfacial Characterization of Stainless Steel 420 and Inconel 718 Multi-Material Structures**
[Beytullah Aydogan](#)¹; [Himanshu Sahasrabudhe](#)¹; ¹Michigan State University

14:15 PM
STUDENT **Material Characterization and Reduction of Thermal Deformation of Continuous Carbon Fiber Reinforced Polyether-ether-ketone (PEEK) Parts Produced by Open Environment Fused Filament Fabrication**
[Alexander T. Prigge](#)¹; Boran (Max) Cui¹; John Mertens¹; John Rindini¹; ¹Trinity College

14:30 PM
STUDENT **Submicron Manufacturing of Polymer/Nanoparticle Composites via 3D Printing**
[Dhanush Patil](#)¹; [Arunachalam Ramanathan](#)¹; Sayli Jambhulkar¹; Kenan Song¹; ¹Arizona State University

14:45 PM **END OF DAY**

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STUDENT PRESENTATION COMPETITION

31ST OCT 2022 (MON)
OSPREY (LEVEL 2)

31ST OCTOBER 2022

SESSION CHAIR (AM SESSION):

Animesh Bose, Desktop Metal

SESSION CHAIR (PM SESSION):

Thomas Niendorf, University of Kassel

08:00 AM STUDENT **Accelerating Additive Manufacturing Alloy Development Cycles through Efficient Neural Network-Based Surrogate Models**
Jiahui Ye¹; Abdelrahman Kotb¹; Raymundo Arróyave¹; Ibrahim Karaman¹; Alaa Elwany¹; ¹Texas A&M University

08:15 AM STUDENT **Mechanical Characterisation of Laser Metal Deposition Produced Super-Duplex Stainless Steel**
Sébastien Ballésio^{1,2}; Fabien Szmytka¹; Thai Le Hong¹; Cédric Doudard²; Matthieu Dhondt²; ¹ENSTA Paris (IMSIA) - Institut Polytechnique de Paris; ²ENSTA Bretagne (IRD)

08:30 AM STUDENT **Additive Manufacturing of Recycled Carbon Fiber/Thermoset Composites**
Chunyan Zhang¹; Kun Fu¹; ¹University Of Delaware

08:45 AM STUDENT **Comparison of Lattice Structures Fabricated by Additive Manufacturing Processes**
Valerio Di Pompeo¹; Stefano Spigarelli¹; Marcello Cabibbo¹; Eleonora Santecchia¹; Alberto Santoni¹; ¹Università Politecnica delle Marche (UNIVPM)

09:00 AM STUDENT **Warping Control in Fused Deposition Modeling (FDM) of Thermoplastic ABS**
Yash G. Mittal¹; Neel Kamal Gupta¹; Gopal Gote¹; Pushkar Kamble¹; Avinash Kumar Mehta¹; K. P. Karunakaran¹; ¹Indian Institute of Technology Bombay (IIT Bombay)

09:15 AM STUDENT **Influence of H13 Powder Properties on Laser Powder Bed Fusion Processed Parts**
Edem Dugbenoo¹; Mathieu Brochu¹; ¹McGill University

09:30 AM STUDENT **Systematization and Structuring of AMC-Processes for Quality Assurance and Qualification Concepts**
Birger Buschmann¹; Tobias Ludwig¹; Daniel Talke¹; ¹Technical University of Munich

09:45 AM STUDENT **3D Printed Composite Layers for Mechanical Reinforcement and Intelligent Behaviors**
Dharneedar Ravichandran¹; Kenan Song¹; ¹Arizona State University

10:00 AM BREAK

10:30 AM STUDENT **Comparative Study of the Passive Films of Selective Laser Melting and Wrought 316L Austenitic Stainless Steel**
Xavier Majnoni d'Intignano¹; Olivier Devos²; Mohamed El May²; Christine Labrugère Sarroste³; Sébastien Mercier¹; Nicolas Saintier²; Jean-Paul Salvétat³; ¹ONERA (The French Aerospace Lab); ²12M Bordeaux - Institut de mécanique et d'ingénierie; ³PLACAMAT - CNRS

10:45 AM STUDENT **Performance Assessment of Machine Learning Algorithms in Process Parameter Optimization of Selective Laser Melted SS 316L**
Sumanth Theeda¹; Shweta Hanmant Jagdale¹; Bharath Bhushan Ravichander¹; Golden Kumar¹; ¹University of Texas at Dallas

11:00 AM STUDENT **In Situ Infrared Temperature Sensing for Real-Time Defect Detection in Additive Manufacturing**
Rifat-E-Nur Hossain¹; Jerald Lewis¹; Arden Moore¹; ¹Louisiana Tech University

11:15 AM STUDENT **Control-Oriented Modeling and Continuous Melt Pool Geometry Estimation using Deep Neural Network**
John Shim¹; Xu Chen¹; ¹University of Washington

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- 11:30 AM STUDENT** **A New Method for Spatter Monitoring in Additive Manufacturing using Artificial Intelligence (Machine Learning)**
[Gwenaëlle Chebil](#)^{1,2}; Yves Renollet¹; Dimitri Bettebghor¹; Pierre Lapouge²; Cécile Davoine¹; Marc Thomas¹; Véronique Favier²; Matthieu Schneider²; ¹ONERA (The French Aerospace Lab) - DMAS; ²Arts et Métiers ParisTech - PIMM
- 11:45 AM STUDENT** **Evaluation of Convolution-Based Architectures in Segmentation of AM Tomography Data**
[Saber Nemati](#)¹; Leslie G. Butler¹; Shengmin Guo¹; ¹Louisiana State University
- 12:00 PM LUNCH**
- 13:30 PM STUDENT** **The Impact of the Metal X Printing Infill on the Tensile Properties of Atomic Diffusion Additively Manufactured 17-4PH Stainless Steel**
[Mahmoud M. Naim](#)^{1,2}; [Mahdi Chemkhi](#)¹; [Akram Alhussein](#)²; ¹EPF École d'Ingénieurs; ²Université de technologie de Troyes (UTT)
- 13:45 PM STUDENT** **Single Alloy Metal Matrix Composites with Anisotropic Mechanical Properties and Defect Analysis through Laser Powder Bed Fusion**
[Shweta Hanmant Jagdale](#)¹; Bharath Bhushan Ravichander¹; Sumanth Theeda¹; Golden Kumar¹; ¹University of Texas at Dallas
- 14:00 PM STUDENT** **Machine Learning-Based Framework for Defect Classification with X-Ray Computed Tomography in Laser-Powder Bed Fusion Process**
[Jiafeng Ye](#)¹; Jia (Peter) Liu¹; ¹Auburn University
- 14:15 PM STUDENT** **Multivariate Statistical Process Control in PBF Metal AM**
[Venkatavaradan Sunderarajan](#)¹; Suman Das¹; ¹Georgia Institute of Technology
- 14:30 PM STUDENT** **High Cycle and Very High Cycle Fatigue Resistance of LB-PBF 17-4 Precipitation Hardening Stainless Steel Fabricated under Ar and N₂ Environments**
[Jade Welsh](#)¹; Indrajit Nandi²; Pooriya Dastranjy Nezhadfar²; Nima Shamsaei²; Shuai Shao²; Jutima Simsiriwong¹; ¹University of North Florida; ²Auburn University
- 14:45 PM END OF DAY**

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AM FOR ELECTRONIC APPLICATIONS

CO-ORGANIZERS:

Shweta Agarwala

Aarhus University,
Denmark

Masoud Mahjouri-Samani

Auburn University, USA

Jaim Nulman

Nano Dimension,
USA

Alireza Sarraf

Divergent, USA

31ST OCT 2022 (MON)

GRIFFIN A (LEVEL 1)

31ST OCTOBER 2022

SESSION CHAIR (AM SESSION):

Alireza Sarraf, Divergent

SESSION CHAIR (PM SESSION):

Masoud Mahjouri-Samani, Auburn University

08:00 AM
INVITED **Additive Manufacturing of Embedded Electronics for Smart and Soft Robotics: Current Progress and Future Perspectives**
[Konstantinos Sierros](#)¹; ¹West Virginia University

08:30 AM
INVITED **3D Printing of Nanomaterials-Based Electronics and Ingestible Robots**
[Yong Lin Kong](#)¹; ¹University of Utah

09:00 AM
REGULAR **Development & Integration of Flexible & Printed Electronic Solutions for Next Generation Army Applications**
[Hayley B. Katz](#)¹; Matthew Brauer¹;
¹U.S. Army Combat Capabilities Development Command - Armaments Center

09:20 AM
INVITED **Development and Testing of a Multi-Element AM Antenna**
[Rudy Lopez](#)¹; Robert Maloney¹; Tara Spafford¹; ¹Northrop Grumman

09:50 AM **BREAK**

10:30 AM
INVITED **Lightweight and Embedding Electronic Functionalities using Printed Electronic Materials and Processes**
[Zachary J. Davis](#)¹; Torsten Lund-Olesen¹; Kasper Venstentoft¹; Anna Krzyzanowska¹; Jonas Daugaard Hulstrøm¹; ¹Danish Technological Institute

11:00 AM
INVITED **Additive Nanomanufacturing and Dry Printing of Flexible Hybrid Electronics**
[Masoud Mahjouri-Samani](#)¹; Zabihollah Ahmadi¹; Seungjong Lee¹; Aarsh Patel¹; Nima Shamsaei¹; Raymond R. Unocic²; ¹Auburn University; ²Oak Ridge National Laboratory (ORNL)

11:30 AM
REGULAR **Printed Circuit Structure**
[Kenneth Church](#)^{1,2}; Jason Benoit¹; Paul Deffenbaugh¹; Josh Goldfarb¹; Bryce Gray¹; Jasmine Hammonds¹; Mark Kloza¹; Sam LeBlanc¹; Nicholas Willey¹; ¹Sciperio; ²nScript

11:50 AM **LUNCH**

13:30 PM
REGULAR **Beamforming Behavior of a Waveguide Fed 3D-Printed Luneburg-Style Lens in Ku and Ka Bands**
[Philip Lambert](#)¹; Shawn Rogers²;
¹Fortify; ²Envistacom

13:50 PM
REGULAR **Additive Manufacturing of Energy Storage Devices based on Mxenes**
[Majid Beidaghi](#)¹; Jafar (Kian) Orangi¹; Fatima Hamade¹; Virginia Davis¹;
¹Auburn University

14:10 PM
INVITED **Printed Organic Electronics for Smart Sensor Systems**
[Marco Fattori](#)¹; Eugenio Cantatore¹;
¹Eindhoven University of Technology (TU/e)

14:40 PM
INVITED **Integration of Sensors and Printed Electronics into PBF-LB Parts**
[Simon Vervoort](#)¹; Jonas Mertin¹;
¹Fraunhofer Institute for Laser Technology ILT

15:10 PM
INVITED **Low-Cost, Low-Power Gas Detection: All-Aerosol-Jet-Printed Highly Sensitive and Selective Polyaniline-Based Ammonia Sensors**
[Tolga Aytug](#)¹; Pooran Joshi¹; Christine Fisher²; Kai Li¹; ¹Oak Ridge National Laboratory (ORNL); ²City University of New York

15:40 PM **END OF DAY**

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3D PRINTED POLYMERS AND POLYMER MATRIX COMPOSITES

CO-ORGANIZERS:

Rachael Andrulonis
WSU-NIAR, USA
Cindy Ashforth
FAA, USA

Carl Dekker
Met-L-Flo, USA
Jonathan Seppala
NIST, USA

31ST OCT 2022 (MON)
GRIFFIN B (LEVEL 1)

31ST OCTOBER 2022

SESSION CHAIRS (AM + PM SESSION):

Rachael Andrulonis, WSU-NIAR
Cindy Ashforth, FAA

08:00 AM **Additive Manufacturing of Carbon Scaffold for Thermoset Composites**
INVITED Kun (Kelvin) Fu¹; ¹University of Delaware

08:30 AM **Caverna: A Microporous, FFF-Printable Material for Lightweight and Flexible Structures**
REGULAR Ben Mac Murray¹; Jonathan Farren¹; Nathan Ockwig¹; Jeffrey Cernohous¹; ¹Interfacial

08:50 AM **Additive Manufacturing of Thermally Conductive Polymer for Lighting Fixtures**
REGULAR John Hana¹; Shahab Zekriardehani¹; Felix Tran¹; John Trublowski¹; Javed Mapkar¹; Jeremy Santiago²; ¹Eaton; ²Ford Motor Company

09:10 AM **3D Printed Membranes for Next Generation Energy and Water Applications**
INVITED Michael Hickner¹; ¹Pennsylvania State University

09:40 AM **Reactive Extrusion Additive Manufacturing (RX-AM™) for Volume Industrial Applications**
REGULAR Cora Leibig¹; ¹Chromatic 3D Materials

10:00 AM **BREAK**

10:30 AM **Chemical Upcycling of PLA: From FDM 3D Printed Wastes to Fresh SLA 3D Printing Resin**
REGULAR Yu-Chung Chang¹; Lin Shao¹; Jinwen Zhang¹; ¹Washington State University - Composite Materials and Engineering Center (WSU - CMEC)

10:50 AM **Process Uniformity and Properties of ABS Materials by Selective Thermoplastic Electrophotographic Process**
REGULAR Brian Mullen¹; Jerry A. Pickering¹; Jackson Muehlbauer¹; ¹Evolve Additive Solutions

11:10 AM **Programmed Fiber Orientation for Improved Geometric Tolerancing in Printed Composite Tools**
REGULAR Alexander Quinn¹; ¹Fortify

11:30 AM **Evaluation of Structural Performance of Sandwich Panels Fabricated by Vat Photopolymerization**
REGULAR Sabrina Nilufar¹; Shukantu Dev Nath¹; ¹Southern Illinois University Carbondale

11:50 AM **LUNCH**

13:30 PM **Composite Materials Handbook-17 (CMH-17) - Non-Metallic Additive Manufacturing**
INVITED Curtis R. Davies¹; Cindy Ashforth¹; Rachael Andrulonis²; ¹Federal Aviation Administration (FAA); ²Wichita State University - National Institute for Aviation Research (WSU - NIAR)

14:00 PM **Polymer Additive Manufacturing Qualification Programs**
INVITED Royal Lovingfoss¹; Rachael Andrulonis¹; Brian Smith¹; Joel D. White¹; ¹Wichita State University - National Institute for Aviation Research (WSU - NIAR)

14:30 PM **Development of Overtest Factors for Powder Bed Fusion Nylon 11 Parts, Allowing a Single Design Acceptance Test Taking into Account Material and Process Variability**
INVITED Joseph Costanzo¹; ¹Boeing - Commercial Airplanes

15:00 PM **BREAK**

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15:30 PM **High Accuracy Temperature
Measurements of Polymer Additive
Manufacturing using Filament
Material Extrusion**
INVITED
Richard Cole¹; Marc Genest¹; Liam
Reynolds¹; ¹National Research
Council Canada (NRC Canada)

16:00 PM **Development of Tensile Testing
Method for Filaments Used in
Material Extrusion Based Additive
Manufacturing Process**
INVITED
Haibin Ning¹; George Chambers¹;
Kirstie Snodderly²; Cody Johnson¹;
Derrick Armstrong¹; Selvam Pillay¹;
¹University of Alabama at Birmingham
(UAB); ²ASTM International

16:30 PM **END OF DAY**

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FATIGUE AND FRACTURE OF AM MATERIALS AND PARTS

CO-ORGANIZERS:

Stefano Beretta

Politecnico di
Milano, Italy

Craig McClung

Southwest Research
Institute (SwRI), USA

Thomas Niendorf

University of Kassel,
Germany

Jutima Simsiriwong

University of
North Florida, USA

Douglas Wells

NASA-MSFC, USA

31ST OCT 2022 – 2ND NOV 2022 (MON-WED)
GRIFFIN C (LEVEL 1)

31ST OCTOBER 2022

SESSION CHAIRS (AM SESSION):

Thomas Niendorf, University of Kassel
Jutima Simsiriwong, University of North Florida

SESSION CHAIRS (PM SESSION):

Stefano Beretta, Politecnico di Milano
Douglas Wells, NASA-MSFC

08:00 AM
INVITED **Review on Fracture-Based Fatigue Assessment for Net-Shape Metal Surfaces Manufactured by L-PBF and its Relation to Component Qualification**
[Stefano Beretta](#)¹; ¹Politecnico di Milano

08:30 AM
INVITED **Small Fatigue Crack Growth in AM Ti-6Al-4V under Axial, Torsion, and Combined Loadings**
[Ali Fatemi](#)¹; [Matthew Markham](#)¹; Reza Molaei¹; Nam Phan²; ¹University of Memphis; ²Naval Air Systems Command (NAVAIR)

09:00 AM
INVITED **Process-Structure-Property-Fatigue Performance of Additively Manufactured Metallic Materials**
[Mauro Madia](#)¹; ¹Bundesanstalt für Materialforschung und -prüfung (BAM)

09:30 AM
INVITED **Validation of Multi-Laser Printing Technology for Additive Manufacturing**
[Donald Godfrey](#)¹; [Jacky Diemann](#)¹; ¹SLM Solutions

10:00 AM **BREAK**

10:30 AM
REGULAR **Tailoring Hot Isostatic Pressing Treatments to Homogenize Process-Dependent Microstructures and Mechanical Properties of Electron Beam Melted Ti-6Al-4V Parts**
[Jake Benzing](#)¹; Magnus Ahlfors²; Chad M. Beamer²; Julius Bonini³; Nik Hrabe¹; Sara Randall³; ¹NIST; ²Quintus Technologies; ³Lucideon

10:50 AM
REGULAR **A Bayesian-Based Fatigue Characterization Sufficiency Criteria and Fatigue Life Prediction Framework for AM Applications**
[Luke C. Sheridan](#)¹; ¹Air Force Research Laboratory (AFRL)

11:10 AM
INVITED **Critical Effect of Defects on Axial Fatigue Behavior of Additively Manufactured Ti-6Al-4V**
[Shuai Shao](#)¹; Nima Shamsaei¹; ¹Auburn University

11:40 AM
REGULAR **Impact of Surface Finishing/Texture on Fatigue Performance of L-PBF GRCop-42**
[Joshua R. Boykin](#)¹; [Agustin Diaz](#)¹; [Justin Michaud](#)¹; Patrick McFadden¹; Paul R. Gradl²; Thomas Teasley²; Gabriel Demeneghi²; ¹REM Surface Engineering; ²NASA - Marshall Space Flight Center (MSFC)

12:00 PM **LUNCH**

13:30 PM
REGULAR **Defect Acceptance Criteria and Simple Assessment of AM Components**
[Stefano Beretta](#)¹; ¹Politecnico di Milano

13:50 PM
INVITED **Developing Approaches for Certification of Uninspectable Fracture Critical AM Components**
[William G. Tilson](#)¹; Douglas Wells¹; Craig McClung²; ¹NASA - Marshall Space Flight Center (MSFC); ²Southwest Research Institute (SwRI)

14:20 PM
REGULAR **Fatigue of AM Metals in the Presence of Notches under Uniaxial and Multiaxial Service Load Histories**
[Reza Molaei](#)¹; Ali Fatemi¹; ¹University of Memphis

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14:40 PM
REGULAR **The Relationship Between
Microporosity and Fatigue
Performance in Direct Energy
Deposited (DED) Ti-6-4 for
Aerospace Structural Applications**
Daniel R. Klenosky¹; Paul R.
Toivonen¹; ¹Spirit AeroSystems

15:00 PM
INVITED **Process Induced Defects and their
Effects on Resulting Fatigue
Behavior**
Rakish Shrestha¹; Arash Soltani-
Tehrani²; Jutima Simsiriwong³; Nima
Shamsaei²; Mohsen Seifi⁴; Nam
Phan⁵; ¹Sandia National
Laboratories; ²Auburn University;
³University of North Florida; ⁴ASTM
International; ⁵Naval Air Systems
Command (NAVAIR)

15:30 PM **END OF DAY**

1ST NOVEMBER 2022

SESSION CHAIRS (AM SESSION):
Thomas Niendorf, University of Kassel
Douglas Wells, NASA-MSFC

SESSION CHAIRS (PM SESSION):
Stefano Beretta, Politecnico di Milano
Jutima Simsiriwong, University of North Florida

08:30 AM
INVITED **Uniform Fatigue Damage Tolerance
Assessment in Additive
Manufactured Metals and
Structures**
Frank Walther¹; Jochen Tenkamp¹;
Felix Stern¹; Mohamed Merghany¹;
Mirko Teschke¹; ¹TU Dortmund
University - Department of Materials
Test Engineering (WPT)

09:00 AM
REGULAR **Fatigue Response up to 10⁹
Cycles of Notched Specimens
Made of SLM Ti6Al4V Alloy**
Andrea Tridello¹; Filippo Berto²;
Davide S. Paolino¹; ¹Politecnico di
Torino - DIMEAS; ²Norwegian
University of Science and Technology
(NTNU)

09:20 AM
REGULAR **Stress Corrosion Cracking and
Hydrogen-Metal Interactions in
Additively Manufactured 17-4PH**
James Burns¹; Trevor K. Shoemaker¹;
Lauren Singer¹; Zachary Harris¹; John
Scully¹; ¹University of Virginia

09:40 AM
INVITED **Additive Manufacturing
Microstructural Engineering for
Improved Fatigue Resistance**
Jonathan Pegues¹; ¹Sandia National
Laboratories

10:10 AM **BREAK**

10:30 AM
INVITED **The Role of Cyclic Strain Rate and
Heat Treatment on High-Cycle and
Very High-Cycle Fatigue Behavior
of LB-PBF 17-4 PH Stainless Steel**
Jutima Simsiriwong¹; Pooriya
Dastranjy Nezhadfar²; Jade Welsh¹;
Indrajit Nandi²; Shuai Shao²; Nima
Shamsaei²; ¹University of North
Florida; ²Auburn University

11:00 AM
INVITED **Fatigue Response of AM Materials:
A Methodology for the Statistical
Analysis of the Experimental Data**
Davide S. Paolino¹; Andrea Tridello¹;
¹Politecnico di Torino - DIMEAS

11:30 AM
INVITED **Theory and Application of
Probabilistic Damage Tolerance to
Predict the Structural Integrity of
Additively Manufactured Parts**
James C. Sobotka¹; Michael Enright¹;
Craig McClung¹; ¹Southwest
Research Institute (SwRI)

12:00 PM **LUNCH**

13:30 PM
REGULAR **Mechanical Performance of Cold
Spray Additively Manufactured Al-
6061 Deposits**
Ahmad Nourian-Avval¹; Sinan Muftu¹;
¹Northeastern University

13:50 PM
REGULAR **Qualification Method for the
Process Dependent Factors and
Affecting the Fatigue Behavior of
Laser Powder Bed Fusion Methods
for Ti6Al4V**
Umit Aytar¹; Erdem Mermer¹;
¹Turkish Aerospace

14:10 PM
REGULAR **Mechanism-Based Characterization
and Modeling of Additive
Manufactured Medical Implants
with Tailored Functionality**
Jochen Tenkamp¹; Mirko Teschke¹;
Frank Walther¹; ¹TU Dortmund
University - Department of Materials
Test Engineering (WPT)

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14:30 PM **Characterization of Defects in Metal AM for Structural Integrity Assessment**
INVITED
Michael Gorelik¹; ¹Federal Aviation Administration (FAA)

15:00 PM **END OF DAY**

2ND NOVEMBER 2022

SESSION CHAIRS (PM SESSION):

Jutima Simsiriwong, University of North Florida
Douglas Wells, NASA-MSFC

13:30 PM **What is Needed to Predict the Fatigue Performance of an AM Ti-6Al-4V Component?**
INVITED
Derek Warner¹; Peipei Li^{1,2}; Terrence Moran¹; ¹Cornell University - Cornell Fracture Group; ²Brown University

14:00 PM **Impact of Surface Roughness on Fatigue Performance in Additive Manufacturing**
REGULAR
Joy Gockel¹; Rachel Evans²; Edwin Glaubitz¹; Simon Richardsen¹; Nathan Klingbeil²; ¹Colorado School of Mines; ²Wright State University

14:20 PM **Investigation of Residual Stresses and Activation Energies in PBF-EB Ti-6Al-4V Globular Surface Layers**
REGULAR
Nicholas A. Derimow¹; Thomas A. Berfield²; Keenan Hanson³; Jake T. Benzing¹; Nikolas Hrabec¹; ¹NIST; ²University of Louisville; ³Stryker

14:40 PM **Fatigue Life and Effect of Defect for Various Engineering Alloys Made with Laser Powder Bed Fusion**
REGULAR
Emiel Amsterdam¹; Enrico Scolaro¹; ¹Royal NLR - Netherlands Aerospace Centre

15:00 PM **On the Role of Powder Quality and Process Instabilities on the Fatigue Properties of Additively Manufactured Materials**
INVITED
Thomas Niendorf¹; ¹University of Kassel

15:30 PM **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



CENTER of
EXCELLENCE
Research to Standards

GENERAL TOPICS IN AM: MATERIALS AND PROCESSING, POST-PROCESSING, QUALIFICATION & SAFETY

CO-ORGANIZERS:

Sara Bagherifard Politecnico di Milano, Italy
David Brackett The MTC, UK
Nik Hrabe NIST, USA
Jasmin Kathrin Saewe Fraunhofer ILT, Germany
Brian West NASA-MSFC, USA

31ST OCT 2022 – 2ND NOV 2022 (MON-WED)
CYPRESS (LEVEL 1)

31ST OCTOBER 2022

SESSION CHAIR (AM SESSION):

Richard Huff, ASTM International

SESSION CHAIR (PM SESSION):

Khalid Rafi, ASTM International

08:00 AM **AM Materials Data – Challenges and Opportunities**
INVITED Richard Huff¹; ¹ASTM International

08:30 AM **Maturation of Additive Manufactured Aerospace Alloys and Development of Mechanical and Thermophysical Properties for Space Applications**
REGULAR Paul R. Gradl¹; Seyed Reza Ghiaasiaan²; Shengmin Guo³; Colton Katsarelis¹; Omar Mireles¹; Alison Park⁴; Nima Shamsaei²; Shuai Shao²; Brian West¹; ¹NASA - Marshall Space Flight Center (MSFC); ²Auburn University; ³Louisiana State University; ⁴NASA Engineering and Safety Center (NESC)

08:50 AM **Parameter Development of High Strength Aluminium Alloys for PBF-LB**
INVITED Joseph C. Chamberlin¹; Andrew Bobel²; Nick Cruchley¹; ¹The Manufacturing Technology Centre (MTC); ²General Motors

09:20 AM **Laser Powder Bed Fusion of High Strength Aluminum Alloys using Laser Stirring Technique**
REGULAR Alber A. Sadek¹; ¹EWI

09:40 AM **Overcoming the Challenges of Changing Designs, Materials, and 3D Printers with X-Ray CT**
REGULAR Curtis L. Frederick¹; ¹ZEISS

10:00 AM **BREAK**

10:30 AM **Use of Reactive Additive Manufacturing (RAM) Techniques for New Alloy and Composite Development**
INVITED Jeremy J. Iten¹; ¹Elementum 3D

11:00 AM **Dissimilar Material Mixing in Directed Energy Deposition for Compositionally Complex Alloys**
INVITED Sarah J. Wolff¹; ¹Texas A&M University

11:30 AM **Deep Learning Image Analysis Applied to Defects in Additive Manufacturing**
INVITED Anton Du Plessis^{1,2}; ¹Object Research Systems; ²Stellenbosch University

12:00 PM **LUNCH**

13:30 PM **Predictive Process Parameter Development for Laser Powder Bed Fusion**
INVITED Priyanshu Bajaj¹; ¹m4p material solutions

14:00 PM **Process Optimisation Strategies for Laser Powder Bed Fusion and Directed Energy Deposition**
INVITED Maria L. Montero-Sistiaga¹; Marc J. de Smit¹; Ralph L. Haagsma¹; Timo Osinga¹; ¹Royal NLR - Netherlands Aerospace Centre

14:30 PM **Coaxial Monitoring and Closed-Loop Control in Directed Energy Deposition using a Photodiode Array**
INVITED Samantha A. Webster^{1,2}; Jihoon Jeong²; Alberto Castro³; Lars Jacquemetton³; Jian Cao²; ¹NIST; ²Northwestern University; ³Sigma Additive Solutions

15:00 PM **BREAK**

15:30 PM **Advantages of NeuBeam Technology to Electron Beam AM**
INVITED Robin Weston¹; Peter Hansford¹; Ian Laidler¹; ¹Wayland Additive

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ICAM 2022 PROGRAM AGENDA

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CENTER of
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Research to Standards

16:00 PM Ergonomic Design of Human-AM
INVITED Machine Interface
SJ Jones¹; ¹Velo3D

16:30 PM **END OF DAY**

1ST NOVEMBER 2022

SESSION CHAIR (AM + PM SESSION):

Nik Hrabe, NIST

08:00 AM A Design Guide for AM Post
INVITED Processing
Andrew Triantaphyllou¹; Farhan M.
Khan²; ¹The Manufacturing
Technology Centre (MTC); ²Xerox

08:30 AM Influence of Post-Processing
INVITED Techniques on the Properties of
Laser Powder-Bed Fusion
AlSi10Mg Alloy
Mario Guagliano¹; ¹Politecnico di
Milano

09:00 AM Strategizing with Unique Hot
INVITED Isostatic Pressing Treatments to
Increase Productivity during Post-
Processing and Take Advantage of
Microstructural Heterogeneities in
Laser-Melted Inconel 718 Parts
Jake Benzing¹; Orion L. Kafka¹; Chad
M. Beamer²; Philipp Schumacher³;
Donald Godfrey³; Nik Hrabe¹; Frank
DelRio⁴; ¹NIST; ²Quintus
Technologies; ³SLM Solutions;
⁴Sandia National Laboratories

09:30 AM Surface Finishing for Metal AM
INVITED Chris Dalton¹; Annie Kerwin¹; Hoda
Amel¹; ¹The Manufacturing
Technology Centre (MTC)

10:00 AM **BREAK**

10:30 AM Understanding and Predicting
REGULAR Distortion in Metal AM
Corey Wardrop¹; ¹Sintavia

10:50 AM Tunable Fatigue Performance via
INVITED Controlled Powder Recovery for
Additively Manufactured Titanium
Alloy
Nik Hrabe¹; Nicholas Derimow¹;
Keenan Hanson²; Jake Benzing¹;
Newell Moser¹; Orion L. Kafka¹;
¹NIST; ²Stryker

11:20 AM Support Structure Strategy for
REGULAR Optimal Removal through a
Controlled Chemical Process
Agustin Diaz¹; Justin Michaud¹;
Patrick McFadden¹; Francisco
Medina²; Bob Markley³; ¹REM
Surface Engineering; ²University of
Texas at El Paso; ³Addman
Engineering

11:40 AM When Hybrid Manufacturing Makes
INVITED Sense
Mark Mohr¹; ¹DMG MORI Federal
Services

12:10 PM **LUNCH**

13:30 PM 3-D Printed RF Systems Experiment
INVITED on the International Space Station
Arthur Paoella¹; ¹L3Harris

14:00 PM PBF-LB Process Qualification
INVITED Aaron McCandless¹; Jacob Williams¹;
Mahdi Jamshidinia¹; Mohsen Seifi¹;
¹ASTM International

14:30 PM Additive Manufacturing Process
REGULAR Evaluation for Medical Applications
Matthew Di Prima¹; ¹U.S. Food and
Drug Administration (FDA)

14:50 PM **BREAK**

15:30 PM Development of a Roadmap for
INVITED Computational Materials-Informed
Qualification and Certification of
Process Intensive Metallic Materials
Edward H. Glaessgen¹; Michael
Gorelik²; ¹NASA - Langley Research
Center (LaRC); ²Federal Aviation
Administration (FAA)

16:00 PM Standard Guide for Density
REGULAR Measurement of Additively
Manufactured Parts
Mallory S. James¹; Pooriya Dastranjy
Nezhadfar²; Sean Dobson¹; ¹NASA -
Marshall Space Flight Center (MSFC);
²Auburn University

16:20 PM A New Set of Guidelines for
REGULAR Additive Manufacturing Facility
Safety
Austin Kron¹; ¹AddUp

16:40 PM **END OF DAY**

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2ND NOVEMBER 2022

SESSION CHAIR (PM SESSION):

Nik Hrabe, NIST

13:30 PM
INVITED **LPBF Surface Roughness of Gas Turbine Alloys from Multi-Size and Multi-Laser Machines, using Standardized Coupon Geometries**
Ramesh Subramanian¹; ¹Siemens Energy

14:00 PM
INVITED **Photopolymer Additive Manufacturing: Probing the Relationship Between Print Conditions and Final Part Fidelity the First-Ever NIST-Characterized Light Engine**
Callie I. Higgins¹; Jason Killgore¹;
¹NIST

14:30 PM
REGULAR **Latest Developments in HIP and High-Pressure Heat Treatment for Additive**
Chad M. Beamer¹; James Shipley¹;
¹Quintus Technologies

14:50 PM
REGULAR **Directional Gas Flow Characterization and its Effect on Melt Pool Size in Laser Powder Bed Fusion**
Jordan S. Weaver¹; David Deisenroth¹; Shawn Moylan¹; Alec Schlenoff¹; ¹NIST

15:10 PM **BREAK**

15:30 PM
INVITED **Tensile Ductility and Fracture of AM Fabricated Inconel 718 with Voided Microstructures at High Strain Rate**
Paul Wood¹; Urvashi Gunpath¹; Pawel Platek²; ¹University of Derby - Institute for Innovation in Sustainable Engineering (IISE); ²Military University of Technology

16:00 PM
INVITED **Thickness Size Effects on Laser Powder Bed Fusion and Laser Powder Directed Energy Deposition GRCop-42 Copper Alloy**
Gabriel Demeneghi¹; Paul R. Gradl¹; Kavan Hazeli²; ¹NASA - Marshall Space Flight Center (MSFC); ²University of Arizona

16:30 PM
INVITED **Shaping Microstructures and Mindsets: The Challenge of Switching Between Different Metal Additive Manufacturing Technologies**
Eleonora Santecchia¹; Marcello Cabibbo¹; Valerio Di Pompeo¹; Alberto Santoni¹; Stefano Spigarelli¹;
¹Università Politecnica delle Marche (UNIVPM)

17:00 PM **END OF DAY**

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AM OF CERAMICS: CHALLENGES & OPPORTUNITIES

CO-ORGANIZERS:

Shawn Allan
Lithoz America, USA
Brandon Cox
Honeywell, USA
Sean Looi
Creatz3D, Singapore

Jason Jones
Moog, USA
Sadaf Sobhani
Cornell University, USA

31ST OCT 2022 (MON)
DOGWOOD (LEVEL 1)

31ST OCTOBER 2022

SESSION CHAIR (AM SESSION):
Sadaf Sobhani, Cornell University

08:00 AM **3D Printed Ceramic Structures -**
INVITED **Properties, Performance and**
 Applications
 Pedro Cortes¹; Eric MacDonald²;
 Bharat Yelamanchi¹; Bhargavi
 Mummareddy¹; ¹Youngstown State
 University; ²University of Texas at El
 Paso

08:30 AM **Single and Multi-Material 3D**
INVITED **Printing of Ceramics: Material**
 Properties and Applications
 Martin Schwentenwein¹; Shawn
 Allan²; ¹Lithoz; ²Lithoz America

09:00 AM **Influence of Post Processing Heat**
INVITED **Treatments on the Mechanical**
 Properties of Alumina Made via
 Lithography-Based Ceramic
 Manufacturing
 Sarah Boardman¹; Corinne E.
 Packard¹; ¹Colorado School of Mines

09:30 AM **3D Printing of Transparent**
INVITED **Ceramics: Challenges, Mitigation**
 Approaches and Potential
 Applications
 Chee Lip Gan¹; Zehui Du¹; Li Ying
 Liu¹; Pengcheng Ye²; ¹Nanyang
 Technological University (NTU);
 ²Creatz3D

10:00 AM **BREAK**

10:30 AM **Innovative Zirconia-Based Material**
INVITED **Shaped by SLA 3D Printing**
 Richard Gaignon¹; Christophe
 Chaput¹; ¹3DCeram

11:00 AM **3D Printed Geometrically-Complex**
INVITED **Ceramic Substrates for Electronics**
 Eric MacDonald¹; ¹University of
 Texas at El Paso

11:30 AM **END OF DAY**

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AM FOR DEFENSE APPLICATIONS

CO-ORGANIZERS:

Mark Benedict
AFRL, USA
Eric Fodran
Northrop Grumman, USA
Travis Mayberry
Raytheon Missiles
and Defense, USA
Katherine Olson
U.S. Army CCDC-
AvMC, USA

Nam Phan
NAVAIR, USA
Brandon Ribic
NCDMM, USA
Jose Hector Sandoval
Lockheed Martin
MFC, USA

1ST NOV 2022 (TUE)
GRIFFIN A (LEVEL 1)

1ST NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Jose Hector Sandoval, Lockheed Martin MFC

SESSION CHAIR (PM SESSION):

Travis Mayberry, Raytheon Missiles and Defense

08:00 AM **Metal Additive Manufacturing for Aerospace Sustainment and Fleet Readiness at Scale**
INVITED
[Kevin Holder](#)¹; [Nirup Nagabandi](#)¹;
[Elisa Teipel](#)¹; ¹Essentium

08:30 AM **Hybrid Agile Manufacturing Integration Cells for Future Armaments**
INVITED
[James L. Zunino, III](#)¹; [David Sabanosh](#)¹; ¹U.S. Army Combat Capabilities Development Command - Armaments Center

09:00 AM **Why it is Easier Said than Done: Sustaining a Legacy Aircraft Fleet with Additive Manufacturing**
REGULAR
[Joseph D. Sirmans](#)¹; ¹Lockheed Martin Aeronautics

09:20 AM **Additive Qualification Approach for Airworthy Defense Applications**
REGULAR
[Lyndsay Kibler](#)¹; ¹GE Additive

09:40 AM **Army AM Night Vision Clip - Path to Part Qualification**
REGULAR
[Daniel Smith](#)¹; [Stacey L. Clark](#)¹; ¹U.S. Army Combat Capabilities Development Command - C5ISR PIF

10:00 AM **BREAK**

10:30 AM **Challenges of Adopting Additive Manufacturing in the Industry**
INVITED
[Travis L. Mayberry](#)¹; ¹Raytheon Missiles and Defense

11:00 AM **The Additive Manufacturing Link between Defense and Aerospace**
INVITED
[Elizabeth Crisler](#)¹; ¹Textron Aviation

11:30 AM **Relevance of Additive Manufacturing Standards in Highly Leveraged Process-Structure-Property-Performance Applications**
INVITED
[Tyler LeBrun](#)¹; ¹Sandia National Laboratories

12:00 PM **LUNCH**

13:30 PM **Additive Manufacturing: Adoption and Industrialization Challenges at Lockheed Martin**
INVITED
[Prabhjot Singh](#)¹; ¹Lockheed Martin Space

14:00 PM **Developing the Workforce of Tomorrow – COMET: A Collaborative Operationalized Manufacturing Education & Training Strategy**
REGULAR
[David Sabanosh](#)¹; [James L. Zunino, III](#)¹; [Samuel Gatley](#)²; ¹U.S. Army Combat Capabilities Development Command - Armaments Center; ²New Jersey Institute of Technology

14:20 PM **Feasibility of Using Recycled PET Water Bottle Flake as an Additive Manufacturing Feedstock at Forward Operating Bases**
REGULAR
[Samantha Snabes](#)¹; [Helen Little](#)¹; [Richard Heggs](#)²; [Prabhat Krishnaswamy](#)²; ¹re:3D; ²Engineering Mechanics Corporation of Columbus (Emc²)

14:40 PM **Additive Manufacturing of Aluminum Metal Matrix Composites for Defense and Space Applications**
REGULAR
[Ethan Parsons](#)¹; ¹MIT Lincoln Laboratory

15:00 PM **BREAK**

15:30 PM **Thermal Aging Study for Additively Manufactured F357 Aluminum**
INVITED
[Francisco Medina](#)¹; [Edel Arrieta](#)¹; [Mark Benedict](#)²; [Victor Medrano](#)¹; [Kevin Caballero](#)¹; ¹University of Texas at El Paso; ²Air Force Research Laboratory (AFRL)

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16:00 PM **Effect of Geometrically Seeded
INVITED** **Defects on the Mechanical
Properties and High Cycle Fatigue
Life of Stress Relieved L-PBF
AISI10Mg**
Steven M. Kraft¹; Jose Hector
Sandoval¹; ¹Lockheed Martin Missiles
and Fire Control (MFC)

16:30 PM **Fatigue Behavior of Additively
INVITED** **Manufactured Ferrium C64**
Thomas Kozmel¹; Peter Jacobson¹;
Jacqueline Hardin¹; Kerem Taskin¹;
Chris Kantner¹; Jason Fetty²;
¹QuesTek; ²U.S. Army Combat
Capabilities Development Command -
Aviation & Missile Center

17:00 PM **END OF DAY**

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AM APPLICATIONS IN AVIATION

CO-ORGANIZERS:

Thomas Broderick
AFRL, USA

Jim Dobbs
Boeing, USA

Michael Gorelik
FAA, USA

Mikkel Pedersen
Oerlikon AM, Germany

**1ST NOV 2022 – 2ND NOV 2022 (TUE-WED)
GRIFFIN B (LEVEL 1)**

1ST NOVEMBER 2022

SESSION CHAIR (AM + PM SESSION):

Jim Dobbs, Boeing

08:00 AM **INVITED** **A User and Developers Perspective on Standards in Additive Manufacturing**

Jesse R. Boyer^{1,2}; ¹Pratt & Whitney; ²Raytheon Technologies

08:30 AM **INVITED** **Joint Metal Additive Database Definition (JMADD) Ti-6Al-4V Additive Manufacturing Qualification Program**

Joel D. White¹; Rachael Andrulonis¹; Royal Lovingfoss¹; ¹Wichita State University - National Institute for Aviation Research (WSU - NIAR)

09:00 AM **INVITED** **Best Practice Guide on Part Family Certification for Aviation**

Alberto Bordin¹; Mahdi Jamshidinia¹; Mohsen Seifi¹; Kirstie Snodderly¹; Martin White¹; ¹ASTM International

09:30 AM **INVITED** **Fatigue Data Generation, Reduction, and Presentation for Metallic Additive Manufacturing**

Zachary Whitman¹; ¹Boeing - Commercial Airplanes

10:00 AM **BREAK**

10:30 AM **REGULAR** **Design Principles and Strategies for Prototyping and Large-Scale Additive Manufacturing**

Paul R. Toivonen¹; **Daniel R. Klenosky¹**; ¹Spirit AeroSystems

10:50 AM **INVITED** **Innovative Aerospace and Space Structures Made by Additive Manufacturing**

Christoph Leyens^{1,2}; Frank Brückner^{1,3}; Elena López¹; ¹Fraunhofer Institute for Material and Beam Technology IWS; ²Technische Universität Dresden - Institute of Materials Research; ³Luleå University of Technology

11:20 AM **REGULAR** **AM Developments within the Nadcap Program**

Richard Freeman¹; ¹Performance Review Institute (PRI)

11:40 AM **LUNCH**

13:30 PM **INVITED** **A Novel Approach for Evaluating Multiple Machine Platforms in Ti6Al4V Laser Powder Bed Fusion**

Cory Cunningham¹; Jim Dobbs¹; Elaine MacDonald¹; Andrew Steevens¹; Zachary Whitman¹; ¹Boeing

14:00 PM **REGULAR** **Photo-Curing 3D Printing of Sacrificial Tooling for Fabricating Hollow Lightweight Composites**

Baoming Zhao¹; Yu-Chung Chang¹; Cheng Hao¹; Jinwen Zhang¹; ¹Washington State University - Composite Materials and Engineering Center (WSU - CMEC)

14:20 PM **REGULAR** **Effect of Processing Parameters on Defect Populations and Fatigue Behavior for AM Aerospace Applications**

Robert K. Rhein¹; Kathleen Chou¹; Jacob Kallivayalil¹; Harsha Phukan¹; Niloofar Sanaei¹; ¹Eaton

14:40 PM **REGULAR** **Manufacturing Process Route Simplification: HIP Removal**

Guillaume Fallot¹; Johannes Siegert¹; Andreas Neumann¹; ¹Airbus Helicopters

15:00 PM **BREAK**

15:30 PM **INVITED** **Volumetric Defects in Laser Beam Powder Bed Fused Ti-6Al-4V: Geometric Features, Classification, and Impacts on Short Crack Growth**

Jia (Peter) Liu¹; Shuai Shao¹; Nima Shamsaei¹; ¹Auburn University

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16:00 PM **L-DED Process Monitoring & Control Development**
INVITED [Daniel Driemeyer](#)¹; Baily Thomas¹;
¹Boeing Research & Technology

16:30 PM **END OF DAY**

2ND NOVEMBER 2022

SESSION CHAIR (PM SESSION):
Thomas Broderick, AFRL

13:30 PM **From Composites to AM: The Relationship Between Specifications and Material Data**
REGULAR [Cindy Ashforth](#)¹; Larry Ilcewicz¹;
¹Federal Aviation Administration (FAA)

13:50 PM **Progress Towards a Standard for Rapid Qualification of Additively Manufactured Materials Based on Defect Structures**
REGULAR [Krzysztof Stopka](#)¹; Andrew Desrosiers²; Tyler Nicodemus²; Amber Andreaco²; Michael D. Sangid¹;
¹Purdue University; ²GE Additive

14:10 PM **Part Classifications for Aviation**
INVITED [Chul \(Charles\) Park](#)¹; ¹Supernal

14:40 PM **The Challenges of AM Qualification and Certification in Aerospace**
INVITED [Marko Bosman](#)¹; ¹GKN Aerospace

15:10 PM **BREAK**

15:30 PM **Combining Forging and Arc Direct Energy Deposition (DED) Techniques to Produce Dissimilar Titanium Alloy Aerospace Components**
REGULAR [Misael Pimentel Espirindio e Silva](#)^{1,2}; [Calum Hicks](#)^{1,2}; Scott McKegney²; Giribaskar Sivaswamy¹; Saeed Tamimi¹; Stephen Fitzpatrick²;
¹University of Strathclyde - Advanced Forming Research Centre (AFRC); ²National Manufacturing Institute Scotland (NMIS)

15:50 PM **Digital Additive Manufacturing at Boeing**
INVITED [Nicholas Mulé](#)¹; Wentao Fu¹; ¹Boeing

16:20 PM **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

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APPLICATION OF AM IN CONSTRUCTION ON EARTH AND BEYOND

CO-ORGANIZERS:

Michael Fiske
NASA-JSEG, USA
Giada Gasparini
University of
Bologna, Italy
Ali Kazemian
Louisiana State
University, USA

Stephan Mansour
ASTM International, USA
Sam Ruben
Mighty Buildings, USA
Timothy Wangler
ETH Zürich, Switzerland

1ST NOV 2022 – 2ND NOV 2022 (TUE-WED)
DOGWOOD (LEVEL 1)

1ST NOVEMBER 2022

SESSION CHAIR (AM SESSION):
Timothy Wangler, ETH Zürich

SESSION CHAIR (PM SESSION):
Michael Fiske, NASA-JSEG

08:00 AM **An Overview of Additive**
REGULAR **Construction Technologies for**
 Planetary Surface Infrastructure
 Development
 Michael R. Fiske¹; ¹NASA - Jacobs
 Space Exploration Group (JSEG)

08:20 AM **Performance Characterization of 3D**
INVITED **Printed Materials for Planetary**
 Infrastructure Construction
 Ali Kazemian¹; Ilerioluwa Giwa¹;
 Hassan Ahmed¹; Dennis Duong¹;
 Michael R. Fiske²; ¹Louisiana State
 University; ²NASA - Jacobs Space
 Exploration Group (JSEG)

08:50 AM **Scaleup of Microwave Powder Bed**
INVITED **Fusion for Lunar Infrastructure**
 Construction
 Michael R. Effinger¹; ¹NASA -
 Marshall Space Flight Center (MSFC)

09:20 AM **Geopolymer Lunar Concrete**
INVITED **Design Utilizing a Response**
 Surface Methodology
 Aleksandra Radlinska¹; Peter Collins¹;
 Jennifer E. Edmunson²; Michael R.
 Fiske³; ¹Pennsylvania State
 University; ²NASA - Marshall Space
 Flight Center (MSFC); ³NASA -
 Jacobs Space Exploration Group
 (JSEG)

09:50 AM **BREAK**

10:30 AM **Additive Manufacture at F+P: On-**
INVITED **and Off-Earth Latest Research and**
 Technological Advancements
 Marina Konstantatou¹; ¹Foster +
 Partners

11:00 AM **Retrofitting and Repairing Printing**
INVITED **Defects for 3D Printed Terrestrial**
 and Planetary Structures
 Hongyu (Nick) Zhou¹; Reese
 Sorgenfrei¹; Michael R. Fiske²;
 ¹University of Tennessee, Knoxville;
 ²NASA - Jacobs Space Exploration
 Group (JSEG)

11:30 AM **NASA's Moon-to-Mars Planetary**
INVITED **Autonomous Construction**
 Technology (MMPACT) Project:
 Additive Construction for Lunar
 Infrastructure
 Raymond G. Clinton, Jr.¹; Michael R.
 Fiske²; Jason Ballard³; Jennifer E.
 Edmunson¹; Michael R. Effinger¹;
 Evan Jensen³; ¹NASA - Marshall
 Space Flight Center (MSFC); ²NASA -
 Jacobs Space Exploration Group
 (JSEG); ³ICON

12:00 PM **LUNCH**

13:30 PM **Additive Construction of Concrete**
INVITED **Structures: A Research Roadmap**
 Jose P. Duarte¹; Sven Bilén¹; Nathan
 Brown¹; Ali Memari¹; Shadi Nazarian¹;
 Aleksandra Radlinska¹;
 ¹Pennsylvania State University

14:00 PM **Achieving Urban and Infrastructural**
REGULAR **Resilience through Large-Scale**
 Additive Construction
 Michael R. Fiske¹; Melodie Yashar²;
 ¹NASA - Jacobs Space Exploration
 Group (JSEG); ²ICON

14:20 PM **Just How Sustainable is 3D**
REGULAR **Concrete Printing? A Focus on**
 Durability
 Timothy Wangler¹; ¹ETH Zürich

14:40 PM **Functional Cementitious**
REGULAR **Composites for Large-Scale**
 Concrete 3D Printing
 Hongyu (Nick) Zhou¹; Yucen Li¹;
 Adam Brooks²; ¹University of
 Tennessee, Knoxville; ²Oak Ridge
 National Laboratory (ORNL)

15:00 PM **BREAK**

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ICAM 2022 PROGRAM AGENDA

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CENTER of
EXCELLENCE
Research to Standards

15:30 PM
INVITED **Additive Manufacturing: A Key Technology Towards Sustainable Construction**
[Harald Kloft](#)¹; [Norman Hack](#)¹; [Vittoria Laghi](#)²; ¹Technische Universität Braunschweig - Institute of Structural Design; ²University of Bologna – DICAM

16:00 PM
INVITED **3D Concrete Printing – Are We There Yet?**
[Ming-Jen Tan](#)^{1,2}; [Mingyang Li](#)¹; [Teck Neng Wong](#)¹; [Yi Wei Daniel Tay](#)^{1,2}; ¹Nanyang Technological University (NTU); ²Singapore Centre for 3D Printing (SC3DP)

16:30 PM **END OF DAY**

2ND NOVEMBER 2022

SESSION CHAIR (PM SESSION):
Michael Fiske, NASA-JSEG

13:30 PM
INVITED **Next Level - Construction 4.0**
[Lambertus Nicolaas \(Berry\) Hendriks](#)¹; ¹CyBe Construction

14:00 PM
REGULAR **3D Printable Translucent Concrete**
[Yi Wei Daniel Tay](#)^{1,2}; [Ming-Jen Tan](#)^{1,2}; [Khalid Mosalam](#)³; [Paulo Monteiro](#)⁴; ¹Nanyang Technological University (NTU); ²Singapore Centre for 3D Printing (SC3DP); ³University of California, Berkeley - Pacific Earthquake Engineering Research Center; ⁴University of California, Berkeley

14:20 PM
REGULAR **Optimizing the Rheology of 3D Printable Micro-Concrete**
[Gary M. Boon](#)¹; [Didier Lootens](#)¹; [Sree Nanukuttan](#)²; [Marios Soutsos](#)²; ¹Sika; ²Queen's University Belfast

14:40 PM
REGULAR **Experimental and Numerical Results on Three-Point-Bending Tests of Wire-and-Arc Additively Manufactured Stainless Steel Bars**
[Vittoria Laghi](#)¹; [Giada Gasparini](#)¹; [Michele Palermo](#)¹; [Tomaso Trombetti](#)¹; ¹University of Bologna - DICAM

15:00 PM **BREAK**

15:30 PM
INVITED **Code Adoption for 3D Printed Concrete Structures (AC509 and Alternative Approaches)**
[Babak Zareiyan](#)¹; [George Perry](#)²; ¹Emergent 3D; ²Black Buffalo 3D

16:00 PM
REGULAR **Moment Rotation Characterization for Beam-to-Column WAAM Steel Joint for Structural Engineering Applications**
[Zeina AL-Nabulsi](#)¹; ¹University of Warwick

16:20 PM
INVITED **Additive Construction Concepts and Development with Bridge and Building Applications**
[Atorod Azizinamini](#)¹; ¹Florida International University (FIU)

16:50 PM **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



CENTER of
EXCELLENCE
Research to Standards

APPLICATION OF AM IN THE MEDICAL INDUSTRY

CO-ORGANIZERS:

Matthew Di Prima

FDA, USA

David Heard

Stryker, USA

Eddie Kavanagh

Johnson & Johnson,

Ireland

Guha Manogharan

Pennsylvania State

University, USA

Michael Roach

University of Mississippi

Medical Center, USA

**1ST NOV 2022 – 2ND NOV 2022 (TUE-WED)
CARDINAL (LEVEL 2)**

1ST NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Matthew Di Prima, FDA

SESSION CHAIR (PM SESSION)

Michael Roach, UMMC

08:30 AM **The Development and Evaluation of**
INVITED **AM Medical Devices for Total Joint**
 Arthroplasty

Mark L. Morrison¹; ¹Smith+Nephew

09:00 AM **How Do We Make Personalization**
INVITED **Scalable in Orthopedics?**

Cambre Kelly¹; ¹restor3d

09:30 AM **3D Printed Polymers for Pelvic**
REGULAR **Organ Prolapse (POP) Treatment**
 Kenan Song¹; **Yuxiang Zhu¹**; ¹Arizona
 State University

09:50 AM **BREAK**

10:30 AM **Biomedical Applications of 3D**
REGULAR **Printing**

Bianmei Cao^{1,2}; **Ramanathan (Ram)**
Kadirvel¹; **David Kallmes¹**; **Nureddin**
Ashammakhi³; ¹Mayo Clinic;
²National Institutes for Food and Drug
Control (NIFDC); ³University of
California, Los Angeles (UCLA)

10:50 AM **Visible Light 3D Printed Hybrid-**
INVITED **Hydrogel Scaffolds for Tissue**
 Engineering

Maryam Tilton¹; **Maria Astudillo**
Potes¹; **Emily Camilleri¹**; **Lichun Lu¹**;
¹Mayo Clinic

11:20 AM **A Scalable 3D Printed Bioreactor**
REGULAR **for the Expansion of Anchorage-**
 Dependent Stem Cells

Kreg Zimmern¹; **Jian Ling¹**;
¹Southwest Research Institute

11:40 AM **LUNCH**

13:30 PM **Melt Electrowriting as a High-**
INVITED **Resolution Additive Manufacturing**
 Technology

Paul D. Dalton¹; **Naomi Paxton¹**;
¹University of Oregon

14:00 PM **Practical Examples of the**
REGULAR **Utilization of Industrial Computed**
 Tomography in Metal Medical
 Device Additive Manufacturing

Ryan S. Kircher¹; **Pradeep Bhattad²**;
¹rms Company; ²ZEISS

14:20 PM **Patient-Matched Cranial Plate**
REGULAR **Manufacturing with FDM Printing of**
 PEEK. Introduction of an End-to-
 End-Solution Including Regulatory
 Data, Cost-Saving Opportunities
 and Reduction of Waste

Martin Herzmann¹; ¹Kumovis

14:40 PM **Technical Challenges of Point of**
INVITED **Care Additive Manufacturing – The**
 Veterans Health Care Perspective

Beth A. Ripley¹; **Dmitry Levin¹**;
¹Veterans Health Administration

15:10 PM **END OF DAY**

2ND NOVEMBER 2022

SESSION CHAIR (PM SESSION):

Kenan Song, Arizona State University

13:30 PM **Influence of Topology Optimization**
INVITED **Parameters on the Mechanical**
 Response of an Additively
 Manufactured Test Structure

Daniel Porter¹; **Myung Kyun Sung²**;
¹U.S. Food and Drug Administration
(FDA); ²Oak Ridge Institute for
Science and Education (ORISE)

14:00 PM **Build Parameter Influence on Strut**
INVITED **Thickness and Mechanical**
 Response in AM Titanium Lattices

Matthew Di Prima¹; ¹U.S. Food and
Drug Administration (FDA)

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- 14:30 PM** **Overcoming Orthopedic Implants
Limitations using Additive
Manufacturing**
INVITED **Swee Leong Sing¹**; ¹National
University of Singapore (NUS)
- 15:00 PM** **BREAK**
- 15:30 PM** **Amorphous Alloys – The Transition
from Scientific Innovation to
Validated Medical Application**
INVITED **Valeska Melde¹**; **Jürgen Wachter¹**;
¹Heraeus AMLOY
- 16:00 PM** **Magnesium Alloy Design for
Additive Manufacturing of
Biodegradable Implants**
INVITED **Mert Celikin¹**; **Eoin O'Cearbhaill¹**;
¹University College Dublin
- 16:30 PM** **Advances in Bio-Additive
Manufacturing for Biomimetic
Engineered Tissue Design**
INVITED **Rohan Shirwaiker¹**; ¹North Carolina
State University
- 17:00 PM** **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



CENTER of
EXCELLENCE
Research to Standards

MECHANICAL TESTING OF AM MATERIALS

CO-ORGANIZERS:

Joy Gockel

Colorado School
of Mines, USA

Edward Herderick

Ohio State
University, USA

Robert Lancaster

Swansea
University, UK

Jason Jyi Sheuan Ten

A*STAR-SIMTech,
Singapore

Phuong (Jonathan) Tran

RMIT University,
Australia

1ST NOV 2022 – 2ND NOV 2022 (TUE-WED)
IBIS (LEVEL 2)

1ST NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Joy Gockel, Colorado School of Mines

SESSION CHAIR (PM SESSION):

Jason Jyi Sheuan Ten, A*STAR-SIMTech

08:00 AM
INVITED **Surface Features and their Impact upon High Cycle Fatigue Behavior of Laser Powder Bed Fusion IN718**
[Orion L. Kafka](#)¹; Chad M. Beamer²; Jake Benzing¹; Donald Godfrey³; Nikolas Hrabe¹; Philipp Schumacher³; ¹NIST; ²Quintus Technologies; ³SLM Solutions

08:30 AM
INVITED **Mechanical Polishing & Inspection of LPBF Surfaces to Achieve Bulk Material Properties for Nuclear Plant Components**
[Thomas S. Jones](#)¹; ¹Rolls-Royce Submarines

09:00 AM
INVITED **Influence of Precipitates on Fatigue Behavior In Wire Arc Additive Manufactured Nickel-Aluminum-Bronze**
[Ariel D. Murphy-Leonard](#)¹; Veronika Mazanova¹; ¹Ohio State University

09:30 AM
INVITED **Criticality of Defect Features in Failure of Additively Manufactured Components**
[Christopher J. Saldaña](#)¹; Elliott Jost¹; Caroline Massey¹; John Miers¹; David Moore²; ¹Georgia Institute of Technology; ²Sandia National Laboratories

10:00 AM **BREAK**

10:30 AM
REGULAR **Influence of Artificial Defects on Quasi-Static and Fatigue Tensile Testing of Additively Manufactured Ti6Al4V**
[Anton Du Plessis](#)^{1,2}; ¹Object Research Systems; ²Stellenbosch University

10:50 AM
REGULAR **Mechanical Testing of Net-Shape Specimens from Powder Bed Fusion-Laser Beam Manufactured Superalloy Hastelloy X**
[Håkan S. Brodin](#)¹; ¹Siemens Energy

11:10 AM
REGULAR **The Effect of Porosity on Profilometry-Based Indentation Plastometry (PIP), A Technique to Measure Stress-Strain Curves from Indentation**
[Jimmy E. Campbell](#)¹; Rebecca Reiff-Musgrove¹; John Reidy²; Aadithya Chitrapur²; Animesh Bose²; Bill Clyne¹; ¹Plastometrex; ²Desktop Metal

11:30 AM
INVITED **Developments of Mechanical Testing of AM Materials within High Pressure Heat Exchanger Design & Manufacture**
[William Sexton](#)¹; Tom Halhead¹; ¹HiETA Technologies

12:00 PM **LUNCH**

13:30 PM
REGULAR **Specimen Geometry and Shielding Gas Effects on the Fatigue Behavior of LB-PBF 17-4PH Stainless Steel in the High Cycle and Very High Cycle Fatigue Regimes**
[Jutima Simsiriwong](#)¹; Pooriya Dastranjy Nezhadfar²; Jade Welsh¹; Indrajit Nandi²; Shuai Shao²; Nima Shamsaei²; ¹University of North Florida; ²Auburn University

13:50 PM
REGULAR **Mechanical Behavior of 7050 Aluminum AM Lattice Structures**
[Ben DiMarco](#)¹; [Jeremy Seidt](#)¹; Noah Gula¹; Edward Herderick¹; ¹Ohio State University

14:10 PM
INVITED **AlSi10Mg and A205 Aluminum Alloys: Processing Route (Casting and Laser Powder Bed Fusion), Microstructure, and Mechanical Properties**
[Meysam Haghshenas](#)¹; ¹University of Toledo

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ICAM 2022 PROGRAM AGENDA

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CENTER of
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14:40 PM
INVITED **A Comparative Study on Tensile Properties of Additively Manufactured Ni-Base Superalloys from Cryogenic to Elevated Temperatures**
[Seyed Reza Ghiaasiaan](#)¹; Paul R. Gradl²; Shuai Shao¹; Nima Shamsaei¹; ¹Auburn University; ²NASA - Marshall Space Flight Center (MSFC)

15:30 PM
INVITED **Development and Mechanical Characterisation of Additively Manufactured Cellular Metamaterials at Different Strain Rates**
[Nejc Novak](#)¹; Oraib Al-Ketan²; Matej Vesenjak¹; Zoran Ren¹; ¹University of Maribor; ²New York University Abu Dhabi

15:10 PM **END OF DAY**

16:00 PM
INVITED **Qualification of Low-Criticality AM Components in an Expeditionary Environment**
[Jonathan Torres](#)¹; Jacob Aljundi²; Zach Heinkel²; Sam Pratt²; ¹Bucknell University; ²Naval Surface Warfare Center (NSWC) - Carderock Division

2ND NOVEMBER 2022

SESSION CHAIR (PM SESSION):
Ben DiMarco, Ohio State University

16:30 PM **END OF DAY**

13:30 PM
INVITED **As-Printed Additive Manufacturing Miniature Tensile Specimen with 25 mm Total Length**
[Jason Jyi Sheuan Ten](#)¹; Ming Quan Zheng²; Wen Jie Goh²; Chen Heng Lee²; ¹A*STAR - Singapore Institute of Manufacturing Technology (SIMTech); ²Professional Testing Services

14:00 PM
REGULAR **Investigation of Tensile Specimen Out-of-Gage Failures in Additively Manufactured Polymers**
[Christopher J. Murphy](#)¹; Britt Helten¹; ¹University of Maine - Advanced Structures & Composites Center (ASCC)

14:20 PM
REGULAR **Section Area and Archimedes Density Estimation for Thin Wall Laser Powder Bed Fusion Mechanical Test Specimens**
[Dhruv Bhate](#)¹; Daniel Bruce¹; Paul Paradise¹; ¹Arizona State University

14:40 PM
INVITED **Translating Fatigue Testing of Subtractive Parts to Additive Manufactured Parts (Medical Devices): Lessons Learned**
[Dawn Lissy](#)¹; [Stacey Barber](#)¹; ¹Empirical Technologies

15:10 PM **BREAK**

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ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



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INDUSTRY 4.0: DATA MANAGEMENT FOR AM

CO-ORGANIZERS:

Amber Andreaco
GE Additive, USA
Matthew Jacobsen
AFRL, USA
Alex Kitt
EWI, USA

Yan Lu
NIST, USA
Nick Parry
Additive Flow, UK

1ST NOV 2022 (TUE)
OSPREY (LEVEL 2)

1ST NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Amber Andreaco, GE Additive

SESSION CHAIR (PM SESSION):

Yan Lu, NIST

08:00 AM **Semantic Models for Accelerating AM Process Parameter Development and Data Sharing**

INVITED

Kareem S. Aggour¹; Amber Andreaco²; Vipul K. Gupta¹; ¹GE Research; ²GE Additive

08:30 AM **The Benefits of Making Additive Data Findable, Accessible, Interoperable, and Reusable**

INVITED

Francis Raymundo¹; Hunter Macdonald¹; Matthew Jacobsen²; ¹Hexagon Manufacturing InStelligence - MSC Software; ²Air Force Research Laboratory (AFRL)

09:00 AM **Additively Manufactured Material Databases**

INVITED

Rachael M. Andrulonis¹; ¹Wichita State University - National Institute for Aviation Research (WSU - NIAR)

09:30 AM **Additive Manufacturing Data Integration and Metadata Management for Continuous Process Improvement**

INVITED

Yan Lu¹; Milica Perisic¹; ¹NIST

10:00 AM **BREAK**

10:30 AM **Increased Process Stability by Transforming Data into Useful Knowledge**

INVITED

Peter Lindecke¹; ¹Fraunhofer Research Institution for Additive Manufacturing Technologies IAPT

11:00 AM **Delivering Repeatability and Sustainability through Digital Rule Enforcement**

INVITED

Celina Gratton¹; ¹Authentise

11:30 AM **AM Data Management for MMPDS – An Aerospace Approach**

INVITED

Doug Hall¹; Jana Rubadue¹; Carinne Shannon¹; ¹Battelle Memorial Institute

12:00 PM **LUNCH**

13:30 PM **An Extensible File Format to Describe Multi-Source Powder Bed Fusion Build Plans**

INVITED

David Toledano¹; Christopher Immer¹; Edwin Schwalbach²; Adam Hicks²; ¹GE Research; ²Air Force Research Laboratory (AFRL)

14:00 PM **Making a Case for Data Continuity in Additive Manufacturing**

REGULAR

Alexandre Donnadieu¹; Devin Culham¹; ¹YOURMIND

14:20 PM **Technical and Intellectual Property Authentication and Protection for Additive Manufacturing**

REGULAR

Jérémie Farret^{1,2}; Zbigniew Sagan³; ¹Inmind Technologies; ²Mind in a Box; ³Advanced Track & Trace

14:40 PM **Ensuring Quality of Additive Manufacturing Process via Trusted Traceable Records on the Blockchain**

REGULAR

Juan Carlos Flores¹; Mikhail Gladkikh¹; Carlo De Bernardi²; Jack Harvey¹; Faisal Iqbal¹; Maria Onufrow³; Hernan Rincon²; Enzo Savino²; ¹Baker Hughes; ²ConocoPhillips; ³Data Gumbo

15:00 PM **An Intelligent Data Infrastructure for Additive Manufacturing**

INVITED

Shengyen Li¹; ¹Southwest Research Institute (SwRI)

15:30 PM **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



CENTER of
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Research to Standards

ECONOMICS AND SUSTAINABILITY OF AM

CO-ORGANIZERS:

Olaf Diegel

University of Auckland,
New Zealand

Gary Ng

A*STAR-ARTC, Singapore

Behrang Poorganji

Morf3D, USA

Nicolas Sabo

General Electric, USA

2ND NOV 2022 (WED)

GRIFFIN A (LEVEL 1)

2ND NOVEMBER 2022

SESSION CHAIR (PM SESSION):

Behrang Poorganji, Morf3D

13:30 PM
REGULAR **Financial Analysis of Additive Manufacturing in the Department of Defense: Governing and Heuristic Equations**
[Stephen Kuhn-Hendricks](#)¹; Ernesto Ureta¹; William Peterson¹; Timothy Vorakoumane¹; ¹NAVSUP Weapon Systems Support (NAVSUP WSS) - Navy Price Fighters

13:50 PM
INVITED **Is the Notion of Sustainably Going to Cost My Organization More Money with Additive Manufacturing?**
[Greg Kline](#)¹; Eric Bono¹; ¹6K Additive

14:20 PM
REGULAR **Decarbonization: A Framework to Assess Sustainability of Additive Manufacturing on the Supply Chain**
[Jie Lun Tan](#)¹; [Joshua Padeti](#)²; Aditya Bose²; ¹ShipParts.com; ²American Bureau of Shipping (ABS)

14:40 PM
REGULAR **Life Cycle Assessment for Laser Powder Bed Fusion**
[Jasmin Saewe](#)¹; [Simon Vervoort](#)¹; Christian Weiß¹; Daniel Heußen¹; ¹Fraunhofer Institute for Laser Technology ILT

15:00 PM **BREAK**

15:30 PM
REGULAR **Comparative Life Cycle Environmental Assessment of Aluminium, Titanium and Steel Components Manufactured by Wire Arc Additive Manufacturing**
[Filomeno Martina](#)¹; Emanuele Pagone²; ¹WAAM3D; ²Cranfield University

15:50 PM
REGULAR **Decoupling Resolution and Throughput: How to Achieve Faster Build Rates through Large Area LPBF**
[James DeMuth](#)¹; ¹Seurat

16:10 PM
REGULAR **Recyclability of Metal Powder in Direct Energy Deposition: A Case of Manufacturing Multi Material Rocket Nozzle**
[Jongwon Lim](#)¹; Jihyun Jang¹; Seokjin Shin¹; ¹InssTek

16:30 PM **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

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Research to Standards

ROBOTICS, AUTOMATION AND ADDITIVE MANUFACTURING

CO-ORGANIZERS:

Mike Bearman
Vecna Robotics,
USA

Joseph Falco
NIST, USA

Philip L. Freeman
Boeing, USA

Adam Norton
University of Massachusetts
Lowell, USA

Aaron Prather
ASTM International, USA

2ND NOV 2022 (WED)
OSPREY (LEVEL 2)

2ND NOVEMBER 2022

SESSION CHAIRS (PM SESSION):

Mike Bearman, Vecna Robotics
Joseph Falco, NIST

13:30 PM
INVITED **Industrialization of AM through Digitalization**
[Tim Bell](#)¹; ¹Siemens Digital Industries

14:00 PM
INVITED **Improving Additive Manufacturing with Robots and Artificial Intelligence**
[Satyandra K. Gupta](#)¹; ¹University of Southern California

14:30 PM
REGULAR **The Journey to Serial Production – Automation as Key Success Factor for Increasing Productivity and Safety**
[Mario Schafnitzel](#)¹; [Oliver Elbert](#)¹;
[Frédéric Erben](#)¹; ¹Grenzebach Maschinenbau

14:50 PM
INVITED **Influence of Automation and Digitization on OEE KPIs of Additive Manufacturing Production Facilities**
[Marius Lakomic](#)¹; ¹EOS

15:20 PM **BREAK**

15:30 PM
REGULAR **Developing Processes for Integrating Hybrid Advanced Manufacturing Equipment for Streamlining the Production of DoD Commodity Items**
[Matthew Brauer](#)¹; [Hayley Katz](#)¹; [David Sabanosh](#)¹; [Tim Swaszek](#)²; [James Zunino](#)¹; ¹U.S. Army Combat Capabilities Development Command - Armaments Center; ²AURA

15:50 PM
INVITED **Quality and Energy Efficiency in Robotic Additive Manufacturing: From Single to Multi-Robot Systems**
[Azadeh Haghighi](#)¹; ¹University of Illinois Chicago

16:20 PM
REGULAR **Laser Line Scanner Benchmarking and Automation of Laser Scanning**
[Bhupesh Verma](#)¹; [Carsten Putz](#)¹; [Jan Bremer](#)²; [Stefan Reich](#)¹; [Johannes Henrich Schleifenbaum](#)¹; ¹RWTH Aachen University - Digital Additive Production DAP; ²BCT Steuerungs- und DV-SystemeS

16:40 PM
REGULAR **Mechanical Evaluation of Topology- and Toolpath-Optimized Composite Structures Manufactured via Multi-Axis Material Extrusion**
[Joseph R. Kubalak](#)¹; [Christopher B. Williams](#)¹; ¹Virginia Tech - DREAMS Lab

17:00 PM
INVITED **Closed-Loop Additive Manufacturing (AM) with Automated Metrology**
[Mingu Kang](#)¹; ¹ARIS Technology

17:30 PM **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



CENTER of
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Research to Standards

NON-DESTRUCTIVE EVALUATION METHODS FOR AM

CO-ORGANIZERS:

Alphons Antonysamy

GKN Aerospace, UK

Anton Du Plessis

Stellenbosch University,

South Africa / Object

Research Systems, Canada

Ben Dutton

The MTC, UK

Patrick Howard

GE Aviation, USA

**3RD NOV 2022 – 4TH NOV 2022 (THU-FRI)
GRIFFIN A (LEVEL 1)**

3RD NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Patrick Howard, GE Aviation

SESSION CHAIRS (PM SESSION):

Anton Du Plessis, Stellenbosch University / Object

Research Systems

Ben Dutton, The MTC

08:00 AM **Role of Nondestructive Evaluation (NDE) and In Situ Process Monitoring in Managing Risk of Additive Manufactured (AM) Space Hardware**
INVITED **Erin L. Lanigan¹; ¹NASA - Marshall Space Flight Center (MSFC)**

08:30 AM **Enabling CT for AM: ASTM E07.01 – Overview of Subcommittee on Radiology (X and Gamma) Method**
INVITED **Cliff Bueno¹; Trey Gordon²; ¹Blue Origin; ²PNW Digital X-Ray Consulting**

09:00 AM **Quality in Additive Manufacturing – Challenges, Opportunities and Progressions for NDE**
REGULAR **Wilson Vesga Rivera¹; Ben Dutton¹; ¹The Manufacturing Technology Centre (MTC)**

09:20 AM **Novel Approaches for Quality Control and Strength Estimation of AM Fatigue Properties**
INVITED **Simone Romano¹; ¹Avio Aero**

09:50 AM **BREAK**

10:30 AM **Evaluation of the Influence of Additive Manufacturing Process Parameters on Parts' Porosity using X-Ray Computed Tomography**
REGULAR **Shengkai Yu¹; Huiyuan Qu¹; Shihua Wang¹; ¹A*STAR - National Metrology Centre (NMC)**

10:50 AM **X-Ray Computed Tomography of Directed Energy Deposition Builds: New Mathematical Techniques to Analyze 3D Pore Morphology**
REGULAR **Orion L. Kafka¹; Jian Cao²; Edward Garboczi¹; Samantha Webster²; Newell Moser¹; ¹NIST; ²Northwestern University**

11:10 AM **Developing X-Ray Computed Tomography Phantom and Data with Controlled Flaws**
INVITED **Felix H. Kim¹; Edward J. Garboczi¹; Nikolai N. Klimov¹; Adam L. Pinter¹; Sarah M. Robinson¹; John Henry J. Scott¹; ¹NIST**

11:40 AM **Probability of Detection and Validation of X-Ray Computed Tomography of Additively Manufactured Ti-6Al-4V and AF-9628 Alloys**
REGULAR **Griffin Jones¹; Rachel Reed²; Veeraraghavan Sundar²; Jayme Keist¹; ¹Pennsylvania State University - Applied Research Laboratory (PSU - ARL); ²UES**

12:00 PM **LUNCH**

13:30 PM **Inspection Simulation to Enhance the Reliability and Validity of Automated X-Ray Data Analysis**
REGULAR **Robert A. Culver¹; Ben Dutton¹; ¹The Manufacturing Technology Centre (MTC)**

13:50 PM **Quality and NDE in Metal Powder Bed Fusion**
INVITED **Martin White¹; Paul Bates¹; Shane Collins¹; Steve James²; Youping Gao²; ¹ASTM International; ²Castheon**

14:20 PM **Approaches for Assessing the Capability of X-Ray Computed Tomography for Anomaly Detection in Additive Manufacturing**
REGULAR **Anjali Singhal¹; Patrick Howard¹; ¹GE Aviation**

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ICAM 2022 PROGRAM AGENDA

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CENTER of
EXCELLENCE
Research to Standards

14:40 PM
REGULAR **Measuring the Fidelity of Additively Manufactured Parts: X-Ray Tomography and the Principal Axes of Inertia**
Edward Garboczi¹; Hajar Afarani²; Joseph Biernacki²; Ebrahim Esfahani²; Newell Moser¹; ¹NIST; ²Tennessee Technological University

15:00 PM **BREAK**

15:30 PM
INVITED **X-Ray Based Inspection Routines for Additively Manufactured Parts**
Niils Achilles¹; ¹XYLON

16:00 PM
REGULAR **Considerations for Inspection of Additively-Manufactured Parts with Ultrasonic Testing (UT) and the Total Focusing Method (TFM)**
George D. Connolly¹; John P. Shingledecker¹; Anand Kulkarni²; Alex Bridges¹; Jeffrey L. Crandall³; ¹Electric Power Research Institute (EPRI); ²Siemens Energy; ³Connecticut Center for Advanced Technology (CCAT)

16:20 PM
INVITED **NDT for Emerging New Applications**
Ben Dutton¹; Wilson Vesga¹; Sandra Cabeza²; Ranggi Ramadhan²; Julian Wright³; ¹The Manufacturing Technology Centre (MTC); ²Institut Laue-Langevin (ILL); ³Theta Technologies

16:50 PM **END OF DAY**

4TH NOVEMBER 2022

SESSION CHAIRS (AM SESSION):

Anton Du Plessis, Stellenbosch University / Object Research Systems
Patrick Howard, GE Aviation

SESSION CHAIR (PM SESSION):

Ben Dutton, The MTC

08:00 AM
INVITED **Process Compensated Resonance Testing for Reduction of Mechanical Testing Burden in AM Process Qualification, Monitoring and Control**
Eric Biedermann¹; Julieanne Heffernan¹; Ira Widmayer²; Niklas Höhn¹; Martin Bach²; Leanne Jauriqui¹; Thomas Köhler¹; ¹Vibrant; ²Airbus Helicopters

08:30 AM
REGULAR **CT Based Geometrical Analysis of Process Induced Defects in Thin Lattice Struts**
Philipp Sugg¹; Philip Sperling¹; Frederik Coppens²; Moritz Ellenberger³; Guillaume Meyer³; Christian Mittelstedt³; Damiano Pasini⁴; ¹Volume Graphics; ²TESCAN XRE; ³Technical University of Darmstadt; ⁴McGill University

08:50 AM
REGULAR **Automated Laser Ultrasonic Phased Arrays for the Rapid Defect Detection within As-Deposited AM Components**
Don M. Pieris¹; Geo Davis¹; Peter Lukacs¹; Panagiotis Kamintzis¹; Theodosia Stratoudaki¹; Charles N. MacLeod¹; Stephen G. ssPierce¹; Adam T. Clare²; Stewart Williams³; ¹University of Strathclyde; ²University of Nottingham; ³Cranfield University

09:10 AM
INVITED **In-Situ Monitoring for Additive Manufacturing: Towards Qualify-as-you-Build**
Paul Hooper¹; ¹Imperial College London

09:40 AM
REGULAR **Towards Building and Inspecting Larger AM Parts In Situ via Hybrid Manufacturing**
Jason B. Jones¹; ¹Hybrid Manufacturing Technologies

10:00 AM **BREAK**

10:30 AM
INVITED **Use of a Modified IQI Standard – A Way Forward in NDI of Metallic AM Parts?**
Josef Spachtholz¹; Andreas Fischersworing-Bunk¹; Stefan Neuhäusler¹; Josef Spachtholz¹; ¹MTU Aero Engines

11:00 AM
INVITED **Resonance-Based Acoustic/Ultrasonic Testing for AM Quality Control**
Parisa Shokouhi¹; ¹Pennsylvania State University

11:30 AM
INVITED **Inconel 625 L-PBF Part Categorization by Process Parameters using Resonant Ultrasound Spectroscopy**
Anne-Françoise Obaton¹; Gregory Weaver²; Lucas Fournet-Fayard¹; Charles Cayron¹; Florian Montagner³; Olivier Burnet⁴; Alex Van den Bossche⁴; ¹Laboratoire National de Métrologie et d'Essais (LNE); ²WeaverNDT; ³Baker Hughes Digital Solutions; ⁴GrindoSonic

12:00 PM **LUNCH**

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ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



CENTER of
EXCELLENCE
Research to Standards

- 13:30 PM**
INVITED **Additive Manufactured Metals:
Execution of Non-Destructive Testing
in Production**
Philip Riegler¹; ¹Norsk Titanium
- 14:00 PM**
INVITED **Application of In Situ X-Ray Imaging
of Metal Powders, Powder Bed Fusion
Process, and its Manufactured
Components**
Chu Lun Alex Leung¹; Yuze Huang¹;
Samuel J. Clark²; David Rees¹; Samy
Hocine¹; Sebastian Marussi¹; Marta
Majkut³; Alexander Rack³; Peter D. Lee¹;
¹University College London (UCL);
²Argonne National Laboratory (ANL);
³European Synchrotron Radiation
Facility (ESRF)
- 14:30 PM**
INVITED **Developments of In-Process NDE
Techniques for Wire + Arc Additive
Manufacture at University of
Strathclyde**
Stephen G. Pierce¹; Charles N.
MacLeod¹; Ehsan Mohseni¹; Randika
Wathavana Vithanage¹; Theodosia
Stratoudaki¹; Yashar Javadi¹; Rastislav
Zimmermann¹; Euan Foster¹; Momchil
Vasilev¹; Charalampos Loukas¹; David
Lines¹; Peter Lukacs¹; Geo Davis¹; Don
Pieris¹; Panagiotis Kamintzis¹;
Muhammad Rizwan¹; Anthony
Gachagan¹; Stephen Fitzpatrick^{1,2};
Misael Pimentel Espirindio e Silva^{1,2};
Scott McKegney^{1,2}; Kenneth Burnham¹;
²William Kerr^{1,2}; ¹University of
Strathclyde; ²National Manufacturing
Institute Scotland (NMIS)
- 15:00 PM**
INVITED **In-Process Monitoring and
Nondestructive Testing of AM:
Lessons Learned from ASTM
WK73289**
Brandon M. Lane¹; Surendra Singh²;
Darren P. Beckett³; Lars Jacquemetton³;
Scott Gold⁴; Erin L. Lanigan⁵; Steve
James⁶; Abdalla R. Nassar⁷; ¹NIST;
²Honeywell; ³Sigma Additive Solutions;
⁴GE Aviation; ⁵NASA - Marshall Space
Flight Center (MSFC); ⁶Castheon; ⁷John
Deere
- 15:30 PM** **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

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MICROSTRUCTURAL ASPECTS OF AM

CO-ORGANIZERS:

Jonathan Pegues
Sandia National
Laboratories, USA
Shuai Shao
Auburn University,
USA

Swee Leong Sing
National University of
Singapore (NUS), Singapore
Chantal Sudbrack
National Energy Technology
Laboratory (NETL), USA

3RD NOV 2022 – 4TH NOV 2022 (THU-FRI)
GRIFFIN B (LEVEL 1)

3RD NOVEMBER 2022

SESSION CHAIRS (AM SESSION):

Jonathan Pegues, Sandia National Laboratories
Shuai Shao, Auburn University

SESSION CHAIRS (PM SESSION):

Swee Leong Sing, NUS
Chantal Sudbrack, NETL

08:00 AM
INVITED

In-Situ Microstructural Characterization of Additively Manufactured Lattice Structures

[Donald W. Brown](#)¹; Nathan S. Johnson²; Maria Strantza³; Jenny Wang³; Manylibo Matthews³; Jun-Sang Park⁴; Peter Kenesei⁴; ¹Los Alamos National Laboratory (LANL); ²SLAC National Accelerator Laboratory; ³Lawrence Livermore National Laboratory (LLNL); ⁴Argonne National Laboratory (ANL)

08:30 AM
INVITED

Advanced Materials and Manufacturing Development for Heat Exchanger Applications: Microstructural Comparison of Solid State and Liquid State Additive Manufacturing

[Isabella J. van Rooyen](#)¹; Saumyadeep Jana¹; Luis Nunez²; ¹Pacific Northwest National Laboratory (PNNL); ²Idaho National Laboratory

09:00 AM
INVITED

Crystallographic Texture of DED AM Ti64 Revealed by Large-Area Quantitative Polarized-Light Microscopy

[Brian G. Hoover](#)¹; Jonathan W. Pegues²; Cesar H. Ornelas-Rascon¹; Andrew B. Kustas²; ¹Advanced Optical Technologies (AOT); ²Sandia National Laboratories

09:30 AM
INVITED

2D & 3D In-Situ Characterization of Metal AM Microstructure using SEM and X-Ray Diffraction Contrast Tomography

[Pradeep Bhattad](#)¹; Curtis Frederick¹; ¹ZEISS

10:00 AM

BREAK

10:30 AM
REGULAR

Melt Pool Analysis on PBF-LB/M Produced Stepped Samples Dependent on the Exposure Order

[Lisa Kersting](#)¹; Johannes Henrich Schleifenbaum²; Adrian Jacob³; ¹Siemens Energy; ²RWTH Aachen University - Digital Additive Production DAP; ³Technische Universität Berlin

10:50 AM
REGULAR

Microstructure of Extra Fine Feature Copper Alloy Parts Additively Manufactured through a High-Resolution Laser Powder Bed Fusion System

[Jason Jyi Sheuan Ten](#)¹; Junwei Tan¹; Fern Lan Ng¹; Hang Li Seet¹; Mui Ling Sharon Nai¹; ¹A*STAR - Singapore Institute of Manufacturing Technology (SIMTech)

11:10 AM
INVITED

Micromechanical Modeling of Porosity Defects in Additively Manufactured Alloys

[Krzysztof Stopka](#)¹; Michael D. Sangid¹; ¹Purdue University

11:40 AM
INVITED

Simulating Additive Manufacturing with SPPARKS – Process Modeling for Realistic 3D Microstructures

[Theron M. Rodgers](#)¹; Fadi Abdeljawad²; Joseph E. Bishop¹; Judith A. Brown¹; Kyle Johnson¹; Hojun Lim¹; Jonathan D. Madison¹; John A. Mitchell¹; Daniel Moser¹; Veena Tikare¹; Jeremy Trageser¹; ¹Sandia National Laboratories; ²Clemson University

12:10 PM

LUNCH

13:30 PM
INVITED

Microstructural Control of Functional Structural Materials through Innovations in Additive Manufacturing

[Changquan Lai](#)¹; ¹Nanyang Technological University (NTU)

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ICAM 2022 PROGRAM AGENDA

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Research to Standards

- 14:00 PM**
INVITED **Materials-by-Design Approach for Steels Tailored Towards Additive Manufacturing**
Amit Behera¹; Greg Olson¹; Abhinav Saboo¹; ¹QuesTek
- 14:30 PM**
INVITED **Leveraging Microstructure-Informed Design to Mitigate Manufacturing Risk**
Amberlee Haselhuhn¹; David Hicks¹; ¹LIFT
- 15:00 PM** **BREAK**
- 15:30 PM**
INVITED **Development of Advanced 3D Printed Light Metal Structural Materials Assisted by AI/MGI**
Che-Nan Kuo¹; ¹National Sun Yat-sen University
- 16:00 PM**
INVITED **Initial Microstructure-Property Evaluation of Additively Manufactured IN625 for IGT Combustor Applications**
Chantal K. Sudbrack¹; Kyle Rozman²; Kristin Tippey²; Rui Feng²; Martin Detroit¹; Lucas Teeter²; Omer Dogan¹; ¹National Energy Technology Laboratory (NETL); ²NETL Support Contractor
- 16:30 PM** **END OF DAY**

4TH NOVEMBER 2022

SESSION CHAIRS (AM SESSION):
Jonathan Pegues, Sandia National Laboratories
Shuai Shao, Auburn University

SESSION CHAIRS (PM SESSION):
Swee Leong Sing, NUS
Chantal Sudbrack, NETL

- 08:00 AM**
INVITED **Machine-to-Machine and Parameter Effects on Tensile Properties of 316L Stainless Steel Produced using Laser Powder Bed Fusion**
Joy Gockel¹; Simon Richardsen¹; Garrison Hommer¹; Jorge Ramirez¹; Steve Midson¹; Craig Brice¹; ¹Colorado School of Mines
- 08:30 AM**
INVITED **Revealing the Influence of Microstructure and Morphology on the Mechanical Behavior of Thin Wall Laser Powder Bed Fusion Structures**
Dhruv Bhate¹; Paul Paradise¹; Tyler D. Smith¹; ¹Arizona State University

- 09:00 AM**
INVITED **Experimental and Computational Characterization of the Effect of Process Parameters on Strength and Porosity of AISi10Mg by L-PBF**
Rashid Miraj¹; Vasyi Harik¹; Qixiang Luo²; Mallikharjun Marrey¹; Timothy Simpson²; Allison Beese²; Frank Abdi¹; ¹AlphaSTAR; ²Pennsylvania State University
- 09:30 AM**
REGULAR **Effect of Heat Treatment on Micro-Machinability of Laser Powder Bed Fused AISi10Mg**
Basil Kuriachen¹; Jino Joshy¹; Mohit Godara¹; Jose Mathew¹; ¹National Institute of Technology Calicut
- 09:50 AM**
REGULAR **Microstructural Studies of Heat-Treated Alloy 625 Fabricated by Laser Powder Bed Fusion**
Karen T. Henry¹; Steven A. Attanasio¹; Stephen M. Sabol¹; John A. Sutliff¹; Robert A. Morris¹; ¹Naval Nuclear Laboratory (NNL)
- 10:10 AM** **BREAK**
- 10:30 AM**
INVITED **Laser Additive Manufacturing of Fe-Co and Fe-Si Soft Magnetic Alloys**
Andrew Kustas¹; Erin Barrick¹; Jonathan Pegues¹; Mark Wilson¹; Kyle Johnson¹; Eric Theisen²; Frank DelRio¹; Todd Monson¹; Don Susan¹; ¹Sandia National Laboratories; ²Metglas

11:00 AM
INVITED **Combined Effect of Defects and Stress State on Fracture of Additively Manufactured Metals**
Allison M. Beese¹; ¹Pennsylvania State University

11:30 AM
INVITED **Chemistry-Processing-Microstructure Relationships in Materials for Advanced Manufacturing**
Eric A. Lass¹; ¹University of Tennessee, Knoxville

12:00 PM **LUNCH**

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ICAM 2022 PROGRAM AGENDA

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13:30 PM **In-Situ Formation of Titanium Metal
Matrix Composites Exploiting
Invariant Reactions by Laser
Powder Bed Fusion**

INVITED

[William R. Hixson](#)¹; James A. Coakley¹; Dieter Isheim²; Jonathan D. Poplawsky³; Howard J. Stone⁴;
¹University of Miami; ²Northwestern University; ³Oak Ridge National Laboratory (ORNL); ⁴University of Cambridge

14:00 PM **Microtextured Composites of
Additively Manufactured
Molybdenum**

REGULAR

[Christopher Ledford](#)¹; Patxi Fernandez-Zelaia¹; Seokpum Kim¹; Quinn Campbell¹; Julio Ortega Rojas¹; Andres M. Rossy¹; Michael Kirka¹;
¹Oak Ridge National Laboratory (ORNL)

14:20 PM **Additive Manufacturing of 2000
Series Aluminum Alloys: Crack
Mitigation, Microstructure and
Mechanical Properties**

REGULAR

[Graham Matheson](#)^{1, 2}; Alper Evirgen¹;
¹Oerlikon AM; ²Technical University of Munich

14:40 PM **Microstructure and Properties of
Additively Manufactured High
Temperature Metals**

INVITED

[Patxi Fernandez-Zelaia](#)¹; Christopher Ledford¹; Michael Kirka¹; ¹Oak Ridge National Laboratory (ORNL)

15:10 PM **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

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AM FOR SPACE APPLICATIONS

CO-ORGANIZERS:

Faith Oehlerking
Beehive3D, USA
Rick Russell
NASA, USA

Kiley Versluys
Relativity Space, USA
John Vickers
NASA, USA

3RD NOV 2022 (THU)
GRIFFIN C (LEVEL 1)

3RD NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Rick Russell, NASA

SESSION CHAIR (PM SESSION):

Faith Oehlerking, Beehive3D

08:00 AM
INVITED **Additive Manufacturing: Moving Beyond Parts to Production Systems for Space Applications**
[Behrang Poorganji](#)¹; Ivan Madera¹;
¹Morf3D

08:30 AM
INVITED **Having a Come-Apart: Lessons Learned from Additively Manufactured Hardware Failures**
[Paul R. Gradl](#)¹; Gabriel Demeneghi¹;
David Ellis²; Colton Katsarelis¹; Alison Park³; William G. Tilson¹; Brian West¹;
Benjamin B. Williams¹; ¹NASA - Marshall Space Flight Center (MSFC);
²NASA - Glenn Research Center;
³NASA Engineering and Safety Center (NESC)

09:00 AM
INVITED **Combining Laser Metal Fusion with Laser Metal Deposition to Open the Door to Space**
[Eliana Fu](#)¹; Adam Simons¹; Zeke Sudbury¹; ¹TRUMPF

09:30 AM
INVITED **A Trial in Additive Manufacturing Certification for Human Space Flight, RS-25 POGO**
[Alan Fung](#)¹; Dan Matejczyk¹; Bryan Webb¹; ¹Aerojet Rocketdyne

10:00 AM **BREAK**

10:30 AM
INVITED **Indian AM Space Program – Design, Development, Qualification and Challenges**
[Ankit Sahu](#)¹; ¹Objectify Technologies

11:00 AM
REGULAR **Internal Channel Polishing and Controlled Orifice Geometry Modification via Chemical Polishing for Liquid Rocket Engine Fuel Injector Optimization**
[Justin Michaud](#)¹; [Agustin Diaz](#)¹;
Patrick McFadden¹; Paul R. Gradl²;
Thomas Teasley²; ¹REM Surface Engineering; ²NASA - Marshall Space Flight Center (MSFC)

11:20 AM
REGULAR **Material Properties and Manufacturing Feasibility of Cold Spray Additive Manufactured (CSAM) Launcher Propulsion System Components**
[Markus Brotsack](#)¹; Jan Kondas¹; Reeti Singh¹; Max Meinicke¹; Mario Guagliano²; Sara Bagherifard²; Ondrej Kovarik³; Jan Cizek⁴; ¹Impact Innovations; ²Politecnico di Milano; ³Czech Technical University in Prague; ⁴Institute of Plasma Physics of the Czech Academy of Sciences

11:40 AM
REGULAR **The Effect of Post-Processing on Tensile and Fatigue Behaviors of Additively Manufactured Haynes 282 Superalloy at Cryogenic and Elevated Temperatures**
[Seyed Reza Ghiaasiaan](#)¹; Paul R. Gradl²; Shuai Shao¹; Nima Shamsaei¹; ¹Auburn University; ²NASA - Marshall Space Flight Center (MSFC)

12:00 PM **LUNCH**

13:30 PM
INVITED **Additive Manufacturing for On Earth, In Orbit and On Planet Space Applications**
[Andrew Norman](#)¹; Thomas Rohr¹;
Tommaso Ghidini¹; ¹European Space Agency

14:00 PM
INVITED **Challenges in Processing Alloy 718 using Cold Spray Additive Manufacturing**
[Philipp Kindermann](#)¹; Martin Wunderer¹; Ismail Ünsal¹; Christian Seidel^{1,2}; Georg Schlick¹;
¹Fraunhofer Institute for Casting, Composite and Processing Technology IGCV; ²HM Hochschule München University of Applied Sciences

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- 14:30 PM** **AM of Ceramics - Opportunities and Challenges**
INVITED [Alicia Carey](#)¹; [Brandon Kirkland](#)¹;
 ¹Redwire Space
- 15:00 PM** **BREAK**
- 15:30 PM** **Success of Nickel Alloys 939 and 282 in Space Applications**
REGULAR [Scott Volk](#)¹; ¹Keselowski Advanced Manufacturing
- 15:50 PM** **Production vs Performance: Manufacturing Heritage Designs with A.M.**
INVITED [Tim Berry](#)¹; ¹Launcher
- 16:20 PM** **Total Cost Factors Associated with L-PBF Manufacturing**
INVITED [Kiley Versluys](#)¹; ¹Relativity Space
- 16:50 AM** **Additive Manufacturing Probabilistic Methods for Aviation Applications**
INVITED [Martin White](#)¹; [Alberto Bordin](#)¹; [Mahdi Jamshidinia](#)¹; [Mohsen Seifi](#)¹; [Kirstie Snodderly](#)¹; ¹ASTM International
- 17:20 PM** **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

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DESIGN, MODELING, AND SIMULATION METHODOLOGIES AND CONCEPTS FOR AM

CO-ORGANIZERS:

Eujin Pei
Brunel University
London, UK

David Rosen
Georgia Institute of
Technology, USA

Albert To
University of
Pittsburgh, USA

Andrew Triantaphyllou
The MTC, UK

**3RD NOV 2022 – 4TH NOV 2022 (THU-FRI)
CYPRESS (LEVEL 1)**

3RD NOVEMBER 2022

SESSION CHAIR (AM SESSION):
Andrew Triantaphyllou, The MTC

SESSION CHAIR (PM SESSION):
David Rosen, Georgia Institute of Technology

08:00 AM
INVITED **The Support of Bio-Inspired Multi-Functional and Multi-Scale Design through Function-Based Heterogeneous Lattice Modeling Approach**
[Yaoyao Fiona Zhao](#)¹; Nikita Letov¹; Pavan Velivela¹; ¹McGill University - Additive Design and Manufacturing Laboratory (ADML)

08:30 AM
REGULAR **Application of Multi-Scale Mesh-Refinement in Abaqus for Increased Efficiency of Metallic Additive Manufacturing Process Simulations**
[Johnathan Tran](#)¹; Elliot Haag¹; David Najera¹; Marc Russell¹; ¹ATA Engineering

08:50 AM
REGULAR **Bio-Inspired Design of Architected Materials**
[Alexander Grishin](#)¹; [Dhruv Bhate](#)²; Yash Mistry²; Swapnil Morankar³; Athul Rajeev²; Grace Cope⁴; Alexander Potts²; Clint Penick⁴; Nikhilesh Chawla³; ¹Phoenix Analysis & Design Technologies (PADT); ²Arizona State University; ³Purdue University; ⁴Kennesaw State University

09:10 AM
REGULAR **Design for Additive Manufacturing of Fiber-Reinforced Polymer Composites: Review and Status**
[David W. Rosen](#)¹; [Janet Wong](#)¹; [Abdulmajeed Altassan](#)¹; ¹Georgia Institute of Technology

09:30 AM
INVITED **The Impact of Multi-Axis Continuous Fiber AM on the Design Process**
[Ian Campbell](#)¹; ¹Wohlers Associates

10:00 AM **BREAK**

10:30 AM
REGULAR **Digital Foam: The Padding Revolution**
[Jon Walker](#)¹; ¹EOS North America

10:50 AM
REGULAR **How the Full Digital Thread Improves the Value and Validity of Additive Manufacturing**
[Chris Robinson](#)¹; ¹Anslys

11:10 AM
REGULAR **A Novel Multi-Spatial-Temporal Resolution Concurrent FE Model for Melt Pool and Residual Stress Prediction in Laser Power Bed Fusing Additive Manufacturing**
[Jiahao Cheng](#)¹; Xiaohua Hu¹; Yang Huo²; Mei Li²; Xin Sun¹; ¹Oak Ridge National Laboratory (ORNL); ²Ford Motor Company

11:30 AM
INVITED **Multi-Scale Modeling of Thermal/Residual Stress in Additive Manufacturing Across Grain-, Track- and Part-Scales**
[Wentao Yan](#)¹; Fan Chen¹; Daijun Hu¹; ¹National University of Singapore (NUS)

12:00 PM **LUNCH**

13:30 PM
REGULAR **A Residual Stress Investigation of Large-Scale Additively Manufactured Parts: Process Modeling and Validation**
[George Scarlat](#)¹; Kyle Warren¹; Robert Grout¹; ¹University of Maine - Advanced Structures and Composites Center

13:50 PM
REGULAR **Numerical Quantification of DED Closed-Loop Melt Pool Temperature Control on Thermal History and Residual Stresses of Thin-Wall Structures**
[Zoé Jardon](#)¹; Jorge Sanchez Medina¹; Julien Ertveldt¹; Patrick Guillaume¹; Lincy Pyl¹; ¹Vrije Universiteit Brussel

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4TH NOVEMBER 2022

SESSION CHAIR (PM SESSION):

Richard Huff, ASTM International

14:10 PM
REGULAR **An Extended Goldak Heat Source Model for FE Simulation of Both Conduction Mode and Keyhole Model Melt Pool in Laser Powder Bed Fusion Additive Manufacturing**
[Jiahao Cheng](#)¹; Patxi Fernandez-Zelaia¹; Xiaohua Hu¹; Yang Huo²; Mei Li²; Xin Sun¹; ¹Oak Ridge National Laboratory (ORNL); ²Ford Motor Company

14:30 PM
INVITED **Aluminum Heat Exchangers: A Case Study of Advancing Additive Manufacturing in a Skeptical Environment**
[Caleb Martin](#)¹; Roddy Rodriguez¹; ¹Northrop Grumman Mission Systems

15:00 PM **BREAK**

15:30 PM
INVITED **Accelerating Materials Design for Additive Manufacturing through Graded Alloy Deposition Techniques**
[Wei Xiong](#)¹; ¹University of Pittsburgh

16:00 PM
REGULAR **Overheating in Ti6Al4V Laser Powder Bed Fusion Components: Properties, Prediction and Prevention**
[Tim Koenis](#)¹; Emiel Amsterdam¹; Marc J. de Smit¹; Maria L. Montero-Sistiaga¹; ¹Royal NLR - Netherlands Aerospace Centre

16:20 PM
REGULAR **Structural Mechanical Simulation of Additively Manufactured Parts with Internal Defects Based on Computed Tomography Data**
[Philipp Sugg](#)¹; ¹Volume Graphics

16:40 PM
REGULAR **Computational Modeling and Identification of Nanoparticles Dispersion Mechanism in 316L Matrix Additively Manufactured By Hybrid Process of Ink Jetting and Laser Powder Bed Fusion**
[Somayeh Pasebani](#)¹; Milad Ghayoor¹; Omid Sadeghi¹; Bryce Cox¹; Joshua Gess¹; ¹Oregon State University

17:00 PM **END OF DAY**

13:30 PM
REGULAR **Fatigue Crack Initiation Behavior of Laser Beam Powder Bed Fused IN718**
[Shuai Shao](#)¹; Nima Shamsaei¹; ¹Auburn University

13:50 PM
REGULAR **Fatigue and Fracture Control Plan for AM AISi10Mg Alloy**
[Rashid Miraj](#)¹; Amirhossein Eftekharian¹; Frank Abdi¹; ¹AlphaSTAR

14:10 PM
INVITED **Integrating Ceramic AM Piece Parts into Products: Weibull Mechanics**
[Kurtis R. Ford](#)¹; Dale Cillessen¹; Daniel Kammler¹; Elizabeth D. Smith¹; ¹Sandia National Laboratories

14:40 PM
REGULAR **Model-Based Quantification of Uncertainties in Metal Additive Manufacturing**
[Daniel Moser](#)¹; Michael Heiden¹; Scott Jensen¹; Kyle Johnson¹; Mario Martinez¹; Theron M. Rodgers¹; Michael Stender¹; ¹Sandia National Laboratories

15:00 PM **BREAK**

15:30 PM
REGULAR **Assessment of Residual Stresses in Cold Spray Additive Manufacturing: Experiments and Thermo-Mechanical Modeling with Geometry Evolution**
[Chaitanya Vundru](#)¹; Chaitanya Vundru¹; Sinan Muftu¹; Sohayb Batwa¹; Samuel Boese¹; Ozan C. Ozdemir¹; Enqiang Lin²; ¹Northeastern University; ²VulcanForms

15:50 PM
REGULAR **Simulation of Wire Arc Additive Manufacturing in the Reinforcement of a Half-Cylinder Shell Geometry**
[Xiao Fan Zhao](#)¹; Avelino Zapata¹; Michael F. Záh¹; ¹Technical University of Munich - Institute for Machine Tools and Industrial Management (TUM - iw)

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ICAM 2022 PROGRAM AGENDA

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16:10 PM **Comparison of Methods of
REGULAR Modeling Additive Manufacturing
with ABAQUS and Sierra**
Elton L. Freeman¹; Ivan P. Beckman¹;
Guillermo A. Riveros¹; Matthew
Ireland²; Tomas Mondragon¹; Daniel
Mosser³; Christine M. Lozano¹; James
T. Stinson¹; ¹U.S. Army Engineer
Research and Development Center
(ERDC); ²University of Maine; ³Sandia
National Laboratories

16:30 PM **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

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PROCESS CONTROL AND IN-SITU MONITORING TECHNIQUES IN AM

CO-ORGANIZERS:

Darren Beckett **Abdalla Nassar**
Sigma Additive John Deere, USA
Solutions, USA **Tuan Tran**
Ajay Krishnan Nanyang Technological
EWI, USA University (NTU), Singapore

3RD NOV 2022 – 4TH NOV 2022 (THU-FRI)
DOGWOOD (LEVEL 1)

3RD NOVEMBER 2022

SESSION CHAIR (AM + PM SESSION):

Darren Beckett, Sigma Additive Solutions

08:00 AM **The In-Situ Project: Correlating In-Situ Monitoring Data and Non-Destructive Evaluation (NDE) Methods to Characterize Defect Populations in Laser Powder Bed Fusion (L-PBF) Material**
INVITED [Delphine Duquette](#)¹; Erin L. Lanigan¹; James Mavo¹; Isabelle Sadowksi¹; ¹NASA

08:30 AM **A Closed-Loop Feedback Control System for In-Situ Defect Monitoring and Correction in Laser Powder Bed Fusion Process**
REGULAR [Michael Sealy](#)¹; Jingfu Liu²; Ziyi Liu²; Behrooz Jalalahmadi²; Michael Presley³; Michael Schwartz³; Tom Houle⁴; Ian Palmer⁵; Jason Fetty⁵; ¹Purdue University; ²Sentient Science; ³Johns Hopkins University - Applied Physics Laboratory (JHU - APL); ⁴Matsuura; ⁵U.S. Army Combat Capabilities Development Command - Aviation & Missile Center

08:50 AM **Machine Learning Based In-Situ Sensor Evaluation and Defect Detection for Laser Powder Bed Fusion**
INVITED [Brian A. Fisher](#)¹; Luke Scime²; Zackary Snow²; ¹Raytheon Technologies Research Center; ²Oak Ridge National Laboratory (ORNL)

09:20 AM **Automated Defect Detection and Validation for Laser Powder Bed Additive Manufacturing**
REGULAR [Wentao Fu](#)¹; Robert Grube¹; Asya Lou¹; ¹Boeing

09:40 AM **Monitoring and Prediction of Porosity in Laser Powder Bed Fusion using Physics-Informed Meltpool Signatures and Machine Learning**
REGULAR [James Craig](#)¹; [Pralhada K. Rao](#)²; [Ziyad Smoqi](#)²; [Benjamin Bevans](#)²; Aniruddha Gaikwad²; Alonso Peralta³; Alan Abul-Haj⁴; ¹Stratronics; ²University of Nebraska-Lincoln; ³Honeywell; ⁴ARA Engineering

10:00 AM **BREAK**

10:30 AM **Process Optimization in Metal Additive Manufacturing using In-Situ Diagnostics and Machine Learning**
INVITED [Nicholas P. Calta](#)¹; Manyalibo Matthews¹; Jean-Baptiste Forien¹; Gabriel M. Guss¹; ¹Lawrence Livermore National Laboratory (LLNL)

11:00 AM **Towards a Quality Continuum of Monitoring and Analytics that Enables AM Part Qualification**
INVITED [Alex Benham](#)¹; Darren P. Beckett¹; ¹Sigma Additive Solutions

11:30 AM **Process Monitoring for Pore Detection using In Situ X-Ray Imaging and Pyrometry Signal**
REGULAR [Sanam Gorgannejad](#)¹; Nicholas P. Calta¹; Jean-Baptiste Forien¹; Sen Liu²; Aiden Martin¹; Peiyu Quan²; Maria Strantz¹; Christopher J. Tassone²; Vivek Thampy²; Jenny Wang¹; ¹Lawrence Livermore National Laboratory (LLNL); ²SLAC National Accelerator Laboratory

11:50 AM **LUNCH**

13:30 PM **Two Approaches for Multi Measurand In-Situ Monitoring of the L-PBF Process – Bicolor- and RGB-Optical Tomography**
REGULAR [Tina Becker](#)¹; Simon J. Altenburg¹; Christian Metz²; Philipp P. Breese¹; Simon Oster¹; Christiane Maierhofer¹; ¹Bundesanstalt für Materialforschung und -prüfung (BAM); ²THETASCAN

13:50 PM **Effects of Process Byproducts on In-Situ Thermography and Laser Coupling Measurements of a LPBF Process**
INVITED [David Deisenroth](#)¹; ¹NIST

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ICAM 2022 PROGRAM AGENDA

Updated as of 28th October 2022



CENTER of
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Research to Standards

14:20 PM
REGULAR **A New Instrument for In-Situ X-Ray
Characterization for Inoculation
Treatment of Laser Additive
Manufacturing**
Peiyu Quan¹; Sen Liu¹; Vivek
Thampy¹; Christopher J. Tassone¹;
¹SLAC National Accelerator
Laboratory

15:20 PM **END OF DAY**

14:40 PM
REGULAR **Track-by-Track Shape Evolution of
Cold Spray Deposits**
Scott E. Julien¹; Nathaniel Hanson¹;
Joseph Lynch¹; Ozan C. Ozdemir¹;
Taskin Padir¹; Sinan Muftu¹;
¹Northeastern University

15:00 PM **END OF DAY**

4TH NOVEMBER 2022

SESSION CHAIR (PM SESSION):
Ajay Krishnan, EWI

13:30 PM
INVITED **Microstructure Homogenization in
LPBF Builds via Feed-Forward
Process Control of Thermal History**
Ajay V. Krishnan¹; Alex R. Riensche²;
Benjamin Bevans²; Prahalada K.
Rao²; ¹EWI; ²University of Nebraska-
Lincoln

14:00 PM
REGULAR **Spatter Characterization and
Control in Metal LPBF**
David Maass¹; ¹Flightware

14:20 PM
REGULAR **In-Situ X-Ray Characterization for
Printable Aluminum Alloy Design**
Sen Liu¹; Vivek Thampy¹; Peiyu
Quan¹; Christopher J. Tassone¹;
¹SLAC National Accelerator
Laboratory

14:40 PM
REGULAR **X-Ray Monitoring to Detect
Porosity in Directed Energy
Deposition**
Sarah J. Wolff¹; ¹Texas A&M
University

15:00 PM
REGULAR **Closed-Loop Control of Meltpool
Temperature in Directed Energy
Deposition**
Pralhada K. Rao¹; Ziyad Smoqi¹;
Benjamin Bevans¹; James Craig²;
Aniruddha Gaikwad¹; Alan Abul-Haj³;
Jeffrey E. Shield¹; ¹University of
Nebraska-Lincoln; ²Stratronics; ³ARA
Engineering

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ENVIRONMENTAL EFFECTS ON AM PARTS

CO-ORGANIZERS:

James Burns
University of Virginia, USA
Jiadong Gong
QuesTek, USA

Michael Melia
Sandia National
Laboratories, USA

3RD NOV 2022 (THU)
CARDINAL (LEVEL 2)

3RD NOVEMBER 2022

SESSION CHAIR (AM + PM SESSION):

James Burns, University of Virginia

08:00 AM **Environmental Fracture and Fatigue in Additively Manufactured Ti-6Al-4V as a Function of Build Direction**
INVITED

[Allison Akman](#)¹; Matthew McMahon¹; Eric Dau¹; Nicholas Pizzolato¹; Elissa Trueman¹; ¹Naval Surface Warfare Center (NSWC) - Carderock Division

08:30 AM **Comparing the Environmental Cracking Behavior of Additively Manufactured and Wrought 316L Stainless Steel through a Matched Yield Strength Approach**
INVITED

[James Burns](#)¹; Michael P. Roach¹; ¹University of Virginia

09:00 AM **Hydrogen Trapping and Transport at Grain Boundaries and Dislocation Structures in Additively-Manufactured Stainless Steel 316L Evaluated via SIMS/EBSD**
INVITED

[Kaila Bertsch](#)¹; Peter Weber¹; Shohini Sen-Britain¹; Thomas Voisin¹; Chris San Marchi²; Brandon Wood¹; ¹Lawrence Livermore National Laboratory (LLNL); ²Sandia National Laboratories

09:30 AM **A Computational Framework for Probabilistic Quantification of Stress Corrosion Cracking and its Application to Metal Additive Manufacturing**
INVITED

[Lei Chen](#)¹; Karnpiwat Tantratrian¹; ¹University of Michigan-Dearborn

10:00 AM **BREAK**

10:30 AM **Feedstock Modification to Improve Corrosion Performance of 316L Stainless Steel Produced by Laser Powder Bed Fusion**
INVITED

[Rajeev K. Gupta](#)¹; Venkata Bhuvanawari Vukkurum¹; Ahmed A. Dariwsh¹; Jijo Christudasjustus¹; Steven Storck²; ¹North Carolina State University; ²Johns Hopkins University - Applied Physics Laboratory (JHU - APL)

11:00 AM **Interstitial Oxygen Created via Laser Powder Bed Fusion**
INVITED

[Xiaolei Guo](#)¹; Gerald S. Frankel¹; Hsien-Lien Huang¹; Menglin Zhu¹; Karthikeyan Hariharan¹; Szu-Chia Chien¹; Ngan Huynh¹; Jinwoo Hwang¹; Wolfgang Windl¹; Christopher Taylor¹; Eric Schindelholz¹; ¹Ohio State University

11:30 AM **High Strength Austenite for Additive Manufacturing**
INVITED

[Andreas Mohr](#)¹; Janosch Conrads¹; Horst Hill¹; Karlheinz Hoeren¹; ¹Deutsche Edelstahlwerke Specialty Steel

12:00 PM **LUNCH**

13:30 PM **Mechanisms of Selective Corrosion in Laser Powder Bed Fusion and Direct Energy Deposition 316L**
INVITED

[Robert G. Kelly](#)¹; Duane A. Macatangay¹; ¹University of Virginia

14:00 PM **Corrosion Behavior of 2507 Super Duplex Stainless Steel Produced by Additive Manufacturing Processes such as SLM and DED in Saline Environment**
REGULAR

[Matthieu Dhondt](#)¹; Chloé Comas¹; Sébastien Ballésio^{1,2}; Fabien Szymyka²; Cédric Doudard¹; ¹ENSTA Bretagne; ²ENSTA Paris - Institut Polytechnique de Paris

14:20 PM **Corrosion Performance Comparison of Additively Manufactured (AM) and Wrought Alloy 625 in Organic and In-Organic Acids**
INVITED

[Suresh Divi](#)¹; Adam Rowe¹; Matthew Sanders¹; ¹Stress Engineering Services

14:50 PM **END OF DAY**

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SINTER-BASED AM TECHNOLOGIES

CO-ORGANIZERS:

Usama Attia
The MTC, UK
Animesh Bose
Desktop Metal, USA

Amy Elliot
ORNL, USA
Benoit Verquin
CETIM, France

3RD NOV 2022 (THU)
IBIS (LEVEL 2)

3RD NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Animesh Bose, Desktop Metal

SESSION CHAIR (PM SESSION):

Amy Elliot, ORNL

08:00 AM **Digital Additive Production with**
INVITED **Metal Binder Jetting**
 Simon Hoeges¹; ¹GKN Additive

08:30 AM **Recent Progress in Solvent Jetting**
INVITED **on Granules 3D Printing**
 Efrain Carreño-Morelli¹; Mikel
 Rodriguez-Arbaizar¹; ¹University of
 Applied Sciences and Arts Western
 Switzerland (HES-SO)

09:00 AM **Printing and Consolidation**
REGULAR **Strategies for Niche-Materials in**
 Binder Jet Additive Manufacturing
 Amy A. Elliott¹; ¹Oak Ridge National
 Laboratory (ORNL)

09:20 AM **Process-Integrated Production of**
REGULAR **Functional Graded WC-Co**
 Structures by Binder Jetting
 Maja Lehmann¹; Cara Kolb¹; Josef
 Gschlößl¹; Michael F. Zäh¹;
 ¹Technical University of Munich -
 Institute for Machine Tools and
 Industrial Management (TUM - iwib)

09:40 AM **Introducing a New Green Part**
REGULAR **Manufacturing Approach with**
 Increased Repeatability and
 Robustness
 Ben Arnold¹; Ohad Dolev¹; ¹Tritone
 Technologies

10:00 AM **BREAK**

10:30 AM **Tailored Binder in Binder Jetting**
INVITED **for Tooling**
 Tomonori Saito¹; Dustin Gilmer²;
 Sungjin Kim¹; Peeyush Nandwana¹;
 Amy A. Elliott¹; ¹Oak Ridge National
 Laboratory (ORNL); ²University of
 Tennessee, Knoxville

11:00 AM **Supersolidus Liquid Phase**
REGULAR **Sintering of Binder Jet AM H13:**
 Densification and Microstructure
 Evolution
 Peeyush Nandwana¹; Arun Devaraj²;
 Rangasayee Kannan¹; Jia Liu²;
 Tingkun Liu²; Dalong Zhang²; ¹Oak
 Ridge National Laboratory (ORNL);
 ²Pacific Northwest National
 Laboratory (PNNL)

11:20 AM **Crossing the Manufacturing Chasm**
REGULAR **in Additive Manufacturing (AM)**
 Charles Bibas¹; ¹Technica

11:40 AM **Metal Binder Jet Printing – Where**
REGULAR **to Find Success**
 Eric Johnson¹; ¹Eaton

12:00 PM **LUNCH**

13:30 PM **As-Printed and Sintered**
INVITED **Microstructure of Binder Jetted**
 Structural and Functional Materials
 Markus Chmielus¹; ¹University of
 Pittsburgh

14:00 PM **Sintering Mechanisms and**
INVITED **Microstructural Evolution in Binder**
 Jetting Additive Manufacturing
 Iñigo Iturriza¹; Carmen Luno-Bilbao¹;
 Nerea Ordás¹; Beatriz Pérez¹;
 Shandra Sainz¹; Angela Veiga¹; ¹Ceit
 - Technology Center

14:30 PM **Material Parameter Development**
INVITED **for Sintering Models of Binderjet**
 Printed Materials
 Paul Prichard¹; Tyler Mealy¹; Zhuqing
 Wang¹; ¹Kennametal

15:00 PM **BREAK**

15:30 PM **Methodology to Determine**
REGULAR **Sintering Simulation Material**
 Properties
 Jeff Robertson¹; ¹Hexagon
 Manufacturing Intelligence - Simufact

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15:50 PM
INVITED **Sintering Simulation and Distortion
Compensation of Metal AM Parts**
Andrew Roberts¹; Animesh Bose¹;
Artyom Djanikian¹; Christian Gomez¹;
¹Desktop Metal

16:20 PM
INVITED **Sinter Based Additive
Manufacturing of Copper via
Material Extrusion Process**
Carrie Barber¹; Kameswara Pavan
Kumar Ajjarapu²; Luke Malone²; Mark
Barr¹; Sundar Atre²; Kunal Kate²;
¹Kymera International; ²University of
Louisville

16:50 PM **END OF DAY**

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ICAM 2022 PROGRAM AGENDA

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AM FEEDSTOCK: CHARACTERIZATION, SPECIFICATION AND REUSE

CO-ORGANIZERS:

Ben Ferrar

Carpenter Additive, USA

Edward Garboczi

NIST, USA

Steven Hall

The MTC, UK

Tony Thornton

Micromeritics, USA

Frank Venskytis

Consultant, USA

**3RD NOV 2022 – 4TH NOV 2022 (THU-FRI)
OSPREY (LEVEL 2)**

3RD NOVEMBER 2022

SESSION CHAIRS (AM SESSION):

Edward Garboczi, NIST

Tony Thornton, Micromeritics

SESSION CHAIR (PM SESSION):

Steven Hall, The MTC

08:00 AM
INVITED **Comparing the Particle Size Distribution, Morphology, and Rheology of Several Metal Additive Manufacturing Powders**

[Justin Whiting](#)^{1,2}; [Vipin Tondare](#)¹; [Shawn Moylan](#)¹; [Edward Garboczi](#)¹; [Alkan Donmez](#)¹; ¹NIST; ²Georgetown University

08:30 AM
REGULAR **Imaging Particle Analysis Advances for Laboratory and Online Applications in Additive Manufacturing**

[Thomas Canty](#)¹; [Matthew Spink](#)¹; [Ethan Schrod](#)¹; ¹Canty

08:50 AM
INVITED **Cold Spray Additive Manufacturing: The Importance of Powder Feedstock Size and Shape**

[Edward Garboczi](#)¹; [Newell Moser](#)¹; [Shawn Moylan](#)¹; [Sinan Muftu](#)²; [Ozan C. Ozdemir](#)²; ¹NIST; ²Northeastern University

09:20 AM
REGULAR **Evaluation of Triboelectric Charging of Additive Manufacturing Metal Powders**

[Eileen Ross L. Espiritu](#)¹; [Camila Gutiérrez](#)¹; [Kamran Azari](#)²; [José A. Muñoz Lerma](#)²; [Martin Conlon](#)²; [Mathieu Brochu](#)¹; ¹McGill University; ²Equispheres

09:40 AM
REGULAR **Thermogravimetric Analysis of Ti-6Al-4V Powders in Different Gaseous Environments**

[Nicholas A. Derimow](#)¹; [Elisabeth Mansfield](#)¹; [Nikolas Hrabec](#)¹; ¹NIST

10:00 AM
BREAK

10:30 AM
INVITED **A Round Robin on μ XCT Inspection of Metal Powders**

[Roger Pelletier](#)¹; [Philippe Émile](#)²; [Salah-Eddine Brika](#)³; [Mahdi Habibnejad](#)⁴; ¹National Research Council Canada (NRC Canada); ²Airbus; ³École de technologie supérieure (ÉTS); ⁴GE Additive

11:00 AM
REGULAR **Rapid, High-Sensitivity Elemental Characterization of Feedstock Powders**

[Jeffrey Williams](#)¹; [Jonathan C. Putman](#)¹; [Ellen S. Williams](#)¹; [Peyton Willis](#)¹; ¹Exum Instruments

11:20 AM
REGULAR **Multimaterial Fiber Spinning for Potential 3D Printing Applications**

[Kenan Song](#)¹; [Weiheng Xu](#)¹; ¹Arizona State University

11:40 AM
INVITED **How the Rheology of Powder Affects its Spreadability?**

[Filip Francqui](#)¹; [Aurélien Neveu](#)¹; [Geoffroy Lumay](#)²; [Salvatore Pillitteri](#)¹; ¹Granutools; ²University of Liège

12:10 PM
LUNCH

13:30 PM
INVITED **Comparing the Spreadability of Polymer and Metal Powders using Counter-Rotating Roller and Fixed Plate Recoater Geometry at Various Roller and Spreading Speeds**

[Greg Martiska](#)¹; ¹Mercury Scientific

14:00 PM
REGULAR **An Equipment for Powder Bed Density Measurement**

[Roger Pelletier](#)¹; [Louis-Philippe Lefebvre](#)¹; [Nicolas Sauriol](#)²; ¹National Research Council Canada (NRC Canada); ²Sautech

14:20 PM
REGULAR **Improving Material Conveyance of Pellet and Granulated Flake Feedstocks in Material Extrusion Additive Manufacturing**

[Douglas M. Sassaman](#)¹; [Helen Little](#)²; [Oliver L. Uitz](#)¹; [Carolyn Seepersad](#)¹; [Samantha Snabes](#)²; [Matthew Fiedler](#)²; ¹University of Texas at Austin; ²re:3D

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14:40 PM
INVITED Novel Tool for Evaluating Powder Feedstock Suitability for AM Spreading Processes
Tony Thornton¹; Jamie Clayton²; Amalia Thomas²; ¹Micromeritics; ²Freeman Technology

15:10 PM **BREAK**

15:30 PM
INVITED From Requirements to Qualified Parts – Selecting the Right Powder for AM
Amir Nobari¹; ¹Tekna

16:00 PM
REGULAR Contamination Detection in Metal Powder Feedstock used in AM
Aneta Chrostek-Mroz¹; Steven Hall¹; ¹The Manufacturing Technology Centre (MTC)

16:20 PM
REGULAR Evaluating the Influence of Storage and Preparation on AM Feedstocks
Tony Thornton¹; Yun Bai²; Animesh Bose²; Jamie Clayton³; Christopher Craven²; Michael A. Gibson²; Steve Hudelson²; John P. Reidy²; Gavin A. Winter²; ¹Micromeritics; ²Desktop Metal; ³Freeman Technology

16:40 PM
INVITED Effect of Moisture on Additive Manufacturing Powder Feedstocks
Louis-Philippe Lefebvre¹; Anatolie Timercan¹; Pelle Mellin²; Mylène Trublet³; Annika Talus³; Olivier Rigo⁴; ¹National Research Council Canada (NRC Canada); ²Swerim; ³RISE KIMAB; ⁴Sirris

17:10 PM **END OF DAY**

14:20 PM
INVITED AM Powder from Re-Cycled Feedstocks; Maintaining Quality while Reducing Environmental Impact and Cost
Xinjiang Hao¹; James L. Ashby¹; ¹LIBERTY Powder Metals

14:50 PM
REGULAR Comprehensive Evaluation on the Impact of Aluminum Powder Properties on Feedstock Reusability in Laser Powder Bed Fusion Process
José A. Muñoz-Lerma¹; Mathieu Brochu²; Evan Butler-Jones¹; Martin Conlon¹; Eileen Ross L. Espiritu²; Grant Nixon³; Justin Valenti³; ¹Equispheres; ²McGill University; ³Mohawk College

15:10 PM
REGULAR A Framework for Powder Evaluation with Reuse in Laser Powder Bed Fusion Additive Manufacturing
Chinmay Phutela¹; Nesma Aboulkhair¹; ¹Technology Innovation Institute

15:30 PM
REGULAR Rapid Characterization of Additively Manufactured Aerospace Heat Exchangers
John B. Yorston¹; ¹Thermo Fisher Scientific

15:50 PM **END OF DAY**

4TH NOVEMBER 2022

SESSION CHAIR (PM SESSION):
Frank Venskytis, Consultant

13:30 PM
REGULAR Driving Additive Manufacturing Cost Reduction through Metal Powder Feedstock Reuse
Joseph Murphy¹; Zach Loftus¹; Jose Hector Sandoval¹; ¹Lockheed Martin

13:50 PM
INVITED Developing Powder Feedstock Re-Use Strategies
Steven Hall¹; Aneta Chrostek-Mroz¹; ¹The Manufacturing Technology Centre (MTC)

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DIRECTED ENERGY DEPOSITION TECHNIQUES

CO-ORGANIZERS:

Jean-Luc Belon
GKN Aerospace, UK
Paul Gradl
NASA-MSFC, USA

Filomeno Martina
WAAM3D, UK
Badri Narayanan
Lincoln Electric, USA

4TH NOV 2022 (FRI)
GRIFFIN C (LEVEL 1)

4TH NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Filomeno Martina, WAAM3D

SESSION CHAIR (PM SESSION):

Paul Gradl, NASA-MSFC

08:00 AM **Qualification of Large Components
Produced by Wire Arc Welding**
INVITED [Teresa Melfi](#)¹; J. Ben Schaeffer¹;
¹Lincoln Electric

08:30 AM **Making & Breaking the Rules for
DED Design**
INVITED [Laura L. Ely](#)¹; [Paul R. Gradl](#)²; ¹The
Barnes Global Advisors; ²NASA -
Marshall Space Flight Center (MSFC)

09:00 AM **Fundamentals of Rapid Alloy
Development with Laser Powder
Directed Energy Deposition (LP-
DED)**
INVITED [Melanie Lang](#)¹; [Jeff Riemann](#)¹;
¹FormAlloy

09:30 AM **The Case for an End-to-End
Software-Hardware Stack in Wire
Arc Additive Manufacturing**
INVITED [Filomeno Martina](#)¹; [Jialuo Ding](#)¹;
[Stewart Williams](#)¹; ¹WAAM3D

10:00 AM **BREAK**

10:30 AM **Approach for a Quality Assurance
System using Tolerance Bands in
Wire and Arc Additive
Manufacturing**
REGULAR [Daniel Baier](#)¹; [Tobias Weckenmann](#)¹;
[Siegfried Bähr](#)¹; [Michael F. Zäh](#)¹;
¹Technical University of Munich -
Institute for Machine Tools and
Industrial Management (TUM - iwib)

10:50 AM **Method for Improving DED
Simulation through the Use of
Deposition Path Modeling**
REGULAR [Chris Robinson](#)¹; ¹Ansys

11:10 AM **Large Scale Metal Additive
Manufacturing for Space Industry
using Laser-Powder DED Process**
INVITED [Bhaskar Dutta](#)¹; [Farhad Ghadamli](#)¹;
¹DM3D

11:40 AM **Grading Inconel 625 to Copper
Alloys via Hybrid Wire-Powder
Directed Energy Deposition: Design
Methodology and Validation
towards Defect Free Graded Alloys**
REGULAR [Somayeh Pasebani](#)¹; [Jakub Preis](#)¹;
[Sriram Manoharan](#)¹; [Ryan Doyle](#)¹;
[Zhengming Wang](#)¹; [Brian Paul](#)¹;
[Donghua Xu](#)¹; ¹Oregon State
University

12:00 PM **LUNCH**

13:30 PM **Exploring High Temperature
Functionally Graded Alloys for Site-
Specific Property Response**
INVITED [Soumya Nag](#)¹; [Brian Jordan](#)¹; [Ke An](#)¹;
[Chuan Zhang](#)²; [Fan Zhang](#)²; [Raymond
R. Unocic](#)¹; [Jonathan D. Poplawsky](#)¹;
[Jaimie Tiley](#)¹; ¹Oak Ridge National
Laboratory (ORNL); ²CompuTherm

14:00 PM **Performance Responses of Wire-
Arc Additively Manufactured Fe-
Based Structural Materials to Post-
Print Heat Treatments**
INVITED [Yukinori Yamamoto](#)¹; [Peeyush
Nandwana](#)¹; [Wei Tang](#)¹; [Andrzej
Nycz](#)¹; [Mark W. Noakes](#)¹; [Ben B.
Schaeffer](#)²; [Badri Narayanan](#)²; ¹Oak
Ridge National Laboratory (ORNL);
²Lincoln Electric

14:30 PM **High Pressure Cold Spray in
Advanced Metal Additive
Manufacturing Applications**
INVITED [Marius D. Ellingsen](#)¹; [Bharat Jasthi](#)²;
¹VRC Metal Systems; ²South Dakota
School of Mines & Technology

15:00 PM **BREAK**

15:30 PM **Potentials and Challenges of
Extreme High-Speed DED-LB
Technology: Additive
Manufacturing, Coating and
Material Development**
REGULAR [Tobias Stittgen](#)¹; ¹ponticon

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ICAM 2022 PROGRAM AGENDA

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- 15:50 PM**
REGULAR **Dynamic Tensile Deformation of Stainless Steel Processed by Laser-Based Directed Energy Deposition – Contribution to Crash-Safe Components**
Niklas Sommer¹; Stefan Böhm¹;
Christian Wolf¹; ¹University of Kassel
- 16:10 PM**
REGULAR **Availability and Cost Efficiency by Digitalization of Metal Spare Parts Manufacturing – Integration of Qualified WAAM Parts in the Industrial Supply Chain**
Edward Peterson¹; Colin Clark²;
Tobias Krümborg²; ¹Laser Welding Solutions; ²GEFERTEC
- 16:30 PM**
INVITED **An Overview: Prediction and Control of Part Distortion and Residual Stress for Large-Scale Metal Additive Manufacturing**
Yousub Lee¹; Andrzej Nycz¹; Srdjan Simunovic¹; Luke Meyer¹; Chris Masuo¹; William Carter¹; ¹Oak Ridge National Laboratory (ORNL)
- 17:00 PM** **END OF DAY**

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INDUSTRY 4.0: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN AM

CO-ORGANIZERS:

Kareem Aggour
GE Research, USA
Shaw Feng
NIST, USA

Branden Kappes
Contextualize, USA
Jia (Peter) Liu
Auburn University, USA

4TH NOV 2022 (FRI)
CYPRESS (LEVEL 1)

4TH NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Branden Kappes, Contextualize

08:00 AM **Networked Attribute Learning of
INVITED** **Manufacturing Defect Ontology
with Limited Measurements**
[Hui Wang](#)¹; [Tsegai Yhdego](#)¹; An-Tsun
Wei¹; ¹Florida A&M University -
Florida State University (FAMU-FSU)
College of Engineering

08:30 AM **Defects Classification via
REGULAR** **Hierarchical Graph Convolutional
Network in L-PBF Additive
Manufacturing**
[Jia \(Peter\) Liu](#)¹; Anyi Li¹; Shuai Shao¹;
Nima Shamsaei¹; ¹Auburn University

08:50 AM **Uncovering the Truth behind Defect
INVITED** **Formations through Feature
Reclassification**
[Michelle Daya](#)¹; Briana Ugarte²;
Matthew Miller¹; Brayant Lopez²;
Hunter Taylor²; Ryan Wicker²;
Branden Kappes¹; ¹Contextualize;
²University of Texas at El Paso

09:20 AM **Improved Process Parameter
INVITED** **Optimization using Machine
Learning**
[Annie Wang](#)¹; ¹Senvol

09:50 AM **BREAK**

10:30 AM **Residual Stress and Microstructure
REGULAR** **Data Alignment for Additive
Manufacturing Data Registration for
Data Analytics**
[Shaw Feng](#)¹; ¹NIST

10:50 AM **In-Situ Microstructural Phase
INVITED** **Monitoring for Metal Additive
Manufacturing via Machine
Learning**
[Xiaoli Zhang](#)¹; Sen Liu²; Noopur
Jamnikar³; Qiaojie (Grant) Zheng¹;
Craig Brice¹; ¹Colorado School of
Mines; ²Stanford University;
³University of Michigan-Ann Arbor

11:20 AM **Digitally Twinned Additive
INVITED** **Manufacturing: Real-Time
Detection of Flaws in Laser Powder
Bed Fusion by Combining Thermal
Simulations with In-Situ Meltpool
Sensor Data**
[Pralhada K. Rao](#)¹; [Alex R.
Riensch](#)¹; Reza Yavari¹; Emine
Tekerek²; Lars Jacquemetton³; Harold
Scott Halliday⁴; Vignesh Perumal²;
Ziyad Smoqi¹; Antonios Kontsos²;
¹University of Nebraska-Lincoln;
²Drexel University; ³Sigma Additive
Solutions; ⁴Navajo Technical
University

11:50 AM **END OF DAY**

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CENTER of
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Research to Standards

INDUSTRY 4.0: CYBER SECURITY ASPECTS OF AM

CO-ORGANIZERS:

Chris Adkins
Identify3D, USA

Nikhil Gupta
New York University
(NYU), USA

Mark Yampolskiy,
Auburn University, USA

4TH NOV 2022 (FRI)
DOGWOOD (LEVEL 1)

4TH NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Mark Yampolskiy, Auburn University

- 08:00 AM** **Who Would Attack My 3D Printer?**
INVITED [Gary Pike](#)¹; Kristian Dehaan¹; Grant Parker¹; John D. Sprunger¹; Mark Yampolskiy¹; Theo Zinner¹; ¹Auburn University
- 08:30 AM** **Using Non-Intrusive Physical Emissions to Transmit Metadata Stored in Additive Manufacturing Toolpaths for Enhanced Security and Traceability**
INVITED [Logan D. Sturm](#)¹; Nathan Raeker-Jordan²; Christopher B. Williams²; ¹Oak Ridge National Laboratory (ORNL); ²Virginia Tech - DREAMS Lab
- 09:00 AM** **Streaming as Enabler of Secure AM Supply Chains**
REGULAR [Moritz Kolter](#)¹; Johannes Henrich Schleifenbaum¹; ¹RWTH Aachen University - Digital Additive Production DAP
- 09:20 AM** **Crime Scripts and Cost/Security Balance Guide the Choice of Cyber-Physical Trust Anchor for Linkage to Blockchain**
REGULAR [Michele Maasberg](#)¹; [Ian Taylor](#)²; Leslie G. Butler³; ¹United States Naval Academy (USNA); ²SIMBA Chain; ³Louisiana State University
- 09:40 AM** **Developing Common Criteria Based 3D Printing Equipment Cyber Security Certification**
REGULAR [Alan Sukert](#)¹; Paul D. Tykodi¹; ¹IEEE-ISTO - Printer Working Group (IPP Workgroup)

- 10:00 AM** **BREAK**
- 10:30 AM** **On Leveraging Blockchain to Secure the AM Digital Thread**
INVITED [Pramita Mitra](#)¹; Ellen Lee¹; ¹Ford Motor Company
- 11:00 AM** **Data Ownership and Privacy Issues in the AM Workflow**
INVITED [Chris Adkins](#)¹; Stephan Thomas¹; ¹Identify3D
- 11:30 AM** **Myths and Misconceptions in AM Security**
INVITED [Mark Yampolskiy](#)¹; ¹Auburn University
- 12:00 PM** **END OF DAY**

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APPLICATION OF AM IN ENERGY, MARITIME AND OIL & GAS

CO-ORGANIZERS:

Ole Geisen

Siemens Energy, Germany

Matt Sanders

Stress Engineering
Services, USA

Valeria Tirelli

AIDRO, Italy

Lakshmi Vendra

Baker Hughes, USA

4TH NOV 2022 (FRI)
CARDINAL (LEVEL 2)

4TH NOVEMBER 2022

SESSION CHAIR (AM + PM SESSION):

Matt Sanders, Stress Engineering Services

08:00 AM **Thin-Walled Dual Coolant Heat Exchanger for Fusion Energy Applications**
INVITED
James W. Paterson¹; Ole Geisen²; Timo Heitmann²; Bernd Koos²; Frank Schoofs¹; ¹United Kingdom Atomic Energy Authority; ²Siemens Energy

08:30 AM **Utilization of Additive Manufacturing for Pump Impellers in Cryogenic Applications**
REGULAR
Derrick T. Bauer¹; Jan de Roos²; ¹Elliott Group; ²Shell

08:50 AM **API and ASME Qualification of a 3D Printed Pressure Component for Oil & Gas Service**
INVITED
Robert Rettew¹; Matthew Sanders²; Teresa Melfi³; ¹Chevron; ²Stress Engineering Services; ³Lincoln Electric

09:20 AM **Qualification of Additive Manufacturing Technology for Oil and Gas Applications**
REGULAR
Stephen Freitas¹; ¹IMI CCI

09:40 AM **Unlocking the Potential of Additive Manufacturing in Energy, Oil & Gas and Maritime Applications through Standardised Qualification & Certification Framework**
INVITED
Sastry Y. Kandukuri¹; Serkan Yildiz²; Stian Gurrik¹; Onno Ponfoort³; Gisle Rørvik⁴; ¹DNV; ²BMT Aerospace; ³Berenschot; ⁴Equinor

10:10 AM **BREAK**

10:30 AM **Industrialization of 3D Printed Gas Turbine Vanes, an End to End View in Opportunities and Challenges**
INVITED
Magnus Hallberg¹; Martin Lindbäck¹; Ilya Fedorov¹; Dikran Barhanko¹; ¹Siemens Energy

11:00 AM **New Metal AM Materials for Oil and Gas Industry – High Strength, Corrosion Resistant Steels**
REGULAR
Priyanshu Bajaj¹; Andreas Pelz¹; Bastian Kallenbach¹; ¹m4p material solutions

11:20 AM **Industrial Application of Leak Repair Clamp Produced by Wire Arc Additive Manufacturing**
REGULAR
Angeline Goh¹; Danny Steel²; Olivier Tartar³; Heather Gower¹; Gonghyun Jung¹; Alfred Kruijer¹; Sam McFarland¹; Archana Pathiraj¹; ¹Shell; ²TEAM; ³Vallourec

11:40 AM **Spare Parts on Demand by Additive Manufacturing**
REGULAR
Tad Steinberg¹; Kevin Sheehan¹; ¹Siemens Energy

12:00 PM **LUNCH**

13:30 PM **Exploring a Novel Approach for Support Optimization Aiming Reduction of Fabrication Costs and Print Job Failure Rates**
INVITED
Alexandre Hiricoiu¹; Timo Heitmann²; Enrique Escobar de Obaldia¹; ¹Ansys; ²Siemens Energy

14:00 PM **Drop Tests of Multiple 3D-Printed Container Models in Calm Water**
REGULAR
Vincent Xiaochuan Yu¹; ¹University of New Orleans

14:20 PM **Enabling Distributed Supply Chains through Additive Manufacturing**
INVITED
Roberto Esposito¹; ¹Velo3D

14:50 PM **Additively Manufactured Polymeric Gaskets for Oil & Gas Digital Inventory Solutions**
INVITED
Luisa Elena Mondora¹; ¹Valland

15:20 PM **END OF DAY**

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AM APPLICATIONS FOR AUTOMOTIVE TRANSPORTATION/HEAVY MACHINERY

CO-ORGANIZERS:

Eric Johnson

Eaton, USA

Aaron Lalonde

U.S. Army CCDC-

GVSC, USA

Ante Lausic

General Motors, USA

Simon Pun

Divergent, USA

4TH NOV 2022 (FRI)

OSPREY (LEVEL 2)

4TH NOVEMBER 2022

SESSION CHAIR (AM SESSION):

Simon Pun, Divergent

08:00 AM **Enabling Vehicle Scale Metal**
INVITED **Additive Manufacturing**
[Aaron D. LaLonde](#)¹; ¹U.S. Army
Combat Capabilities Development
Command - Ground Vehicles Systems
Center (GVSC)

08:30 AM **Opportunities & Challenges with**
REGULAR **Laser Powder Bed Fusion for**
Automotive Applications
[Whitney Poling](#)¹; [Ante Lausic](#)¹; Md
Ashabul Anam¹; Andrew Bobel¹;
Tyson Brown¹; Anil Sachdev¹; Mark
Smith¹; ¹General Motors

08:50 AM **Challenges and Strategies for**
REGULAR **Implementing Additive**
Manufacturing in Heavy Industries -
Lessons Learned from Aerospace
& Defense
[Abdalla R. Nassar](#)¹; ¹John Deere

09:10 AM **Additive Manufacturing for SNCF**
REGULAR **Réseau: An Industrial Ambition**
[Pascal De Guio](#)¹; [Philippe Kuchly](#)¹;
[Véronique Vidal](#)¹; ¹SNCF Réseau

09:30 AM **Metal Binder Jetting Additive**
INVITED **Manufacturing of Transmission**
Shift Knob Component for
Automotive Application
[Cody Cochran](#)¹; [Mattia Forgiarini](#)¹;
¹Azoth

10:00 AM **BREAK**

10:30 AM **Enhancement of Heat Exchanger**
REGULAR **Performance using Additive**
Manufacturing of Gyroid Lattice
Structures
[Mostafa Yakout](#)¹; Shekhar Rammohan
Singh Tandel²; Dalia Mahmoud³;
Mohamed Abdelaziz Elbestawi²;
Fabrizio Mattiello⁴; Stefano Paradiso⁵;
Chan Ching²; Mohammed Zaher⁶;
Mohamed Abdelnabi²; ¹University of
Alberta; ²McMaster University;
³Alexandria University; ⁴Centro
Ricerche Fiat (CRF); ⁵Stellantis;
⁶University of Toronto

10:50 AM **Algorithm-Aided-Design:**
REGULAR **Parametric Modeling and**
Automated Design Generation of
3D Winding Designs of Hairpin
Stators (E-Machines) for Additive
Manufacturing
[Carsten Putz](#)¹; Johannes Henrich
Schleifenbaum¹; ¹RWTH Aachen
University - Digital Additive Production
DAP

11:10 AM **END OF DAY**

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PANEL DISCUSSIONS

31ST OCT 2022 (MON)

GRIFFIN D (LEVEL 1)

13:30 PM **AM AT THE POINT OF CARE: NEXT STEPS**

PANEL 01

MODERATOR:

Laura Gilmour,
LG Strategies

PANELISTS:

- Matthew Di Prima, U.S. FDA
- Martin Herzmann, Kumovis/3D Systems
- Dawn Lissy, Empirical Technologies
- Mark Morrison, Smith+Nephew
- Beth Ripley, VHA

15:30 PM **ADDITIVE CONSTRUCTION – CURRENT STATE, GAPS, FUTURE DEVELOPMENT**

PANEL 02

MODERATOR:

Stephan Mansour,
ASTM International

PANELISTS:

- Berry Hendriks, CyBe Construction
- Marina Konstantatou, Foster + Partners
- Matteo Pietrobelli, DeSimone Consulting Engineers
- Bruno Silva, Defining Humanity

PANEL DISCUSSIONS

1ST NOV 2022 (TUE)

GRIFFIN D (LEVEL 1)

10:30 AM **STATUS OF FEEDSTOCK MANAGEMENT IN METAL ADDITIVE MANUFACTURING**

PANEL 03

MODERATOR:

Tony Thornton,
Micromeritics

PANELISTS:

- Steven Hall, The MTC
- Xinjiang Hao, Liberty Powder Metals
- Amir Nobari, Tekna
- Roger Pelletier, NRC Canada

13:30 PM **WHEN DOES AM MAKE SENSE – ECONOMIC CONSIDERATIONS IN MANUFACTURING WITH AM**

PANEL 04

MODERATOR:

Joseph Kowen,
Wohlers Associates

PANELISTS:

- Ben Arnold, Tritone Technologies
- James DeMuth, Seurat Technologies
- Roberto Esposito, Velo3D
- Greg Hyatt, DMG MORI Advanced Solutions

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PANEL DISCUSSIONS

2ND NOV 2022 (WED)

GRIFFIN D (LEVEL 1)

13:30 PM **PROGRESS, IMPACT, AND FUTURE OF IN-SITU MONITORING IN AM**

PANEL 05

MODERATOR:

Abdalla Nassar,
John Deere

PANELISTS:

- Darren Beckett, Sigma Additive Solutions
- Brandon Lane, NIST
- Nicholas Mulé, Boeing
- Prahalada Rao, Virginia Tech
- Sarah J. Wolff, Ohio State University

15:30 PM **CERTIFICATION CHALLENGES AND OPPORTUNITIES FOR AM DEFENSE APPLICATIONS**

PANEL 06

MODERATOR:

Brandon Ribic,
NCDMM

PANELISTS:

- Mark Benedict, AFRL
- Derrick Lamm, Lockheed Martin
- Rashid Miraj, AlphaSTAR
- Venkat Vedula, Raytheon Technologies
- Cindy Waters, NSWCCD
- Doug Wells, NASA

PANEL DISCUSSIONS

3RD NOV 2022 (THU)

GRIFFIN D (LEVEL 1)

10:30 AM **ADVANCED QUALIFICATION AND CERTIFICATION FOR AVIATION THROUGH SIMULATION AND MODELING**

PANEL 07

MODERATOR:

Martin White,
ASTM International

PANELISTS:

- Jesse Boyer, Pratt & Whitney
- Jim Dobbs, Boeing
- Michael Gorelik, FAA
- Jeff Robertson, Hexagon

13:30 PM **INDUSTRIALIZATION OF AM IN THE ENERGY SECTOR: OPPORTUNITIES AND CHALLENGES**

PANEL 08

MODERATOR:

Andy Medla,
Siemens Energy

PANELISTS:

- Tim Bell, Simens Digital Industries
- Angeline Goh, Shell
- Sherri Monroe, AMGTA
- Alan Pearce, FasTech
- Soeren Wiener, Westinghouse

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PANEL DISCUSSIONS

4TH NOV 2022 (FRI)

GRIFFIN D (LEVEL 1)

10:30 AM

PANEL 10

THE PATH TO PRODUCTION FOR SPACE EXPLORATION FOR AM

MODERATOR:

Paul Gradl,
NASA-MSFC

PANELISTS:

- Tim Berry, Launcher
- Alan Fung, Aerojet Rocketdyne
- Elena López, Fraunhofer IWS
- Alison Park, NASA-NESC

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KEYNOTES

2ND NOV 2022 (WED)

GRIFFIN CD (LEVEL 1)

08:15 AM WELCOME ADDRESS

08:30 AM AGILE, SUSTAINABLE STRUCTURES: INDUSTRIALISING AM FOR DEFENSE
KEYNOTE 01 APPLICATIONS

KEYNOTE SPEAKER:

David Bond, GKN Aerospace

09:00 AM OPPORTUNITIES AND CHALLENGES FOR METAL ADDITIVE MANUFACTURING IN THE
KEYNOTE 02 AUTOMOTIVE INDUSTRY

KEYNOTE SPEAKER:

Anil Sachdev, General Motors

09:30 AM NATIONAL SCIENCE FOUNDATION AND ADDITIVE MANUFACTURING: OVERVIEW,
KEYNOTE 03 FUNDAMENTAL RESEARCH AND FUNDING OPPORTUNITIES

KEYNOTE SPEAKER:

Kevin Chou, National Science Foundation

10:00 AM BREAK

10:30 AM HOW RECENT CHANGES ARE IMPACTING THE FUTURE OF AM
KEYNOTE 04

KEYNOTE SPEAKER:

Terry Wohlers, Wohlers Associates

11:00 AM HOW AM IS SHAPING THE 4TH INDUSTRIAL REVOLUTION – FROM RESEARCH TO
KEYNOTE PANEL COMMERCIALIZATION

DISCUSSION

KEYNOTE MODERATOR:

Terry Wohlers,
Wohlers Associates

KEYNOTE PANELISTS:

- David Bond, GKN Aerospace
- Kevin Chou, National Science Foundation
- Anil Sachdev, General Motors

12:00 PM END OF KEYNOTE SESSIONS

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