— Call for Papers —

A Symposium on

Advances in Metal Additive Manufacturing Processes

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal of Micro and Nano Manufacturing*.

Additional Symposium Activities

Based on the submitted papers, symposium organizers will make an effort to:

- Attract a high profile international keynote speaker

Organizers

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

* The conference is collocated 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

Advances in Bioinspired Additive Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

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 (three-dimensinal (3D) printing) 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 bioinspired additive manufacturing 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

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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. 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 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

Additive Manufacturing with Functional Polymers, Multi-material Structures and Composites

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Emerging additive manufacturing (AM) technologies present a new opportunity to further the capabilities of functional polymers, multi-material systems or composites by enabling (1) manufacturing of parts in structurally and functionally customized and precisely controlled topologies and (2) layer-by-layer control of manufacturing process leading to the potential control over the morphology and microstructure of various material phases in the system. This improved process control and design freedom transcend current manufacturing capabilities and conventional material process-property-structure relationships. Realization of this exciting potential calls for multi-disciplinary research involving feedstock discovery, novel AM method development, process modeling and final part property characterization and prediction and AM-enabled novel applications. This symposium will feature the advances in these research domains focusing specifically on but not limited to:

- Design, implementation, and control of novel 3D printer systems that can process multiple materials.
- Experimental characterization, modeling and simulation of AM processes involving functional polymers, composite materials or multiple materials in one functional part.
- Design, processing, characterization, and optimization of functional polymer or composite feedstock materials including composite inks, powders, filaments, laminates, etc.
- Experimental, analytical, and computational studies of properties in AM composite parts or multi-material structures.
- Feedstock-process-structure-performance relationships in AM composite materials and structures.
- Interfacial properties additively manufactured multi-material structures.
- Structural and functional applications of AM polymeric parts, composites, nanocomposites, and multi-material structures, including energy devices, sensors and electronics integrated in structural components and robotics.
- Novel design strategies for AM multi-material and composite parts, including topology optimization and resulting AM enabled functional designs such hierarchical structures, architected materials etc.
- Emerging cyber technologies (e.g., machine learning, VR/AR) 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
- Organize a state-of-the-art paper that will be the lead article in the special issue

Organizers

Dr. Bulent Arda Gozen, Washington State University, Pullman, WA, USA. 509-335-3214; arda.gozen@wsu.edu
Prof. Kun (Kelvin) Fu, University of Delaware, Newark, DE, USA. 302-831-2008; kfu@udel.edu
Dr. Danning Zhang, Wisk Aero, Mountain view, CA, USA. 302-766-4389; danning.zhang@wisk.aero
Ashu Dikshit, Schlumberger, Houston, TX, 403-513-3369; ADikshit@slb.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

Computational Methods and Process Planning for Additive Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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:

- Modeling, analysis, and optimization for AM.
- Process planning and simulation 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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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. 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

Smart Additive Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
Manufacturing Systems Technical Committee
Quality & Reliability Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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
- Novel computing technology-enabled big data transmission, process, and management.

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. Yiran (Emma) Yang, The University of Texas at Arlington, TX, USA, yiran.yang@uta.edu
Dr. Brian Giera, Lawrence Livermore National Laboratory, Livermore, CA, USA. giera1@llnl.gov

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— Call for Papers —

A Symposium on

Additive Manufacturing of Ceramics, Concretes, and Composites

Sponsored by the ASME Manufacturing Engineering Division's
Additive Manufacturing Technical Committee
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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

Hybrid Manufacturing Processes for Multi-Material Components

Sponsored by the ASME Manufacturing Engineering Division's
Advanced Materials Manufacturing Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Advanced lightweight components rely on multi-material systems often associated with new designs for achieving the desired weight reduction, preserving high performance and a low cost. However, high throughput multi-material components is nowadays a challenge due to multi-stage and high cost manufacturing processes. To overcome these challenges, innovative manufacturing processes which combines the high throughput of the top-down technologies with the precision and free form geometries created by bottom-up technologies are emergent for breaking the frontiers between single material and multi-material component.

The aim of this special call is to provide a forum for researchers and practitioners to review the recent developments in the area of hybrid manufacturing processes developed for multi-material components. Hybrid manufacturing processes involves processing of lightweight metals (advanced high strength steels, aluminum alloys, magnesium alloys, titanium alloys etc.) and/or composites (polymeric and/or metallic) by combination of different mechanisms of manufacturing and different mechanisms of bonding between the multi-materials toward high performance and low cost components. The papers are welcome to include modeling and simulation, data-driven and experimental approaches with application in aerospace, automotive, renewable energy, electronics, medical sectors, etc. This symposium invites papers from academia, national labs and industry that deal with innovative ideas of manufacturing multi-material components fitting the following topic areas, but not limited to:

- Combinations of additive, subtractive and forming processes for manufacturing foam and bionic designs
- Hybrid solutions of injection molding on an existing substrate, insert or outset
- X-trusion processes (any type of extrusion, pultrusion process which involves more than one material)
- Robot based manufacturing processes of multi-material components
- Quality control of the multi-material manufacturing processes: non-destructive and data-driven algorithms.

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
- Organize a special issue in the ASME Journal of Manufacturing Science and Engineering

Organizers

Dr. Saeed Farahani, Clemson University, Greenville, SC, USA. 864-501-7502; sfaraha@clemson.edu
Dr. Mihaela Banu, University of Michigan, Ann Arbor, MI, USA. 734-936-0378; mbanu@umich.edu
Dr. Srikanth Pilla, Clemson University, Greenville, SC, USA. 864-283-7216; spilla@clemson.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

Advances in Biomanufacturing of Tissue-Engineered Scaffolds and Organs

Sponsored by the ASME Manufacturing Engineering Division's
Biomanufacturing Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Three-dimensional (3D) bioprinting is driving major innovations in tissue engineering and regenerative medicine, in which bioinks composed of cells and extracellular matrix (ECM) materials are printed into complex 3D functional constructs to mimic living tissues and organs using various additive manufacturing approaches. Such engineered tissues and organs are envisioned to be used for the replacement of damaged or injured human tissues and organs, providing a promising solution to the challenge of tissue and organ donor shortage. The common 3D bioprinting techniques include inkjet printing, extrusion printing, laser-assisted printing, and stereolithography. The typical bioprinting process of 3D tissues and organs are composed of three key steps: 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 biomaterial selection, interaction between cells and ECM materials, manufacturing challenges related to the printability of bioinks and sensitivities of living cells, 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 3D bioprinting of tissue-engineered scaffolds 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:

- Bioinks and biomaterials: new material development and printability investigation.
- Modeling and analysis of biomanufacturing process.
- Innovation of new 3D bioprinting or biomanufacturing approaches.
- Engineering 2D/3D cellular microenvironments.
- Design, fabrication and characterization of 3D tissue-engineered scaffolds.
- 3D bioprinting of complex tissues and organs.
- Bioreactor systems for tissue engineering.
- Cell-biomaterial interaction: cell encapsulation, cell migration, aggregation, and distribution.
- Tissue ingrowth and functionality.

Paper Submission

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Additional Symposium Activities

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

- Work to attract a high reputation keynote speaker to introduce the cutting-edge techniques in biomanufacturing
- Work to organize a review paper to summarize the state-of-the-art achievements that will be published in one of the ASME journals

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. Kyle Christensen, Embody Inc., Norfolk, VA, USA. (813) 335-4344; kchristensen@embody-inc.com

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— Call for Papers —

A Symposium on

Advances in Manufacturing, Development, and Analysis of Biomedical Devices

Sponsored by the ASME Manufacturing Engineering Division's
Biomanufacturing Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

The characteristics, use and performance of materials, structures and devices for biomedical applications entail unique requirements for the processes used to produce them. 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 3D printing, sensing, and robotics, which have created new tools and novel ideas 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 is aimed at identifying the constraints imposed on manufacturing processes by the requirements of biomedical materials and products, presenting forefront research results, highlighting needs and solutions in biomedical product production and pointing 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, such as soft matters.
- 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.
- 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 a high profile keynote speaker
- Work to organize a paper on the state of the art
- Organize a discussion session on latest advances and future directions in biomedical manufacturing

Organizers

Dr. Yihao Zheng, Worcester Polytechnic Institute, Worcester, MA, USA. (218) 666-8808; yzheng8@wpi.edu
Dr. Yancheng Wang, Zhejiang University, Hangzhou, China. (+86) 13675828104; yanchwang@zju.edu.cn
Ms. Anne Gu, Boston Scientific, Marlborough, MA, USA. (857) 378-8957; anne.gu@bsci.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

Smart Manufacturing for Resilient and Environmentally-Efficient Systems

Sponsored by the ASME Manufacturing Engineering Division's
Life Cycle Engineering Technical Committee
Manufacturing Systems Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

In light of the COVID-19 pandemic, the manufacturing community is rethinking the implications and relationships of existing manufacturing paradigms such as resiliency, lean manufacturing, and smart manufacturing. Sustainability can serve as an organizing principle for future manufacturing systems, providing a focus for understanding trade-offs inherent in the re-engineering of systems. During times of rapid re-configuration of manufacturing systems, such as we experienced during the recent pandemic, keeping sight of sustainability principles is paramount for avoiding unintended and negative consequences. This symposium seeks to explore advances in innovation brought about by smart technologies through the lens of resiliency and environmental efficiency. For example, cyber-physical systems can enable resource-efficient manufacturing; continuous monitoring and prognostics can help ensure worker safety and extend the remaining useful life of critical assets; machine learning models can inform production planning in real time and enable the implementation of a circular economy; or predictive process control can optimize the quality of production runs and facilitate waste reduction. Challenges remain in the implementation of these advanced systems, including the incorporation of uncertainty into the models and assessments, the lack of available and trained operators, and the inability to scale-up from pilot projects. The tradeoffs associated with improvements to any system or process should be well understood. Specific topics of interest include, but are not limited to:

- Enabling circular economy principles and multi-life cycle material and information flow through digital technologies.
- Tradeoffs between the resilience and environmental impacts of manufacturing systems.
- Development of sustainability indicators, frameworks, or tools for smart and connected systems.
- Life cycle environmental and/or economic assessments of smart manufacturing systems or processes.
- Modeling of cyber-physical systems for green manufacturing.
- Sustainable innovations in the manufacturing, operation, maintenance and/or end-of-life processing to reduce environmental impacts.
- Machine learning applied to the modeling, design, or operation of sustainable production systems.
- Innovations to promote environmentally-concious decision-making across the manufacturing workforce.
- Academic or industrial case studies.

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website: https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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

Nancy Diaz-Elsayed, University of South Florida, Tampa, FL, USA. 760-220-8167; nancyd1@usf.edu
K.C. Morris, National Institute of Standards and Technology, Gaithersburg, MD, USA. 301-975-8286; kcm@nist.gov
Julius Schoop, Univeristy of Kentucky, Lexington, KY, USA. 859-323-8308; julius.schoop@uky.edu

* 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

Advances in Sustainable Manufacturing Processes and Systems

Sponsored by the ASME Manufacturing Engineering Division's
Life Cycle Engineering Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Understanding and mitigating the environmental impacts of manufacturing processes and systems is becoming critical for manufacturers to stay competitive. Alarming rates of resource consumption and pollution have already driven market responses in other sectors. This symposium will examine the latest advances in the theory and practice of sustainable manufacturing processes and systems. Submissions to this symposium can address any of the three dimensions of manufacturing sustainability: environment, profit, and people/society. Papers are encouraged to address the interrelationship between all aspects of sustainability and manufacturing. Specific areas of interest include, but are not limited to the following:

- Process selection tools for sustainability-aware decision-making
- Resource (e.g., mass, energy, exergy) modeling at the process, factory, and supply chain scales
- Process electrification and quantification of subsequent energy and environmental impacts
- Development of new resource efficient processes and systems
- Cradle-to-cradle manufacturing & utilization of reused, remanufactured or recycled feedstock
- Optimization of manufacturing systems or life cycle systems from sustainability perspectives
- Unit manufacturing process (UMP) impact models for additive processes and comparisons to rival technologies
- Uncertainty quantification and reduction in unit manufacturing process (UMP) models
- Mitigation of environmental impacts for emerging manufacturing technologies (e.g., additive manufacturing)
- Design flexibility, part consolidation, and the effect on the number of manufacturing operations
- Quantification and/or mitigation of environmental impacts for use phase and maintenance functions
- Material selection and component light-weighting or dematerialization and its life cycle impacts
- Closed loop production and circular economy considerations including product take back and remanufacturing
- Product-service systems and the effect of service models of consumption on manufacturing
- Standards-based approaches for sustainability-based assessments
- Production planning for reduced impacts, such as multi-part 3D printing builds and the use of renewable energy
- Industrial ecology and manufacturing processes as part of industrial metabolisms
- Social impact assessment for manufacturing workers and end users from emerging materials and processes
- Road mapping for critical manufacturing industries, such as aerospace and automotive
- Scalability: future markets and calculating prospective environmental impacts with uncertainty
- Computer-supported tools for designing or improving manufacturing systems in the context of sustainability
- Visualization-first approaches, such as augmented reality (AR) and InfoVis dashboards, for improving sustainability
- Simulation-driven techniques that promote systems tradespace exploration for improving sustainability

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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.

Additional Symposium Activities

To highlight advancements in this technical area, the symposium organizers will work to attract a high profile international keynote speaker.

Organizers

Dr. Daniel Cooper, University of Michigan, Ann Arbor, MI, USA. 734-764-1357; drcooper@umich.edu
Dr. William Z. Bernstein, NIST, Gaithersburg, MD, USA. 301-975-3528; william.bernstein@nist.gov
Dr. Abigail Clarke-Sather, University of Minnesota-Duluth, USA. 218-726-8424; abbie@d.umn.edu

* The conference is collocated 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

Tribology of Manufacturing Processes and Machinery

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Equipment & Automation Technical Committee
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Tribology, the science of friction, lubrication and wear between sliding surfaces, plays a critical role in materials processing and performance. 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 (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

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website: https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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

Organizers

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

Innovations in the Design and Control of Manufacturing Machines and Equipment (ASME-JSME Joint Symposium)

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Equipment and Automation Technical Committee
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

New, emerging technologies are always in the manufacturing. Matured machining technologies have been demanded to manufacture complex parts of new, difficult-to-machine materials for aerospace, automobile, energy and medical industries. Additive manufacturing technologies have been long studied and implemented in commercial manufacturing processes. World-wide trend of increase in labor costs requires more automated and efficient manufacturing processes, introducing more machines, such as industrial robots, into a factory, with interconnecting network technologies. Machine control and metrology play an essential role in addressing such technical challenges in manufacturing. Monitoring of machining process and machine tool control are key technology for not only subtractive manufacturing processes, but also for additive manufacturing processes. The measurement of various machine tool performances is a key to improve the overall manufacturing performance, and such a measurement can potentially extend the application of industrial robots as well. The metrology for machining process and machine performance should closely incorporate with interconnecting network technologies. This symposium focuses on the research advances in the areas of machine control and metrology in manufacturing. Monitoring and control of subtractive and additive manufacturing processes, control of machine tools and industrial robots, metrology for machine performance, interconnecting technology for machine control and metrology, will be among main topics of the symposium but the symposium is not limited to them. Specific topics of interest include, but are not limited to:

- Machine tools, industrial robots, and other machines in manufacturing
- Modeling, monitoring and control of machining processes
- Metrology, design, or control of additive or hybrid machine systems
- Design and control of high precision motion systems and high speed/precision spindles
- Advances in sensors, actuators, motion command algorithms for positioning systems
- Novel multi-axis machine structures and controllers
- Sensor-assisted manufacturing (e.g., sensor assisted 3D printing or machining)
- Data-driven machine tool/process automation and control
- Nozzles for additive manufacturing (e.g., ink jet, electrospinning, FDM)
- Novel tool holders and tool path planning (e.g., in machining), Tool design (e.g., in forming)
- Automation in metrology systems and motion accuracy
- Autonomous operation and smart manufacturing

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal of Micro and Nano Manufacturing*.

Organizers

Dr. Martin Jun, Purdue University, West Lafayette IN, USA, Ph: +1-765-491-2793, mbgjun@purdue.edu
Dr. Chandra Nath, Maijker Corp., West Lafayette, IN, USA, Ph: +1-248-516-4095, chandra.nath@maijker.com
Dr. Atsushi Matsubara, Kyoto University, JAPAN. Ph: +81-3-5284-5474; matsubara@prec.kyoto-u.ac.jp
Dr. Naruhiro Irino, DMG Mori. Co., Ltd., JAPAN. Ph: +81-595-45-4268; na-irino@dmgmori.co.jp

* 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

Advanced Machining and Metrology for Smart Manufacturing Technologies (ASME-JSME Joint Symposium)

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Equipment and Automation Technical Committee
Nano/Micro/Meso Manufacturing Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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. Nowaday, Internet of Things (IoT) has been actualized by the rapid progress in smart and realtime 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 processses, 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, modelings and simulations in multi-scale machining processes
- Advanced cutting tool design and coating technologies
- Machining technologies for composite and hard materials
- Inteligient machining and measurement with inprocess 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 encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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
Dr. Norikazu Suzuki, Nagoya University, JAPAN. Ph: +81-52-789-4491; nsuzuki@mech.nagoya-u.ac.jp
Dr. Yasuhiro Takaya, Osaka University, Suita, Osaka, Japan. +81-6-6879-7320; takaya@mech.eng.osaka-u.ac.jp
Mr. Satoru Maruyama, Tokyo Seimitsu Co.,LTD., Tsuchiura, Ibaraki, Japan, +81-29-831-1234; s.maruyama@accretech.jp

* The conference is collocated 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

Advances in Mechanics of Materials in Modern Manufacturing and Materials Processing Techniques

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
Manufacturing Equipment & Automation Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

This symposium will bring together material scientists, mechanicians, applied physicists, industrial and mechanical engineers to discuss recent advances in the mechanics of cutting, forming and materials processing. The symposium will contain papers showcasing state-of-the-art experimental, analytical and computational mechanics techniques as applied to these manufacturing processes. A broad array of processes and materials 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 techniques and multi-scale methods, for studying deformation and flow mechanics in cutting, forming and solid-state materials processing
- Advances in multi-scale modeling (phenomenological, crystal plasticity, etc.) of plastic deformation and ductile failure in material removal, deformation processing and sheet forming
- State-of-the-art computational modeling of plastic instabilities, localization, damage and fracture mechanics as they pertain to manufacturing processes
- Advances in understanding of fluid mechanics, flow rheology and fluid instabilities in metal and polymer processing
- Constitutive models for material behavior under process conditions, and finite element-based process modeling
- Micromechanics (e.g., dislocation slip, twinning) and microstructure evolution during processing
- Size-dependent mechanics and chemo-mechanical effects in manufacturing
- Applications of novel manufacturing methods for bottom-up microstructure design and enhanced mechanical properties
- Processing-structure-property relationships in processing of novel material systems (e.g., advanced structural alloys, foams, composites)

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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. Koushik Viswanathan, Indian Institute of Science, Bengaluru, India. Ph: +91 802 293-2670; koushik@iisc.ac.in
Dr. Yang Guo, Michigan State University, MI. Ph: (517) 432-3164; yguo@msu.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 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

Tool Wear Mechanisms, Measurements, and Monitoring

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021 (tentative)
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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 (Dates are subject to change.)

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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. Meisam Salahshoor, Saint-Gobain R&D NA, MA, USA. 508-471-6292; meisam.salahshoor@saint-gobain.com

* The conference is collocated 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

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

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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 (Dates are subject to change.)

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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

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

* 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

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
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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, welding, over-molding processes
- Fiber spinning processes, cast and blown film extrusion, stretching forming processes
- Production and testing of SMART polymers, foams and composites
- Materials removal/ablation processes
- 3D printing of polymers and polymer composites: Processing considerations and applications
- Devices made of polymers/composites
- Precision instrumentation and tooling for injection molding/extrusion/fiber spinning/thermoforming
- Process dynamics and modeling in polymer processing
- Polymer and composite recycling processes and properties of recycled materials
- Polymers for medical applications and medical devices. Bio-medical applications of 3D printed polymer composites
- Processing-structure-property relationships in polymers and polymer composites

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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.

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 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

Advances in Nontraditional Manufacturing Processes

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Nontraditional Manufacturing (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 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:

- Electro Discharge/Electrochemical Machining (EDM/ECM)
- Ultrasonic Machining (USM)
- Abrasive/Water Jet Machining(A/WJM)
- Surface Processing (Coating, Texturing)
- Applications in Additive Manufacturing/Tooling and Fixturing
- Environmental and Safety Issues in NTM manufacturing
- Industrial Applications of NTM manufacturing
- Other Non-traditional Machining Methods and Their Applications

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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
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* 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

Advances in Lightweight and Dissimilar Materials Joining

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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, and 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 and control;
- Off-line joint structure characterization and nondestructive evaluations using advanced metallographic and micrographical techniques such as SEM, XPS, EDX, TEM, CT, and ultrasonic evaluations.

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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, (86)(21)34206305, yongbinglee@sjtu.edu.cn
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* 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

Laser-based Advanced Manufacturing and Material Processing

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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 encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website: https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal of Micro and Nano Manufacturing*.

Organizers

Dr. Xin Zhao, Clemson University, Clemson, SC, USA. 864-656-2151; xzhao5@clemson.edu
Dr. Wenda Tan, The University of Utah, Salt Lake City, UT, USA. 801-585-2536; wenda.tan@mech.utah.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 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

Advances in Assisted and Augmented Manufacturing Processes

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Processes Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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 traditional manufacturing process performance is extended or improved through the addition of complimentary processes. Topics of interest include, but are not limited to:

- Electrically-Assisted Manufacturing Processes
- Thermally-Assisted Manufacturing Processes
- Magnetic Field-Assisted Manufacturing Processes
- Laser-Assisted Manufacturing Processes
- Ultrasonically-Assisted Manufacturing Processes
- Assisted Manufacturing Process Monitoring and Control
- Industrial Applications of Assisted Manufacturing Processes
- Related Manufacturing Innovations for Medical Devices and Healthcare Products

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website: https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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 and outstanding researchers from industry
- Organize a state-of-the-art paper that will be the lead article in ASME journal
- Organize discussions between junior researchers and senior experts

Organizers

Dr. Weilong Cong, Texas Tech University, Lubbock, TX 79409, 806-834-6178; weilong.cong@ttu.edu
Dr. Meng Zhang, Kansas State University, Manhattan, KS 66506, 785-532-3732; meng@ksu.edu
Dr. Farbod Akhavan Niaki, The Timken Company, North Canton, OH 44720, 864-569-4396, farbod.niaki@timken.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

Smart Maintenance Operations through Algorithmic Support and Human-Centered Design

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Organizational ability to modernize maintenance operations has improved with the recent availability of more accessible toolkits, remote sensing hardware, and algorithmic techniques to support artificial intelligence (AI) systems, e.g., for Prognostics and Health Monitoring (PHM). Yet existing AI technologies are not one-size-fits-all solutions for maintainers, having been designed and tested primarily for other domains. Mitigating this mismatch can require incorporating manufacturing and reliability expertise under a wide range of scenarios into the deployment of AI systems—this process is often cost- and time-prohibitive. Implementation risk-assessments are difficult to perform. Even in the best case, automated systems are rarely able or advised to directly replace maintenance personnel. Instead, better operational performance might be achieved by using technologies that maximize the ability of personnel to perform their tasks. For example by improving the design of algorithms that support operation and maintenance teams by directly designing to the skills and limitations of personnel. Maintenance in manufacturing operations is uniquely suited to digitization approaches designed to intertwine human and digital capabilities, since even with successful PHM, maintenance will continue to be a predominantly human-based enterprise. Advances must incorporate strengths and weaknesses of both human and algorithm: Human-centered Design. This paradigm shift toward collaboration between human and algorithm must be holistically applied, as mounting technological, logistic, organizational, and cultural challenges stand between current state of practice and Smart Maintenance Operations of the future. Specific topics of interest include, but are not limited to:

- Uses for AI and other algorithmic enhancement in support of manufacturing maintenance personnel
- Diagnostic and prognostic tools, including:
  - Process assessment and alert optimization
  - Scheduling recommendations through active/reinforcement learning and hybrid models
  - Reliability reporting, asset monitoring, and diagnostic assisstance
- Technical natural-language processing (NLP), for work-order annotation, data structuring, and expert elicitation
- Application of knowledge graphs or ontologies for contextualizing AI in question-answering (e.g., searching manuals)
- Data-driven anthropometric or behavioral models, for example to quantify error sources (execution, reporting, etc.)
- Novel visualization tools and user interfaces with quantified improvements over traditional methods
- Sensory feedback designs that minimize confusion, obfuscation, or mistrust of personnel

Paper Submission

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Additional Symposium Activities

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

- Work to attract high profile international keynote speakers from industry

Organizers

Mr. Thurston Sexton, NIST, Gaithersburg, MD, USA. +1 301-975-2285; thurston.sexton@nist.gov
Dr. Sarah Lukens, GE Digital, Roanoke, VA, USA. +1 540-494-5097; sarah.lukens@ge.com
Dr. Melinda Hodkiewicz, Univ. of W. Australia, Perth, WA, AUS. +61 8-6488-3544; melinda.hodkiewicz@uwa.edu.au

* The conference is collocated 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

Cyber-Physical Systems and Cybersecurity in Industry 4.0

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

In the era of Industry 4.0 and the smart factory, manufacturing automation through cyber-physical systems (CPS) has attracted attention from industrial organizations and research universities to improve productivity, performance, and profit, and artificial intelligence (AI) and machine learning offer great computing strength in cyber computing to realize real-time predictive monitoring and data analytics. Although CPS, Internet of Things (IoT), big data, and AI have been utilized by major manufacturing companies, wide use of such technologies in small and medium-sized enterprises (SMEs) is faced with challenges from limited data, massive computing infrastructure, and high upfront costs. In addition, due to the nature of CPS, both information technology systems and operational technology systems of manufacturing firms are vulnerable to threats including theft of intellectual property (IP) and trade secrets, sabotage of operations, and damage to hardware and software. This symposium will focus on the research advances in the areas of cyber-physical systems and cybersecurity for smart manufacturing, which will benefit more companies with high efficient and more economical manufacturing systems under the privacy and security framework. Specific topics of interest include, but are not limited to:

- Efficient computing in cyber-physical systems.
- Edge computing technologies for Internet of Things (IoT).
- Monitoring and health management for industrial robot systems.
- Cyber physical systems with designed-in cybersecurity.
- Artificial intelligence for cyber threat detection.
- Automated vulnerability assessment and detection.
- Security in sensor design, integration and fusion.
- Security of Industrial Internet of Things (IIoT) devices.
- Advanced manufacturing through the digital thread.
- Cybersecurity in manufacturing systems.
- Information technology (IT) and operations technology (OT) security in manufacturing.
- Blockchain for security of sensitive manufacturing information.
- Cloud computing security in digital manufacturing.
- Edge computing security in digital manufacturing.
- Case study for cyber-physical security in manufacturing.

Paper Submission (Dates are subject to change.)

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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. Dazhong Wu, University of Central Florida, Orlando, FL, USA. 407-823-1561; Dazhong.Wu@ucf.edu
Dr. Guixiu "Helen" Qiao, National Institute of Standards and Technology, guixiu.qiao@nist.gov

* The conference is collocated 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

Advances in Quality and Continuous Improvement in Manufacturing Development and Execution

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
Quality & Reliability Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

The quality has always been the key characteristics and performance indicators of manufacturing. Significant new advances and progresses, such as on the principles, methodology, computer simulation, and applications, have been made by industrial practioners and academic researchers. This symposium will focus on the research, development, and application efforts addressing the advancement of quality engineering, lean methodologies, continuous improvement in manufacturng processes. Presentations in this session will portray the latest developments in the principles, practices, tools, processes, and applications. Specific topics of interest include, but are not limited to:

- Innovative visions on manufacturing quality
- Strategies of manufacturing quality assurance in the integration of product development
- New methods and tools of quality engineering
- Innovations in algorithms and models of quality engineering
- New approaches of data measurement and analysis in quality engineering
- New concepts of total quality management and their applications
- Trends in failure analysis of manufacturing processes, equipments, and systems
- Model-based quality control for manufacturing processes
- Descrete event simulation for improved manufacturing quality and productivity
- Optimization of quality for development time and cost of manufacturing
- Comprehensive approaches of problem solving in manufacturing operations
- Integration of lean manufacturing and quality engineering
- New approachs of six sigma and lean product development for Manufacturing
- Lean six Sigma, application and improvement methods in Manufacturing
- Applications of Lean Manufacturing Principles

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website: https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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. Herman Tang, Eastern Michigan University, Ypsilanti, MI, USA. Ph: (734) 487-2040; htang2@emich.edu
Mr. Mike Smith, Magna International - Powertrain, Troy, MI, USA. Ph: (248) 525-8752; gmsmith336@yahoo.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

Cognitive Manufacturing: Opportunities, Challenges, Technologies & Applications

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

At the intersection of connectivity and artificial intelligence for the factories of the future, Cognitive Manufacturing holds the promise of transforming industry by endowing production systems with perceptive and decisive capabilities. These new capabilities enable autonomous operations based on embedded cognitive reasoning while the systems intelligence and reasoning are retained by humans and backed by core smart manufacturing technologies, such as, Industrial Internet of Things, big data analytics,collaborative robots, augmented and virtual reality, as well as cognitive computing. With advanced cognitive capabilities, manufacturing equipment, manufacturing systems, and factories will be able to self-sense, self-communicate, self-reason, and self-configure to prevent potential critical issues, optimize operations, and enhance the overall integration of machines, humans, and digital supply network. The rise of cognitive intelligence in smart manufacturing operations, ranging all the way from the device level to supply network collaboration will enable a more intelligent, resilient, and sustainable manufacturing industry in the future. Specific topics of interest include, but are not limited to:

- Advanced sensing technologies for environment monitoring in smart manufacturing systems
- Advanced sensing technologies for environment monitoring in smart manufacturing systems
- Cognitive computing and AI-powered analytics for productivity optimization
- Self-organizing and configurable mechanisms and systems
- Self-sensing and self-learning manufacturing systems
- Machine and system architectures for plug-and-produce manufacturing systems
- System architecture of cognitive manufacturing systems
- Design and manufacturing for mass personalization
- Distributed control and decentralized decision-making in manufacturing automation
- Big data extraction, transmission, and processing for knowledge management and transfer in manufacturing
- Collaboration mechanisms between manufacturing systems for enhanced cognitive intelligence
- Industrial ontologies for cognitive manufacturing
- New standard needs in cognitive manufacturing
- Industrial applications and case studies that leverage cognitive manufacturing core technologies

Paper Submission

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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. Yuqian Lu, The University of Auckland, New Zealand. +64-9-923-1584; yuqian.lu@auckland.ac.nz
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* 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

Robotic Manufacturing and Assembly in Smart Factories

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Industrial robots are important components of today's manufacturing systems and have been applied in a wide variety of applications including manufacturing, assembly, recycling, and material handling. To facilitate smart factories of the future, and as one of the key enablers of industry 4.0, robotic technologies need to undergo continuous enhancements towards improved quality, sustainability, agility, flexibility, adaptability, efficiency, and collaborative ability. In addition, the integration of robotic systems with emerging manufacturing techniques such as the additive manufacturing technology have created new challenges in the areas of sustainable process planning and quality assurance. To address the above, this symposium will focus on research advances in the areas of planning, monitoring, and control of traditional and non-traditional robotic manufacturing systems, as well as robotic material handling and assembly/disassembly platforms. Specific topics of interest include, but are not limited to:

- Energy-efficient robotic manufacturing and assembly/disassembly planning.
- Process planning challenges in robotic assembly and manufacturing involving processes of additive, subtractive, or hybrid natures.
- Application of robots in additive and hybrid manufacturing platforms; capabilities and challenges.
- Advanced vision systems and sensing for remote control, collision detection, and collaborative task assignment.
- Novel process and control system design for higher efficiency, adaptability, and sustainability.
- Augmented and virtual reality applications in robotic manufacturing and assembly planning.
- Robotic manufacturing and assembly planning with humans in the loop; human-robot collaboration.
- Application of data analytics and novel machine learning algorithms in smart automation and intelligent robotic systems.
- Robotic disassembly in remanufacturing and its challenges.
- Process monitoring and quality control in robotic manufacturing and assembly.
- Robot-as-a-Service; cloud robotics and its challenges in manufacturing settings.
- Application of robots for manufacturing, assembly, and handling in hazardous environments and conditions.
- Multi-robot assembly/disassembly and manufacturing strategies.

Paper Submission (Dates are subject to change.)

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal of Micro and Nano Manufacturing*.

Additional Symposium Activities

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

- Work to promote high-quality submissions and attract a high profile 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. Azadeh Haghighi, University of Illinois at Chicago, Chicago, IL, USA.; ahaghi3@uic.edu
Dr. Lihui Wang, KTH Royal Institute of Technology, Stockholm, Sweden. +46-8-790-8305; lihuiw@kth.se

* 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

Industrial Internet, Cloud and Digital Twins in the Wake of COVID-19

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

In 2020, the COVID-19 brings unexpected impacts and challenges to the manufacturing industry. Manufacturing operations and supply chain are interrupted severly worldwide. Many manufacturers are closed down due to the regulaitons of social distance and short of essential supplies, whereas some companies moves to producing other type of products to alleviate the shortage personal protective equipment and financial stress. It required a large amount of time, effort and resources to change the product or the production line.

As a matter of fact, the reserch in distributed, integrated, and robust manufacturing system has been taken before the COVID-19 pandemic. The global crisis and social-distancing accelerate the level of industrial automation and digitalisation to some degree, in both the cyber and physical world. It is valuable to explore the enabling technologies towards intelligent, flexible and robust manufacturing systems. Meanwhile, the succss stories and lessons learnt during the pandemic also need to be analysed to be prepared for future challenges.Specific topics of interest include, but are not limited to:

- Cloud Manufacturing
- Industrial Internet and other ICT supporting remote manufacturing process
- Digitalisation, Big Data analytics for resilient manufacturing
- Horizontal and vertical integration for flexible and robust manufacturing
- Success case studies and lessons of manufacturers in the COVID-19 pandemic
- Case studies in the design and deployment of a resilient manufacturing system
- Manufacturing systems coping with uncertainties and disruptions
- Innovative adaption of human-machine interface and communication technologies
- Workforce re-training, re-skilling and re-deployment for manufacturers

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website: https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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. Xi (Vincent) Wang, KTH Royal Institute of Technology, Sweden. 46 8 790-9024; wangxi@kth.se
Prof. Xun Xu, University of Auckland, New Zealand. 814-898-6469; xun.xu@auckland.ac.nz
Dr. Yujie Chen, Caterpillar Inc., USA. 1 309 494 3683; chen_yujie@cat.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

Changeable, Transformable Manufacturing & Distributed Green Supply Chains in Pandemic Recovery Efforts

Sponsored by the ASME Manufacturing Engineering Division's
Manufacturing Systems Technical Committee
Life Cycle Engineering Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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, as well as the supply chain. Research in changeable systems and transformable factories will be covered—both the logical and physical aspects. 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. For the supply chain, the role of distributed green chains and redundancies in risk aversion and mitigation will be explored. Appropriate consideration should be given to discourage remoteness in choice of tier suppliers cutting on product-to-market times and greenhouse emissions. The scope of this symposium covers:

- Exploitation of the following means and technologies in addressing the challenges explicated:
  - Changeable and Transformable Manufacturing
  - Emerging Hybrid Manufacturing
  - Green and distributed supply chains with built-in redundancies
- 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
  - Supply chain management
- Solution of aforementioned problems and planning functions exploiting the highlighted technologies.

Paper Submission (Dates are subject to change.)

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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, Canada (519) 253-3000 x4958, azab@uwindsor.ca
Dr. M. Gadalla, Alabama A&M University, Normal, Alabama, (256) 372-5891, mohamed.gadalla@aamu.edu
Mr. Asif Khan, FCA, Auburn Hills, Michigan, (313) 378-8117 asif.khan@fcagroup.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

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 ManufacturingTechnical Committe
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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

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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 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 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

Advances in Micro and Nano Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Nano/Micro/Meso Manufacturing Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Micro- and nano-scale manufacturing is gaining more attention due to production miniaturization and customization. High precision and product quality is 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 improvement of product quality. 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 small scales. 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. 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.

- Mechanical and nontraditional manufacturing processes and systems
- Process and system characterization, modeling, and simulation
- Scalable micro and nano manufacturing
- Micro and nano scale digital or virtual manufacturing
- Surface texturing, surface integrity and process improvement
- Process monitoring and control
- Measurement and metrology
- Novel product designs and assembly technologies and equipment for micro- and nano-scale manufacturing
- Design and fabrication methods for micro-sensors
- Tip-based manufacturing
- Manufacturing related to micro- and nano-composites
- Use of nano additives and fluids for manufacturing
- New application, characterization, design for manufacturing, quality control of porous structures, i.e., meta-materials.
- Unifying/holistic techniques (i.e., Machine Learning Industry 4.0) for design, simulation, and manufacturing of functional micro/nano structures, manufacturing for emergency response (Flexible manufacturing)

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website:*** ***https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal 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. Ping Guo, Northwestern University, Evanston, IL, Ph: 847-491-4029, ping.guo@northwestern.edu
Dr. Bashir Khoda, The University of Maine, Orono, ME, USA. 207-581-5183; bashir.khoda@maine.edu
Dr. Martin Byung-Guk Jun, Purdue University, West Lafayette, IN, Ph: 765-496-3376, mbgjun@purdue.edu
Dr. Chandra Nath, Maijker Corp., West Lafayette IN, Ph: 217-607-3029, chandra.nath@maijker.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

Advances in Micro- and Nano-scale Additive Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Nano/Micro/Meso Manufacturing Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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. As a result, several promising micro- and nano-enabled devices have died off in the research laboratories without a viable path forward for industrial-scale manufacturing. 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 volumes.
- Prediction, monitoring, and control of process quality metrics, such as uniformity, repeatability, or defects.
- In-situ process metrology for measurement of geometry, process conditions, or material properties.
- Process modeling for prediction of printed geometry and/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 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. Brian Giera, Lawrence Livermore National Laboratory, Livermore, CA, USA. 925-422-2518; giera1@llnl.gov
Dr. Nilabh Roy, Canon Nanotechnologies, Austin, TX, USA. 512-363-2167; nroy@cnt.canon.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

Reliability Engineering and System Safety in Advanced Manufacturing

Sponsored by the ASME Manufacturing Engineering Division's
Quality and Reliability Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

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 industrial robots and human-robot collaborative manufacturing environments.
- Workplace safety and risk assessment in manufacturing environments.

Paper Submission

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Additional Symposium Activities

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

- Work to invite a high-profile keynote speaker.

Organizers

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

* The conference is collocated 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

Data-Enabled Modeling, Detection, Optimization, and Prognostics for Quality and Reliability Improvement of Advanced Manufacturing Systems

Sponsored by the ASME Manufacturing Engineering Division's
Quality and Reliability Technical Committee
2021 ASME International Manufacturing Science and Engineering Conference (MSEC)*
June 21-25, 2021
Virtual Conference
Hosted by the University of Cincinnati, College of Engineering and Applied Science

Technical Focus

Real-time data collection at various levels of advanced manufacturing systems becomes easier and more cost-effective, by benefitting from new sensing and information technologies. Massive data with complex spatial and temporal structures ('Big Data') provide great opportunities for improving modeling, detection, optimization, and prognostics. Meanwhile, it raises significant challenges on data analytics, system pattern recognition, feature learning, as well as quality and reliability engineering, because the data is usually high-dimensional, large-size, noisy and heterogeneous. There is a pressing need to develop systematic methodologies for big data analytics of advanced manufacturing systems. This symposium will focus on research advances in the areas of data-enabled modeling, detection, optimization, and prognostics for quality management and reliability improvement, and the application of such models to various advanced manufacturing systems. Such models will have a significant industrial impact by achieving better product quality, larger productivity, quicker identification of root causes for specific anomalies, higher reliability, and, ultimately, reduction of manufacturing costs through improved quality and reliability. Specific topics of interest include, but are not limited to:

- Advanced methods and tools for predictive modeling and process monitoring.
- Technical innovations in algorithms for detection, diagnosis, and prognostics.
- Real-time monitoring and control for system intelligence.
- Fusing physics-driven and data-enabled models for advanced manufacturing.
- Advanced machine learning approaches for quality and reliability engineering.
- Uncertainty quantification and system optimization for advanced manufacturing.
- Digital twin for advanced manufacturing simulation.
- Factory-level simulation and process flow optimization strategies.
- Model-based quality engineering and reliability engineering.

Paper Submission

Authors are encouraged to submit a full manuscript for review by **November 9, 2020**. ***Submissions will only be accepted via the conference website: https://event.asme.org/MSEC/***. No papers are to be submitted to the organizers. Only industry presenters have the option to present without a paper. Final revised manuscripts must be submitted by **March 26, 2021**. The copyright transfer form must be completed by **March 26, 2021**. The presenting author must register by **April 16, 2021** or the paper will be withdrawn from the conference proceedings. **High quality MSEC 2021 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 *ASME Journal of Manufacturing Science and Engineering* or the *ASME Journal of Micro and Nano Manufacturing*.

Additional Symposium Activities

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

- Organize a joint session between ASME-Manufacturing Engineering Division and INFORMS- Quality, Statistics, and Reliability Section.

Organizers

Dr. Xiaowei Yue, Virginia Tech, Blacksburg, VA, USA. 540-231-9081; xwy@vt.edu
Dr. Xiaolei Fang, North Carolina State University, Raleigh, NC, USA. 919-515-0312; xfang8@ncsu.edu
Dr. Mohammad Abubaker Nabhan, King Fahd University of Petroleum & Minerals, Saudi Arabia. nabhan@kfupm.edu.sa

* 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.