NAMRC 49 / MSEC 2021 VIRTUAL CONFERENCE

JUNE 22 - 25, 2021

AGENDA (UPDATED)

*Time	6/22/2021 Tuesday	6/23/2021 Wednesday	6/24/2021 Thursday	6/25/2021 Friday
10:10 AM – 10:45 AM	University of Cincinnati – Welcome Session (Live) Prof. Sam Anand | John W. Weidner (UC CEAS Dean) | David J. Adams (CIO, UCRI)			
10:50 AM – 11:20 AM	Keynote Session (Live) Mike Molnar (NIST)	Keynote Session (Pre-Recorded) Sarah Kleinbaum (DOE)	Keynote Session (Pre-Recorded) Dr.-Ing. Christian Brecher (RWTH Aachen)	
11:25 AM – 11:55 AM	Keynote Session (Live) Jutapat (Air) Boonvongsakorn (P&G)	Keynote Session (Live) Kevin Eustace (Siemens)	Keynote Session (Live) Dr. Robert W. Ivester (NIST)	Keynote Session (Live) Dr. Gen Satoh (Raytheon Technologies)
12:00 PM – 1:30 PM	8 parallel sessions Pre-Recorded Presentations 12:00 PM – 1:00 PM Live Discussion 1:00 PM – 1:30 PM	7 parallel sessions Pre-Recorded Presentations 12:00 PM – 1:00 PM Live Discussion 1:00 PM – 1:30 PM	7 parallel sessions Pre-Recorded Presentations 12:00 PM – 1:00 PM Live Discussion 1:00 PM – 1:30 PM	7 parallel sessions Pre-Recorded Presentations 12:00 PM – 1:00 PM Live Discussion 1:00 PM – 1:30 PM
	Women in Advanced Manufacturing Forum – Panel of Advanced Manufacturing Leaders & Virtual Networking Organizers: Dr. Li, Dr. McGovern, Ms. Reslan, Dr. Linke, Dr. Wiens (Live) 12:00 PM – 1:30 PM	Blue Sky Competition – Session I Organizer: Dr. Pfefferkorn (Live) 12:00 PM – 1:30 PM	Federal Agencies' Perspectives on Advanced Manufacturing Organizer: Dr. Pfefferkorn (Live) 12:00 PM – 1:30 PM	Doctoral Symposium – Session I Pre-Recorded Presentations 12:00 PM – 1:00 PM Live Discussion 1:00 PM – 1:30 PM Organizers: Dr. Chen, Dr. Haapala

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	Student Manufacturing Design Competition – Session I Organizer: Dr. Pfefferkorn (Live) 12:00 PM – 1:30 PM			
1:30 PM – 3:00 PM	8 parallel sessions Pre-Recorded Presentations 1:30 PM – 2:30 PM Live Discussion 2:30 PM – 3:00 PM	8 parallel sessions Pre-Recorded Presentations 1:30 PM – 2:30 PM Live Discussion 2:30 PM – 3:00 PM	8 parallel sessions Pre-Recorded Presentations 1:30 PM – 2:30 PM Live Discussion 2:30 PM – 3:00 PM	8 parallel sessions Pre-Recorded Presentations 1:30 PM – 2:30 PM Live Discussion 2:30 PM – 3:00 PM
	Women in Advanced Manufacturing Forum – Professional Development Workshop & Post-Forum Discussions Organizers: Dr. Li, Dr. McGovern, Ms. Reslan, Dr. Linke, Dr. Wiens (Live) 1:30 PM – 3:00 PM Student Manufacturing Design Competition – Session II Organizer: Dr. Pfefferkorn (Live) 1:30 PM – 3:00 PM	Blue Sky Competition – Session II Organizer: Dr. Pfefferkorn (Live) 1:30 PM – 3:00 PM	NSF's Advanced Manufacturing Program: Overview, Update and Q&A Organizer: Dr. ZJ Pei (Live) 1:30 PM – 3:00 PM	Doctoral Symposium – Session II Pre-Recorded Presentations 1:30 PM – 2:30 PM Live Discussion 2:30 PM – 3:00 PM Organizers: Dr. Chen, Dr. Haapala
3:10 PM – 4:40 PM	ASME Awards Ceremony Organizer: Dr. Pfefferkorn (Live)	NSF Early Career Forum Organizers: Dr. Linke, Dr. ZJ Pei (Live) 3:10 PM – 4:40 PM	SME Awards Ceremony Organizer: Suzy Marzano (Live)	Doctoral Symposium – Session III Pre-Recorded Presentations 3:10 PM – 4:10 PM Live Discussion 4:10 PM – 4:40 PM Organizers: Dr. Chen, Dr. Haapala Poster Session (5 parallel sessions) Live Discussion Organizers: Dr. Chen, Dr. Haapala 3:10 PM – 4:40 PM

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Tuesday, June 22, 2021

Time*	Event	Organizers
10:10 AM to 10:15 AM	Welcome Note from the Organizing Committee- University of Cincinnati	Dr. Sam Anand
10:20 AM to 10:30 AM	Welcome Note from Dr. John W. Weidner, Dean of the University of Cincinnati College of Engineering and Applied Science	Dr. Sam Anand
10:35 AM to 10:45 AM	Welcome Note from David J. Adams, Chief Innovation Officer and Architect of the Cincinnati Innovation District	Dr. Sam Anand
10:50 AM to 11:20 AM	Keynote Session 1 (Live Event) by Mike Molnar, Director of the Advanced Manufacturing National Program Office & the Office of Advanced Manufacturing (OAM) at NIST	Dr. Sam Anand
11:25 AM to 11:55 AM	Keynote Session 2 (Live Event) by Jutapat (Air) Boonvongsakorn, Global Transformational Engineering Senior Director at P&G	Dr. Sam Anand
12:00 PM to 1:00 PM	Pre-recorded Technical Presentations ▪ NAMRC Track 1- Manufacturing Systems Session 1 ▪ NAMRC Track 2- Manufacturing Processes Session 1 ▪ NAMRC Track 3- Material Removal Session 1 ▪ MSEC 01-01-01 Advances in Metal Additive Manufacturing Processes 1 ▪ MSEC 04-01-01 Smart Manufacturing for Resilient and Environmentally- Efficient Systems 1 ▪ MSEC 05-02-01 Innovations in the Design and Control of Manufacturing Machines and Equipment (ASME- JSME Joint Symposium) 1 ▪ MSEC 06-01 Advances in Mechanics of Materials in Modern Manufacturing and Materials Processing Techniques	

	▪ MSEC 07-06-01 Industrial Internet, Cloud and Digital Twins in the Wake of COVID-19 (1)	
12:00 PM to 1:30 PM	Women in Advanced Manufacturing Forum– Panel of Advanced Manufacturing Leaders & Virtual Networking (Live Event)	Dr. Li, Dr. McGovern, Ms. Reslan, Dr. Linke, Dr. Wiens
12:00 PM to 1:30 PM	Student Manufacturing Design Competition –Session I (Live Event)	Dr. Pfefferkorn
1:00 PM to 1:30 PM	Live discussion for Technical Presentations	
1:30 PM to 2:30 PM	Pre-recorded Technical Presentations ▪ NAMRC Track 4- Additive Manufacturing Session 1 ▪ NAMRC Track 5- Smart Manufacturing and Cyber Physical Systems Session 1 ▪ NAMRC Track 6- Manufacturing Education Session 1 ▪ MSEC 01-01-02 Advances in Metal Additive Manufacturing Processes 2 ▪ MSEC 04-01-02 Smart Manufacturing for Resilient and Environmentally- Efficient Systems 2 ▪ MSEC 05-02-02 Innovations in the Design and Control of Manufacturing Machines and Equipment (ASME-JSME Joint Symposium) 2 ▪ MSEC 06-02 Tool Wear Mechanisms, Measurements, and Monitoring ▪ MSEC 07-06-02 Industrial Internet, Cloud and Digital Twins in the Wake of COVID-19 (2)	
1:30 PM to 3:00 PM	Women in Advanced Manufacturing Forum –Panel of Advanced Manufacturing Leaders & Virtual Networking (Live Event)	Dr. Li, Dr. McGovern, Ms. Reslan, Dr. Linke, Dr. Wiens
1:30 PM to 3:00 PM	Student Manufacturing Design Competition –Session II (Live Event)	Dr. Pfefferkorn
2:30 PM to 3:00 PM	Live discussion for Technical Presentations	
3:10 PM to 4:40 PM	ASME Awards Ceremony (Live Event)	Dr. Pfefferkorn

Presentation Details for Tuesday, June 22, 2021

Tuesday, June 22 **12:00 PM – 1:30 PM**	**NAMRC Track 1 Manufacturing Systems 1** Session Chair: Xun Xu | Session Co-chair: Shiv Kapoor	
NAMRC Paper 10	Wei Li, Barrie R. Nault, Jingjing You and Briscoe Bilderback	Balancing Trade-offs in One-Stage Production with Processing Time Uncertainty
NAMRC Paper 71	Zhangyue Shi, Soumya Mandal, Sandip Harimkar and Chenang Liu	Surface Morphology Analysis Using Convolutional Autoencoder in Additive Manufacturing with Laser Engineered Net Shaping
NAMRC Paper 111	Santhana Pandiyan Muniraj and Xun Xu	An Implementation of OPC UA for Machine-to-Machine Communications in a Smart Factory
NAMRC Paper 104	Matthew Krugh and Laine Mears	Pervasive Environmental Sensing for Industry 4.0 as an Educational Tool
NAMRC Paper 99	Partha Protim Mondal, Placid Matthew Ferreira, Shiv Gopal Kapoor and Patrick N Bless	Monitoring and Diagnosis of Multistage Manufacturing Processes Using Hierarchical Bayesian Networks
Tuesday, June 22 **12:00 PM – 1:30 PM**	**NAMRC Track 2 Manufacturing Processes 1** Session Chair: Brad Kinsey | Session Co-chair: Brigid Mullany	
NAMRC Keynote	Brad Kinsey	Driving Manufacturing Process Innovations through Fundamental Science Phenomena
NAMRC Paper 119	Nakul Ghate and Amber Shrivastava	Power Spectral Analysis of Surface Microtopography Formed in CW Laser Surface Texturing
NAMRC Paper 90	Aarush Sood and Brigid Mullany	Advanced Surface Analysis to Identify Media Workpiece Contact Modes in a Vibratory Finishing Processes
Tuesday, June 22 **12:00 PM – 1:30 PM**	**NAMRC Track 3 Material Removal 1** Session Chair: Tony Schmitz | Session Co-chair: Muhammad Jahan	
NAMRC Paper 3	Al Mazedur Rahman, S M Abdur Rob and Anil K. Srivastava	Modeling and Optimization of Process Parameters in Face Milling of Ti6Al4V Alloy using Taguchi and Grey Relational Analysis
NAMRC Paper 15	Timothy No, Michael Gomez, Jaydeep Karandikar, Jarred Heigel, Ryan Copenhaver and Tony Schmitz	Propagation of Johnson-Cook Flow Stress Model Uncertainty to Milling Force Uncertainty using Finite Element Analysis and Time Domain Simulation
NAMRC Paper 32	Mark Gueli, Jianfeng Ma, Nicholas Cococcetta, David Pearl and Muhammad Jahan	Experimental Investigation into Tool Wear, Cutting Forces, and Resulting Surface Finish During Dry and Flood Coolant Slot Milling of Inconel 718
NAMRC Paper 43	Takenori Ono	Sharpening and Re-Shaping of the Diamond Tool Edge by the Ar Ion Beam Machine Tool

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NAMRC Paper 106	Gustavo Fernandes, Guilherme Lopes, Lucas Barbosa, Paulo Martins and Álisson Machado	Wear Mechanism of Diamond-like Carbon Coated Tools in Tapping of AA6351 T6 Aluminium Alloy
Tuesday, June 22 12:00 PM – 1:30 PM	**MSEC 01-01-01 Advances in Additive Manufacturing Processes 1** Session Chair: Wenchao Zhou| Session Co-chair: Qiong Nian	
MSEC2021-60448	Sebastian Greco, Kevin Gutzeit, Hendrik Hotz, Marc Schmidt, Marco Zimmermann, Benjamin Kirsch and Jan C. Aurich	Influence of Machine Type and Powder Batch During Laser-Based Powder Bed Fusion (L-PBF) of AISI 316L
MSEC2021-61726	Jin Fu, Shuo Qu, Junhao Ding, Xu Song and Ming Wang Fu	Effect of Heat Treatment on Microstructure and Mechanical Property of 316L Stainless Steel by Micro Selective Laser Melting
MSEC2021-64108	Yash Parikh and Mathew Kuttolamadom	Selective Laser Melting of Stainless Steel 316L for Mechanical Property-Gradation
MSEC2021-63402	Dipesh Kumar Mishra and Pulak Mohan Pandey	Experimental Investigation into the Fabrication of Porous Biodegradable Fe Scaffold by Microwave Sintering of 3D Printed Green Body
MSEC2021-64111	Michael Liu and Mathew Kuttolamadom	Manufacturing of Co-Cr-Mo Alloy via Directed Energy Deposition
Tuesday, June 22 12:00 PM – 1:30 PM	**MSEC 04-01-01 Smart Manufacturing for Resilient and Environmentally- Efficient Systems 1** Session Chair: Nancy Diaz-Elsayed | Session Co-chair: KC Morris	
MSEC2021-72892	Björn Johansson	Tradeoff Analysis Using Digital Tools for Sustainable Manufacturing
MSEC2021-62227	Nancy Diaz-Elsayed, KC Morris and Julius Schoop	Towards a Digital Depot to Support Sustainable Manufacturing During Crisis Response
MSEC2021-62394	Arpita Chari, Johan Vogt Duberg, Emma Lindahl, Johan Stahre, Mélanie Despeisse, Erik Sundin, Björn Johansson and Magnus Wiktorsson	Swedish Manufacturing Practices Towards a Sustainability Transition in Industry 4.0: A Resilience Perspective
Tuesday, June 22 12:00 PM – 1:30 PM	**MSEC 05-02-01 Innovations in the Design and Control of Manufacturing Machines and Equipment (ASME-JSME Joint Symposium) 1** Session Chair: Martin Jun | Session Co-chair: Chandra Nath	
MSEC2021-72999	Yuefeng Luo	An Investigation into the Equipment Robustness of 3d Printing/L-PBF
MSEC2021-63900	Yi-Wei Chen, Rex Joseph, Alec Kanyuck, Shahwaz Khan, Rishi Malhan, Omey Manyar, Zachary Mcnulty, Bohan Wang, Jernej Barbic and Satyandra Gupta	A Digital Twin for Automated Layup of Prepreg Composite Sheets

MSEC2021-64036	Eunseob Kim, Huitaek Yun, Kyunghyun Kim, Suk-Won Cha and Martin Jun	Multiple Sound Sensors and Fusion in Modern CNN-Based Machine State Prediction
Tuesday, June 22 12:00 PM – 1:30 PM	**MSEC 06-01 Advances in Mechanics of Materials in Modern Manufacturing and Materials Processing Techniques** Session Chair: Dinakar Sagapuram | Session Co-chair: Koushik Viswanathan	
MSEC2021-59877	Elizabeth Mamros, Matthew Eaton, Jinjin Ha and Brad Kinsey	Numerical Analysis of Stainless Steel 316L Biaxial Cruciform Specimens Under Proportional Loading Paths
MSEC2021-63417	Fabian Stiebert, Heinrich Traphöner, Rickmer Meya and A. Erman Tekkaya	Characterization of Flow Curves for Ultra-Thin Steel Sheets with the In-Plane Torsion Test
MSEC2021-63614	Haseung Chung, Guangchao Song, Bibek Poudel, Patrick Kwon, Zachary Detweiler and Guangchun Quan	Development of Magnetic-Field Assisted Finishing (MAF) Process for Chromium-Alloyed Low Carbon Steel Sheet Metal
MSEC2021-63790	Wolfgang Lortz and Radu Pavel	Advanced Modeling of Drilling - Realistic Process Mechanics Leading to Helical Chip Formation
MSEC2021-64005	Mainak Pal, Vandit Pandya and Anupam Agrawal	Study of Formability Limit Based on Ductile Damage Criteria of Incremental Sheet Forming of Titanium Grade 2 Sheet
Tuesday, June 22 12:00 PM – 1:30 PM	**MSEC 07-06-01 Industrial Internet, Cloud and Digital Twins in the Wake of COVID-19 (1)** Session Chair: Xi (Vincent) Wang | Session Co-chair: Yujie Chen	
MSEC2021-72937	Thomas Kurfess	Democratizing Advanced Manufacturing – Ensuring Prosperity and Security
MSEC2021-64237	Jay Lee, Xiang Li, Qibo Yang, Xiaodong Jia and Keyi Sun	Collaborative Platform for Remote Manufacturing Systems Using Industrial Internet and Digital Twin in the Covid-19 Era
Tuesday, June 22 1:30 PM – 3:00 PM	**NAMRC Track 4 Additive Manufacturing 1** Session Chair: Tsz-Ho Kwok | Session Co-chair: Sam Anand	
NAMRC Paper 9	Michael Borish and Charles Wade	A GPU-based Approach for Path Planning Optimization via Travel Length Reduction
NAMRC Paper 23	Yunlong Tang, Guoying Dong, Yi Xiong and Qiusen Wang	Data- driven Design of Customized Porous Lattice Sole Fabricated by Additive Manufacturing
NAMRC Paper 26	Vysakh Venugopal, Nathan Hertlein and Sam Anand	Multi-Material Topology Optimization Using Variable Density Lattice Structures for Additive Manufacturing
NAMRC Paper 30	Halil Tetik, Keren Zhao, Nasrullah Shah and Dong Lin	3D Freeze- printed Cellulose-based Aerogels: Obtaining Truly 3D Shapes, and Functionalization with Cross-linking and Conductive Additives
NAMRC Paper 37	Nathan Decker and Qiang Huang	Optimizing the Expected Utility of Shape Distortion Compensation Strategies for Additive Manufacturing

Tuesday, June 22 **1:30 PM – 3:00 PM**	**NAMRC Track 5 Smart Manufacturing – Processes, Systems and Integration 1** Session Chair: Peng Wang | Session Co-chair: Carlos Escobar	
NAMRC Keynote	S Jack Hu	Industrial Internet of Things and smart, personalized manufacturing
NAMRC Paper 132	Carlos Escobar, Debejyo Chakraborty, Megan McGovern, Daniela Macias and Ruben Morales-Menedez	Quality 4.0 – Green Belt, Black Belt and Master Black Belt Curricula
NAMRC Paper 117	Bhaskar Botcha, Ashif Sikandar Iquebal and Satish Bukkapatnam	Efficient Manufacturing Processes and Performance Qualification via Active Learning: Application to a Cylindrical Plunge Grinding Platform
Tuesday, June 22 **1:30 PM – 3:00 PM**	**NAMRC Track 6 Industrial Applications and Manufacturing Education** Session Chair: Brian Paul | Session Co-chair: Albert Shih	
NAMRC Keynote Paper 133	Brian Paul, Laine Mears and Albert Shih	Teaching Manufacturing Processes from an Innovation Perspective
NAMRC Paper 84	Suryanarayanan Gunasekar, Scott Kerner, Matthew Krugh and Laine Mears	Wearable Shear Force-Sensing for Augmenting Manual Hose Connections in an Automotive Assembly
NAMRC Paper 81	John Hart, Dawn Wendell, John Liu, John Lewandowski, Miguel Funes and Albert Shih	Teaching Manufacturing Processes Using a Flipped Classroom Model
Tuesday, June 22 **1:30 PM – 3:00 PM**	**MSEC 01-01-02 Advances in Metal Additive Manufacturing Processes 2** Session Chair: Ho Yeung | Session Co-chair: Wenchao Zhou	
MSEC2021-63263	Basil Paudel, Garrett Marshall and Scott Thompson	Monitoring and Modeling of Ti-6AI-4V Thin Wall Temperature Distribution During Blown Powder Laser Directed Energy Deposition
MSEC2021-63632	Hanyu Zhu, Nanzhu Zhao, Sandeep Patil, Amit Bhasin and Wei Li	A Method to Predict Fatigue Life of Additively Manufactured Metallic Parts
MSEC2021-63841	Lauren Heinrich, Thomas Feldhausen, Kyle Saleeby, Christopher Saldana and Thomas Kurfess	Prediction of Thermal Conditions of DED with FEA Metal Additive Simulation
MSEC2021-63877	Bilal Taha, Sandeep Patil and Brian Dennis	Design and Manufacturing of Topology Optimized Heat Sinks Made of Copper Using 3D Printing
Tuesday, June 22 **1:30 PM – 3:00 PM**	**MSEC 04-01-02 Smart Manufacturing for Resilient and Environmentally Efficient Systems 2** Session Chair: Julius Schoop | Session Co-chair: Nancy Diaz-Elsayed	
MSEC2021-63460	David Adeniji and Julius Schoop	In-Situ Calibrated Digital Process Twin Models for Resource Efficient Manufacturing

MSEC2021-63822	Lei Di, Gaurav Manish Shah, Yiran Yang and Weiwei Cui	Greenhouse Gas Emission Analysis of Integrated Production-Inventory-Transportation Supply Chain Enabled by Additive Manufacturing
MSEC2021-63966	Hao-Yu Liao, Willie Cade and Sara Behdad	Forecasting Repair and Maintenance Services of Medical Devices Using Support Vector Machine
Tuesday, June 22 1:30 PM – 3:00 PM	**MSEC 05-02-02 Innovations in the Design and Control of Manufacturing Machines and Equipment (ASME-JSME Joint Symposium) 2** Session Chair: Chandra Nath | Session Co-chair: Martin Jun	
MSEC2021-60227	Weitao Li, Liping Wang and Guang Yu	Time Domain Study on the Construction Mechanism of Milling Stability Lobe Diagrams with Multiple Modes
MSEC2021-63302	Kotaro Mori, Iwao Yamaji, Daisuke Kono, Atsushi Matsubara, Takehiro Ishid, Yuki Kaitani, Eiji Higashi and Taisuke Urakami	Influence of Contact Positioning of Pivot Support on Machining Vibration
MSEC2021-63615	Christopher Martin, Alexandrina Unataroiu, Kemu Xu and S M Mahbobur Rahman	A Study of the Efficacy of Flame Electrical Resistance for Standoff Measurements During the Oxyfuel Cutting Process
MSEC2021-63617	Prahar Bhatt, Rishi Malhan, Pradeep Rajendran, Aniruddha Shembekar and Satyandra Gupta	Trajectory-Dependent Compensation Scheme to Reduce Manipulator Execution Errors for Manufacturing Applications
MSEC2021-63693	Yesiliang Qiu, Janet Dong and Caroline "Niki" Harrison Moretto	Platform Development of Tick Collection Robot
Tuesday, June 22 1:30 PM – 3:00 PM	**MSEC 06-02 Tool Wear Mechanisms, Measurements, and Monitoring** Session Chair: Rui Liu | Session Co-chair: Steven Liang	
MSEC2021-62021	Ben Stuhr and Rui Liu	A Flexible Similarity Based Algorithm for Tool Condition Monitoring
MSEC2021-63468	Zongwei Ren, Zhenglong Fang, Takuhiro Arakane, Toru Kizaki, Yannan Feng, Junshi Kugo, Tsukasa Nishikawa and Eiji Nabata, Naohiko Sugita	Predictions of Cutting Force and Tool Wear in Gear Power Skiving
MSEC2021-63510	Patrick Kwon, Ryan Khawarizmi, Dave Kim, Md Abdulla Sayem and Yinyin Han	The Effect of Carbon Fiber Types on Tool Wear During Edge Trimming of 0°, 45°, 90°, and 135°carbon Fiber Reinforced Plastic Laminates
MSEC2021-63573	Guisen Wang, Fuzhu Han and Liang Zhu	Evolution of White Layer and Residual Stress in Electrical Discharge Machining
MSEC2021-63576	Kuo Liu, Yongqing Wang, Mengmeng Niu, Honghui Wang, Mingrui Shen and Bo Qin	Tool Condition Monitoring Method Based on Generative Adversarial Network for Data Augmentation

Tuesday, June 22 **1:30 PM – 3:00 PM**	**MSEC 07-06-02 Industrial Internet, Cloud and Digital Twins in the Wake of COVID-19 (2)** Session Chair: Yujie Chen | Session Co-chair: Xi (Vincent) Wang	
MSEC2021-63647	Chuan Xiao, Chun Zhao, Yue Liu and Lin Zhang	A FPGA-Based Cloud-Edge Collaboration Platform in Cloud Manufacturing
MSEC2021-63700	Xiaobin Li and Chao Yin	A Cloud Solution for Service Oriented Workshop Management
MSEC2021-63857	Xiaobin Li and Chao Yin	An OSGi-Based Adaptation Access of Machine Tool in the Cloud Manufacturing Environment
MSEC2021-64438	Huiyue Huan and Xun Xu	Edge Computing Enhanced Digital Twins for Smart Manufacturing

Wednesday, June 23, 2021

Time*	Event	Organizers
10:50 AM to 11:20 AM	Keynote Session 3 (Pre-Recorded Event) by Sarah Kleinbaum, Program Manager for Materials Technology in the Department of Energy's (DOE) Vehicle Technologies Office	Dr. Sam Anand
11:25 AM to 11:55 AM	Keynote Session 4 (Live Event) by Kevin Eustace, Senior Vice President and General Manager, Engineering and Consulting Services, Siemens Digital Industry Software (Siemens Digital Industry)	Dr. Sam Anand
12:00 PM to 1:00 PM	Pre-recorded Technical Presentations ▪ Student Competition ▪ NAMRC Track 1- Manufacturing Systems Session 2 ▪ NAMRC Track 2- Manufacturing Processes Session 2 ▪ MSEC 01-05 Smart Additive Manufacturing ▪ MSEC 05-02-03 Innovations in the Design and Control of Manufacturing Machines and Equipment (ASME-JSME Joint Symposium) 3 ▪ MSEC 06-03 Advances in Finishing Processes: Hard Machining, Grinding, and Abrasive Finishing ▪ MSEC 08-03-01 Advances in Micro- and Nano-scale Additive Manufacturing 1	
12:00 PM to 1:30 PM	Blue Sky Competition- I (Live Event)	Dr. Pfefferkorn
1:00 PM to 1:30 PM	Live discussion for Technical Presentations	
1:30 PM to 2:30 PM	Pre-recorded Technical Presentations ▪ Student Competition ▪ NAMRC Track 3- Material Removal Session 2 ▪ NAMRC Track 4- Additive Manufacturing Session 2	

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	▪ NAMRC Track 5- Smart Manufacturing and Cyber Physical Systems Session 2 ▪ MSEC 01-02 Advances in Bioinspired Additive Manufacturing ▪ MSEC 06-04 Advances in Processing of Polymers and Polymer Composites ▪ MSEC 07-05 Robotic Manufacturing and Assembly in Smart Factories ▪ MSEC 08-03-02 Advances in Micro- and Nano-scale Additive Manufacturing 2	
1:30 PM to 3:00 PM	Blue Sky Competition- II (Live Event)	Dr. Pfefferkorn
2:30 PM to 3:00 PM	Live discussion for Technical Presentations	
3:10 PM to 4:40 PM	NSF Early Career Forum (Live Event)	Dr. Linke, Dr. Z J Pei

Presentation Details for Wednesday, June 23, 2021

Wednesday, June 23 12:00 PM – 1:30 PM	**NAMRC Student Competition 1** Session Chair: Xi Vincent Wang | Session Co-chair: Tony Schmitz	
NAMRC Paper 80	Scott Kerner, Suryanarayanan Gunasekar, Rishabh Vedant, Matthew Krugh and Laine Mears	Parametrization of Manual Work in Automotive Assembly for Wearable Force Sensing
NAMRC Paper 4	Timothy No, Michael Gomez and Tony Schmitz	Contributions of Scanning Metrology Uncertainty to Milling Force Prediction
NAMRC Paper 16	Xiao Zhang, Weijun Shen, Vignesh Suresh, Jakob Hamilton, Li- Hsin Yeh, Xuepeng Jiang, Zhan Zhang, Qing Li, Beiwen Li, Iris V. Rivero and Hantang Qin	In-situ Monitoring of Direct Energy Deposition via Structured Light System and its Application in Remanufacturing Industry
NAMRC Paper 113	Md Moinuddin Shuvo and Guha Manogharan	Novel Riser Designs via 3D Sand Printing to Improve Casting Performance
NAMRC Paper 92	Abdullah Al Mamun, Chenang Liu, Chen Kan and Wenmeng Tian	Real-time Process Authentication for Additive Manufacturing Processes based on In-situ Video Analysis
Wednesday, June 23 12:00 PM – 1:30 PM	**NAMRC Track 1 Manufacturing Systems 2** Session Chair: Laine Mears | Session Co-chair: Matthew Krugh	
NAMRC Paper 103	Mohammed Shafae, Lee Wells and Jaime Camelio	Modeling in Process Machining Data Using Spatial Point Cloud vs. Time Series Data Structures
NAMRC Paper 124	Miguel Saez and Patrick Spicer	Fixtureless Assembly in the Automotive Industry: A Body Closure Case Study (Presentation Only)
NAMRC Paper 88	Behin Elahi	Manufacturing Plant Layout Improvement: Case Study of a High Temperature Heat Treatment Tooling Manufacturer in Northeast Indiana
NAMRC Paper 112	Farhang Momeni and Jun Ni	Quality Can Improve as Productivity Increases: Machining as Proof
NAMRC Paper 24	Waleed Ahmed, Hussien Hegab, Atef Mohany and Hossam Kishawy	Sustainability Assessment of Difficult-to-Cut Materials Using Rotary Tools: A Step Towards Sustainable Machining Environment

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Wednesday, June 23 12:00 PM – 1:30 PM	**NAMRC Track 2 Manufacturing Processes 2** Session Chair: Rohan Shirwaiker | Session Co-chair: Sangkee Min	
NAMRC Paper 13	Abishek B. Kamaraj, Natalie Reed and Murali Sundaram	Effect of Ultra-High Pulse Frequency on the Resolution in the Electrochemical Deposition of Nickel
NAMRC Paper 101	Davide Campanella, Gianluca Buffa and Livan Fratini	A Two Steps Lagrangian-Eulerian Numerical Model for The Simulation of Explosive Welding of Three Dissimilar Materials Joints (Presentation Only)
NAMRC Paper 18	Andreas Hetzel, Marion Merklein and Michael Lechner	Influence of A Local Short-Term Heat Treatment on The Formability of Orbital Formed Functional Components
NAMRC Paper 130	Justin Morrow, Francis Deck, Aditya Nagaraj and Sangkee Min	Evaluating Sub-Surface Stress of Precision Machined Single-Crystal Sapphire with Raman Spectroscopy (Presentation Only)
NAMRC Paper 127	John Agapiou	Filling Friction Stir Welding In-Process Exit Holes in Copper Squirrel Cage Rotors for Electric Motors
Wednesday, June 23 12:00 PM – 1:30 PM	**MSEC 01-05 Smart Additive Manufacturing** Session Chair: Chinedum Okwudire | Session Co-chair: Prahalada Rao	
MSEC2021-68940	David Rosen	Smart Additive Manufacturing Process Chains for Part Production and Design
MSEC2021-63623	Juan Diego Toscan, Sahand Hajifar, Christian Oswaldo Segura, Luis Javier Segura and Hongyue Sun	Deformation Analysis of 3-D Printed Metacarpophalangeal and Interphalangeal Joints via Transfer Learning,
MSEC2021-63870	Keval Ramani, Ehsan Malekipour and Chinedum Okwudire	Toward Intelligent Online Scan Sequence Optimization for Uniform Temperature Distribution in LPBF Additive Manufacturing
Wednesday, June 23 12:00 PM – 1:30 PM	**MSEC 05-02-03 Innovations in the Design and Control of Manufacturing Machines and EquiPMent (ASME-JSME Joint Symposium) 3** Session Chair: Atsushi Matsubara | Session Co-chair: Naruhiro Irino	
MSEC2021-63199	Daisuke Kono and Tomoyuki Osumi	A Friction Fluctuation Model of Rolling Guideways
MSEC2021-63720	Shotaro Ogawa, Takuhiro Tsukada, Katsuki Koto and Yasuhiro Kakinuma	Enhancement of Force Control Performance of Macro-Micro System Based Polishing Robot with Gravity Compensation
MSEC2021-63809	Nobutoshi Ozaki, Shota Matsui, Toshiki Hirogaki, and Eiichi Aoyama	Cutting State Estimation via Chatter Mark on End Milled Surface and Analysis of Its Formation Mechanism Using Voxel Model Simulation

MSEC2021-63721	Katsuki Koto,Takuhiro Tsukada, Shotaro Ogawa and Yasuhiro Kakinuma	Performance Evaluation of Robot Polishing in Macro-Micro System Based Polishing Robo
MSEC2021-65062	Yoshitaka Morimoto, Akio Hayashi, Yoshiyuki Kaneko, Naohiko Suzuki, Akane Ishizuka and Narimasa Ueda	Study on Non-Axisymmetric 3-D Curved Surface Turning by Driven-Type Rotary Tool Synchronized with Spindle
Wednesday, June 23 12:00 PM – 1:30 PM	**MSEC 06-03 Advances in Finishing Processes: Hard Machining, Grinding, and Abrasive Finishing** Session Chair: Hitomi Yamaguchi Greenslet | Session Co-chair: Changsheng Guo	
MSEC2021-59981	Xin Li, Xueping Zhang and Rajiv Shivpuri	Microstructure Alteration in the High-Speed Machining of Titanium Alloy Involved with Tool Wear and Cryogenic Condition
MSEC2021-63535	Jin Zhang and Fuzhu Han	High-Speed EDM Milling Using Rotating Short Arcs Under Composite Field
MSEC2021-63712	Yun Huang, Shaochuan Li, Guijian Xiao, Benqiang Chen, Yi He, Wenxi Wang and Kun Zhou	Experimental Study on the Effect of Surface Integrity on Fatigue Performance of Aero-Engine Blade
MSEC2021-63805	Wolfgang Lortz and Radu Pavel	New Perspectives Regarding the Chip Formation Process of Ti-6Al-4V
Wednesday, June 23 12:00 PM – 1:30 PM	**MSEC 08-03-01 Advances in Micro- and Nano-scale Additive Manufacturing 1** Session Chair: Sourabh Saha | Session Co-chair: Brian Giera	
MSEC2021-72956	Jonathan Hopkins	Manufacturing Micro-Granular Crystals and Other Advanced Microstructures Using Optical Tweezers
MSEC2021-63929	Andriy Sherehiy, Andres Montenegro, Danming Wei and Dan Popa	Adhesive Deposition Process Characterization for Microstructure Assembly
MSEC2021-63942	Olalekan Olowo, Ruoshi Zhang, Zhong Yang, Brian Goulet and Dan Popa	Organic Piezoresistive Robotic Skin Sensor Fabrication, Integration and Characterization
Wednesday, June 23 1:30 PM – 3:00 PM	**NAMRC Student Competition 2** Session Chair: Dale Lombardo| Session Co-chair: Peng Wang	
NAMRC Paper 51	Karl Schuchard, Abhay Joijode, Vincent Willard, Bruce Anderson, Pierre Grondin, Behnam Pourdeyhimi and Rohan Shirwaiker	Fabrication of Drug-Loaded Ultrafine Polymer Fibers via Solution Blowing and their Drug Release Kinetics
NAMRC Paper 19	Aaron Cornelius, Jaydeep Karandikar, Michael Gomez and Tony Schmitz	A Bayesian Framework for Milling Stability Prediction and Reverse Parameter Identification
NAMRC Paper 38	Christopher Henson, Nathan Decker and Qiang Huang	A Digital Twin Strategy for Major Failure Detection in Fused Deposition Modeling Processes

NAMRC Paper 21	Matthew Russell, Evan King, Chadwick Parrish and Peng Wang	Stochastic Modeling for Tracking and Prediction of Gradual and Transient Battery Performance Degradation
NAMRC Paper 54	Nathan Hertlein, Philip Buskohl, Andrew Gillman, Kumar Vemaganti and Sam Anand	Generative Adversarial Network for Early-Stage Design Flexibility in Topology Optimization for Additive Manufacturing
Wednesday, June 23 1:30 PM – 3:00 PM	**NAMRC Track 3 Material Removal 2** Session Chair: N Arunachalam | Session Co-chair: Zhaoyan Fan	
NAMRC Paper 45	R Vignesh and N Arunachalam	Design and Development of Spiral Grooved Grinding Wheel and their Influence on the Performance of Vertical Surface Grinding Process
NAMRC Paper 60	Leonardo Rosa Ribeiro Da Silva, Felipe dos Anjos Rodrigues Campos, Wisley Falco Sales and Alisson Rocha Machado	Evaluation of the Tool Wear in the Turning Process of INCONEL 718 Using PCD Tools
NAMRC Paper 46	J Rajaguru and N Arunachalam	Effect of Ultrasonic Vibration on the Performance of the Deep Hole Drilling Process
NAMRC Paper 94	Eddie Taewan Lee, Zhaoyan Fan and Burak Sencer	Estimation of CBN Grinding Wheel Condition Using Image Sensor
NAMRC Paper 48	Deep Singh, N Arunachalam and D S Srinivasu	A Novel Iterative- Based Field Search Technique for Roundness Evaluation
Wednesday, June 23 1:30 PM – 3:00 PM	**NAMRC Track 4 Additive Manufacturing 2** Session Chair: Frank Pfefferkorn| Session Co-chair: Mathew Kuttolamadom	
NAMRC Paper 34	Stefan Ball, Milad Ghayoor, Somayeh Pasebani and Ali Tabei	Statistical Analysis of Porosity and Process Parameter Relationships in Metal Additive Manufacturing
NAMRC Paper 33	James Bevis, Shane Dunlavey and Rodrigo Martinez-Duarte	Development and Preliminary Validation of a Robocasting Platform for the Additive Manufacturing of a Composite Paste Towards the Fabrication of Complex Geometries of Porous Tungsten Carbide
NAMRC Paper 121	Michael Liu, Abhishek Kumar, Satish Bukkapatnam and Mathew Kuttolamadom	A Review of the Anomalies in Directed Energy Deposition (DED) Processes & Potential Solutions - Part Quality & Defects
NAMRC Paper 40	Kandice S. B. Ribeiro, Fábio E. Mariani, Henrique T. Idogava, Gustavo C. da Silva, Zilda C. Silveira, Milton S. F. de Lima and Reginaldo T. Coelho	Evaluation of Laser Polishing as Post-Processing of Inconel 625 Produced by Directed Energy Deposition
NAMRC Paper 125	Marcus Jackson, Aishwarya Deshpande, Aaron Kim and Frank Pfefferkorn	A Study of Particle Size Metrics Using Non-Spherical Feedstock for Metal Additive Manufacturing

Wednesday, June 23 1:30 PM – 3:00 PM	**NAMRC Track 5 Smart Manufacturing – Processes, Systems and Integration 2** Session Chair: Ahmed El-Ghannam | Session Co-chair: Hantang Qin	
NAMRC Paper 11	Ahmed El-Ghannam, Sujithra Chandrasekaran and Farjana Sultana	Mechanism of Epitaxial Growth of Silica Nanowires Reinforcing Agent on Porous Sic Scaffold
NAMRC Paper 12	Li Chen, Jing Huang and Qing Chang	Data-Enabled Real-Time Molding for Production Systems with Variable Cycle Time
NAMRC Paper 128	Russell Waddell and Taylor Fry	The Cheaply Connected Factory: A Brief Evaluation of Consumer Sensors and Hardware Deployed in Industrial Applications
NAMRC Paper 17	Weijun Shen, Xiao Zhang, Xuepeng Jiang, Li-Hsin Yeh, Zhan Zhang, Qing Li, Beiwen Li and Hantang Qin	Surface Extraction from Micro-Computed Tomography Data for Additive Manufacturing
NAMRC Paper 118	Yanglong Lu and Yan Wang	Machine Fault Diagnosis of Fused Filament Fabrication Process with Physics-Constrained Dictionary Learning
Wednesday, June 23 1:30 PM – 3:00 PM	**MSEC 01-02 Advances in Bioinspired Additive Manufacturing** Session Chair: Xiangjia (Cindy) Li | Session Co-chair: Yang Yang	
MSEC2021-60675	Binjamin Perelman and Vishal Sharma	Assessing the Mechanical Properties of 3d Printed Bio-Inspired Structures and Integrating the Structures into a Product
MSEC2021-60894	Brandon Bethers and Yang Yang	Computational Study of Reinforcement Mechanisms of Cuttlefish Bone Inspired Structure for 3d Printing
MSEC2021-61050	Dylan Joralmon, Evangeline Amonoo, Yizhen Zhu and Xiangjia Li	Magnetic Field Assisted 3d Printing of Limpet Teeth Inspired Polymer Matrix Composite With Compression Reinforcement
MSEC2021-63493	Zipeng Guo, Lu An, Sushil Lakshmanan, Jason Armstrong, Shenqiang Ren and Chi Zhou	Additive Manufacturing of Porous Ceramics With Foaming Agent
Wednesday, June 23 1:30 PM – 3:00 PM	**MSEC 06-04 Advances in Processing of Polymers and Polymer Composites** Session Chair: Felicia Stan | Session Co-chair: Anasuya Sahoo	
MSEC2021-62311	Carlos Javier Rodriguez Mondejar, Alvaro Rodriguez-Prieto and Ana Maria Camacho	Estimation of Maximum Flow Length for Cf-Peek Overmolded Grid Structures Using the Finite Element Method
MSEC2021-63499	Felicia Stan, Ionut-Laurentiu Sandu, Adriana-Madalina Turcanu, Nicoleta-Violeta Stanciu and Catalin Fetecau	The Influence of Carbon Nanotubes and Reprocessing on Morphology and Properties of High-Density Polyethylene/carbon Nanotube Composites
MSEC2021-63821	Fabrizio Quadrini, Daniele Santoro, Leandro Iorio and Loredana Santo	Conical Thermoplastic Composite Anisogrid Lattice Structure by Innovative Out-of-Autoclave Molding Process
MSEC2021-64002	Asma Ul Hosna Meem, Kyle Rudolph, Allyson Cox, Austin Andwan, Timothy Osborn and Robert Lowe	Impact of Process Parameters on the Tensile Properties of Dlp Additively Manufactured Elast-Blk 10 Uv-Curable Elastomer

MSEC2021-64039	Weiheng Xu, Dharneedar Ravichandran, Sayli Jambhulkar, Yuxiang Zhu and Kenan Song	Fabrication of Multilayered Polymer Composite Fibers for Enhanced Functionalities
Wednesday, June 23 1:30 PM – 3:00 PM	**MSEC 07-05 Robotic Manufacturing and Assembly in Smart Factories** Session Chair: Azadeh Haghighi | Session Co-chair: Bitao Yao	
MSEC2021-62468	Yunbo Zhang, Wenhao Yang and Qinqin Xiao	An Augmented-Reality Based Human-Robot Interface for Robotics Programming in the Complex Environment
MSEC2021-63670	Jared Flowers and Gloria Wiens	Collaborative Robot Risk of Passage Among Dynamic Obstacles
MSEC2021-63687	Danming Wei, Andriy Sherehiy, Alireza Tofangchi, Mohammad Hossein Saadatze, Dan Popa, Keng Hsu and Moath Alqatamin	Precision Evaluation of Nexus, a Custom Multi-Robot System for Microsystem Integration
MSEC2021-63787	Azadeh Haghighi, Abdullah Mohammed and Lihui Wang	Energy Efficient Multi-Robotic 3d Printing for Large-Scale Construction – Framework, Challenges, and a Systematic Approach
MSEC2021-64512	Yang Hu, Yalin Wang, Feng Xu, Bitao Yao, Wenjun Xu and Hao Feng	Two-Dimensional Image Based Product Connector Recognition for Robotic Disassembly in Remanufacturing
Wednesday, June 23 1:30 PM – 3:00 PM	**MSEC 08-03-02 Advances in Micro- and Nano-scale Additive Manufacturing 2** Session Chair: Brian Giera | Session Co-chair: Nilabh Roy	
MSEC2021-60255	Rushil Pingali and Sourabh Saha	Reaction-Diffusion Modeling of Photopolymerization During Femtosecond Projection Two-Photon Lithography
MSEC2021-63803	Dilan Ratnayake, Alexander Curry, Chuang Qu, John Usher and Kevin Walsh	Characterizing the Conductivity of Aerosol Jet Printed Silver Features on Glass
MSEC2021-63985	Obehi Dibua, Chee Foong and Michael Cullinan	Advances in Nanoparticle Sintering Simulation: Multiple Layer Sintering and Sintering Subject to a Heat Gradient
MSEC2021-64058	Byoungdo Lee, Weishen Chu and Wei Li	The Cooling Rate Effect on Graphene Synthesis in Low Pressure Chemical Vapor Deposition
MSEC2021-64048	Joshua Grose, Obehi Dibua, Dipankar Behera, Chee Foong and Michael Cullinan	Simulation and Characterization of Nanoparticle Thermal Conductivity for a Microscale Selective Laser Sintering System

Thursday, June 24, 2021

Time*	Event	Organizers
10:50 AM to 11:20 AM	Keynote Session 5 (Pre-Recorded Event) by Dr.-Ing. Christian Brecher, Ordinary Professor for Machine Tools at the Laboratory for Machine Tools and Production Engineering (WZL) of the RWTH Aachen & Director of the Department for Production Machines at the Fraunhofer Institute for Production Technology IPT	Dr. Sam Anand
11:25 AM to 11:55 AM	Keynote Session 6 (Live Event) by Dr. Robert W. Ivester, Acting MEP Director and the Deputy Director of the Hollings Manufacturing Extension Partnership (MEP) Program at the National Institute of Standards & Technology (NIST)	Dr. Sam Anand
12:00 PM to 1:00 PM	Pre-recorded Technical Presentations ▪ NAMRC Track 4- Additive Manufacturing Session 3 ▪ NAMRC Track 5- Smart Manufacturing and Cyber Physical Systems Session 3 ▪ MSEC 01-03 Additive Manufacturing with Functional Polymers, Multi-material Structures and Composites ▪ MSEC 02-01 Advanced Materials Manufacturing ▪ MSEC 03-01-01 Advances in Biomanufacturing of Tissue-Engineered Scaffolds and Organs 1 ▪ MSEC 05-03-01 Advanced Machining and Metrology for Smart Manufacturing Technologies (ASME-JSME Joint Symposium) 1 ▪ MSEC 06-06-01 Advances in Lightweight and Dissimilar Materials Joining 1	
12:00 PM to 1:30 PM	Federal Agencies Perspective on Advanced Manufacturing (Live Event)	Dr. Pfefferkorn
1:00 PM to 1:30 PM	Live discussion for Technical Presentations	

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*All times indicated in the agenda are in US Eastern Daylight Time

1:30 PM to 2:30 PM	Pre-recorded Technical Presentations ▪ NAMRC Track 2- Manufacturing Processes Session 3 ▪ NAMRC Track 4- Additive Manufacturing Session 4 ▪ NAMRC Track 5- Smart Manufacturing and Cyber Physical Systems Session 4 ▪ MSEC 01-04-01 Computational Methods and Process Planning for Additive Manufacturing 1 ▪ MSEC 03-01-02 Advances in Biomanufacturing of Tissue-Engineered Scaffolds and Organs 2 ▪ MSEC 04-02 Advances in Sustainable Manufacturing Processes and Systems ▪ MSEC 06-08 Advances in Assisted and Augmented Manufacturing Processes ▪ MSEC 07-07 Changeable, Transformable Manufacturing & Distributed Green Supply Chains in Pandemic Recovery Efforts	
1:30 PM to 3:00 PM	NSF's Advanced Manufacturing Program: Overview, Update and Q&A (Live Event)	Dr. ZJ Pei
2:30 PM to 3:00 PM	Live discussion for Technical Presentations	
3:10 PM to 4:40 PM	SME Awards Ceremony (Live Event)	Suzy Marzano

Presentation Details for Thursday, June 24, 2021

Thursday, June 24 12:00 PM – 1:30 PM	**NAMRC Track 4 Additive Manufacturing Processes 3** Session Chair: Tarik Dickens | Session Co-chair: Wayne Hung	
NAMRC Paper 50	Vysakh Venugopal, Omkar Ghalsasi, Matthew McConaha, Alice Xu, Jonathan Forbes and Sam Anand	Image Processing-based Method for Automatic Design of Patient-Specific Cranial Implant for Additive Manufacturing
NAMRC Paper 56	Vinay Varghese and Soham Mujumdar	Micromilling-induced Surface Integrity of Porous Additive Manufactured Ti6Al4V Alloy
NAMRC Paper 131	Shyam-Sundar Balasubramanian, Chris Philpott, James Hyder, Mike Corliss, Bruce Tai and Wayne Hung	Novel Fatigue Tester for Additively Manufactured Metals
NAMRC Paper 68	Chaitanya Vundru, Ramesh Singh, Wenyi Yan and Shyamprasad Karagadde	Effect of Spreading of the Melt Pool on the Deposition Characteristics in Laser Directed Energy Deposition
NAMRC Paper 69	Helen Parker, Sean Psulkowski, Phong Tran and Tarik Dickens	In-Situ Defect Analysis of 3D Printing via Conductive Filament and Ohm's Law
Thursday, June 24 12:00 PM – 1:30 PM	**NAMRC Track 5 Smart Manufacturing: Processes, Systems and Integration 3** Session Chair: Matthew Krugh | Session Co-chair: Binil Starly	
NAMRC Paper 126	John Karigiannis, Shaopeng Liu, Stephane Harel, Xiao Bian, Peihong Zhu, Feng Xue, Steeves Bouchard, David Cantin, Maxime Beaudoin-Pouliot, Bernard Bewlay and Marie-Christine Caron	Multi-Robot System for Automated Fluorescent Penetrant Indication Inspection with Deep Neural Nets
NAMRC Paper 52	Mahmud Hasan, Kemafor Anyanwu and Binil Starly	Hybrid Blockchain Architecture for Cloud Manufacturing-as-a-service (CMaaS) Platforms with Improved Data Storage and Transaction Efficiency
NAMRC Paper 44	Jinwoo Song and Young Moon	A Layer Image Auditing System Secured by Blockchain
NAMRC Paper 55	Jonathan Rosales Vizuete, Sourabh Deshpande and Sam Anand	IIoT based Augmented Reality for Factory Data Collection and Visualization
NAMRC Paper 62	Ethan Wescoat, Matthew Krugh and Laine Mears	Random Forest Regression for Predicting an Anomalous Condition on a UR10 Cobot End-Effector from Purposeful Failure Data

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*All times indicated in the agenda are in US Eastern Daylight Time

Thursday, June 24 12:00 PM – 1:30 PM	**MSEC 01-03 Additive Manufacturing with Functional Polymers, Multi-material Structures and Composites** Session Chair: Bulent Arda Gozen | Session Co-chair: Kun (Kelvin) Fu	
MSEC2021-62317	Jordan Garcia, Robert Harper and Y. Charles Lu	Anisotropic Material Behaviors of 3D Printed Carbon-Fiber Polymer Composites with Open-Source Printers
MSEC2021-63208	Nor Aiman Sukindar, Azib Azhari Awang Dahan, Sharifah Imihezri Syed Shaharuddin and Farah Huda Abd Halim	Performance of Low-Cost 3D Printer in Medical Application
MSEC2021-63412	Roozbeh (Ross) Salary, Mohan Yu, Logan Lawrence, James Day and Pier Paolo Claudio	Pneumatic Microextrusion-Based Additive Biofabrication of Polycaprolactone Bone Scaffolds – Part II: Investigation of the Influence of Polymer Flow Parameters
MSEC2021-63635	Jing Zhao, Muyue Han and Lin Li	Impacts of Process Parameters on Shape Memory Properties of Stereolithography Manufactured Parts: An Experimental Analysis
MSEC2021-64133	Murali Sundaram, Zane Decker, Mason Makulinski and Suprita Vispute	Effects of Size-Reduction on the Failure Mechanism of 3D Printed PLA + Parts
Thursday, June 24 12:00 PM – 1:30 PM	**MSEC 02-01 Advanced Materials Manufacturing** Session Chair: Saeed Farahani | Session Co-chair: Mihaela Banu	
MSEC2021-58537	Aspen Glaspell, Jaejoong Ryu and Kyosung Choo	Thermo-Mechanical Simulation of Ti6Al4V-NiTi Dissimilar Laser Welding Process
MSEC2021-64052	Sahil Dhoka, Himansshu Abhi, Nicholas Hendrickson, William Emblom and Scott Wagner	Integrating Friction-Stir Back Extrusion to Powder Metallurgy
MSEC2021-64916	Mihaela Banu, Tae Hwa Lee, S. Jack Hu and Pei-Chung Wang	Investigation of the Dynamic Response of a Multispot System at Joining Using Ultrasonic Welding
Thursday, June 24 12:00 PM – 1:30 PM	**MSEC 03-01-01 Advances in Biomanufacturing of Tissue-Engineered Scaffolds and Organs 1** Session Chair: Yifei Jin | Session Co-chair: Jun Yin	
MSEC2021-71264 (Invited Symposium Speaker)	Michael McAlpine	3D Printing Bionic Devices
MSEC2021-63658	MD Ahasan Habib, Slesha Tuladhar and Cartwright Nelson	Rheological Analysis of Low-Viscous Hydrogels for 3D Bio-Printing Processes

MSEC2021-63996	Bashir Khoda and Md Ahasan Habib	A Rheological Study of Bio-Ink: Shear Stress and Cell Viability
Thursday, June 24 12:00 PM – 1:30 PM	**MSEC 05-03-01 Advanced Machining and Metrology for Smart Manufacturing Technologies (ASME-JSME Joint Symposium) 1** Session Chair: Takashi Matsumura | Session Co-chair: Norikazu Suzuki	
MSEC2021-60045	Tsutomu Uenohara, Reza Aulia Rahman, Yasuhiro Mizutani and Yasuhiro Takaya	Laser Micro Machining Using a Photonic Nanojet in Water Medium
MSEC2021-60409	Yizhao Guan, Hiromasa Kume, Shotaro Kadoya, Masaki Michihata and Satoru Takahashi	The FDTD Analysis of Near-Field Response for Microgroove Structure with Standing Wave Illumination for the Realization of Coherent Structured Illumination Microscopy
MSEC2021-60417	Yushen Liu, Shotaro Kadoya, Masaki Michihata and Satoru Takahashi	Numerical Study on Tip Shape of Near-Field Optical Fiber Probe for Detecting Electric Field Intensity of Whispering Gallery Mode Resonance
MSEC2021-64688	John Henry Navarro-Devia, Dzung Viet Dao, Yun Chen and Huaizhong Li	Analysis of Vibration Signals in Monitoring Titanium End Milling Process Using Triaxial Accelerometer
Thursday, June 24 12:00 PM – 1:30 PM	**MSEC 06-06-01 Advances in Lightweight and Dissimilar Materials Joining 1** Session Chair: Wayne Cai | Session Co-chair: Xun Liu	
MSEC2021-69636 (Invited Symposium Speaker)	Jingjing Li	Creation of Dissimilar Materials Structures
MSEC2021-61180	Tyler Grimm, Amit Deshpande and Laine Mears	Chipping Reduction Using Thermally-Assisted Friction Element Welding
MSEC2021-63650	Gowtham Parvathy, Tyler Grimm and Laine Mears	Conduction Heat Assisted Friction Element Welding
Thursday, June 24 1:30 PM – 3:00 PM	**NAMRC Track 2 Manufacturing Processes 3** Session Chair: Laine Mears | Session Co-chair: Arif Malik	
NAMRC Paper 27	Andreas Rohrmoser, Hinnerk Hagenah and Marion Merklein	Influence of the Forming Induced Hardening on the Wear Behavior of Aluminum Gears within a Metal-Plastic Material Pairing and Targeted Adaption
NAMRC Paper 28	Tyler Grimm, Gowtham Parvathy and Laine Mears	Friction Element Riveting: A Novel Aluminum to Aluminum Joining Process

NAMRC Paper 31	Tyler Grimm, Ankit Varma, Amit Deshpande, Laine Mears and Xin Zhao	Characterization of Aluminum Flow During Friction Element Welding
NAMRC Paper 39	Rachele Bertolini, Enrico Savio, Andrea Ghiotti and Stefania Bruschi	The Effect of Cryogenic Cooling and Drill Bit on the Hole Quality when Drilling Magnesium-based Fiber Metal Laminates
NAMRC Paper 20	Sumair Sunny, Glenn Gleason, Karuna Sitaula and Arif Malik	Predictive Modeling of Laser Shock Peening Induced Near-Surface Residual Stress in Alumina
Thursday, June 24 1:30 PM – 3:00 PM	**NAMRC Track 4 Additive Manufacturing 4** Session Chair: Yong Chen | Session Co-chair: Maxwell Praniewicz	
NAMRC Paper 91	Pu Han, Sihan Zhang, Alireza Tofangchi and Keng Hsu	Relaxation of Residual Stress in FFF Part with In-Process Laser Heating
NAMRC Paper 98	Yang Xu, Fangjie Qi, Xiangyun Gao, Yujie Shan, Yun Zhou and Yong Chen	Direct Droplet Writing – A Novel Droplet-punching Capillary-splitting 3D Printing Method for Highly Viscous Materials
NAMRC Paper 85	Chao Liu and Junjun Ding	Material Extrusion 3D Printing of Carbon Material Reinforced PDMS Matrix Composites and their Mechanical Properties
NAMRC Paper 109	Jie Sun	An Overview of Scaffolds for Retinal Pigment Epithelium Research
NAMRC Paper 59	Jaime Berez, Maxwell Praniewicz and Christopher Saldana	Assessing Laser Powder Bed Fusion System Geometric Errors through Artifact-Based Methods
Thursday, June 24 1:30 PM – 3:00 PM	**NAMRC Track 5 Smart Manufacturing – Processes, Systems and Integration 4** Session Chair: Weihong Guo | Session Co-chair: N Arunachalam	
NAMRC Paper 57	Dongdong Liu, Weidong Cheng, Jianjing Zhang, Robert Gao and Weigang Wen	Integrated Method of Generalized Demodulation and Artificial Neural Network for Robust Bearing Fault Recognition
NAMRC Paper 79	Nesar Ahmed Titu, Matthew Baucum, Timothy No, Mitchell Trotsky, Jaydeep Karandikar, Tony Schmitz and Anahita Khojandi	Estimating Johnson-Cook Material Parameters using Neural Networks
NAMRC Paper 25	Kandice S. B. Ribeiro, Henrique H. L. Núñez, Jason Jones, Peter Coates and Reginaldo Coelho	A Novel Melt Pool Mapping Technique Towards the Online Monitoring of Directed Energy Deposition Operations
NAMRC Paper 73	Matthew Behnke, Shenghan Guo and Weihong Guo	Comparison of Early Stopping Neural Network and Random Forest for In-Situ Quality Prediction in Laser Based Additive Manufacturing

NAMRC Paper 77	Rishikesan V, Bhagyesh Chaturvedi and Arunachalam N	Characterisation of drilling-induced damage in GFRP Honeycomb Sandwich Composites using Acoustic Emission
Thursday, June 24 1:30 PM – 3:00 PM	**MSEC 01-04-01 Computational Methods and Process Planning for Additive Manufacturing 1** Session Chair: Tsz-Ho Kwok | Session Co-chair: Yunbo 'Will' Zhang	
MSEC2021-63351	Ana Paula Clares and Guha Manogharan	Discrete-Element Simulation of Powder Spreading Process in Binder Jetting, and the Effects of Powder Size Distribution.
MSEC2021-63375	Liangkui Jiang, Pavithra Premaratne, Yanhua Huang, Zhan Zhang and Hantang Qin	Modeling and Experimental Validation of Droplet Generation in Electrohydrodynamic Inkjet Printing for Prediction of Printing Quality
MSEC2021-63719	Xiaoqing Tian, Yaling Li, Dingyifei Ma, Jiang Han and Lian Xia	Closed-Loop Control of Silicone Extrusion-Based Additive Manufacturing Based on Machine Vision
MSEC2021-63642	Zhicheng Rong, Chang Liu and Yingbin Hu	4D Printing of Complex Ceramic Structures via Controlling Zirconia Contents and Patterns
MSEC2021-63717	Wenxuan Jia, Yuen-Shan Leung, Huachao Mao, Han Xu, Chi Zhou and Yong Chen	Hybrid-Light-Source Stereolithography for Fabricating Macro-Objects with Micro-Textures
Thursday, June 24 1:30 PM – 3:00 PM	**MSEC 03-01-02 Advances in Biomanufacturing of Tissue-Engineered Scaffolds and Organs 2** Session Chair: Yifei Jin | Session Co-chair: Kyle Christensen	
MSEC2021-63242	Youping gong, Jinlai Qi, Rougang Zhou, Honghao Chen, Junling He, Zizhou Qiao, Zhikai Bi, Huipeng Chen, Furjan M. S. H. Al, Guojin Chen, Xiang Zhang and Huifeng Shao	Three-Dimensional Cell Culture with Alginate Hetero Gel Microspheres
MSEC2021-63411	Logan Lawrence, James Day, Pier Paolo Claudio and Roozbeh (Ross) Salary	Investigation of the Regenerative Potential of Human Bone Marrow Stem Cell-Seeded Polycaprolactone Bone Scaffolds, Fabricated Using Pneumatic Microextrusion Process
MSEC2021-63413	Roozbeh (Ross) Salary, Abigail Chaffins, Mohan Yu, James Day and Pier Paolo Claudio	Investigation of the Functional Properties of Additively-Fabricated Triply Periodic Minimal Surface-Based Bone Scaffolds for the Treatment of Osseous Fractures.
MSEC2021-63471	Cartwright Nelson, Slesha Tuladhar and MD Ahasan Habib	Designing an Interchangeable Multi-Material Nozzle System for 3D Bioprinting Process
MSEC2021-63654	Huifeng Shao, Zhuoluo Jing, Rougang Zhou, Zhiheng Nian, Haiqiang Liu, Youping Gong and Yong He	Manufacturing of Biodegradable Intramedullary Nail with High Strength

Thursday, June 24 1:30 PM – 3:00 PM	**MSEC 04-02 Advances in Sustainable Manufacturing Process and Systems** Session Chair: Daniel Cooper | Session Co-chair: William Bernstein	
MSEC2021-63507	Xiange Wang, Philip Kent Velbis and Barbara Linke	Framework for User-Friendly Modeling of Energy Use in Fused Deposition Modeling
MSEC2021-63645	Abigail Clarke-Sather, Asad Bashir Tyler Poggiogalle and Christopher Meehan	Material Properties of Discarded Textiles for Manufacturing Feedstocks
MSEC2021-63739	Reginald Elvis Peter Francis and Senthilkumaran Kumaraguru	Material Efficiency and Economics of Hybrid Additive Manufacturing
Thursday, June 24 1:30 PM – 3:00 PM	**MSEC 06-08 Advances in Assisted and Augmented Manufacturing Processes** Session Chair: Weilong Cong | Session Co-chair: Meng Zhang	
MSEC2021-60388	Yunze Li, Dongzhe Zhang and Weilong Cong	Ultrasonic Vibration Assisted-Laser Directed Energy Deposition of B4C-Ti Composite: Effects of Laser Power and Ultrasonic Vibration
MSEC2021-60520	Rui Dai, Beomjin Kwon and Qiong Nian	A Novel Packing Hollow Dodecahedron Model to Study the Mechanical and Thermal Properties of Stocastic Metallic Foams
MSEC2021-63281	Tom Zhang, Yubin Liu and Lawrence Yao	Effect of Laser Forming on the Energy Absorbing Behavior of Metal Foams
MSEC2021-63404	Tyler Grimm and Laine Mears	Electrically Assisted Wire Drawing Polarity Effects
Thursday, June 24 1:30 PM – 3:00 PM	**MSEC 07-07 Changeable, Transformable Manufacturing & Distributed Green Supply Chain in Pandemic Recovery Efforts** Session Chair: Ahmed Azab | Session Co-chair: Mohamed Gadalla	
MSEC2021-65490	Sardar Asif Khan	Single Minute Exchange of Die: A Case Study to Improve System Changeability
MSEC2021-60408	Saeideh Salimpour and Ahmed Azab	A Dynamic Programming Approach to Solve the Facility Layout Problem for Reconfigurable Manufacturing
MSEC2021-63766	Yunqing Li, Shivakumar Raman, Binil Starly and Paul Cohen	Design of Knowledge Graph in Manufacturing Services Discovery

Friday, June 25, 2021

Time*	Event	Organizers
11:25 AM to 11:55 AM	Keynote Session 7 (Live Event) by Dr. Gen Satoh, Associate Director at the Raytheon Technologies Additive Manufacturing Process Capability Center	Dr. Sam Anand
12:00 PM to 1:00 PM	Pre-recorded Technical Presentations ▪ NAMRC Track 2- Manufacturing Processes Session 4 ▪ NAMRC Track 4- Additive Manufacturing Session 5 ▪ MSEC 06-06-02 Advances in Lightweight and Dissimilar Materials Joining 2 ▪ MSEC 07-06-03 Industrial Internet, Cloud and Digital Twins in the Wake of COVID-19 (3) ▪ MSEC 08-02-01 Advances in Micro and Nano Manufacturing 1 ▪ MSEC 09-02 Data-Enabled Modeling, Detection, Optimization, and Prognostics for Quality and Reliability Improvement of Advanced Manufacturing Systems ▪ MSEC 12-01-01 MED 100-Year Issue of JSME State-of-the-Art Papers 1	
	Pre-recorded Doctoral Symposium-I Presentations (Process planning and modeling)	Dr. Chen, Dr. Haapala
1:00 PM to 1:30 PM	Live discussion for Technical Presentations and Doctoral Symposium-I	Dr. Chen, Dr. Haapala
1:30 PM to 2:30 PM	Pre-recorded Technical Presentations ▪ NAMRC Track 5- Smart Manufacturing and Cyber Physical Systems Session 5 ▪ MSEC 01-04-02 Computational Methods and Process Planning for Additive Manufacturing 2 ▪ MSEC 03-02 Advances in Manufacturing, Development, and Analysis of Biomedical Devices	

	▪ MSEC 05-03-02 Advanced Machining and Metrology for Smart Manufacturing Technologies (ASME-JSME Joint Symposium) 2 ▪ MSEC 06-06-03 Advances in Lightweight and Dissimilar Materials Joining 3 ▪ MSEC 07-02 Cyber-Physical Systems and Cybersecurity in Industry 4.0 ▪ MSEC 08-02-02 Advances in Micro and Nano Manufacturing 2 ▪ MSEC 12-01-02 MED 100-Year Issue of JSME State-of-the-Art Papers 2	
	Pre-recorded Doctoral Symposium-II Presentations (Processes and materials)	Dr. Chen, Dr. Haapala
2:30 PM to 3:00 PM	Live discussion for Technical Presentations and Doctoral Symposium-II	Dr. Chen, Dr. Haapala
3:10 PM to 4:10 PM	Pre-recorded Doctoral Symposium-III Presentations (Design, simulation and optimization)	Dr. Chen, Dr. Haapala
3:10 PM to 4:40 PM	Poster Session (Live Event)	Dr. Chen, Dr. Haapala
4:10 PM to 4:40 PM	Live discussion for Doctoral Symposium-III	Dr. Chen, Dr. Haapala

Presentation Details for Friday, June 25, 2021

Friday, June 25 12:00 PM – 1:30 PM	**NAMRC Track 2 Manufacturing Processes 4** Session Chair: N Arunachalam | Session Co-chair: Sarah J. Wolff	
NAMRC Paper 66	Przemysław Podulka	Application of Image Processing Methods for the Characterization of Selected Features and Wear Analysis in Surface Topography Measurements
NAMRC Paper 75	Hui Wang, Benjamin Gould, Niranjan Parab, Cang Zhao, Aaron Greco, Tao Sun and Sarah J. Wolff	High-Speed Synchrotron X-Ray Imaging of Directed Energy Deposition of Titanium: Effects of Processing Parameters on the Formation of Entrapped-Gas Pores
NAMRC Paper 120	T Aravind, S Boominathasellarajan and N Arunachalam	Fabrication of Micro-Channels on Polymethyl Methacrylate (PMMA) Plates by Thermal Softening Process Using Nichrome Wire: Tool Design and Surface Property Evaluation
NAMRC Paper 96	Ching-Tun Peng and Iqbal Shareef	Dry Machining Parameter Optimization for γ-TiAl With a Rhombic Insert
NAMRC Paper 108	Kelsey Lalka, Aaron Dunn, Hannah Skrbis, Noelle Langmack, Joseph Budzinski and Steven Schmid	Hydroforming of Ti-6Al-4V Acetabular Cups
Friday, June 25 12:00 PM – 1:30 PM	**NAMRC Track 4 Additive Manufacturing 5** Session Chair: Jing Shi | Session Co-chair: Sam Anand	
NAMRC Paper 70	Michael Ogunsanya, Joan Isichei, Santosh Kumar Parupelli, Salil Desai and Yi Cai	In-situ Droplet Monitoring of Inkjet 3D Printing Process using Image Analysis and Machine Learning Models
NAMRC Paper 72	Roman Savinov, Yachao Wang, Jin Wang and Jing Shi	Comparison of Microstructure and Properties of CoCrFeMnNi High-Entropy Alloy from Selective Laser Melting and Directed Energy Deposition Processes
NAMRC Paper 76	Edisson Andres Naula Duchi, Biali Fernando Lima Rodriguez, Luis Eduardo Garza Castañon and José Israel Martínez López	Manufacturing of Stereolithography Enabled Soft Tools for Point of Care Micromixing and Sensing Chambers for Underwater Vehicles
NAMRC Paper 100	Yujie Shan, Dongming Gan and Huachao Mao	Curved Layer Slicing based on Isothermal Surface
NAMRC Paper 89	Lun Li and Sam Anand	Hatch Pattern Optimization of Powder Bed Fusion Additive Manufacturing Process for Minimizing Part GD&T Errors

Friday, June 25 12:00 PM – 1:30 PM	**MSEC 06-06-02 Advances in Lightweight and Dissimilar Materials Joining 2** Session Chair: Yongbing Lee | Session Co-chair: Wayne Cai	
MSEC2021-60179	Fadi Al-Badour, Abdulrahman Al-Ghamdi, Akeem Adesina, Rami Suleiman and Nesar Merah	Friction Stir Diffusion Bonding of Magnesium Alloy ZK 60 to Steel
MSEC2021-61036	Jiangchao Wang, Bin Yi and Xiaoli Zhou	Influence of Clamping for Out-of-Plane Welding Distortion Mitigation During Thin Steel Plates Welding
MSEC2021-61250	Koen Faes, Jens Vermeersch and Rafael Gomes Nunes Silva	Joining of Metal-Plastic Composites with Advanced Welding Processes
MSEC2021-63321	Giovanni Chianese, Pasquale Franciosa, Jonas Nolte, Darek Ceglarek and Stanislao Patalano	Photodiode-Based In-Process Monitoring of Part-to-Part Gap and Weld Penetration Depth in Remote Laser Welding of Automotive Battery Tab Connectors
MSEC2021-64320	Daniel Franke, Shiva Rudraraju, Michael Zinn and Frank Pfefferkorn	Effect of Tool Eccentricity on the Development of Force Based Defect Detection During Friction Stir Welding of Aluminum Alloy 6061-T6
Friday, June 25 12:00 PM – 1:30 PM	**MSEC 07-06-03 Industrial Internet, Cloud and Digital Twins in the Wake of COVID-19 (3)** Session Chair: Yujie Chen | Session Co-chair: Xi (Vincent) Wang	
MSEC2021-61672	Dong Han, Wangming Li, Xinyu Li, Liang Gao and Yang Li	A Data-driven Proactive Scheduling Approach for Hybrid Flow Shop Scheduling Problem
MSEC2021-63407	David Stock, Aditi Mukhopadhyay, Rob Potter and Andy Henderson	Tool Wear Analysis of MTConnect Production Data
MSEC2021-63522	Yilin Fang and Kai Mei	Multi-Robotic Disassembly Line Balancing Using Deep Reinforment Learning
MSEC2021-64407	Yang Hu, Zitong Liu, Feng Xu, Jiayi Liu, Wenjun Xu and Hao Feng	Human Motion Position Prediction for Human-Robot Collaboration in Manufacturing Considering Human Joint Repair
MSEC2021-64642	Yang Hu, Yiwen Ding, Feng Xu, Jiayi Liu, Wenjun Xu and Hao Feng	Knowledge Recommendation System for Human-Robot Collaborative Disassembly Using Knowledge Graph
Friday, June 25 12:00 PM – 1:30 PM	**MSEC 08-02-01 Advances in Micro and Nano Manufacturing 1** Session Chair: Ping Guo | Session Co-chair: Bashir Khoda	
MSEC2021-59847	Chuang Qu, Bruce Alphenaar, Shamus Mcnamara and Kevin Walsh	Optimization of Ultra-High Aspect Ratio Nanostructures Fabricated Using Glancing Angle Deposition
MSEC2021-59982	Peiqiang Yang, Xueping Zhang, Zhenqiang Yao and Rajiv Shivpuri	Molecular Dynamics Modeling the Nano-Indentation of Titanium

MSEC2021-60390	Stanislau Niauzorau, Aliaksandr Sharstniou, Natalya Kublik, Venkata Sampath and Bruno Azeredo	Synthesis of Nanoporous Gold by Chemical Dealloying of Co-Sputtered Gold-Silver Thin Films and Study of Its Variability
MSEC2021-60460	Madhu Vadali and Utsavkumar Mistry	Influence of Surface Geometry on Melt Pool Flows and Shape in Pulsed Laser Surface Melting
MSEC2021-63347	Michael Grzenda, Arielle Gamboa, James Mercado, Lin Lei, Jennifer Guzman, Lisa Klein, Andrei Jitianu and Jonathan Singer	Parametric Control of Melting Gel Morphology and Chemistry via Electrospray Deposition
Friday, June 25 12:00 PM – 1:30 PM	**MSEC 09-02 Data-Enabled Modeling, Detection, Optimization, and Prognostics for Quality and Reliability Improvement of Advanced Manufacturing Systems** Session Chair: Xiaowei Yue | Session Co-chair: Xiaolei Fang	
MSEC2021-58639	Shenglei Du, Jingmei Guo, Lin Yi, Chen Zhang and Shi Liu	Real-Time Reliability Assessment of Wind Turbine Components Using a Back-Propagation Neural Network and SCADA Data
MSEC2021-62056	Rajshekhar Singhania, Chinmay Sawkar and Manoj Tiwari	Optimal Sensor Deployment to Diagnose Large-Scale Manufacturing Systems Using a Convergence-Trajectory Controlled Ant Colony System Algorithm
MSEC2021-62348	Xiaolei Fang and Xin Li	Multistream Sensor Fusion-Based Prognostics Model for Systems Under Multiple Operational Conditions
MSEC2021-63465	Joseph Cohen and Jun Ni	A Semi-Supervised Multiclass Anomaly Detection Approach for Partially Labeled In-Process Measurement Data
MSEC2021-63661	Hao Wang, Yassine Qamsane, James Moyne and Kira Barton	Merging Subject Matter Expertise and Deep Convolutional Neural Network for State-Based Online Machine-Part Interaction Classification
Friday, June 25 12:00 PM – 1:30 PM	**MSEC 12-01-01 MED 100-Year Issue of JSME State-of-the-Art Papers 1** Session Chair: Laine Mears | Session Co-chair: Albert Shih	
MSEC2021-72735	Yuming Zhang	Advanced Welding Manufacturing - A Brief Analysis and Review of Challenges and Solutions
MSEC2021-73103	Jay Lee	Intelligent Maintenance Systems and Predictive Manufacturing
MSEC2021-73166	Yung C. Shin, Benxin Wu, Shuting Lei, Gary J. Cheng and Y. Lawrence Yao	Overview of Laser Applications in Manufacturing and Materials Processing in Recent Years
Friday, June 25 12:00 PM – 1:30 PM	**Doctoral Symposium- Session 1 Process planning and modeling** Session Chair: Yong Chen | Session Co-chair: Karl Haapala	
MSEC2021-68367	Donghua Zhao and Weizhong Guo	Research on Design Methodology and Key Technology of Rotary 3d Printer for Curved Layer Slicing

MSEC2021-68804	Ankit Agarwal	Modeling and Control of Geometric Tolerances in End Milling of Thin-Walled Component
MSEC2021-68865	Karl Schuchard	Computational and Experimental Characterization of 3d-Melt Blowing Process-Structure-Function Interrelationships for Tissue Engineering
MSEC2021-68992	Rishi Malhan	Manipulator Trajectory Planning Under Motion Constraints
MSEC2021-68998	Joseph Kubalak, Alfred Wicks and Christopher Williams	Topology and Toolpath Optimization via Layer-Less Multi-Axis Material Extrusion
MSEC2021-69071	Muhammad-Ali Ablat	Mechanics of Origami-Based Sheet Metal Bending
Friday, June 25	**NAMRC Track 5 Smart Manufacturing - Processes, Systems and Integration 5**	
1:30 PM – 3:00 PM	Session Chair: Zhaoyan Fan | Session Co-chair: Ali Tabei	
NAMRC Paper 78	Cheng Zhu, Tian Yu and Qing Chang	Applying Task-Oriented Safety Field Calibration in Human Robot Collaborative Systems
NAMRC Paper 61	Shohanuzzaman Shohan, Jordan Harm, Mahmud Hasan, Binil Starly and Rohan Shirwaiker	Non-Destructive Quality Monitoring of 3D Printed Tissue Scaffolds via Dielectric Impedance Spectroscopy and Supervised Machine Learning
NAMRC Paper 87	Niechen Chen	An Evolutionary Neural Network Approach to Machining Process Planning: A Proof of Concept
NAMRC Paper 53	Asmaa Harfoush, Karl Haapala and Ali Tabei	Application of Artificial Intelligence in Incremental Sheet Metal Forming: A Review
NAMRC Paper 97	Mitch Woodside, Joseph Fischer, Patrick Bazzoli, Douglas Bristow and Robert Landers	A Kinematic Error Controller for Real-Time Kinematic Error Correction of Industrial Robots
Friday, June 25	**MSEC 01-04-02 Computational Methods and Process Planning for Additive Manufacturing 2**	
1:30 PM – 3:00 PM	Session Chair: Chi Zhou | Session Co-chair: Tsz Ho Kwok	
MSEC2021-63540	Muyue Han, Jing Zhao and Lin Li	Emissions of Volatile Organic Compounds From 4D Printing and Associated Control Strategies Towards Workplace Safety
MSEC2021-63751	Shubhra Kamal Nandi, Rakesh Kumar, Anubhav Anubhav and Anupam Agrawal	Prediction of Melt-Pool Characteristics in SLM Process for Ti6Al4V Using a Semi-Analytical Model
MSEC2021-63823	Ryan Stebbins, Philip King and Guha Manogharan	A Computational Study on Novel Runner Extension Designs via 3D Sand-Printing to improve Casting Performance
MSEC2021-63965	Irfan Mustafa and Tsz Ho Kwok	Development of Intertwined Infills to Improve Multi-Material Interfacial Bond Strength
Friday, June 25	**MSEC 03-02 Advances in Manufacturing, Development, and Analysis of Biomedical Devices**	
1:30 PM – 3:00 PM	Session Chair: Yihao Zheng | Session Co-chair: Yancheng Wang	
MSEC2021-63406	Prasannavenkadesan Varatharajan and Pandithevan Ponnusamy	Prediction of Cutting Force in Bone Cutting Using Finite Element Analysis
MSEC2021-63715	Yong Lei, Yingda Hu and Murong Li	Friction Analysis in Needle Insertion into Soft Tissue

MSEC2021-63952	Yuan-Shin Lee, Yi Wang and Yen Yu Ian Shih	Vibration-Assisted Insertion of Flexible Cortical Neural Micro-Electrodes with Bio-Dissolvable Guides for Medical Implantation
MSEC2021-64056	Xinxiao Li, Patrick Chernjavsky, Katerina Angjeli, Sola Hoffman, Sara Frunzi and Yihao Zheng	Experimental Investigation of the Material Removal Rate in Grinding of Calcified Plaque by Rotational Atherectomy
Friday, June 25 1:30 PM – 3:00 PM	**MSEC 05-03-02 Advanced Machining and Metrology for Smart Manufacturing Technologies (ASME-JSME Joint Symposium) 2** Session Chair: Yasuhiro Takaya | Session Co-chair: Satoru Maruyama	
MSEC2021-60651	Norikazu Suzuki, Hiroki Hayashi, Eiji Shamoto, Naruhiro Irino and Yasuhiro Imabeppu	Time Domain Simulation of Dynamic Corner Milling Process Considering Chatter Vibration with Finite Amplitude
MSEC2021-63373	Mitsuru Hasegawa and Tatsuya Sugihara	Development of Cutting Tools with Micro-Textured Surface for High-Speed Machining of Ti-6Al-4V
MSEC2021-63704	Shoichi Tamura, Takashi Matsumura, Atsushi Ezura and Kazuo Mori	Anisotropic Cutting Force Characteristics in Milling of Maraging Steel Processed through Selective Laser Melting
MSEC2021-63727	Isamu Nishida and Keiichi Shirase	Automated Tool Path Generation for End-Milling Operation using CAD Model in STL Format
Friday, June 25 1:30 PM – 3:00 PM	**MSEC 06-06-03 Advances in Lightweight and Dissimilar Materials Joining 3** Session Chair: Xun Liu | Session Co-chair: Wayne Cai	
MSEC2021-60412	Jan-Tore Jakobsen, R. M Chandima Ratnayake, Arnfinn Neverdal and Sølve Sætre Sem	Investigating Optimal Parameter combination for Friction Stir Spot Welding on Al7075-T6: Engineering Robust Design Approach
MSEC2021-60759	Nannan Chen, Hongliang Wang, Jingjing Li, Vic Liu and James Schroth	Evolution of Interfacial Microstructure during Resistance Spot Welding of Cu and Al with Ni-P Coating
MSEC2021-61775	Shenghan Guo, Dali Wang, Jian Chen, Zhili Feng and Weihong Guo	Predicting Nugget Size of Resistance Spot Welds using Infrared Thermal videos with Image Segmentation and Convolutional Neural Network
Friday, June 25 1:30 PM – 3:00 PM	**MSEC 07-02 Cyber-Physical Systems and Cybersecurity in Industry 4.0** Session Chair: Rui Liu | Session Co-chair: Dazhong Wu	
MSEC2021-63892	Helen Guixiu Qiao and Guangkun Li	Auto-Calibration for Vision-Based 6-D sensing system to support Monitoring and Health Management for Industrial Robots
MSEC2021-63960	David Gamero, Andrew Dugenske, Thomas Kurfess, Christopher Saldana and Katherine Fu	SQL and NoSQL Databases for Cyber Physical Production Systems in Internet of Things for Manufacturing
MSEC2021-63990	Zhaojun Qin and Yuqian Lu	Multi-Agent-Based Self-Organising Manufacturing Network Towards Mass Personalisation

MSEC2021-63974	Junying Yao, Yongkui Liu, Tingyu Lin, Xubin Ping, He Xu, Wenxiao Wang, Yingying Xiao, Lin Zhang and Lihui Wang	Robotic Grasping Training Using Deep Reinforcement Learning with Policy Guidance Mechanism
MSEC2021-64065	Yongzhi Qu, Gregory Vogl and Zechao Wang	A Deep Neural Network Model for Learning Generalized Frequency Response Function Using Sensor Measurements
Friday, June 25 1:30 PM – 3:00 PM	**MSEC 08-02-02 Advances in Micro and Nano Manufacturing 2** Session Chair: Martin Jun | Session Co-chair: Chandra Nath	
MSEC2021-63864	Sri Sukanta Chowdhury, Zhong Yang, Patrick W. Clapacs and Dan O. Popa	Untethered Microrobots with Serpentine Actuators: The Role of Elastics Point Contact & Laser Beam Shape on Their Locomotion
MSEC2021-63887	Sushmita Challa, M. Shafquatul Islam, Danming Wei, Cindy Kathleen Harnett, Jasmin Beharic and Dan Popa	Functional Fiber Junctions for Circuit Routing in E-Textiles: Deterministic Alignment of MEMS Layout with Fabric Structure
MSEC2021-63902	Sayli Jambhulkar, Weiheng Xu, Yuxiang Zhu, Dharneedar Ravichandran and Kenan Song	Microscale 3D Printed Patterns for Nanoscale Particle Assembly
MSEC2021-63916	Andrea Grisell and Murali Sundaram	Creation of Functionally Graded Glass Channels by Electrochemical Discharge Machining Process: A Feasibility Study
MSEC2021-64079	Bashir Khoda, S M Naser Shovon and AMM Nazmul Ahsan	Solid Transfer of Large Particles by Dipping in a Heterogeneous Mixture
Friday, June 25 1:30 PM – 3:00 PM	**MSEC 12-01-02 MED 100-Year Issue of JSME State-of-the-Art Papers 2** Session Chair: Albert Shih | Session Co-chair: Laine Mears	
MSEC2021-68677	Jian Cao and Mihaela Banu	Opportunities and Challenges in Metal Forming for Lightweighting: Review and Future Work
MSEC2021-72613	Yusuf Altintas, Gabor Stepan, Erhan Budak, Tony Schmitz and Zekai Murat Kilic	Chatter Stability of Machining Operations
MSEC2021-73443	I. Jawahir	Modeling and Optimization of Sustainable Machining Processes: Recent Advances and Outlook
Friday, June 25 1:30 PM – 3:00 PM	**Doctoral Symposium- Session 2 Processes and materials** Session Chair: Karl Haapala | Session Co-chair: Yong Chen	
MSEC2021-67567	Yizhou Jiang	Direct Ink Writing of Functional Fiber Composites
MSEC2021-68705	Padmalatha Kakanuru and Kishore Pochiraju	Additively Manufactured High-Performance Silicon Carbide Composite
MSEC2021-68869	Daniel Franke	Sub-Surface Void Formation and Detection During Friction Stir Welding of Aluminum Alloys
MSEC2021-68873	Yang Xu	Direct Droplet Writing – a Novel Droplet-Punching Capillary-Splitting 3D Printing Method for Highly Viscous Materials

MSEC2021-68999	Hemant Agiwal, Frank Pfefferkorn, Kumar Sridharan and Hwasung Yeom	Low Force Friction Surfacing for Crack Repair in 304l Austenitic Stainless Steels
Friday, June 25 3:10 PM – 4:40 PM	**Doctoral Symposium- Session 3 Design, simulation, and optimization** Session Chair: Yong Chen	
MSEC2021-68770	Zhuo Wang and Lei Chen	Machine Learning Boosted Modeling and Simulation of Additive Manufacturing: Process, Structure and Property
MSEC2021-68811	Nathan Hertlein	Optimal Design and Processing for Additive Manufacturing Using Machine Learning
MSEC2021-68991	Vysakh Venugopal	Numerical Optimization and Machine Learning Techniques for Part Design and Process Parameters for Additive Manufacturing
MSEC2021-69048	Lun Li	Fast Additive Manufacturing Simulation and Optimization
MSEC2021-69068	Matthew Krugh	Evaluation of Product Quality Through Technologically Augmented Workers in Industry 4.0 Assembly
Friday, June 25 3:10 PM – 4:40 PM	**Poster Session- Manufacturing Systems** Session Chair: Ahmed Azab | Session Co-chair: Chi Zhou	
MSEC2021-67770	Barbara S. Linke, Peter Groche, Zhijian Pei and Petra Wiederkehr	Promoting U. S. - Germany Collaborative Research in Advanced Manufacturing
MSEC2021-73030	Philipp Sembdner, Bernhard Bust, Lars Dornheim, Stefan Holtzhausen and Ralph Stelzer	Parametrically Adjustable Surgical Template Models to Support the Insertion of Individual Knee Joint Implants
MSEC2021-70118	Scott Kerner, Shamali Laxman Nevase, Matthew Krugh and Laine Mears	Wearable Force Sensing Glove for Manual Work in Automotive Assembly
MSEC2021-72796	Yinan Wang and Xiaowei Yue	NP-ODE: Neural Process Aided Ordinary Differential Equations for Uncertainty Quantification of Finite Element Analysis
MSEC2021-68691	David Merayo, Alvaro Rodriguez-Prieto and Ana Maria Camacho	Prediction of Material Properties by Using the Finite Element Method and Artificial Intelligence
MSEC2021-73167	Ethan Wescoat, Matthew Krugh and Laine Mears	Purposeful Failure Methodology: Generating Training Data for Predicting Equipment Failure
MSEC2021-69077	Purvee Bhatia and Nancy Diaz-Elsayed	A Framework to Aid Decision-Making for Investing in Smart Manufacturing Technologies
MSEC2021-68958	Chenang Liu and Zhangyue Shi	A Blockchain-Enabled Approach for Cyber-Physical Security in Advanced Manufacturing
MSEC2021-68971	Aniruddha Gaikwad, Brian Giera, Gabriel Guss, Jean-Baptiste Forien, Manyalibo Matthews and Prahalada Rao	Sensing and Physics-based Machine Learning for Quality Assurance in L-PBF

Friday, June 25 **3:10 PM – 4:40 PM**	**Poster Session- Additive Manufacturing - Metal** Session Chair: Yifei Jin	
MSEC2021-64845	Santosh Rauniyar and Kevin Chou	3D Transient Zone in Conduction and Keyhole Mode Melting in Laser Powder Bed Fusion Process
MSEC2021-68848	Kolbe Kirlin and James Garofalo	Design and Testing of Wire Arc Additive Manufacturing (WAAM) End Effector
MSEC2021-68965	Benjamin Bevans, Ziyad Smoqi, James Craig, Alan Abul-Haj, Brent Roeder, Bill Macy, Jeffery Shield and Prahalada Rao	Closed-Loop Control of Meltpool Temperature in Directed Energy Deposition
MSEC2021-69049	Reza Yavari, Ziyad Smoqi, Alex Rienschie, Ben Bevans, Humaun Kobir, Heimdall Mendoza, Hyeyun Song, Kevin Cole and Prahalada Rao	Part-Scale Thermal Simulation of Laser Powder Bed Fusion Using Graph Theory: Effect of Thermal History on Porosity, Microstructure Evolution, and Recoater Crash
MSEC2021-69073	Xiaoqing Wang, Yi Yao, Shanshan Zhang, Lin Li, Wenjun Cai, Natalia Esparragoza, Matthew Rosser, Dana Ingalsbe and Kaiwen Wang	Microstructure and Mechanical Properties of 18Ni-300 Maraging Steel Fabricated by Selective Laser Melting
MSEC2021-69078	Ziyad Smoqi, Benjamin Bevans, Harold (Scott) Halliday, Joshua Toddy, Jeffery Shield and Prahalada Rao	Directed Energy Deposition of Cobalt-Chromium Stellite Wear Coating
MSEC2021-67397	Rana Dabaja, Robert Buechler, Sun-Yung Bak, Gustavo Mendonca, Bogdan Ioan Popa and Mihaela Banu	Intelligent Dental Implant Design
MSEC2021-62855	Fucheng Zhang and Robert Chang	Design and Fabrication of Heterogeneous Scaffolds using Melt Electrowriting
Friday, June 25 **3:10 PM – 4:40 PM**	**Poster Session- Additive Manufacturing-Polymer** Session Chair: Dong Lin	
MSEC2021-68643	India Dykes, Mahmoud Amr, Arda Gozen, Michelle Counts, Joshua Kernan, Alia Mallah, Juana Mendenhall, Nehal Abu-Lail and Bernard Vanwie	3D Printed Sa-Gel-Ga Scaffolds with Tunable Mechanical Properties
MSEC2021-68863	Karl Schuchard, Bruce Anderson, Behnam Pourdeyhimi and Rohan Shirwaiker	Characterization of 3d-Melt Blowing for Tissue Engineering Applications
MSEC2021-72866	Moataz Abdulhafez and Mostafa Bedewy	Direct Laser-Induced Nanocarbon Formation on Flexible Polymers: Tailoring Porous and Fibrous Morphologies
MSEC2021-73147	Chao Sui and Wenchao Zhou	Effects of Driving Signal on Piezo Inkjet Printing
MSEC2021-68771	Mingman Sun and Meng Zhang	Physics-Based Modeling for Two Photon Polymerization Additive Manufacturing

MSEC2021-68949	Liangkui Jiang, Pavithra Premaratne, Yanhua Huang, Zhan Zhang and Hantang Qin	Modeling of Droplet Generation in Electro Hydrodynamic Inkjet Printing
MSEC2021-68608	Ala Qattawi, Ala'aldin Alafaghani, Muhammad Ali Ablat Nuryar, Hossein Abedi and Jian-Qiao Sun	Data-Driven Modeling and Optimization of FDM Processing Parameters
MSEC2021-68726	Christopher Indrarto and Burak Sencer	Machine Tool Vibration Mitigation by Optimal Trajectory Pre-Filter Design
Friday, June 25 3:10 PM – 4:40 PM	**Poster Session - Machining** Session Chair: Zheng Yihao	
MSEC2021-68185	Ian Garretson, Qiuhao Guo and Barbara Linke	Simulations of a Stand for a Grinding Machine for Improved Energy Efficiency
MSEC2021-68798	Marija Glisic, Badrinath Veluri and Devarajan Ramanujan	Reusable Life Cycle Inventory Models for Centerless Grinding
MSEC2021-68852	Tyler Grimm and Laine Mears	Electrically Assisted Milling
MSEC2021-68968	Julianne Jonsson, Christopher Chighizola, Christopher D'elia, Michael Hill, Barbara Linke, Daniel Weber, Benjamin Kirsch and Jan Aurich	Wafer Experiments to Assess Machining Distortion in Aluminum
MSEC2021-71239	Nilesh Ashok Kharat, Tyler Grimm and Laine Mears	3D Stochastic Milling for Freeform Surfaces
MSEC2021-69521	Felicia Fashanu and Barbara Linke	Analysis of Force Controlled Grinding with a Multi-Grit Scratch Test on a Polishing Machine
MSEC2021-73165	Sohan Nagaraj and Nancy Diaz-Elsayed	Correlation Between the Tool Temperature and Workpiece Surface Characteristics in CNC Milling
MSEC2021-68966	Masafumi Endo, Burak Sencer	Machining Cycle-Time Prediction by Machine Learning of CNC Interpolator Dynamics
MSEC2021-68994	Nishant Ojal, Harish Cherukuri, Ryan Copenhaver, Tony Schmitz, Adam W. Jaycox and Kyle Devlugt	SPH Simulations of Modulated Tool Path Machining
Friday, June 25 3:10 PM – 4:40 PM	**Poster Session- Modeling & Welding** Session Chair: Karl Haapala	
MSEC2021-67424	Lydia Mika, Arthur Hilbig, Stefan Holtzhausen and Ralph Stelzer	Process Optimization for the Manufacturing of Individualized Ankle Foot Orthoses via Digitalization and AM
MSEC2021-69005	Ru Yang and Ping Guo	Deep-learning based Point-light Photometric Stereo for 3D Reconstruction of Metal Surface

MSEC2021-69021	Mohammad Ali Ansari, Frank Pfefferkorn and Shiva Rudraraju	Predictive Modeling of Defect Formation in Friction Stir Welding
MSEC2021-73041	Amit B. Deshpande, Tyler J. Grimm and Laine Mears	Abrasive Element Use in Friction Element Welding
MSEC2021-73042	Gowtham V. Parvathy, Tyler Grimm and Laine Mears	Heat Assisted Friction Element Welding
MSEC2021-73058	Golnaz Tomraei, Jaegeun Lee, Moataz Abdulhafez and Mostafa Bedewy	Decoupling Gas-Phase Decomposition, Catalyst Nanoparticle Formation, and Catalytic Growth in CVD of Carbon Nanotube Forests
MSEC2021-68963	Hossein Abedi, Keyvan Safaei Baghbaderani, Ala'aldin Alafaghani, Ala Qattawi, Moataz M. Attallah and Mohammad Elahinia	Neural Network Modeling of NiTiHf Transformation Temperatures
MSEC2021-68941	Ala Qattawi, Muhammad Ali Ablat and Jian-Qiao Sun	Investigating Fracture Failure in Origami-Based Sheet Metal Bending