— Call for Papers —

A Symposium on

Additive Manufacturing of Functional Devices and Bioinspired Structures

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Additive manufacturing (three-dimensional (3D) printing) has shown great contributions in the design and fabrication of functional devices, including smart structures, energy related devices, electronic devices, batteries, optical devices, thermal structures, as well as metamaterial devices. Various novel 3D printing technologies have been developed for the fabrication of functional devices. In addition to the engineering design strategies, Nature has developed high-performance materials and structures over millions of years of evolution, providing valuable inspiration for the design of next-generation functional structural materials. A paradigm shift in additive manufacturing from geometry-centered prototype to function-focused applications is taking place recently. Bioinspired additive manufacturing promotes possibilities in manipulating and mimicking the multiscale, multimaterial, and multifunctional biomimetic structures with excellent acoustic, optical, electrical, thermal, mechanical, and hydrodynamic properties. Understanding natural structures and replicating them by additive manufacturing for various engineering applications will lead us to drive the biomimicry field forward. Meanwhile, the fabrication challenges presented by biomimicry will lead to more novel biomimetic additive manufacturing processes. This symposium will focus on research advances in the areas of additive manufacturing of functional devices and bioinspired structures for future engineering systems. The growth of bioinspired additive manufacturing technology will open intriguing perspectives for developing bioinspired materials and structures on the basis of novel additive manufacturing processes together with new computer-aided design and simulation methods. Specific topics of interest include, but are not limited to:

- Design, modeling and simulation of bioinspired structures and material systems for 3D printing.
- Field (electric, magnetic, acoustic, optical, shear force, thermal, etc.) assisted 3D printing.
- Templating (gas, ice, salt, sugar, etc.) based 3D printing.
- Innovative 3D printing processes for bioinspired material and structures fabrication.
- 4D printing of active materials.
- 3D printing of bioinspired metamaterials and metasurfaces.
- 3D printing of electronic devices (circuits, sensors, antennas, piezoelectrics, thermoelectrics, optoelectronics, etc.).
- 3D printing of energy harvest, storage and conversion devices (batteries, supercapacitors, solar cell, fuel cell, etc.).
- 3D printing of bioinspired functional surfaces (hydrophobic, oleophobic, hydrodynamic, microfluidic, etc.).
- Advanced applications of bioinspired 3D printing in mechanics, optics and thermal physics.

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Xiangjia (Cindy) Li, Arizona State University, Tempe, AZ, USA. 480-727-8612; xiangjia.li@asu.edu
Dr. Yang Yang, San Diego State University, San Diego, CA, USA. 626-265-5206; yyang10@sdsu.edu
Dr. Chi Zhou, University at Buffalo, SUNY, Buffalo, NY. USA. 716-645-4706; chizhou@buffalo.edu

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences are not permitted.

— Call for Papers —

A Symposium on

Modeling and Simulation of Additive Manufacturing Processes

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Additive Manufacturing Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

This symposium will focus on the research advances in the areas of modeling, simulation and artificial intelligence of additive manufacturing (AM) processes. Although there is extensive advance in the AM field, challenges in predictive theoretical and computational approaches, and application of artificial intelligence and machine learning still hinder the widespread adoption of AM. The symposium is interested in receiving contributions in the following non-exclusive areas: In particular, the following topics, but not limited to, are of interest:

- Modeling and simulation of AM process to understand the process-structure-property relationship;
- Machine learning and artificial intelligence enabled AM modeling techniques;
- Modeling of morphology evolution, phase transformation, and defect formation in AM parts;
- Multiscale/multiphysics modeling strategies, including any or all of the scales associated with the spatial, temporal, and/or material domains;
- Quantifying uncertainty in AM materials;
- CALPHAD (Calculation of Phase Diagrams)-based method for AM material informatics;
- Efficient computational methods using reduced order models or fast emulators for process control.

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Attract high-profile international keynote speakers;
- Plan a special issue in the ASME Journal of Manufacturing Science and Engineering or ASME Journal of Micro and Nano-Manufacturing;
- Organize a state-of-the-art paper that will be the lead article in the special issue.

Organizers

Dr. Jing Zhang, Indiana University-Purdue University Indianapolis, Indianapolis, IN, USA. 317-278-7186; jz29@iupui.edu
Dr. Yao Fu, Virginia Polytechnic Institute and State University, Blacksburg, VA, USA; yaof@vt.edu
Dr. Athanasios Iliopoulos, U.S. Naval Research Laboratory, Washington, DC, USA; 202-767-2165; athanasios.iliopoulos@nrl.navy.mil

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— Call for Papers —

A Symposium on

Process Planning and Computational Methods for Additive Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Recent advances in additive manufacturing (AM) enable the fabrication of complex and customized parts that are difficult to produce by traditional manufacturing technologies. The new manufacturing capabilities have driven the evolution of computational tools to support design, planning, and analysis of functional parts and assemblies. Meanwhile, the computational methods must take the new constraints of different AM technologies into account. To utilize the capabilities of AM, computer algorithms are being developed to generate desired designs under given design objectives and constraints, as well as to support the emerging AM processes. Example approaches range from shape and topology optimization to semantic design, and to machine learning based designs, among others. Process planning like slicing, support generation and toolpath planning also affects the shape, material distribution, and physical behavior of the fabricated design. The computational methods and AM processes are increasingly being combined to produce disruptive high-performance functional structures with applications in aerospace, automotive, medical, soft robots, customized consumer products, and beyond. This vibrant research area is receiving growing attention in multiple disciplines, such as geometric modelling, graphics, numerical optimization, and computational mechanics. These challenging research topics must be addressed to synthesize parts, assemblies, and systems so that design tools can take full advantage of the rapid advancement in emergent manufacturing technologies.The goal of this symposium is to bring together researchers from relevant fields into a common forum, to share cutting-edge research on computation methods for AM. The joint efforts will accelerate the transition from the stage of conceptual design to final design, and the movement of additive manufacturing from prototyping to industrial production. Specific topics of interest include, but are not limited to:

- Process planning and simulation for AM.
- Modeling, analysis, and optimization for AM.
- Generative design and topology optimization for AM.
- Machine learning and data-driven methods for AM.
- Design for AM with different scales and material compositions.
- Simulating function and performance for parts fabricated by AM.
- Spatial planning and manufacturability analysis for AM.
- Modeling uncertainty in AM processes.

Paper Submission

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- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Tsz-Ho Kwok, Concordia University, Montreal, QC, Canada. 514-848-2424 #3807; tszho.kwok@concordia.ca
Dr. Yunbo "Will" Zhang, Rochester Institute of Technology, Rochester, NY, USA. 585-475-5571; ywzeie@rit.edu
Dr. Chi Zhou, University at Buffalo, SUNY, Buffalo, NY, USA. 716-645-4706; chizhou@buffalo.edu

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— Call for Papers —

A Symposium on

Advances in Additive Manufacturing of Polymers and Polymer Composites

Sponsored by the ASME Manufacturing Engineering Division's

Additive Manufacturing Technical Committee

Advanced Materials Manufacturing Technical Committee

2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*

June 27-July 1, 2022

West Lafayette, Indiana, USA

Hosted by Purdue University, College of Engineering

Technical Focus

Additive manufacturing (AM) or 3D printing with potential benefits to the automation, low cost, rapid prototyping and customizability can greatly outperform conventional polymer and composite manufacturing technologies that suffer from time-consuming and labor-intensive problems during operation. Recent novel AM technologies and rapid developed polymer materials/chemistry have emphasized their combinations for constructing complicated architectures and realizing structurally and functionally customized designs, offering a great opportunity for structural and functional applications that transcend current manufacturing and outperform existing material process-property-structure relations. This symposium will focus on research advances in the areas of additive manufacturing of polymers and polymer-based composites, including polymer materials discovery and development, manufacturing strategy and modifications, composite architectures and constructions, mechanical analysis and characterizations, modeling and simulation, machine learning and emerging cloud technology-assisted AM, and functional devices design and applications.

Specific topics of interest include, but are not limited to:

- Advances in additive manufacturing of multi-scale and multi-material components and structures (e.g., multi-scale 3D printing, multi-material 3D printing, hierarchical structures, and architected materials)
- Advances in polymer and composite additive manufacturing techniques (e.g., FFF, SLA, SLS, DIW, and Hybrid AM)
- Advances in characterization and analysis of polymer and composite additive manufacturing processes
- Emerging cloud technology (e.g., machine learning, VR/AR)in polymer and composite additive manufacturing
- Additive manufacturing of polymer and composite in structural applications (e.g., light-weight, energy-absorbing)
- Additive manufacturing of polymer and composite in functional applications (e.g., bio-applications, energy, environment, electronics, medical models and devices, robotics)
- New materials, new techniques, and emerging applications in polymer and composite additive manufacturing

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- work to attract a high profile international keynote speaker
- organize a special issue in the ASME Journal of Manufacturing Science and Engineering or Journal of Manufacturing Processes
- organize a state-of-the-art paper that will be the lead article in the special issue

Organizers:

Prof. Kun (Kelvin) Fu, University of Delaware, Newark, DE, USA. 302-831-2008; kfu@udel.edu
Prof Xiangyang Dong, Missouri S&T, Rolla, MO, USA. 573-341-4373; dongxi@mst.edu

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— Call for Papers —

A Symposium on

Additive Manufacturing of Ceramics, Concretes, and Ceramic Composites

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
Manufacturing Processes Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

The popularity of additive manufacturing of ceramics, concretes, and composites has gained a lot of impetus in recent years. These important engineering materials can significantly enrich the palette of additive manufacturing. Compared with metals and polymers, ceramics, concretes, and composites are usually more difficult to process due to their high melting point, complex chemistry, or multiple constituent phases. This symposium will focus on the research advances on additive manufacturing of ceramics, concretes, and composites. Specific topics of interest include, but are not limited to:

- Modeling and simulation related to additive manufacturing of ceramics, concretes, and composites
- Material design for additive manufacturing of ceramics, concretes, and composites
- Feedstock material preparation for additive manufacturing of ceramics, concretes, and composites
- Innovative additive manufacturing processes for ceramics, concretes, and composites
- Process optimization for additive manufacturing of ceramics, concretes, and composites
- Process monitoring and control for additive manufacturing of ceramics, concretes, and composites
- Microstructural characterization of additively manufactured ceramics, concretes, and composites
- Heat treatment of additively manufactured ceramics, concretes, and composites
- Surface finishing of additively manufactured ceramics, concretes, and composites
- Properties of additively manufactured ceramics, concretes, and composites
- Emerging applications of additively manufactured ceramics, concretes, and composites
- Sustainability and life cycle analysis of additively manufactured ceramics, concretes, and composites

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a state-of-the-art paper

Organizers

Dr. Chao Ma, Assistant Professor, Texas A&M University, College Station, TX. (979) 458-4509, cma@tamu.edu
Dr. Weilong Cong, Assistant Professor, Texas Tech University, Lubbock, TX. (806) 834-6178, weilong.cong@ttu.edu
Dr. Xuan Song, Assistant Professor, University of Iowa, Iowa City, IA. (319) 335-5680, xuan-song@uiowa.edu

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— Call for Papers —

A Symposium on

Smart Additive Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
Manufacturing Systems Technical Committee
Quality & Reliability Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

There is a lot of excitement about the potential of smart manufacturing (involving the use of information, automation, computation, software, sensing, and networking technologies) to revolutionize the manufacturing industry, e.g., by boosting manufacturing quality and productivity at low cost. An excellent application for such "smart" technologies is additive manufacturing (AM), another area of manufacturing that is gaining a lot of traction but is plagued by quality, productivity, and cost issues. This symposium will focus on research aimed at leveraging advances in sensing, automation, computation, software, networking, big data analytics, machine learning, control, etc., to reduce trial and error, and enhance the quality, productivity, scalability, cost-effectiveness and functionality of AM. Specific topics of interest include, but are not limited to:

- Data-driven predictive modeling of AM processes
- Data-driven predictive maintenance of AM equipment
- In-process and post-built defect detection, characterization, and analysis
- Multi-physics modeling of AM processes
- Digital twin of AM process and equipment
- New sensing modalities and data fusion techniques for AM process monitoring and control
- In-situ monitoring and control techniques for AM
- Applications of machine learning (e.g., physics-guided) in any phase of AM
- New AM equipment and automation technology development
- Use of cloud/edge and high-performance computing to advance AM
- Embedded sensors and integrated functionalities using AM
- Industrial Internet of Things (IIoT) applications in AM
- Novel applications of commercial software in AM

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Invite speakers and organize a panel of thought leaders in AM to discuss the role of smart technologies in AM
- Collate fast-tracked journal papers from this symposium into a special issue on Smart Additive Manufacturing in ASME Journal of Manufacturing Science and Engineering.

Organizers

Dr. Chinedum Okwudire, University of Michigan, Ann Arbor, MI, USA, okwudire@umich.edu
Dr. Prahalada Rao, University of Nebraska-Lincoln, NE, USA, rao@unl.edu
Dr. Brian Giera, Lawrence Livermore National Laboratory, Livermore, CA, USA. giera1@llnl.gov

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— Call for Papers —

A Symposium on

Intelligent and Integrative Manufacturing Systems for Advanced Materials

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Advanced Materials Manufacturing Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Electrified and autonomous vehicles determine paradigm shifts in product designing by considering the materials not a constraint but a variable. Thus a product becomes an integrative system which needs to be design considering the interactions between multiple systems: electric, mechanic, communication, functionality. One promising pathway towards realization of these needs is through integrative and intelligent manufacturing - the concept of integrating multiple technologies and/or crosslinking different fields of science to overcome the limitations of conventional manufacturing or create new capabilities by identifying synergies.

The aim of this symposium is to provide a forum for researchers and practitioners to share and review the recent developments in the area of integrative and intelligent manufacturing systems for advanced and high-performance materials. The relevant works can involve designing and processing of lightweight metals (advanced high strength steels, aluminum alloys, magnesium alloys, titanium alloys, etc.) and/or composites (polymeric and/or metallic) and by considering different criteria such as their impact on the energy consumption, impact on CO_2 emmission, impact on customer satisfaction. Moreover, this call invites papers related to employing advances in the areas of industrial IoT and data analytics to improve manufacturing systems associates with advanced materials. Relevant topics include one or more of the following areas, but not limited to:

- Product design using Integrated Computational Materials Engineering (ICME)
- Integrative system design approaches to reduce CO_2 emmissions (during manufacturing)
- Multi-material design based on integrated manufacturing processes
- Combinations of additive-based processes with conventional composites processes
- Improved quality monitoring and real-time process control
- Digital twins, modeling and simulation of production systems for advanced materials
- Accelerated validation methods for integrated systems including advanced materials
- Uncertainty quantification in designing and manufacturing advanced products

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Work to promote high-quality submissions

Organizers

Dr. Saeed Farahani, Cleveland State University, Cleveland, OH, USA. 864-501-7502; s.farahani@csuohio.edu
Dr. Mihaela Banu, University of Michigan, Ann Arbor, MI, USA, Ph: +1 734 936-0378, mbanu@umich.edu
Dr. Elias Shakour, BASF Corp., MI, USA. 734-324-5279; elias.shakour@basf.com

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— Call for Papers —

A Symposium on

Advanced Tooling for Manufacturing for Lightweight Materials

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Advanced Materials Manufacturing Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

The increasing demands for lightweight products utilizing high-performance materials have challenged the tooling systems. Tools, the closest equipment to the final products, can no longer be a simple piece of metal just to define the geometry of the products. New tooling systems including their supportive components need to have additional functionalities to better control the quality of the final products and detect any signs of failure before scraping the expensive raw materials. In this regard, advancements in the area of Industry 4.0, such as sensing, vision, and robotic technologies, provide a unique opportunity to transform tooling systems from statice components of the production to active components providing valuable feedback/information to the entire manufacturing system. In addition, the development of new tool materials and tool fabrication technologies, such as additive manufacturing, open doors to further improve the performance of the tooling systems and help advance production reliability. The aim of this special call is to provide a forum for researchers and practitioners to review the recent developments greater product flexibility, reduced time to market, reduced cost, reduced wear, add degrees of freedom for controlling the process.

This symposium invites papers that deal with the theoretical, implementation, and/or applied aspects of one or more of the following topic areas, but not limited to:

- Sensors and control systems, vision-based systems into the tooling
- Using the data captured from tooling to develop real-time process optimization or quality monitoring
- Innovations in the design of tools using additive manufacturing
- Enabling product customization by innovative ideas for tooling systems
- New tooling materials for low-volume production or prototyping
- Coating, surface finishing, and surface functionalization for tooling
- Specialized tools for multi-material manufacturing
- New visions of smart tooling systems for manufacturing materials designed for extreme conditions.

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- Work to promote high-quality submissions

Organizers

Dr. Saeed Farahani, Cleveland State University, Cleveland, OH, USA. 864-501-7502; s.farahani@csuohio.edu
Dr. Mihaela Banu, University of Michigan, Ann Arbor, MI, USA, Ph: +1 734 936-0378, mbanu@umich.edu
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— Call for Papers —

A Symposium on

Advances in Biomanufacturing of Engineered Tissues and Organs

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Biomanufacturing Technical Committee
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Technical Focus

Three-dimensional (3D) bioprinting is the main technique in tissue engineering and regenerative medicine, in which bioinks composed of cells and extracellular matrix (ECM) materials are printed into complex 3D functional constructs via various additive manufacturing approaches to mimic living tissues and organs. These engineered tissues and organs are promising to replace damaged or injured human tissues and organs, providing a technical solution to overcome the challenge of tissue and organ donor shortage. The commonly used 3D bioprinting techniques include inkjet printing, material extrusion, laser-assisted printing, and stereolithography. There are three core steps in the biomanufacturing of 3D tissues and organs: 3D bioprinting of cellular constructs, tissue fusion, and tissue maturation. This highly interdisciplinary topic requires integration of manufacturing, materials science, biology, and biomedical engineering. The associated challenges and complexities include manufacturing challenges related to the printability of bioinks and sensitivities of living cells, bioink design and selection, interaction between cells and ECM materials, and design and optimization of tissue and organ constructions, to name a few. This symposium will focus on the cutting-edge research advances in the area of biomanufacturing of engineered tissues and organs. The resulting understanding will couple the manufacturing and materials science with biomedical applications for more efficient and effective fabrication of 3D living tissues and organs. Specific topics of interest include, but are not limited to:

- Innovation of new 3D bioprinting or biomanufacturing approaches.
- Development of new bioinks and biomaterials.
- Modeling and analysis of biomanufacturing processes.
- Engineering 2D/3D cellular microenvironments.
- Design, fabrication, and characterization of 3D engineered scaffolds, tissues, and organs.
- Bioreactor systems for tissue engineering applications.
- Cell-biomaterial interaction: cell encapsulation, migration, aggregation, and distribution.
- Biomanufacturing-driven regenerative medicine and stem cell tissue engineering.
- Artificial intelligence and smart biomanufacturing.
- Transport phenomena in biomanufacturing processes.

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to invite a high reputation keynote speaker to introduce the cutting-edge techniques in biomanufacturing;
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering;
- Organize a state-of-the-art paper that will be the lead article in the special issue.

Organizers

Dr. Yifei Jin, University of Nevada, Reno, Reno, NV, USA. (775) 784-1412; yifeij@unr.edu
Dr. Jun Yin, Zhejiang University, Hangzhou, Zhejiang, China. +86 (571) 8795-1035; junyin@zju.edu.cn
Dr. Roozbeh (Ross) Salary, Marshall University, Huntington, WV, USA. (304)-696-5678; salary@marshall.edu

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Advances in Manufacturing, Analysis, and Development of Biomedical Devices

Sponsored by the ASME Manufacturing Engineering Division's
Biomanufacturing Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

The characteristics, use, and performance of materials, structures, and devices for biomedical applications entail unique requirements for biomedical manufacturing. The better understanding of biomedical manufacturing processes can lead to safer and more effective devices, and thus reducing the healthcare costs and complications. In addition to the continual improvement of generic devices, there are also emerging areas, such as additive manufacturing, sensing, machine learning, and robotics, which have created novel ideas and new tools for research and development in biomedical devices and applications. These applications include manufacturing of soft materials, patient specific medical or assistive devices, novel surgical tools, medical and surgical robots, intraoperative monitoring and feedback, and so on. This symposium aims to identify the constraints imposed on manufacturing processes by the requirements of biomedical materials and products, present forefront research results, highlight needs and solutions in biomedical device manufacturing, development, and analysis, and point to new paths for conceiving, designing, and operating biomedical manufacturing processes. Original contributions are invited in, but not limited to the following areas:

- Analysis of biological tissue cutting, removal, ablation or joining processes.
- Design and manufacturing of advanced medical devices and tools for clinical procedures.
- Modeling and experimentation of clinical operations.
- Characterization and modeling of biomedical and biological materials and related manufacturing processes.
- Additive and other new processes for biomedical manufacturing.
- Energy-based machining equipment/processes, such as electrical, ultrasonic, or laser, for biomedical applications.
- Manufacturing process of new or composite materials for biomedical applications.
- Advances in process validation and verification in biomedical manufacturing.
- Devices, processes, and systems in medical and surgical robotics.
- Design and manufacturing of medical simulation tools and systems.
- Application of machine learning and artificial intelligence in biomedical manufacturing and devices.
- Reviews of the current states of knowledge and technology and of research needs in biomedical manufacturing.

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract clinicians to form a panel discussion on clinical needs for biomedical and advanced manufacturing
- Work to attract a high profile international keynote speaker
- Organize a discussion session on latest advances and future directions in biomedical manufacturing and a paper on the state of art

Organizers

Dr. Yihao Zheng, Worcester Polytechnic Institute, Worcester, MA, USA. (218) 666-8808; yzheng8@wpi.edu
Dr. Lei Chen, University of Massachusetts Lowell, Lowell, MA, USA. (978) 934-2994; Lei_Chen@uml.edu
Ms. Anne Gu, Boston Scientific, Marlborough, MA, USA. (857) 378-8957; anne.gu@bsci.com

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences are not permitted.

— Call for Papers —

A Symposium on

Advances in Smart Manufacturing for Resiliency and Sustainability across the Product Life Cycle

Sponsored by the ASME Manufacturing Engineering Division's

Life Cycle Engineering Technical Committee

2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*

June 27-July 1, 2022

West Lafayette, Indiana, USA

Hosted by Purdue University, College of Engineering

Technical Focus

The COVID-19 and climate change crises have highlighted the need for resilient production systems that make products which are sustainable throughout the life cycle. The scale and urgency of this shift requires radical innovation of the physical processes used to transform (traditional, emerging, and secondary) feedstocks, and of the use of data to control and optimize the manufacturing enterprise, enabling rapid decision-making for environmental efficiency. Upstream material production and onsite fuel use dominate manufacuring's environmental impacts with innovations needed in material efficiency and process electrification. Manufacturing processes and systems already generate a lot of data; however, there are numerous challenges to using that data for pursuit of resilient and efficient manufacturing. Challenges include connecting the data to model-based resiliency and sustainability metrics that guide decision-making; uncertainty quantification, reduction, and interpretation; tradeoff analysis; and the lack of trained operators. This symposium explores understanding and innovation in resiliency and sustainability brought about by physical manufacturing innovations and smart technologies. Specific topics of interest include, but are not limited to:

- Development and application of manufacturing resiliency and sustainability metrics for the product life cycle
- Digital thread and permanent identifiers for the life cycle used in resiliency and sustainability modeling
- Data architectures and/or standards based on ontological resiliency and/or sustainability frameworks
- Machine learning applied to the modeling, design, or operation of sustainable production systems
- Modeling the relationships between system resiliency, redundancy, and environmental impacts
- Machine learning applied to the modeling, design, or operation of sustainable production systems.
- Closed loop production and circular economy considerations including product take back and remanufacturing
- Manufacturing process resilience to heterogeneous, time varying (e.g., recycled or reused) feedstocks
- Innovations in process material efficiency for mass production
- Process electrification and quantification of environmental impacts
- Rapid computer-supported tools for designing/improving manufacturing systems for resiliency/sustainability
- Workforce development: research and/or application on the knowledge and skill sets needed for LCE
- Theory and practice on cyber physical systems and digital twins for resource-efficient manufacturing
- Continuous monitoring and prognostics for worker safety and critical asset life extensions
- Social impact assessment for manufacturing workers and end users from emerging materials and processes
- Visualization-first approaches, such as augmented reality (AR) and InfoVis dashboards, for sustainability

Paper Submission

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Additional Symposium Activities

To engage the community, symposium organizers will work to attract a high profile international keynote speaker.

Organizers

Dr. Dan Cooper, University of Michigan, Ann Arbor, MI, USA. 734-764-1357; drcooper@umich.edu
Dr. Julius Schoop, University of Kentucky, Lexington, KY, USA. 859-323-8308; julius.schoop@uky.edu
Jan de Nijs, Lockheed Martin Aeronautics Company, Fort Worth, TX, USA, 817-762-2425; jan.de.nijs@lmco.com

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences are not permitted.

— Call for Papers —

A Symposium on

Innovations in Equipment Design, Control and Automation

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Equipment and Automation Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Advances in manufacturing technologies have to be aided by innovations in manufacturing equipment, tooling, and control/automation for effective deployment and commercialization. Most often, innovations in equipment/tooling design or control/automation are inspired by the requirements of a new manufacturing technology or the need to improve existing manufacturing processes. This symposium focuses on such demonstrated innovations in the design and control of equipment or components that enable new or improve existing manufacturing technologies. Specific topics of interest include, but are not limited to:

- Machine tools, industrial robots, and other machines in manufacturing
- Modeling, monitoring and control of manufacturing processes (machining, joining, forming, and so on)
- design, or control of additive Metrology, or hybrid machine systems
- Advances in sensors, actuators, motion command algorithms for positioning systems
- Data-driven machine tool/process automation and control
- Design and control of high precision motion systems (e.g., lithography, deposition, micro-machining)
- Sensor-assisted manufacturing (e.g., sensor assisted 3D printing or machining)
- Artificial intelligence and machine learning for predictive systems, autonomous operation, and smart manufacturing
- Novel tool holders and tool path planning (e.g., in machining), Tool design (e.g., in forming)
- Automation in metrology systems and motion accuracy
- Novel multi-axis machine structures and controllers

Papers must demonstrate the testing of the new design or control methods to improve a manufacturing process. Contributions from the industry in this area are particularly encouraged. With a lead article on state-of-the art in this field, **high quality papers** will be recommended to be included in a ***special issue*** in the **ASME Journal of Manufacturing Science and Engineering**. A high-profile international keynote speaker will be invited by the symposium organizers.

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Organizers

Dr. Chandra Nath, Maijker Corp, West Lafayette, IN, USA, Ph: +1-217-607-3029, chandra.nath@maijker.com

Dr. Burak Sencer, Oregon State University, Corvallis, OR, USA, Ph: +1-541-737-5919, burak.sencer@oregonstate.edu

Dr. Martin Jun, Purdue University, West Lafayette, IN, USA, +1-765-491-2793, mbgjun@purdue.edu

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Dimensional Inspection Metrology in Advanced Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Equipment and Automation Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Dimensional inspection metrology assesses the geometric and physical characteristics (e.g., length, width, height, roughness, thickness, profile, alignment, refractive index, etc.) of the machined or deposited parts by CNC, laser, MEMS or additive manufacturing processes to ensure that the accuracy of the part features complies with design specifications. Inspection and metrology are of importance for quality control and quality assurance not only of machining processes, but also of additive manufacturing and semiconductor manufacturing processes. As the high tolerance is required, metrology instruments must accommodate high precision and accuracy. Although the existing measuring instruments can respond to the technological challenges of dimensional measurements toward current manufacturing technology, the needs and limits of dimensional metrology and inspection technology exist and motivate the technological requirement for the future manufacturing technology. This symposium will focus on research advances in the areas of dimensional metrology, surface inspection, sensors and instrumentation, geometric tolerance design, defect feature recognition, and on-machine/in-process machine tools metrology. Such technologies will have industrial impact by achieving better dimensional or process accuracy, better understanding of factors affecting the specific manufacturing process, and, ultimately, reduction of manufacturing costs through improved control and reduced process development time. Specific topics of interest include, but are not limited to:

- Dimensional instrumentation and measurement techniques for CNC, R2R, laser, MEMS or similar processes:
- Surface property characterization by destructive/nondestructive techniques
- Calibration techniques and data analytics.
- In-process/on-machine machine tool (CNC, semiconductor equipment, additive manufacturing equipment) metrology
- Critical dimension metrology
- Automatic inspection feature extraction and recognition
- Approaches to machine-learning/deep-learning based metrology
- Metrology system design and development
- STEM case study: effective metrology education and training

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering, ASME Journal of Micro and Nano-Manufacturing or ASEE (American Society for Engineering Education)
- Promote a partnering platform connecting university research with industry R&D for successful partnerships

Organizers

Dr. ChaBum Lee, Texas A&M University, College Station, TX, USA. +1-979-458-8121, cblee@tamu.edu
Dr. Beiwen Li, Iowa State University, Ames, IA, USA, +1-515-294-9226, beiwen@iastate.edu
Dr. Song Xu, Nanocue Technology Inc. Cheyenne, WY, USA, +1-888-644-0389, songxu@nanocuetech.com
Dr. Mario O. Valdez, Los Alamos National Laboratory, Los Alamos, NM, USA, +1-505-695-8587, movalez@lanl.gov
Dr. Hyo-Young Kim, Korea Institute of Industrial Technology, Cheonan, South Korea, +82-41-589-3432, kimhy02@kitech.re.kr

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences are not permitted.

— Call for Papers —

A Symposium on

Tribology of Material Removal/Deformation Processes and Machinery

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Equipment & Automation Technical Committee
Manufacturing Processes Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Tribology, the science of friction, lubrication and wear between sliding surfaces, plays a critical role in materials processing and performance. For example, in material removal or deformation processes, the severe contact conditions between the tool and workpiece not only determine energy dissipation, process efficiency and tool wear, but also significantly affect the component's surface attributes (e.g., microstructure, residual stress, etc.) which in turn influence material's functional performance under service. Similarly, tribological contacts in machine elements can critically determine the machine's performance, reliability and life cycle. Given that sliding contacts are ubiquitous and particularly severe in manufacturing processes, advances in the field of tribology for better control of friction, wear and energy are of considerable importance. This symposium seeks experimental and theoretical/modeling contributions that advance the state-of-the-art of the science and technology of tribology. While the focus is on tribology of manufacturing processes and machinery, model system studies that contribute to new insights into the nature of sliding surfaces are also welcome. A comprehensive understanding of tribology also warrants an interdisciplinary approach, so submissions are sought from various science and engineering fields including mechanics, materials science, physical chemistry and physics. Specific topics of interest include, but are not limited to:

- Process tribology pertaining to material removal processes (machining, grinding, polishing, etc.), bulk and surface deformation processes (rolling, extrusion, drawing, burnishing, etc.), and sheet metal forming
- Tribology of machine elements (bearings, gears, etc.) and assembled machinery
- Tribology at various length scales from micro/nano to meso to macroscale
- Hard and soft material systems encompassing engineering materials (metals, glasses, ceramics), biological or natural materials (bone, rocks, etc.) and soft matter (polymers, gels, etc.)
- Coatings, surface patterning, texturing, and related methods for reduced wear and friction
- Lubricants, lubrication phenomena and tool wear
- Experiments, theory or modeling of asperity contacts, friction and wear mechanisms
- Tribochemistry, chemomechanical effects, and role of material (microstructure)
- Characterization of interfaces and surfaces/sub-surfaces
- Laboratory testing (tribometers), methods, standards and tribosystem analysis
- *In situ* approaches to tribology

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high-profile international keynote speaker

Organizers:

Dr. Mathew Kuttolamadom, Texas A&M University, College Station, TX, USA. Ph: (979) 862-8472; mathew@tamu.edu
Dr. Dinakar Sagapuram, Texas A&M University, College Station, TX, USA. Ph: (979) 458-2370; dinakar@tamu.edu
Dr. Rachid M'Saoubi, Seco Tools AB, Fagersta, Sweden. Ph: +46 (0) 223-40-668; rachid.msaoubi@secotools.com

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Advances in Finishing Processes: Hard Machining, Grinding, and Abrasive Finishing

Sponsored by the ASME Manufacturing Engineering Division's

Manufacturing Processes Technical Committee

2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*

June 27-July 1, 2022

West Lafayette, Indiana, USA

Hosted by Purdue University, College of Engineering

Technical Focus

Finishing processes such as hard machining, grinding and abrasive finishing are commonly used to achieve the product performance requirements in a variety of applications ranging from aerospace to the health-care industry. The cost associated with these material removal processes continues to be a significant part of the overall manufacturing cost of the components, and there are needs to continue development of these processes. In addition, applications of these processes to new high-strength, lightweight materials including ceramics metal composites require fundamental understanding of metal removal mechanisms, tool wear, and resultant surface properties. This symposium will promote research activities, industrial case studies and novel application approaches in hard machining, grinding and abrasive finishing processes. Specific topics of interest include, but are not limited to the following:

- Advances in hard machining, grinding and abrasive finishing (e.g., metal removal rate, surface integrity, geometrical accuracy, abrasives, etc.)
- Application of Artificial Intelligence for process control and optimization
- Industrial applications and case studies (e.g. Process improvements, Hybrid processes)
- Advances in cutting tool and abrasive materials
- Modeling and Simulation of processes
- High-speed grinding, gear finishing and profile grinding
- Hard machining, grinding and abrasive finishing of novel materials and additively manufactured components
- Modeling and simulation of hard machining, grinding and abrasive finishing processes
- Hybrid processes combining hard machining, grinding and abrasive finishing with non-conventional metal-removal processes
- Economics of hard machining, grinding and abrasive finishing processes

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering or ASME Journal of Micro and Nano-Manufacturing
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Mr. Rahul Chaudhari, The Timken Company, Canton, OH, USA. Ph: (234) 262-2352; rahul.chaudhari@timken.com
Dr. Changsheng Guo, Raytheon Technologies, Hartford, CT, USA. Ph: (860) 308-5543; Changsheng.guo@rtx.com
Prof. Hitomi Yamaguchi, University of Florida, Gainesville, FL, USA. Ph: (352) 392-0812; hitomiy@ufl.edu

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— Call for Papers —

A Symposium on

Advances in Nontraditional Machining Processes

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Nontraditional machining (NTM) processes provide attractive alternatives for machining complex geometry in the advanced, high-strength and temperature-resistant materials being used in industry today. NTM processes rely on mechanisms other than direct mechanical contact between the cutting tool and workpiece, and their application creates a unique set of technical problems to be solved. This symposium will focus on state-of-the-art research on Meso/Micro/Nano-NTM processes and their applications. It will provide an excellent platform for researchers, practitioners, and educators to present and discuss the most recent innovations, trends, and practical challenges encountered and solutions adopted in the fields of nontraditional manufacturing. Research of interest includes: new NTM process development; analytical, mechanistic, and numerical modeling; experimental studies; and process monitoring and control. Specific topics of interest include, but are not limited to:

- Thermo-Electrical NTM Operations and Machine Tools, *e.g.*, EDM, EBM, LBM
- Mechanical NTM Operations and Machine Tools, *e.g.*, USM, RUM, WJM, AWJM
- Chemical and Electrochemical NTM Operations and Machine Tools, *e.g.*, CHM, ECM
- Hybrid and other assisted machining processes
- Applications of NTM in Additive Manufacturing Post-Processing, *e.g.*, WEDM/EDM, Ultrasonic Vibration-Assisted Machining, Micro-Blasting, Chemical-Mechanical Polishing
- Applications of Machine Learning and Intelligent Decision Model in NTM
- Accuracy and Surface Integrity Realized by NTM
- Environmental and Safety Issues in NTM

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering or ASME Journal of Micro and Nano-Manufacturing
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Murali Sundaram, University of Cincinnati, Cincinnati, OH, USA. (513)-556-2791, murali.sundaram@uc.edu
Dr. Yuefeng Luo, Savannah River National Laboratory, Aiken, SC 29831. (518)-376-8760, yuefeng.luo@srnl.doe.gov
Dr. Muhammad P. Jahan, Miami University, Oxford, OH, USA. (513)-529-0349, jahanmp@miamioh.edu
Dr. Meng Zhang, Kansas State University, Manhattan, KS, USA. (785)-532-5606; meng@ksu.edu

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— Call for Papers —

A Symposium on

Tool Wear Mechanisms, Measurements, and Monitoring

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Tool wear is one of the most important practical considerations in machining operations to influence the machining quality and economics, which is typically considered as a traditional research problem and has been well-studied and understood in the past several decades. However, various tool wear modes were typically investigated individually and in particular situations, and practical implications of those research findings are very limited under production conditions. In the era of Industry 4.0 and the smart manufacturing, this research topic is being refocused and reconsidered by industrial organizations and research universities to support real-time predictive monitoring and data analytics for machining operations. Multiple tool wear modes need to be comprehensively considered and monitored under the framework of actual production. This symposium will focus on the research advances in the areas of investigating various tool wear mechanisms in different machining processes, identifying practical methods of tool wear measurements, and detecting the tool wear by effective tool condition monitoring (TCM) systems, which will benefit more manufacturing companies to improve the production efficiency and quality. Specific topics of interest include, but are not limited to:

- Tool wear patterns and mechanisms in various machining operations.
- Tool wear in micro and nano manufacturing.
- Advanced methods and tools for tool wear measurements.
- Relation between tool material and wear behavior.
- Prediction of tool life.
- Prediction of tool wear rates.
- Influences of tool wear on machining processes.
- Advances in tool wear reduction.
- Tool wear monitoring in various machining operations.
- On-line tool wear monitoring.
- Sensor design, integration and fusion for tool wear monitoring.
- Artificial intelligence for tool wear monitoring.
- Case study for tool wear monitoring.

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Rui Liu, Rochester Institute of Technology, Rochester, NY, USA. 585-475-6819; rleme@rit.edu
Dr. Steven Y. Liang, Georgia Institute of Technology, Atlanta, GA, USA. 404-894-8164; steven.liang@me.gatech.edu
Dr. Arkadeep Kumar, Applied Materials, Santa Clara, CA, USA, 404-834-5317; arkadeepkumargt@gmail.com

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Laser-based Advanced Manufacturing and Material Processing

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27- July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University

Technical Focus

The recent advance of high-power/ultrafast lasers has considerably broadened the capability of lasers in advanced manufacturing and material processing. Depending on the power level and the mode (continuous, long/short/ultrashort pulsed), the irradiated materials can be heated, melted, evaporated, and even ionized, and hence the microstructure, geometry, morphology, properties, and/or appearance of the materials will be modified. Complex phenomena taking places during these processes include laser-matter interaction, heat/mass transfer, fluid mechanics, solid mechanics, plastic deformation, phase and microstructure change, etc. All these phenomena can have significant effects on the properties and performance of the materials to be processed. This symposium focuses on the recent advance in the applications of high energy laser beams in advanced manufacturing and material processing. Both fundamental and applied studies are of interest. These include experimental observation, analytical modeling and numerical simulation. Specific topics of interest include, but are not limited to:

- Laser-based surface modification processes, including laser shock peening, laser hardening, laser nitriding, laser coating, laser cladding, laser cleaning, etc.
- Laser-based material processing techniques, including laser sintering, laser-assisted deposition, laser recrystallization, laser annealing, laser bending/forming, etc.
- Laser-based machining processes, including laser ablation, laser cutting/drilling, etc.
- Laser-based welding/soldering/brazing processes.
- Laser-based micro-/nano- fabrication processes.
- Numerical modeling of laser-matter interaction and laser material processing.

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To engage the community, symposium organizers will work to attract a high–profile international keynote speaker.

Organizers

Dr. Wenda Tan, The University of Michigan, Ann Arbor, MI, USA. 801-556-8643; wendatan@umich.edu
Dr. Xin Zhao, Clemson University, Clemson, SC, USA. 864-656-2151; xzhao5@clemson.edu
Dr. Chang Ye, Huazhong University of Science and Technology, Wuhan, Hubei, China. 01186-27-87559416; cye@hust.edu.cn

* The conference is held in conjunction with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Advances in Lightweight and Dissimilar Materials Joining

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee

2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Joining is an essential element in manufacturing complex structures and products - from custom products such as aircrafts, ships and medical devices to high volume products such as automobiles, appliances and microelectronics devices. Current trends in product design saw increased usage of lightweight and dissimilar materials, including metal alloys, metal matrix nanocomposites, carbon fiber composites and high entropy alloys. We are hence inviting researchers from academia, government and industry to share the advances and innovations in the field of joining of lightweight and dissimilar materials. The symposium consists of paper presentations. Specific topics of interest include, but are not limited to:

- Advanced fusion welding technologies, such as high energy beam welding, and cold metal transfer welding;
- Novel solid-state joining technologies, such as friction welding, friction stir welding, ultrasonic welding, wire-bonding, impact welding, and diffusion bonding;
- Novel mechanical joining methods such as self-piercing riveting, flow drill screwing, blind riveting, and clinching;
- Multi-energy field hybrid joining by using magnetic field, ultrasonic vibration, friction, and Joule heating as assisted means;
- Joining process modeling with advanced computational methods such as multi-scale, multi-phase, Eulerian, and meshfree modeling;
- On-line joining process monitoring, quality prediction and adaptive control using artificial intelligence, machine learning etc.;
- Off-line joint structure characterization and evaluations using advanced metallographic and in-situ observation techniques such as SEM, XPS, EDX, TEM, CT, ultrasonic, and micro scale mechanical testing.

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Yongbing Li, Shanghai Jiao Tong University, Shanghai, China, phone: (86)(21)34206305, email: yongbinglee@sjtu.edu.cn
Dr. Xun Liu, The Ohio State University, Columbus, OH, USA, phone: (614)2928915, email: liu.7054@osu.edu
Dr. Yunwu Ma, Osaka University, Osaka, Japan, phone: (81)(80)9985-3404, email: yw.ma@jwri.osaka-u.ac.jp

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Advances in Metal Additive Manufacturing Processes

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
Additive Manufacturing Technical Committee

2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Metal Additive Manufacturing (AM), listed as one of the top 10 Breakthrough Technologies by the 2018 MIT Technology Review, has been gaining momentum in a wide range of industrial applications, such as aerospace, defense, tooling, and healthcare. Metal AM delivers complex metal structures with excellent physical properties using a wide range of industrial materials, such as titanium, stainless steel, Inconel, and other metal superalloys. However, the lack of fundamental understanding of the metal AM processes has made it challenging to control the quality of the product and thus thwarted the progress in the adoption of metal AM. This symposium will report the latest progress in all aspects of metal AM, such as new metal AM processes and systems, process control and development, *in-situ* process monitoring, process optimization, characterization and qualification of AM products, process-structure-property relationships, numerical tools and related simulation and modeling. Authors are encouraged to submit drafts related to metal AM that may contribute to improving the product quality, reducing the cost and risk of adopting metal AM, or new applications of metal AM. People from government, academia and industries are all encouraged to participate. A panel discussion may be organized. Specific topics of interest include, but are not limited to:

- Development of metal AM processes and/or systems.
- AM material characterizations: morphological, size distribution, composition, and thermal properties of the materials.
- AM process: scan path planning, speed/power synchronization, feedforward/ feedback strategies, etc., and their effects on part quality/performance.
- Real-time monitoring techniques: such as high speed camera observation, in-situ X-ray detection, and so on for fundamental AM process understanding and part defects predication (qualify as build).
- Simulation and modeling on metal AM process and process-structure-property relationships, and related experimental prediction and validation.
- Post-process characterization and qualification of metal AM: such as microstructure, mechanical properties, fatigue, and non-destructive testing.

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Attract a high-profile international keynote speaker

Organizers

Dr. Dong Lin, Kansas State University, Manhattan, KS, USA. 785-532-3728; dongl@ksu.edu
Dr. Wenchao Zhou, University of Arkansas, Fayetteville, AR, USA. 479-575-7250; zhouw@uark.edu
Dr. Ho Yeung, NIST, Washington DC, USA, 301-975-2786; ho.yeung@nist.gov

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences are not permitted.

— Call for Papers —

A Symposium on

Advances in Processing of Polymers and Polymer Composites

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
Advanced Materials Manufacturing Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Processing of polymers and polymer composites has rapidly evolved into a multidisciplinary field through technological developments and fundamental understanding in the areas of rheology, heat transfer and material behavior. Innovative contributions in processing from industry and academia have enabled polymers and their composites to widen their reach from products made with traditional processing to many areas of modern technologies. They are widely used in areas such as flexible wearable electronics, nanocomposites, life sciences, membrane and filtration, superabsorber, energy storage and harvesting, scaffolds, drug delivery vehicles, shape memory materials, high damping materials, and others. Development of mass-production capable manufacturing processes including fillers (fibers, nanotubes or graphene) and textile-based processes and other non-traditional processes for polymeric materials is highly demanded. This symposium will provide a platform for interdisciplinary discussion on recent development in polymer processing and manufacturing. Specific topics include, but are not limited to:

- Liquid molding and casting, thermoplastic/ thermoset molding, injection molding, overmolding processes
- Fiber spinning processes, cast and blown film extrusion, stretching forming processes
- Materials removal/ablation processes
- Welding of polymers and interface mechanics
- 3D printing of polymers and polymer composites: Processing considerations and applications
- Precision instrumentation and tooling for injection molding/extrusion/fiber spinning/thermoforming
- Devices made of polymers/composites
- Sustainability of polymer and composite processes, recycling processes and properties of recycled materials
- SMART polymers, foams and composites for Earth and Space environment
- Polymers for medical applications and medical devices
- Process dynamics and modeling in polymer processing
- Processing-structure-property relationships in polymers and polymer composites

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker in the area of polymer processing.
- Organize a state-of-the-art paper that will be the lead article in the special issue.

Organizers

Dr. Felicia Stan, Dunarea de Jos University of Galati, GL, Romania. +40-742-947-501; felicia.stan@ugal.ro
Dr. Anasuya Sahoo, University of Minnesota, Minneapolis, MN, USA. 612-443-6147; sahoo017@umn.edu
Dr. Fabrizio Quadrini, University of Rome Tor Vergata, Rome, Italy. +39-06-7259-7167; fabrizio.quadrini@uniroma2.it

* The conference is held in conjunction with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Advances in Assisted and Augmented Manufacturing Processes

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Manufacturing of materials can be a challenging task, particularly due to the targets of cost and time minimization at maximum quality. When manufacturing process parameters cannot be compromised further due to process constraints to achieve required targets, auxiliary systems can provide significant aid in improving results. These auxiliary systems can be merely assisting the process to overcome capability restrictions in the short term, or augmenting the process to create new solutions in the long term. In many cases, a single manufacturing process cannot fulfill all the requirements of product performance, due to the limitation of that individual process. Combining two processes sequentially or simultaneously can overcome the difficulty of a single process by leveraging each other's strengths. This symposium will focus on the advances on assisted or augmented processes, as well as sequential and hybrid manufacturing processes for further improvement and optimization of manufacturing processes. Papers from both academia and industry are strongly encouraged. **More specifically, this symposium is focused on applications where a manufacturing process performance is extended or improved through the addition of a complimentary process. All manufacturing processes (substractive, additive, deformation, consolidation, and casting) enhanced by a complimentary process are welcomed.** Topics of interest include, but are not limited to:

- Vibration-Assisted Manufacturing Processes
- Laser-Assisted Manufacturing Processes
- Electrically-Assisted Manufacturing Processes
- Thermally-Assisted Manufacturing Processes
- Magnetic-Assisted Manufacturing Processes
- Multiscale and Multiphysics Modeling for Assisted and Augmented Manufacturing Processes
- Assisted Manufacturing Process Monitoring and Control
- Industrial Applications of Assisted Manufacturing Processes

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high-profile international keynote speaker and outstanding researchers from industry
- Organize a state-of-the-art paper that will be included in ASME journals
- Facilitate networking and connection building via organizing discussions between junior researchers and senior experts and using messaging tools and the event feed

Organizers

Dr. Meng Zhang, Kansas State University, Manhattan, KS 66506, Ph: 785-532-5606; meng@ksu.edu
Dr. Weilong Cong, Texas Tech University, Lubbock, TX 79409, Ph: 806-834-6178; weilong.cong@ttu.edu
Dr. Fuda Ning, State University of New York at Binghamton, Binghamton, NY 13902, Ph: 607-777-4793; fning@binghamton.edu

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Physics-Informed Data-Driven (PIDD) models for Advanced Manufacturing and Inspection Processes

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*

June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Manufacturing industries are experiencing significant transformations in recent times due to the evolution of Industry 4.0 initiatives across the globe. The newer set of technological solutions necessitates real-time monitoring of manufacturing processes using sensors followed by data analytics to evaluate the status and adjustment of parameters. It is necessary to embed appropriate process knowledge into the decision-making systems to achieve optimal process settings and performance. Physics-Informed Data-Driven (PIDD) models are presented as an alternative to model various manufacturing and inspection processes in recent years. These models amalgamate well-established physics-based models and data-driven approaches for combining the merits of both variants. PIDD models enable the comprehension of data-driven approaches through physics-based techniques reported in the literature. The symposium focuses on the research advancements in developing PIDD models for enhanced prediction accuracy, scientific coherence, interpretability, and scalability of the model compared to conventional standalone data-driven and physics-based approaches. The symposium also aims to understand the application of PIDD models for diagnostics and prognostics of high precision advanced manufacturing and inspection processes. The specific topics of interest for the symposium include, but are not limited to:

- Issues associated with the generation and labeling of datasets
- Models for various manufacturing processes – casting, joining, machining, forming, etc.
- Monitoring, optimization, and control of manufacturing and inspection processes
- Models for in-process metrology and quality control
- PIDD-based Digital Twin (DT) development for manufacturing and inspection processes
- Models for predictive maintenance of assets involved in a manufacturing process
- Computational and implementation issues with PIDD models

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a discussion session on recent advancements and future directions in PIDD models

Organizers

Dr. Ankit Agarwal, Clemson University, Greenville, SC, USA. +1 864 990 8230; agarwa3@clemson.edu
Dr. Laine Mears, Clemson University, Greenville, SC, USA. +1 864 283 7229; mears@clemson.edu
Dr. Kaushal A. Desai, Institute of Technology Jodhpur, India. +91 707 347 5302; kadesai@iitj.ac.in
Dr. Gaurav Ameta, Siemens Corp. - Technology, Princeton, NJ, USA. +1 609 865 8663; gaurav.ameta@siemens.com

* The conference is held in conjunction with NAMRI/SME's 49th North American Manufacturing Research Conference (NAMRC49), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Mechanics-Driven Approaches to Materials Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
Manufacturing Equipment & Automation Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

This symposium will bring together material scientists, mechanicians, applied physicists, industrial and mechanical engineers to discuss recent advances in mechanics as they relate to materials manufacturing. The symposium will showcase state-of-the-art experimental, analytical and computational studies in three closely-related areas: (i) mechanics-related issues in conventional manufacturing processes, (ii) exploitation of novel mechanics phenomena to enable radically new manufacturing approaches, and (iii) new applications of manufacturing processes themselves as a route to uncover new materials physics under extremes. A broad array of processes, materials and mechanics phenomena fall under the ambit of this call, ranging from basic scientific study to commercial application. Special topics of interest include, but are not limited to:

- Innovative experimental methods, including *in situ* imaging and high-speed photography techniques, for characterizing the mechanics of material deformation in processes such as machining, forming, joining and surface/bulk deformation processes
- Extreme mechanics phenomena related to plastic instability, localization, damage and fracture; and the role of temperature in influencing these phenomena
- Size-dependent mechanics and coupled mechanochemical effects; and their control
- Advances in analytical and computational modeling (phenomenological, crystal plasticity, etc.) of contacts, deformation and failure in material removal, deformation processing and forming processes
- Controlled application of mechanics-driven phenomena such as buckling, folding, wrinkling and self-organization of features to manufacture complex surfaces and structures that are difficult or impossible to achieve using traditional means
- Novel application of well-established processes, such as cutting, as a controlled means to explore material behavior and contact mechanics under extreme conditions (e.g., small scale, high strain, strain rate and temperature) that are difficult to replicate using conventional materials tests

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Dinakar Sagapuram, Texas A&M University, TX. Ph: (979) 458-2370; dinakar@tamu.edu
Dr. Yang Guo, Michigan State University, MI. Ph: (517) 432-3164; yguo@msu.edu
Dr. Koushik Viswanathan, Indian Institute of Science, Bengaluru, India. Ph: +91 802 293-2670; koushik@iisc.ac.in
Dr. Rachid M'Saoubi, Seco Tools AB, Fagersta, Sweden. Ph: +46 (0) 223-40-668; rachid.msaoubi@secotools.com

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences are not permitted.

— Call for Papers —

A Symposium on

Converging Manufacturing Techniques with Hybrid Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
Manufacturing Systems Technical Committee
Additive Manufacturing Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27 – July 1, 2022
West Lafayette, Indiana, USA
Hosted by the Purdue University, College of Engineering

Technical Focus

The convergence of multiple manufacturing techniques and processing domains has enabled new uses of existing manufacturing equipment in novel workflows. For example, integration of additive, subtractive, and inspection techniques by means of hybrid manufacturing has enabled manufacturers to reduce labor and material costs by mitigating disjointed processing. However, hybrid manufacturing presents many challenges due to the complexity and inherently multi-dimensional nature of processing. This call provides an opportunity for the research community to present findings and review recent developments in hybrid manufacturing involving the convergence of multiple manufacturing techniques. Papers are welcome to include process planning, process/system development, material property analysis of resulting components, and novel experimental approaches with applications in aerospace, automotive, tooling, repair, renewable energy, etc. This symposium invites papers from academia, national laboratories, and industry to present findings in topic areas including, but not limited to:

- Modeling, analysis, control and optimization of hybrid manufacturing
- Process planning and simulation for multi-process manufacturing workflows
- Next generation hybrid manufacturing systems
- Convergence of robotic and traditional manufacturing processes
- Design for hybrid manufacturing
- Multi-scale or multi-physics processing
- In-situ process monitoring and control for multi-process workflows
- Development of industrial applications for hybrid manufacturing
- CAD/CAM process modeling, development, and optimization for multi-process manufacturing

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract high profile international keynote speakers, one each from academia, national lab, industry
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers:

Dr. Thomas Feldhausen, Oak Ridge National Laboratory, Oak Ridge, TN USA, +1.865.341.0169, feldhausenta@ornl.gov
Dr. Jason Jones, Hybrid Manufacturing Technologies, McKinney, TX USA, +1.214.530.2334, jj@hybridmanutech.com
Dr. Christopher Saldana, Georgia Institute of Technology, Atlanta, GA USA, +1.404.385.3735, christopher.saldana@me.gatech.edu

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences is not permitted.

— Call for Papers —

A Symposium on

Advanced Machining and Metrology for Smart Manufacturing Technologies

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
Nano/Micro/Meso Manufacturing Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

The machining and metrology are required for manufacturing of diversified products widely ranged from large scales such as airplane/automobile to micro/nano scales such as medical devices. Many composite or hard materials to be machined have also been used for high-end parts in terms of light weight, high mechanical strength, and high thermal/chemical/corrosion resistances. Furthermore, the machining accuracy in the nano/micro/meso orders and material properties in subsurface are critical issues in quality assurance of the multi-scale manufacturing. Those technologies, therefore, should be developed in terms of software and hardware. Nowadays, Internet of Things (IoT) has been actualized by the rapid progress in smart and real time manufacturing technologies with the spreading of cloud technologies. This symposium is focus on the multi-scale technologies in machining, measurement and instrumentation in smart manufacturing processes, to spot their implication for science, industry & engineering and to highlight new techniques of AI-metrology as well as intelligent measuring system. Specific topics of interest include, but are not limited to:

- Controls, modeling and simulations in multi-scale machining processes
- Advanced cutting tool design and coating technologies
- Machining technologies for composite and hard materials
- Intelligent machining and measurement with in-process monitoring, data mining and machine learning
- Process planning of the multi-axis and the multi-tasking machining operations
- Micro- and nano- machining and metrologies and instruments
- Optical and photonic measurement
- CMM, form and dimensional measurement and surface characterization
- Uncertainty evaluation, calibration and testing methods for Measurement Instrument
- Quality control for geometrical quantities and managing production quality control

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering or ASME Journal of Micro and Nano-Manufacturing

Organizers

Dr. Takashi Matsumura, Tokyo Denki University, JAPAN. Ph: +81-3-5284-5474; tmatsumu@cck.dendai.ac.jp
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Dr. Naruhiro Irino, DMG MORI Co., Ltd., JAPAN. Ph: +81-595-45-4268; na-irino@dmgmori.co.jp

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences are not permitted.

— Call for Papers —

A Symposium on

Human-machine-interaction in Advanced Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Advanced manufacturing is progressing rapidly through the adoption of other techniques, including Robotics, Cyber Physical Systems, Advanced Sensing and Instruments, Simulation, Data Analytics, and Artificial Intelligence (AI). These techniques are driving advanced manufacturing to evolve towards higher efficiency, higher level of automation, and more intelligence and flexibility. In spite of making significant progress, researchers have not paid enough attention to how human engineers and workers would be integrated with advanced manufacturing. One critical problem is that the substantially increased complexity of manufacturing systems causes difficulty for humans to operate with current machines through lacking the appropriate human-computer/machine/robot interaction tools. A proper integration of humans and machines would also take the advantage of the humans' high level decision-making ability for high efficiency and more flexibility in production. Another challenging problem is the shortage of qualified skillful workers. Experienced workers are retiring steadily, and their experience cannot be captured and transferred to new generations effectively and efficiently. Therefore, new computational methods are expected to help the preparation of the workforce. The goal of this symposium is to support human engineers and workers in advanced manufacturing by providing a venue for researchers and practitioners to disseminate their latest research results and findings. Specific topics of interest include, but are not limited to:

- Human-computer/machine/robot interaction
- Virtual/augmented reality in manufacturing
- Human-centered AI and data analytics
- Human-centered manufacturing
- Smart solutions for safety in manufacturing
- Human behavioral model and cognition
- Access and inclusion in manufacturing
- Workplace ergonomics
- Gamification for learning and training
- Relationship between man, work environment, physical and cognitive conditions
- Advanced technological devices for physical support and interfacing with production technologies

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Yunbo "Will" Zhang, Rochester Institute of Technology, Rochester, NY, USA. 585-475-5571; ywzeie@rit.edu
Dr. Rui Liu, Rochester Institute of Technology, Rochester, NY, USA. 585-475-6819; rleme@rit.edu
Dr. Vinh Nguyen, National Institute of Standards and Technology, Gaithersburg, MD, USA. 757-952-5221; vinh.t.nguyen@nist.gov

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Prognostics and Health Management (PHM) of Manufacturing Systems

Sponsored by the ASME Manufacturing Engineering Division's

Manufacturing Systems Technical Committee

2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*

June 27-July 1, 2022

West Lafayette, Indiana, USA

Hosted by Purdue University, College of Engineering

Technical Focus

Engineering modeling and analytics deal with quantitative modeling and analytical characterization of engineering systems using physical or mathematical representation of a phenomenon or process of a manufacturing system. For smart and advanced manufacturing, the emerging sensing, communication, and computation technologies have resulted in a data-rich environment and provided opportunities of augmenting manufacturing intelligence through cross-cutting science and technologies such as engineering, computer science and mathematics. By integrating big data analytics that use data from sensors, controllers, metrology systems, and factory databases with engineering models, we are able to make effective use of data for online/offline diagnostic and prognostic modeling, to device AI-enabled process control and quality control, thereby enhancing system self-awareness, productivity, quality, resilience, and the overall manufacturing performance. This symposium focuses on quantitative approaches for manufacturing systems' performance improvement through data analytics and AI based methods for diagnostics and prognostics. The topics of interest include but are not limited to:

- Big data analytics for predictive decision-making in manufacturing systems
- Physics-guided machine learning of manufacturing failures and defects
- Anomaly detection, diagnostics, and prognostics
- Remaining Useful Life (RUL) prediction
- Data mining and machine learning for smart manufacturing
- Sensing, measurement, and visualization of manufacturing data
- Machine vision and signal/image processing
- Sensor-based monitoring, control, and optimization for failure-prone systems
- Multi-sensor multimodal data fusion for machine health estimation, fault diagnosis, and defect detection.
- Modeling and control of complex quality issues and defects in non-traditional manufacturing processes
- Mahine learning and AI for advanced manufacturing equipment, processes and systems

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- work to organize a Special Panel on "Emerging Topics in Data Analytics for Manufacturing."
- work to attract a high-profile international keynote speaker and industry speakers

Organizers:

Dr. Xiaoning Jin, Mechanical and Industrial Engineering, Northeastern University (617) 373-8733; xi.jin@northeastern.edu
Dr. Chenhui Shao, Mechanical Science and Engineering, UIUC (217)300-4750; chshao@illinois.edu
Dr. Hui Wang, Industrial and Manufacturing Engineering, Florida State University, hwang10@fsu.edu
Dr. Shiming Duan, General Motors R&D, shiming.duan@gm.com

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— Call for Papers —

A Symposium on

Maximizing the Competitive Edge in Changeable Manufacturing Systems and Transformable Factories

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Most economies worldwide are severely hit by COVID-19. The developed world has witnessed unprecedented new low unemployment highs. Big players in different sectors have declared bankruptcies, while fundamental commodities are in short supply. New players that demonstrated sufficient levels of agility and flexibility in dealing with the new volatile state of affairs are emerging. In this symposium, we focus on changeable systemic enablers in production and operation—both logical and physical. Risk and resilience assessment and estimation of supply chain due to nature and/or man-made interruptions are highly welcome in this symposium

Research in changeable systems and transformable factories will be covered including but not limited to flexible, reconfigurable, simultaneous, and hybrid systems. The emerging hybrid manufacturing, combining additive and subtractive, among other processes, is a heightened manifestation of flexibility that could be key in addressing current technical challenges. The objective of this symposium is to explore how these technologies and means can enable the agile retooling needed to attend to the current extreme volatility. The scope of this symposium covers:

- Exploitation of the following means and technologies in addressing the challenges explicated for changeable systems:
  - Flexible manufacturing systems
  - Reconfigurable manufacturing systems
  - Simultaneous manufacturing systems
  - Emerging Hybrid Manufacturing
- Modeling (mathematical programming- and machine learning-based) and simulation (discrete-event and systems dynamics) for particularly the following problems and domains:
  - Computer Aided Process Planning (CAPP)
  - Facility Layout Problem
  - Manufacturing Resources Planning and Lot-sizing
  - Scheduling
- Solution of aforementioned problems and planning functions exploiting the highlighted technologies
- Supply-chain resilience and risk assessment.

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile keynote speaker from industry

Organizers

Dr. Ahmed Azab, University of Windsor, (519) 253-3000 x4958, azab@uwindsor.ca
Dr. Mohamed Gadalla, Alabama A&M University, Normal, Alabama, (256) 372-5891 mohamed.gadalla@aamu.edu
Dr. Asif Khan, FCA, Auburn Hills, MI 48326, USA, (313) 378-8117 asif.khan@fcagroup.com

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences are not permitted.

— Call for Papers —

A Symposium on

Advances in Learning, Modeling, and Explainability of AI-based Manufacturing Systems

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

With near 24/7 production, manufacturers typically forgo expensive offline measurements to keep producing parts while waiting to react to problems. Instead, manufacturers need smart production machines with on-machine sensors and analytics that minimize downtime and maximize production quality. Smart manufacturing, or Industry 4.0, will rely on increased numbers of on-machine sensors with associated methods to assess and predict machine health, optimize control strategies, schedule manufacturing plans, and improve the performance of manufacturing processes. These methods will rely on accurate modeling and understanding of the manufacturing system, including the use and fusion of physics-based and data-driven approaches. Physics-based models approximate physical reality, while artificial intelligence (AI) models can find complex structures and relationships but lack the explainability of physical models. As the number and capabilities of sensors increase in manufacturing systems, AI can be leveraged to "fill in the gaps" between simplified physical models and true-world models. This symposium will focus on research advances in learning, modeling, and prediction of manufacturing systems. Such research will facilitate the development of physics-informed machine learning for smart manufacturing, resulting in reliable real-time monitoring and estimation of process outputs and performance indices, so that manufacturers can optimize production instead of reacting to problems. Specific topics of interest include, but are not limited to:

- Artificial intelligence and machine learning algorithms for manufacturing
- System identification for manufacturing systems
- Physics-informed machine learning approaches
- Data-driven methods for process monitoring
- Hybrid models for manufacturing
- Supervised/unsupervised machine learning for manufacturing
- Reinforcement learning/transfer learning in manufacturing
- Uncertainty quantification of AI-based methods
- Structuring and explainability of machine learning techniques and algorithms
- Prediction and control in manufacturing

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high-profile international keynote speaker

Organizers

Dr. Gregory W. Vogl, National Institute of Standards and Technology, MD, USA. 301-975-3198; gvogl@nist.gov
Dr. Yongzhi Qu, University of Minnesota Duluth, Duluth, MN, USA. 218-726-8803; yongzhi@umn.edu

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* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Cloud Manufacturing and Industrial Internet towards Agile and Resilient Manufacturing during and after COVID Era

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Nowadays, Cloud Manufacturing and Industrial Internet technologies have been rapidly developed and implemented for Agile and Resilient manufacturing. More and more major industry segments have started their Cloud Manufacturing and Industrial Internet migration journey, while many countries are raising digital manufacturing as their national strategy. Within the COVID pandemic period, this migration process has been accelerated and industry segments have benefited from Industrial Internet with Cloud technologies by being more agile and resilient. In the post COVID era, it is valuable to explore newly developed and deployed Cloud Manufacturing and Industrial Internet technologies that enable intelligent and robust manufacturing during the global crisis as well as prepare manufacturing systems for future challenges and opportunities. Specific topics of interest include, but are not limited to:

- Success case studies and lessons of manufacturers during and after the COVID Era
- Case studies in the design and deployment of an agile and resilient manufacturing system
- Industrial Internet, cloud, and other ICT supporting remote manufacturing processes
- Horizontal and vertical integration for flexible and robust manufacturing
- Reconfigurable and adaptable production systems
- Agile manufacturing systems
- Smart and resilient supply chain coping with uncertainties in demands and disruptions
- Cyber-physical social production systems
- Digitalization, Big Data analytics for agile and resilient manufacturing
- Innovative adaption of human-machine interface and communication technologies
- Workforce training, skilling and deployment for manufacturers
- Cyber security developments

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high-profile international keynote speaker
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering or another proper high-quality journal
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Yujie Chen, Caterpillar Inc., Peoria, IL, USA. 940-536-4014; chenyujie711@gmail.com
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* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submissions of the same paper to more than one conferences are not permitted.

— Call for Papers —

A Symposium on

Sustainable Cyber-physical Systems for Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee &
Life Cycle Engineering Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Smart manufacturing is emerging as a paradigm of manufacturing with the development of new technologies. Such developments as Cyber-Physical Systems, Digital Twins, Cloud Manufacturing, and Internet of Things (IoT) envision the convergence of physical systems and virtual systems. The concept of smart manufacturing calls for flexible, autonomous, and predictive monitoring and control of the cyber-physical systems, including equipment and systems, particularly in human-machine collaboration and digitalization of human skills to overcome temporal and spatial barriers. Of course, owing to the increasing pressure on industry to consider the environmental impacts of their activities, it is desirable for smart manufacturing to also embrace environmental sustainability. Sustainable manufacturing is gaining increasing attention with its aim to minimize negative environmental impacts and consumption of energy and natural resources, while also being economically viable. This symposium will focus on research advances in the area of smart and sustainable manufacturing: frameworks, platforms, principles, and applications. Research that includes technologies for improving productivity, quality, and sustainability of manufacturing systems, processes, and products are of particular interest, including:

- Virtual manufacturing systems using real-time data, simulations, algorithms, and machine learning
- Collection, storage, and analysis of big data and cloud manufacturing
- Demonstration of cyber-physical systems to assess, maintain, collaborate, predict, and improve: environmental performance, operation efficiency, energy/power consumption efficiency, predictive maintenance, training simulation, virtual prototyping, product life cycles, and consumer trust
- Intuitive and interactive human interface for cyber-physical systems: virtual reality, augmented reality, haptics, and data visualization
- Digitalization of human skills and their utilization for manufacturing
- Applications of IoT sensors for condition monitoring, process control, and prediction

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Attract a high profile international keynote speaker
- Organize a special issue of the ASME Journal of Manufacturing Science and Engineering
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Huitaek Yun, Senior Engineer, IN-MaC, West Lafayette, IN, USA. 203-232-4741; yun37@purdue.edu
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Haiyue Wu, Purdue University, West Lafayette, IN, USA. 765-775-3226; wu1254@purdue.edu

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Advances in Micro and Nano Mechanical, Nontraditional, and Hybrid Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's

Nano/Micro/Meso Manufacturing Technical Committee

2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*

June 27-July 1, 2022

West Lafayette, Indiana, USA

Hosted by Purdue University, College of Engineering

Technical Focus

Micro- and nano-scale manufacturing is gaining more attention due to production miniaturization and customization. High precision and product quality are difficult to achieve at this length scale; thus, deeper understanding of the processes, development of characterization methods, modeling and simulations, and monitoring are required for the improvement of product quality. Also, process and system technologies need to be advanced for scalable manufacturing. In addition, due to the size effects and difficulties in monitoring and control, simulation and prediction are particularly important at the small scale. Thus, digital or virtual manufacturing technology is becoming essential. This symposium will focus on advances in micro- and nano-scale manufacturing technologies that address the aforementioned requirements. Both theoretical and experimental contributions are welcome. Application-oriented novel manufacturing processes and systems are also of interest. Papers from the industrial sector are also strongly encouraged.

Specific topics of interest at the micro- and nano-scale include, but are not limited to:

- Mechanical, nontraditional, and hybrid manufacturing processes and systems
- Process and system characterization, modeling, and simulation
- Scalable micro and nano manufacturing
- Micro and nanoscale digital or virtual manufacturing
- Surface texturing, surface integrity, and process improvement
- Process monitoring and control
- Measurement and metrology
- Novel product designs and assembly technologies
- Design and fabrication methods for micro-sensors
- Equipment for micro- and nano-scale manufacturing
- Tip-based manufacturing
- Manufacturing related to micro- and nano-composites
- Use of nano/micro additives and fluids for manufacturing

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- work to attract a high profile international keynote speaker
- organize a special issue in the ASME Journal of Micro and Nano-Manufacturing
- organize a state-of-the-art paper that will be the lead article in the special issue

Organizers:

Dr. Farid Ahmed, University of Texas RGV, Edinburg, TX, Ph: 956-240-1988, farid.ahmed@utrgv.edu
Dr. Ping Guo, Northwestern University, Evanston, IL, Ph: 847-491-4029, ping.guo@northwestern.edu
Dr. Bashir Khoda, University of Maine, Orono, ME, Ph: 207-581-5183, bashir.khoda@maine.edu
Dr. Chandra Nath, Maijker Corp., West Lafayette IN, Ph: 217-607-3029, chandra.nath@maijker.com

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— Call for Papers —

A Symposium on

Advances in Micro- and Nano-scale Additive Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Nano/Micro/Meso Manufacturing Technical Committee
Additive Manufacturing Technical Committee

2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*

June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

The ability to fabricate small-scale structures enables harnessing novel scale-dependent phenomena. For example, micro- and nano-scale structures that take advantage of subwavelength manipulation of light or strengthening of materials at small scales have led to optical and mechanical metamaterials with superior performance. Additive manufacturing (AM) significantly expands the design space for such structures by enabling the control of geometry and material properties on the scale of the individual building blocks. Despite their advantages, micro- and nano-scale AM processes have remained a niche set with limited industrial-scale adoption due to poor manufacturing readiness. Factors that limit manufacturing readiness include low throughput, poor quality, small material set, limited process knowledge, and lack of tools and techniques for process monitoring and control. A set of mature micro- and nano-scale AM processes will unlock the novel scale-dependent properties for societal benefit. Specific topics of interest include, but are not limited to:

- Integration of micro- and nano-scale AM processes with other manufacturing processes.
- Assembly of additively manufactured micro- and nano-scale structures with macroscale objects.
- Fabrication of functional devices using micro- and nano-scale AM.
- Manufacturing scale up via high-throughput printing or defect-free printing over large areas or volumes.
- Prediction and control of geometry, material properties, or process performance metrics.
- In-situ process metrology for measurement of geometry, process conditions, or material properties.
- Machine learning or data science based approaches for process modeling, prediction, monitoring, or control.
- Design of manufacturing equipment or systems for micro- and nano-scale AM.
- Novel materials, material design, and/or multi-material capabilities for micro- and nano-scale AM.
- Novel AM processes with features smaller than 100 μm and superior rate, quality, cost, or materials.

Paper Submission

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Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Work to attract a high profile international keynote speaker
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering or ASME Journal of Micro and Nano Manufacturing
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Sourabh Saha, Georgia Institute of Technology, Atlanta, GA, USA. 404-894-3622; ssaha8@gatech.edu
Dr. Nilabh Roy, Canon Nanotechnologies, Austin, TX, USA. 512-363-2167; nroy@cnt.canon.com
Dr. Bruno Azeredo, Arizona State University, Tempe, AZ, USA. 480-727-3974; Bruno.Azeredo@asu.edu

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Low-Dimensional Nanostructured Carbon and Related Materials: Synthesis, Self-Organization, and Printing

Sponsored by the ASME Manufacturing Engineering Division's
Nano/Micro/Meso Manufacturing Technical Committee
Advanced Materials Manufacturing Technical Committe
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Recent advances in bottom-up synthesis and self-assembly, as well as top-down printing and fabrication of low-dimensional nanostructured carbon and related materials underlie a revolution in manufacturing of advanced devices for many applications including energy, healthcare, and consumer electronics. Importantly, tuning the atomic structure, nanoscale morphology, and hierarchical architectures of these emerging low-dimensional materials enable a wide variety of impressive electrical, chemical, optical, magnetic, thermal, and other coupled properties. This includes multifunctionality of individual nanoscale building blocks, such as one dimensional carbon nanotubes and other nanofilaments, as well as two-dimensional graphene, transition metal dichalcogenides, and MXenes. It also includes the collective behavior of ensembles of nanostructures and hierarchically architected materials, such as aligned nanofilaments, nanoporous materials, and metamaterials. In particular, ordered nanoscale and mesoscale building blocks give rise to unique collective and hierarchical properties that are not only dependent on the properties of the individual building blocks, but also on their spatial arrangement in one, two, or three dimensions. This symposium brings together interdisciplinary research efforts from academia, national labs, and industry focused on developing new fabrication strategies for advanced carbon-based and related low-dimensional materials. Specific topics include, but are not limited to the following:

- Synthesis of carbon nanotubes, graphene, other nanocarbons, and related materials
- Synthesis of nanoporous materials with heteroatom control and multiphasic nanomaterials
- Post-synthesis processing and functionalization of 1D nanotubes/nanofilaments and 2D nanosheets
- Nanopatterning, lithography, and self-assembly of low-dimensional materials at nano- and micro-scales
- Printing of functional nanocarbons and transition metal dichalcogenides
- Folding and assembly of complex 3D nanostructures from 1D and 2D building blocks
- Design and fabrication of biomimetic and bio-inspired surfaces and interfaces
- Low-dimensional carbons and related materials for flexible devices, transparent films, and transient electronics
- Origami- and kirigami-based fabrication of multifunctional materials
- 3D printing of complex nanocarbons and other multimaterial structures
- Fabrication of carbon metamaterials & cellular structures for tailored mechanical, acoustic, or optical properties

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will (1) work to attract a high profile international keynote speaker, and (2) work on organizing a special issue in an ASME Journal with state-of-the-art paper to be lead article in the special issue.

Organizers

Dr. Mostafa Bedewy, University of Pittsburgh, Pittsburgh, PA, USA. 412-624-2682; mbedewy@pitt.edu
Dr. Michael Cai Wang, University of South Florida, FL, USA. 813-974-8586; mcwang@usf.edu
Dr. Sei Jin Park, Lawrence Livermore National Laboratory, CA, USA. 925-422-8160; park39@llnl.gov

* The conference is collocated with NAMRI/SME's 50th North American Manufacturing Research Conference (NAMRC50), which will have a separate call-for-papers. Please note that submission of the same paper to more than one conference is not permitted.

— Call for Papers —

A Symposium on

Reliability Engineering and System Safety in Advanced Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Quality and Reliability Technical Committee
2022 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 27-July 1, 2022
West Lafayette, Indiana, USA
Hosted by Purdue University, College of Engineering

Technical Focus

Advanced manufacturing has been identified as a national priority by the white house. To create and sustain American leadership in advanced manufacturing, it is critical to understand, evaluate, and improve current advanced manufacturing from different levels (system-, process-, and machine-level) especially reliability and safety issues, as they are essential to system consistency, stability, and efficiency. In the era of Industry 4.0, advanced data analytics and novel algorithms (e.g., machine learning) have offered new opportunities for enhancing the reliability and safety of advanced manufacturing. This symposium focuses on research advances in state-of-the-art modeling, computational, and experimental approaches to addressing reliability engineering and safety issues in advanced manufacturing. Specific topics of interest of this symposium include, but are not limited to:

- Reliability and safety of additive manufacturing systems.
- Reliability issues related to additively manufactured components.
- Process monitoring, diagnostics, and prognostics in advanced manufacturing including both subtractive processes (e.g., milling and turning) and additive processes.
- Advanced sensing for non-destructive testing and evaluation for advanced manufacturing processes.
- Preventive and predictive maintenance methodologies and applications in advanced manufacturing.
- Novel machine learning and data mining algorithms in predictive maintenance and reliability engineering.
- Advanced modeling and simulation for large-scale predictive analytics.
- Maintenance scheduling in advanced manufacturing in the context of Industry 4.0.
- System safety in advanced manufacturing especially involved with robots and human-robot collaboration.
- Workplace safety and risk assessment.

Paper Submission

Authors are required to **submit an abstract of 200-650 words by November 15, 2021 (no extension)**. ***Submissions will only be accepted via the conference website:*** *https://event.asme.org/MSEC/*. Abstracts will be accepted by November 19, 2021. For all the accepted abstracts, authors are required to **submit a full manuscript for review by November 29, 2021**. Only industry presenters have the *technical presentation only* option (i.e., present with an abstract and without a paper). Final publication-ready manuscripts must be submitted by **April 1, 2022** with the copyright transfer forms from all authors completed. The presenting author must register by **April 22, 2022**, or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2022 papers will be channeled to an ASME journal for fast-tracked review and publication.** Accepted papers can be submitted for review to any ASME journal, such as the prestigious *J. of Manufacturing Science and Engineering* or the *J. of Micro and Nano Manufacturing*.

Additional Symposium Activities

To highlight advancements in this technical area, symposium organizers will:

- Organize a special issue on "Data-Driven Additive Manufacturing Process Modeling" in the ASME Journal of Manufacturing Science and Engineering;
- Organize a state-of-the-art paper that will be the lead article in the special issue;
- Work to invite a high-profile keynote speaker.

Organizers

Dr. Yiran (Emma) Yang, University of Texas at Arlington, Arlington, TX, USA. 817-272-3092; yiran.yang@uta.edu
Dr. Dazhong Wu, University of Central Florida, Orlando, FL, USA. 407-823-1561; Dazhong.Wu@ucf.edu
Dr. Miao He, Siemens, Houston, TX, USA. miao.he@siemens.com

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