

namrc 52

North American Manufacturing Research Conference

2024

AWARDS PROGRAM

June 17 - 21, 2024

The University of Tennessee Knoxville
Knoxville, TN

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2023-24



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2023-24

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Scientific Committee



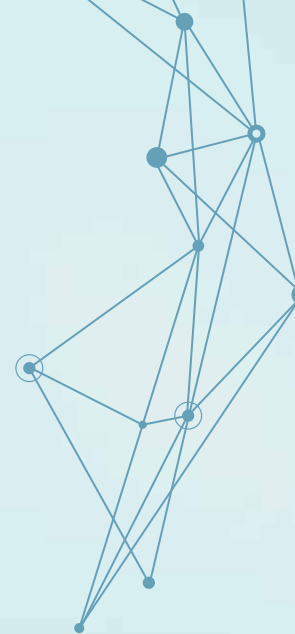
Scientific Committee Chair
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Case Western Reserve University



Scientific Committee Chair-Elect
Xun Xu, PhD, FASME
The University of Auckland



Scientific Committee - Past Chair
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The Pennsylvania State University
The Behrend College



Track 1

Manufacturing Systems — General Submission

Track Chair: Xun Xu

Track Co-Chairs: Laine Mears,** Ray Zhong

Members: David Culler, Yuqian Lu, Paol Parenti, Dazhong Wu,* Thorsten Wuest, Pai Zheng

Track 2

Manufacturing Processes — General Submission

Track Chair: Stefania Bruschi

Track Co-Chairs: Wayne Cai, Till Clausmeyer

Members: Gianluca Buffa, Lei Chen, William Emblom, Azadeh Haghighi, Sangkee Min, Teresa Rinker, Rohan Shirwaiker, Beatriz Silva, Chengying (Cheryl) Xu*,

Track 3

Material Removal

Track Chair: Jeff Ma^

Track Co-Chairs: Jahan Mohammad, Mike Vogler

Members: Shuting Lei, Barbara Linke, Brigid Mullany, Chandra Nath, Tony Schmitz, Iqbal Shareef, Zhongde Shi

Track 4

Additive Manufacturing

Track Chair: Jingyan Dong^

Track Co-Chairs: Tsz-Ho Kwok, Murali Sundaram^

Members: Jia Deng, Pei Dong, Shenghan Guo, Yiwei Han, Fuda Ning, Kyle Saleeby, Yunlong Tang, Changxue Xu

Track 5

Smart Manufacturing – Cyber Physical Systems

Track Chair: Robert Landers

Track Co-Chairs: Qing “Cindy” Chang, Shaopeng Liu,

Members: Weilong Cong, Zhaoyan Fan, David Hoelzle, Hantang Qin, Chenhui Shao, Rok Vrabič, Peng Wang, Xi Vincent Wang*, Xiaowei Yue

Track 6

Manufacturing Education and Case Studies

Track Chair: Johnson Samuel

Track Co-Chairs: Jyhwen Wang

Members: Xi Gu, Samantha Krening, Dale Lombardo,

Track 7

Sustainable Manufacturing

Track Chair: Karl Haapala

Track Co-Chairs: Nancy Diaz-Elsayed,

Sekhar Rakurty

Members: Fazleena Badurdeen, Guiseppe Ingarao, Jeremy Rickli

** Editor in Chief of Journal of Manufacturing Letters

* Associate Editor of Journal of Manufacturing Systems

^ Associate Editor of Journal of Manufacturing Processes

namrc 52 Outstanding Paper Award

North American Manufacturing Research Conference

The NAMRC 52 Outstanding Paper Award recognizes both the engineering value and industrial relevance of publications presented at NAMRC. The top three 2023 papers were selected.

Outstanding Paper in Manufacturing Systems:



NAMRC-198

“Multi-sensor Fusion and Machine Learning-Driven Sequence-to-Sequence Translation for Interpretable Process Signature Prediction in Machining.”

by **Clayton Cooper, Jianjing Zhang, Ihab Ragai and Robert Gao**

Outstanding Papers in Manufacturing Processes:



NAMRC-135

“On the Mechanisms of Charge Weld Evolution in Aluminum Extrusion”

by **Eren Can Sariyarlioglu, Torgeir Welo and Jun Ma**



NAMRC-249

“Spatial Characteristics of Ultra Hard Coating on Directed Energy Deposition (DED)-Printed 316L with a Novel Ultra-Fast Boriding”

by **Himanshu Balhara, Cagatay Yelkarasi, Ali Erdemir and Satish Bukkapatnam**

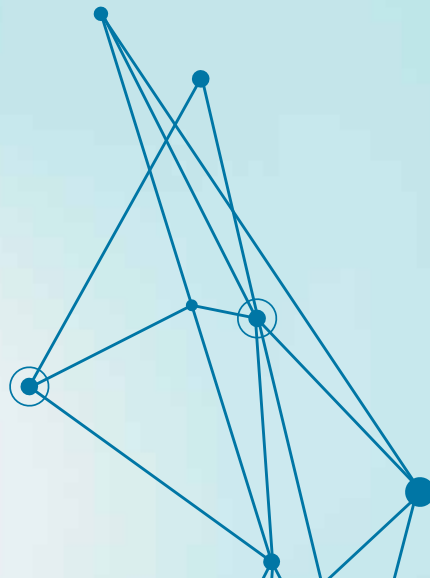
namrc 52 Best Reviewers

North American Manufacturing Research Conference

Giuseppe Ingarao, PhD
University of Palermo

Xiaowei Yue, PhD
Tsinghua University

M.R. McCormick
West Virginia University





S.M. Wu Research Implementation Award

Team Leaders



Satish Bukkapatnam,
PhD, FSME

Professor, Industrial & Systems Engineering, Regents Professor, Rockwell International Professor, College of Engineering. Director, TEES Institute for Manufacturing Systems, Affiliated Faculty, Multidisciplinary Engineering and Biomedical Engineering



Yu Ding, PhD

Anderson-Interface Chair, Professor, H. Milton Stewart School of Industrial and Systems Engineering (College of Engineering), Georgia Institute of Technology



Suhas D. Bhandarkar,
PhD

Group Leader, Lawrence Livermore National Laboratory

Summary

Our team's research focused on developing a sensor fusion and data science approach to understand the dynamic interactions within fine-abrasive polishing processes. This successful approach ensured the critical surface quality of fuel capsules used in the NIF's historic first-ever fusion ignition, a giant leap towards clean and limitless commercial fusion energy. The PMI modeling approach, presented at NAMRI conferences, not only improved fuel capsule quality and reduced polishing time but also introduced a novel data-driven decision support method for tackling complex process issues in critical applications like LLNL's nuclear fusion experiments. This success directly contributed to the NIF's December 2022 breakthrough and subsequent experiments in 2023. The first-ever fusion ignition by the NIF is a historic milestone for humanity. It is a critical step towards commercial fusion energy, which would be clean, safe, cheap, and unlimited. The PMI modeling approach presented in NAMRI conferences not only provided direct impact to real world problem solving, but also brought the new perspective of data science-enabled decision support in solving complicated process/quality issues for mission critical processes like LLNL's nuclear fusion experiment. When the resulting algorithms were implemented in surface quality monitoring of the fuel capsules used the inertial confinement fusion experiment, the polishing time was shortened, and the final surface quality was improved considerably. Since the successful landmark experiment conducted in December 2022, LLNL was able to conduct was able to conduct three more successful experiments in 2023.

S.M. Wu Research Implementation Award Team:

Lawrence Livermore National Laboratory (LLNL) led by Suhas Bhandarkar, Texas A&M University (TAMU) led by Satish Bukkapatnam with Georgia Tech (GaTech) led by Yu Ding. This award recognizes the significant contribution of the LLNL-TAMU-GaTech team in the recent breakthrough achieved in the inertial confinement fusion experiments at the Lawrence Livermore National Laboratory."

Satish Bukkapatnam, Texas A&M University

Bhaskar Botcha, Texas A&M University

Shilan Jin, Texas A&M University

Akash Tiwari, Texas A&M University

Yu Ding, Georgia Tech

Suhas Bhandarkar, Lawrence Livermore National Lab

Sean Hayes, Lawrence Livermore National Lab

Monica Biener, Lawrence Livermore National Lab

Award

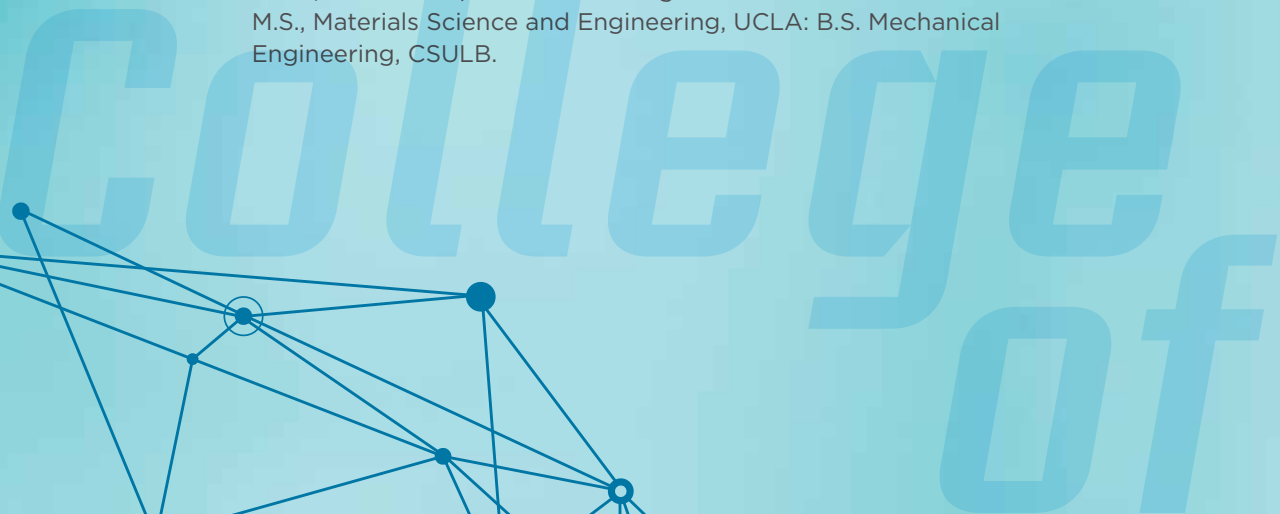
Since 1986, the SME College of Fellows has honored those members who have made outstanding contributions to the social, technological and educational aspects of the manufacturing profession. The industry professionals who make up the 2024 Class of SME Fellows have earned this highly prestigious honor through 20 years or more of dedication and service to manufacturing.



Eric Barnes, FSME

Northrop Grumman Fellow
Northrop Grumman Corp.

Mr. Barnes is a Corporate Fellow for Advanced Manufacturing and Technology, with 39 years of experience in Aerospace & Defense Manufacturing, Materials, Processes, and Structures, with the last 33 years at Northrop Grumman. This includes 29 years of Advanced Development experience, successfully managing many Internal and Contractual Research and Development programs, development and transition of manufacturing technologies, managing the Sector Materials Research and Materials and Processes Engineering Organizations, Manufacturing Technology Strategy, and has worked on more than 20 Northrop Grumman aerospace platforms. In addition to development and implementation of five Additive Manufacturing technologies for Aerospace vehicles, Mr. Barnes has developed and implemented Composites, Coatings, and Robotics technologies into programs. A strong technical leader and strategist with a background encompassing all life cycle phases of defense programs: business capture, product design, manufacturing, production and sustainment. A strong history of transitioning technology has led to very significant cost reductions on multiple air vehicle programs and helped enable rate acceleration on other programs, as recognized by multiple Defense Manufacturing Technology Awards. Granted 12 patents, NGC & DoD Innovation awards and NGC 2019 Invention of the year. Active in several engineering societies, SME Member since 2020, consortium/Institute steering committees and STEM efforts. M.S., Materials Science and Engineering, UCLA; B.S. Mechanical Engineering, CSULB.





Qing (Cindy) Chang, PhD, FSME

Professor, Department of Mechanical and Aerospace Engineering
University of Virginia, Charlottesville

Qing (Cindy) Chang is a professor in the Department of Mechanical and Aerospace Engineering at the University of Virginia (UVA). She received her doctoral degree in mechanical engineering from the University of Michigan. Her research interests include math-based and data-enabled modeling to optimize dynamic manufacturing systems, improving manufacturing efficiency and sustainability through adaptive control and machine learning-based methods, and driving innovation in human-robot collaborations within the manufacturing domain. The impact of her research extends beyond academic realms, with tangible applications in real-world production systems, yielding substantial cost savings. She is an elected fellow of ASME and SME, and a senior member of IEEE. She has been elected to the board of directors of NAMRI/SME and has assumed leadership and editorial positions for numerous journals and conferences affiliated with ASME, IEEE, and SME. She has been recognized with a NSF CAREER Award, one of “20 most influential professors in smart manufacturing” by SME (2020), three GM Boss Kettering Awards (GM’s highest corporate award for innovation), and three GM R&D Charles L. McCuen Special Achievement Awards. SME Member Since 2023.



Ryan Denhoff, PhD, FSME

Director of Manufacturing, Demonstration Facility
Oak Ridge National Laboratory

Dr. Ryan Dehoff is the Director of the Manufacturing Demonstration Facility at Oak Ridge National Laboratory and the Technical Area Lead for Advanced Manufacturing under the Nuclear Energy AMMT Program. His focus of research includes understanding correlations between process conditions of advanced manufacturing processes, materials, microstructure and mechanical performance. His research expertise lies in the field of additive manufacturing, also known as 3D printing, with a particular focus on metals and alloys. He has worked on multiple additive manufacturing technologies including electron beam and laser powder bed, large scale directed energy deposition technology, and solid state-based AM processes. He is working to integrate the digital thread into manufacturing for the certification and qualification of advanced manufactured components. His work at ORNL has been instrumental in pushing the boundaries of additive manufacturing, particularly in metal additive manufacturing, where he has developed innovative techniques to improve the properties, performance, and scalability of printed materials. Ryan’s research has resulted in numerous publications in prestigious scientific journals and has been recognized with several awards and accolades, including the prestigious R&D 100 Award. SME Member since 2018.

FELLOWS



Xiaochun Li, PhD, FSME

Professor, Mechanical and Aerospace Engineering
 Avand Materials Science Engineering
 Raytheon Endowed Chair in Manufacturing Engineering
 UCLA

Professor Xiaochun Li holds the Raytheon Endowed Chair in Manufacturing in the Departments of Mechanical and Aerospace Engineering and Materials Science and Engineering at the University of California, Los Angeles (UCLA). With a Ph.D. from Stanford University in 2001, he is the pioneer and global authority in fundamental research, scalable manufacturing, and the successful commercialization of nanotechnology-enabled solidification processes, including casting, welding, and Additive Manufacturing. He has also made groundbreaking contributions to the structurally embedded micro/nano sensors for smart manufacturing systems. Currently, he directs UCLA's Smart Manufacturing Innovation Center within the Clean Energy Smart Manufacturing Innovation Institute. He is recognized with prestigious awards, including the NSF CAREER award in 2002, the Jiri Tlustý Outstanding Young Manufacturing Engineer Award from SME in 2003, the Howard F. Taylor Award from the American Foundry Society (AFS) in 2008, and the ASME William T. Ennor Manufacturing Technology Award in 2022. Dr. Li is also a Fellow of the National Academy of Inventors since 2021, a Fellow of ASME since 2014, and a Fellow of the International Society for Nanomanufacturing since 2014. Prior to his role at UCLA, he served as a professor at the University of Wisconsin-Madison (UW-Madison) from 2001 to 2013, concurrently directing the Nano-Engineered Materials Processing Center (NEMPC) from 2009 to 2013. SME Member since 2004.





Brigid A. Mullany, PhD, FSME

Associate Dean for Research, Professor
Mechanical Engineering and Engineering Science
University of North Carolina at Charlotte

Brigid Mullany is both a professor in Mechanical Engineering and Engineering Science, and the Associate Dean for Research for the William States Lee College of Engineering at the University of North Carolina at Charlotte. She received her bachelors degree and doctorate in mechanical engineering from the University College Dublin in Ireland. After graduation, she held a two-year EU Marie Curie postdoctoral research position at Carl Zeiss in Germany. In 2004 she joined the University of North Carolina at Charlotte where she is currently working in the area of additive manufacturing (metal and ceramic), surface finishing for optical applications, robust multi-class surface discrimination machine learning frameworks. Mullany received the SME Kuo K. Wang Outstanding Young Manufacturing Engineer Award in 2007, and the NSF CAREER Award in 2008. She is the Past President for SME's North American Manufacturing Research Institute (NAMRI), a fellow of the International Academy of Production Engineering (CIRP), and a past Chair of CIRP's Scientific Technical Committee on Surfaces (STC-S). From January 2017 to November 2019 she was a program director in the Advanced Manufacturing program at the National Science Foundation (NSF) in Alexandria, VA. SME Member since 2018

Fellows



2024 Susan Smyth Outstanding Young Manufacturing Engineer Award



Susan Smyth, Ph.D., FSME, NAE
Chief Scientist for Global Manufacturing General Motors (Retired)
2020 SME Past President



Lei Chen, PhD
University of Massachusetts,
Lowell



Xiangfan Chen, PhD
Arizona State University



Juan Du, PhD
The Hong Kong University
of Science and Technology



Wenchao "Mark" Du, PhD
Argonne National Laboratory



Azadeh Haghighi, PhD
University of Illinois, Chicago



Chen Kan, PhD
The University of Texas,
Arlington



Matthew Korey, PhD
Oak Ridge National Laboratory



Beiwen Li, PhD
Iowa State University



Shunyu Liu, PhD
Clemson University



Monique McClain, PhD
Purdue University



Masoud M. Pour, PhD
General Motors



Ebot Ndip-Agbor, PhD
General Motors



Alex Roschli
Oak Ridge National Laboratory



Wenmeng Tian, PhD
Mississippi State University



Chao Wang, PhD
University of Iowa

2024 Outstanding Lifetime Service Award



Delcie R. Durham, PhD, FSME, FAAAS

Professor Emerita of Mechanical Engineering in College of Engineering
University of South Florida

Delcie Durham has more than forty years experience in academia, industry and at the National Science Foundation, working to advance manufacturing. She earned her bachelors, masters and doctoral degrees at the University of Vermont in Mechanical Engineering. Her doctoral research focused on metallurgical aspects of chip formation in high speed machining of Titanium alloys under the direction of Dr. Branimir von Turkovich and a DARPA research group that included Dr. Ranga Komanduri.

Dr. Durham has been active in SME for most of her career, joining the local SME Green Mountain Chapter in the late 1970s when she worked in industry. Over the next few years, she served on the Executive Board and as Chapter Chair, learning organizational and leadership skills that proved beneficial as her career developed. She has been active in the local chapters in Washington, DC and in the Suncoast Chapter in Tampa, until she retired and moved from the area.

In 1983, Delcie presented her first SME/ NAMRC paper at the research conference at the University of Wisconsin in Madison, where she met the eminent researchers of the time and made many lifelong friends. She attended almost every NAMRC and many of the subsequent MSEC/NAMRC conferences during her career.

Delcie served on the NAMRI Scientific Committee from 1986 through 2002. She was selected to be a Director on the NAMRI Board in 1990 and to the Executive Committee in 1992. During this period, she was actively involved with the strategic planning for SME led by Alan Male, who she considered one of her mentors both in SME and in promoting manufacturing collaboration between industry and academia. In 1994-95, Dr. Durham served as President of NAMRI and at the opening address of NAMRC that year, spoke to the need to bring more women into the challenging and rewarding world of manufacturing - there were only two women manufacturing engineers in the audience that year. Over the years, she has been delighted to be able to mentor a number of women and see them succeed beyond all her hopes as leaders in advancing manufacturing and bringing more women to this exciting field. Delcie was elected to two terms as an International Director of SME starting in 2004.

While she was Program Director at the National Science Foundation from 1997 - 2006, she was able to support the growing research activities that led to the development of the Nano-manufacturing Program. Delcie received an NSF Director's Award for Management Excellence in 2002 for getting this new program approved as a separate entity. Dr. Durham also led efforts to encourage academic researchers to include sustainability issues across the manufacturing enterprise, resulting in an international WTEC study "Environmentally Benign Manufacturing" supported by three federal agencies and a subsequent series of funding opportunities for manufacturing research directed at sustainable manufacturing across the NSF division and sustainable materials across all of NSF. She later organized a junior faculty development workshop for advanced manufacturing sponsored by and held at NSF in 2014.

Dr. Durham was honored to be selected to the College of Fellows in 2002; to give the Founders lecture at the NAMRC/MSEC; and immensely honored to have the 2023 Outstanding Young Manufacturing Engineer Awards named for her. She is proud to be a member of the Society of Manufacturing Engineers, an organization that has been inclusive and had its' roots grounded in education, excellence, and the advancement of manufacturing since its' inception more than 50 years ago.



Rajiv Shivpuri, PhD, FSME
Emeritus Professor, Integrated Systems Engineering
The Ohio State University

Numerical Modeling of Manufacturing Processes: A Historical Perspective

NAMRI | SME Founders Lecture, June 2024

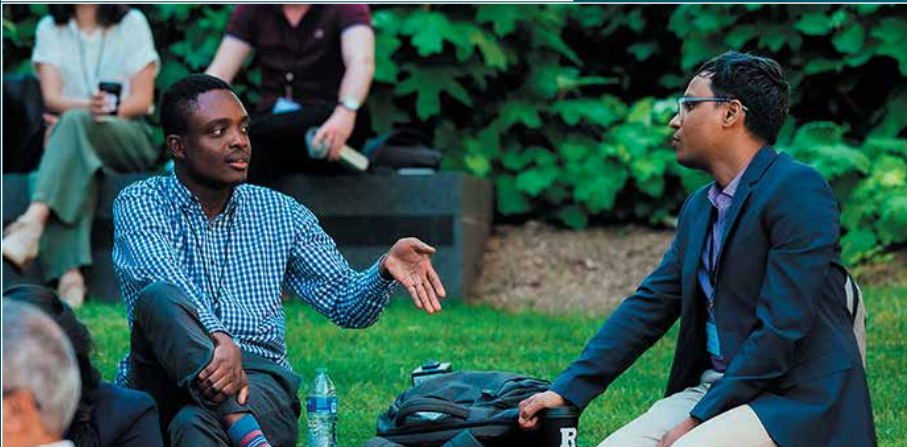
While the mathematical modeling of manufacturing processes started much earlier, their numerical modeling began in the 1970s with the developments in finite difference and finite element methods. Open architecture source codes were initially developed at the Universities and the National Labs to tackle hard problems of material behavior during processing. In the 1990s, these source codes gave rise to commercial general-purpose codes, as well as special purpose codes dedicated to the individual processes. More recently, the focus of modeling has shifted to the study of material behavior during processing at the micro, nano and atomic levels, using advances in sensing, characterization and computational tools. This presentation provides a perspective to these developments, as witnessed by the presenter, and relates them to the important contributions from the NAMRI community. Many of the examples cited come from the 40+ years research of the presenter in the modeling of metal forming, machining, casting and additive processes.

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North American Manufacturing Research Conference



*Celebrating
Excellence*



namri | sme **Journal Recognitions**

SME would like to recognize the following individuals for their service, diligence and oversight in reviewing and editing the submissions for its three peer-reviewed journals.

Manufacturing Letters



Editor-in-Chief

Laine Mears, PhD, FSME
Clemson University

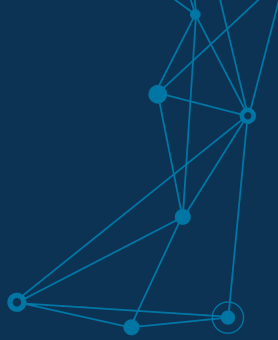
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2024 Manufacturing Letters Associate Editors

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F. Zhao
Purdue University

Journal of Manufacturing Letters Best Paper Award



Award Criteria

The Manufacturing Letters Best Paper Award is given for the work with the highest number of citations over the past 5 years, demonstrating the spirit of novelty and impact sought by the journal. No paper can receive this award more than once.

Qualification Period

One Best Paper is awarded each year to a JML paper published in the past seven years.

Citation-Based

The impact of a paper is measured based on the number of citations in Scopus in the past five years. The Journal of Manufacturing Letters Best Paper goes to the paper with the highest number of citations.

Exclusion Rule

No paper shall receive this award more than once.

Award Type

Certificate.

Announcement

In June of each calendar year at NAMRC, in person or by email.

2023 Award Winner

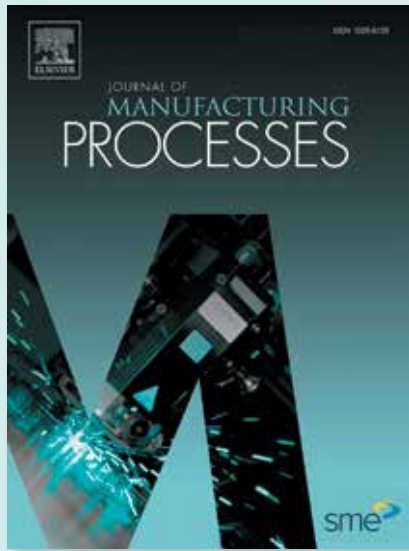
**Hutasoit, N., Kennedy, B., Hamilton, S., Luttick, A.,
Rashid, R., Palanisamy, S.**

**“Sars-CoV-2 (COVID-19) inactivation Capability of Copper-Coated
Touch Surface Fabricated by Cold-Spray Technology,”**

Manufacturing Letters 25:93–97, 2020



Journal of Manufacturing Processes



Editor-in-Chief

Shiv G. Kapoor, PhD, FSME
University of Illinois at Urbana-Champaign

2023 Journal of Manufacturing Processes Area Editor

Shiv G. Kapoor, PhD, FSME: Advanced embossing, casting, forming and molding processes at all scales; Continuum and subcontinuum manufacturing process modeling and simulation, Smart/Intelligent Manufacturing Processes including sensing, diagnostics, and Real-time Control

YuMing Zhang, PhD: Welding/Joining/Additive Manufacturing including, Arc Welding Processes; Solid State Welding and Brazing Processes including Friction Stir Welding; High Energy Beam Welding Processes including Laser, Laser-Arc Hybrid, and Electron Beam Welding; Additive Manufacturing Processes including wire arc additive manufacturing

Martin Jun, PhD: Advanced Manufacturing Processes and Automation including, Meso/micro/nano fabrication, including imprint lithography; Advanced manufacturing processes, including mechanical, chemical, and thermal processes; Rapid prototyping, rapid manufacturing, stereolithography and other 3-D fabrication techniques that can use optical projection; Machine Learning, Signal/Image Processing, and Data Driven Approaches; Tribology and wear issues relevant to manufacturing processes

2023 Journal of Manufacturing Processes Outstanding Associate Editor

Dong Lin

Oregon State University

2023 Journal of Manufacturing Processes Outstanding Reviewers

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Public University of Navarre

Duck Bong Kim

Tennessee Tech University

Varun Sharma

Indian Institute of Technology, Roorkee

Zhijiang Wang

Tianjian University

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University of Michigan

G. Cheng

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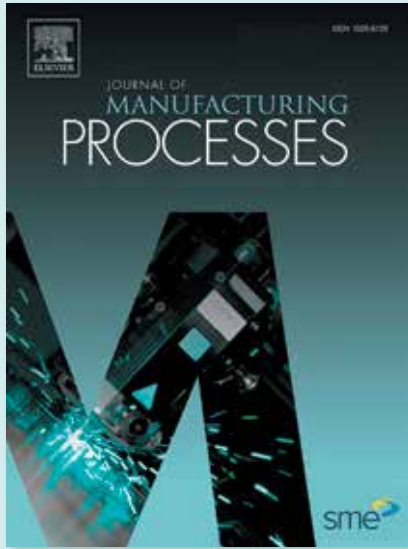
University of Kentucky

X. Zhao

Clemson University

2024

Journal of Manufacturing Processes Best Paper Award



The Journal of Manufacturing Processes (JMP) Best Paper Award is awarded annually to the paper published within the past seven years that has received the highest number of citations, as measured in Scopus within the past five years.

Award Criteria

Exclusion Rule

No paper shall receive this award more than once.

Award Type

Certificate.

Announcement

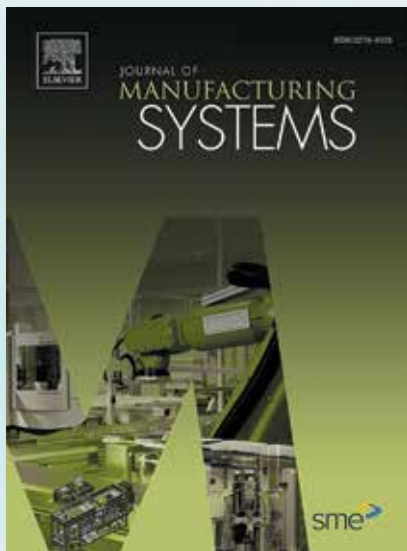
In June of each calendar year at NAMRC, in person or by email.

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Jafar Ghorbani , Pratik Koirala , Yu-Lin Shen, Mehran Tehrani
**“Eliminating Voids and Reducing Mechanical Anisotropy In Fused Filament
Fabrication Parts by Adjusting the Filament Extrusion Rate”**

Journal of Manufacturing Processes Vol. 80, August 2022, Pages 651-658

Journal of Manufacturing Systems



Editor-in-Chief

Lihui Wang, PhD, FSME, PE
KTH Royal Institute of Technology

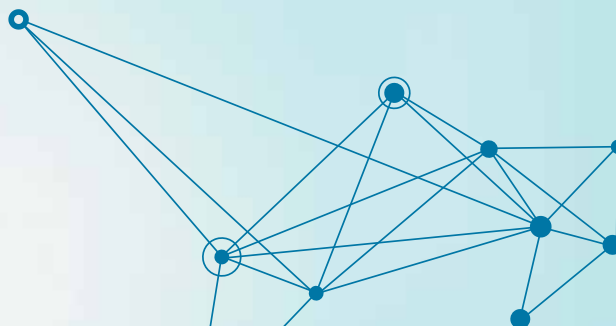
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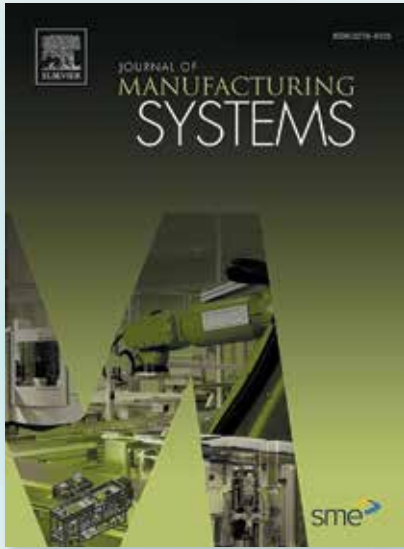
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The Journal of Manufacturing Systems (JMS) Best Paper Award is awarded annually to the JMS paper published within the past seven years that has received the highest number of citations, as measured in Scopus within the past five years.

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One Best Paper is awarded each year to a JMS paper published in the past seven years.

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Certificate.

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2023 Award Winner

Mengnan Liu, Shuiliang Fang, Huiyue Dong, Cunzhi Xu “Review of Digital Twin About Concepts, Technologies, and Industrial Applications”

Journal of Manufacturing Systems
Vol. 58 part B, pp.346-361, 2021



As part of the annual North American Manufacturing Research Conference (NAMRC), a Student Research Presentation Award is presented in recognition of students' contributions to NAMRC. Encouraging young talents to pursue a career in manufacturing research is of vital importance to the long-term goals of the manufacturing community.

A slicing and path generation method for 3D printing of periodic surface structure
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Marthe Vanhulst, Stijn Waumans, Hans Vanhove and Joost R. Duflou

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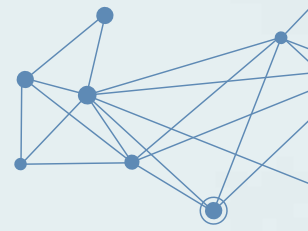
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