



David Dornfeld Manufacturing Vision Award and Blue Sky Competition

The Third Annual David Dornfeld Manufacturing Vision Award and Blue Sky Competition, funded by the National Science Foundation, will be held during the 2019 SME North American Manufacturing Research Conference (NAMRC) and ASME Manufacturing Science and Engineering Conference (MSEC), June 10-14, 2019 in Erie, PA.

The aim of this annual competition is to influence the future of manufacturing research and education in the United States through new visionary ideas of the future. Such visionary ideas are often described as “radical”, “outrageous”, “transformational”, “unconventional”, “convergent”, and “breakthrough”. Presentations should pose grand challenges to be addressed by pursuing the manufacturing research vision, describing the intersections between disparate disciplines necessary to advance that vision. Topical areas should extend beyond the scope of single investigator and show potential for transformative impact in areas of interest to federal agencies.

It is likely that team efforts will be needed to formulate such ideas. Therefore, interdisciplinary collaborations are encouraged, including disciplines outside of engineering.

Abstracts should be submitted by April 1, 2019 to Professor ZJ Pei at zjpei@tamu.edu. Each abstract should be up to one page in length, including the title. This one-page abstract should not include names of submitters and their affiliations. Such information should be included in the email.

Abstracts (without information of submitters) will be judged by a selection committee consisting of members from government and industry covering a broad range of manufacturing interests. About six abstracts will be selected to make oral presentations on Wednesday, June 12, 2019, during the NAMRC/MSEC conference in Erie, PA. Transportation, lodging (up to 2 nights), and conference registration expenses of selected speakers will be reimbursed through Texas A&M University.

The top presentation, determined by the selection committee, will receive the SME Dornfeld Manufacturing Vision Award to recognize outstanding vision and leadership. If appropriate, the winner will be encouraged to organize a workshop on their topic in the near future.

After the conference, SME will post links to presentation slides, so that the ideas can be disseminated broadly to the manufacturing community. Submitting an abstract for the competition requires that the submitters agree to publish their presentation slides through the SME website. Abstracts and presentations from last two years of competition have been posted at <http://www.sme.org/blue-sky-competition/>.

People who are interested in submitting abstracts to the competition are strongly encouraged to talk to Professors Brian Paul (brian.paul@oregonstate.edu), ZJ Pei (zjpei@tamu.edu), or Scott Smith (kssmith@uncc.edu), who will not be serving on the selection committee. It is the intent of the organizers to provide feedback and insight to abstract submitters in an effort to put forward the strongest ideas for advancing manufacturing research in the United States.

2017 Competition Results



Winner

Biomimetic Manufacturing

Tony Schmitz – University of North Carolina at Charlotte, Charlotte, NC

Other Finalists

A Manufacturing Process Compiler (MPC) — Vision for a Futuristic Manufacturing Paradigm

Jian Cao – Northwestern University, Evanston, IL

Achieving "Just Press Print" for Metal Additive Manufacturing

Wayne King – Lawrence Livermore National Laboratory, Livermore, CA

Digital Volumetric Processing Using High Performance Computing

Thomas Kurfess – Georgia Institute of Technology, Atlanta, GA

Interactive Virtual Hands-On Manufacturing

Martin Jun – Purdue University, West Lafayette, IN

Next Generation Agile Manufacturing to Enable "Point of Use" Customization for Complex Vehicles

Bill Harris – Sikorsky Aircraft Corp., Stratford, CT

Sharing for Agility

Mike Vogler – Caterpillar Inc., Peoria, IL

The Global Human-Machine Neural Network

Joel Neidig – ITAMCO, Plymouth, IN

The Internet of Skills: Online Virtual Simulators for Skilled Trades

Mark Mills – Northwestern University, Evanston, IL

2018 Competition Results



Winner

3D Printing for Civil Infrastructure Construction

Alaa Elwany, Negar Kalantar, Stephanie Paal, Zachary Grasley, and Zofia Rybokowski – Texas A&M University, College Station, TX

Runners-up

Factories-In-Space

Ajay Malshe – University of Arkansas, Fayetteville, AR; and *Harsha Malshe* – California

Personalized Manufacturing: Psychology and Sociology as Fundamental Design Elements in Future Advanced Production Systems

Laine Mears, Farbod Akhavan Niaki, Eric Muth, Richard Pak, and Laura Stanley – Clemson University, Clemson, SC

Other Finalists

Distributed Decentralized Rural Agile Manufacturing

Joel Neidig – ITAMCO, Plymouth, IN

Global Distributed Manufacturing of Personalized Products as a Service

Albert Shih – University of Michigan, Ann Arbor, MI

Just-in-Time Learning for the Factory Floor

Jeffrey Reed – Virginia Tech, Blacksburg, VA

Metamorphic Manufacturing: The Third Wave in Digital Manufacturing

Glenn S Daehn – The Ohio State University, Columbus, OH; and *Alan Taub* – University of Michigan, Ann Arbor, MI



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Advanced Manufacturing Blue Sky Competition
Wednesday, June 12, 2019
Organizers: Zhijian (ZJ) Pei, Scott Smith, and Brian Paul

This is the third David Dornfeld Manufacturing Vision Award and Blue Sky Competition, with funding from NSF. It aims to identify areas for emphasis in manufacturing research and education, and to catalyze support for a vision of the future of US manufacturing. The selection committee is responsible for choosing finalists (from submitted abstracts) to make presentations at the sessions on June 12, 2019, and selecting the recipient of the David Dornfeld Manufacturing Vision Award from these presentations.

The selection committee members are:

- AFOSR: Sofi Bin-Salamon (Program Manager, Biophysics)
- DARPA: Bradley Ringeisen (Deputy Director, Biological Technology Office)
- DARPA: John A. Main (Program Manager, Defense Sciences Office)
- DoD: A. Adele Ratcliff (Director, Manufacturing Resiliency & Assurance and Industrial Base Analysis & Sustainment)
- DoE: Rob Ivester (Director, Advanced Manufacturing Office)
- NASA: John Vickers (Principal Technologist)
- NIST/AMNPO: Frank Gayle (Deputy Director, Office of Advanced Manufacturing)
- AAAS/Science: Mahlet Mesfin (Deputy Director, Center for Science Diplomacy)
- Boeing: Steve Walls (Technical Fellow, Production Engineering/Building Integration)
- DEKA Research and Development: Kristy Pottol (Strategic Development)
- GE: Dale Lombardo (Manufacturing Technology Manager, Structural Materials, GE Global Research Center)
- NCDMM: Ralph Resnick (President and Executive Director)
- Saint Gobain: Anand Tanikella (Vice President, R&D Abrasives Worldwide)

Sofi Bin-Salamon

**Program Manager, Biophysics program
Air Force Office of Scientific Research (AFOSR)**



Sofi Bin-Salamon received his PhD in Chemistry at North Carolina State University in 2005. He then served as a National Research Council Research Associate in the Chemistry Division at US Naval Research Laboratory where he developed nanoelectronic materials. Afterwards, he expanded his work on materials chemistry to include photodynamic therapy. This was initially performed in the Department of Chemistry at Texas A&M University and later continued at the Radiation Oncology Branch within the National Cancer Institute/National Institutes of Health. Sofi has served as an American Association for the Advancement of Science Fellow and Program Manager at the AFOSR International Office. He currently is the Program Manager of the AFOSR Biophysics program.

Frank W. Gayle

**Deputy Director, Advanced Manufacturing National Program Office (AMNPO)
Deputy Director, NIST Office of Advanced Manufacturing
National Institute of Standards and Technology (NIST)**



Frank W. Gayle is the Deputy Director of the Office of Advanced Manufacturing at the National Institute of Standards and Technology (NIST). NIST's Office of Advanced Manufacturing is responsible for extramural advanced manufacturing programs and serves as a liaison to industry and academia. The interagency Advanced Manufacturing National Program Office is headquartered at NIST and coordinates federal activities in advanced manufacturing, and is the Congressionally-designated National Program Office for Manufacturing USA[®]. Dr. Gayle's past

roles at NIST include serving as Division Chief of the NIST Metallurgy Division, where he developed programs in energy, microelectronics, and mechanical properties, focusing on measurement needs for industry. Frank also led the team of technical experts on the forensics of structural steel in the Congressionally mandated NIST investigation of the World Trade Center disaster on September 11, 2001. Prior to joining NIST, Frank spent 11 years in the aerospace industry. He is a Fellow of SME and ASM International. Frank earned an Sc.D. in Materials Science from the Massachusetts Institute of Technology, and degrees in Civil and Mechanical Engineering from Duke University.

Rob Ivester

**Director, Advanced Manufacturing Office
Office of Energy Efficiency and Renewable Energy
Department of Energy (DoE)**



Robert W. Ivester currently serves as the Director of the Advanced Manufacturing Office (AMO) in the Office of Energy Efficiency and Renewable Energy. AMO is focused on creating a fertile innovation environment for advanced manufacturing, enabling vigorous domestic development of new energy-efficient manufacturing processes and materials technologies to reduce the energy intensity and life-cycle energy consumption of manufactured products. Prior to this position, he served as the AMO Deputy Director for five years. During that time, AMO launched five Manufacturing USA Institutes, the Critical Materials Hub, and hundreds of small R&D and technical assistance projects across the Nation. He also worked at the National Institute of Standards and Technology for over 16 years, leading and performing research in advanced manufacturing. He has been an instructor for the Johns Hopkins University Engineering for Professionals program for graduate-level studies in manufacturing engineering since 2001. He is a Fellow of SME and the American Society of Mechanical Engineers. He received his doctorate in engineering, a Bachelor of Science in Mechanical Engineering, and Master of Science in Manufacturing Engineering from the University of Massachusetts at Amherst.

Dale Lombardo

**Manufacturing Technology Manager
Structural Materials
General Electric Global Research Center**



Dale Lombardo leads a diverse team of manufacturing technologists working across GE's broad product portfolio. His team links materials to design to customers through a variety of processes including machining, joining, and inspection. Dale's team expands the envelope of conventional manufacturing and incorporates novel and non-conventional methods (e.g. electro-thermal, electro-chemical, and lasers) into GE's toolkit of how its parts are or will be made. Dale graduated from Rensselaer Polytechnic Institute with both BS & MSME with a specialization in Mechatronics & Controls. He joined GE Global Research developing control strategies for machining as a special process for GE Aviation. After that, Dale worked for GE Aviation and expanded to more general in-process machining monitoring and led GE's Shot Peening Special Process team globally for GE jet engines and co-chaired the startup of the PRI/Nadcap criteria for peening special process supplier supervision still in use today. Dale was then part of a Manufacturing Technology startup organization within the GE Power business and expanded his surface treatment technologies expertise to include surface finishing and surface measurement. Dale is a member of the ASME B46 committee on Surface Texture. He holds multiple patents in a broad array of manufacturing related disciplines. Dale lives in upstate New York where he is also a volunteer and mentor in the local school district and supports STEM activities through Invention Convention. Dale represents GE for RPI's MILL: Manufacturing Innovation Learning Laboratory and supports their Senior Capstone Design class.

John A. Main
Program Manager
Defense Sciences Office
Defense Advanced Research Projects Agency (DARPA)



John Main is currently a Program Manager in the Defense Sciences Office at DARPA where he is responsible for initiating new research programs in the physical sciences and fostering the

communities that support those programs. Previously, John worked at technology startup Intific Inc., initially as an Executive Producer developing software products and ultimately as the company's first Chief Operating Officer. His academic credentials include stints as an Associate Professor of Mechanical Engineering at the University of Kentucky and an Assistant Professor at the University of Maine. He also founded Precision Systems and Instrumentation LLC in 2001, which is a company that designs, manufactures, sells, and supports instrument systems used in spinal cord and head trauma injury research. John received his Doctor of Philosophy and Master of Science in mechanical engineering from Vanderbilt University and his Bachelor of Science in physics and mathematics from Western Kentucky University. In 2008, John was awarded the Office of Secretary of Defense Medal for Exceptional Public Service.

Mahlet Mesfin

Center for Science Diplomacy

American Association for the Advancement of Science (AAAS)



Mahlet Mesfin is the deputy director of AAAS's Center for Science Diplomacy, where she serves as a key adviser on areas related to science diplomacy, is responsible for the planning and implementation of science diplomacy initiatives and projects, and serves as the executive editor of the quarterly open-access policy journal *Science & Diplomacy*. Prior to joining AAAS, she was the Assistant Director for International Science and Technology (S&T) at the White House Office of Science and Technology Policy (OSTP). She led the strategic planning, coordination, and execution of the S&T-focused engagements under the responsibility of the U.S. President's Science Advisor, including with those with China, Japan, India, South Korea, Brazil and the G7 Science Ministers, and championed S&T as an element of the broader U.S. government's foreign policy agenda. Mahlet entered the government through the AAAS S&T Policy Fellowship program, where she worked in the Basic Research Office at the U.S. Department of Defense on various projects related to the oversight of the DoD's basic research investments. She was also a policy fellow at the U.S. National Academy of Sciences and Engineering. She received a Ph.D. in bioengineering from the University of Pennsylvania, and a M.S.E. in biomedical engineering and B.S.E. in chemical engineering from the University of Michigan.

Kristy Pottol

Strategic Development

DEKA Research and Development



Kristy Pottol works at DEKA Research and Development to speed health security projects for Health and Human Services priorities. Kristy comes to DEKA after a long career serving the Department of Defense. Recent highlights include Regenerative Medicine Project Manager and development of an advanced tissue biofabrication Manufacturing USA program. Kristy is a certified Defense Acquisition Professional Program Management Level 3 and Project Management Professional. She has worked in project management, biotechnology product development, FDA quality systems, business operations, and strategic communications for over 15 years and has an extensive and varied background in product development projects for militarily-relevant medical solutions from vaccines to devices. Kristy is a former US Navy Hospital Corpsman. She holds a MBA from Regis University, a MS in Accounting with emphasis on Information Systems from the UNC Wilmington, and a BS Physics with an emphasis in biophysics from East Carolina University.

A. Adele Ratcliff

Director, Manufacturing Resiliency & Assurance (MRA) & Industrial Base Analysis & Sustainment (IBAS)

Office of the Deputy Assistant Secretary of Defense (ODASD) for Manufacturing and Industrial Base Policy (MIBP)

Department of Defense



Adele Ratcliff is currently the Director of the Manufacturing Resiliency & Assurance office and the Industrial Base Analysis & Sustainment Program (IBAS) within the Office of the Deputy Assistant Secretary of Defense (ODASD) for Manufacturing and Industrial Base Policy (MIBP). During her tenure in ODASD, she has focused on building strong interagency partnerships to address broad transition of manufacturing issues such as manufacturing readiness and the Advanced Manufacturing Enterprise. Her current position uses the broad authorities of the

IBAS program element to enable a modern Industrial Base that integrates traditional and emerging sectors to be able to respond at will to National Security Requirements. Most recently, as the Director of the DoD Manufacturing Technology (ManTech) Program, Adele led the effort in establishing the DoD's national Manufacturing Innovation Institutes (MIIs) outlined in the President's 2013 State of the Union address, now known as Manufacturing USA Institutes. She has a long acquisition career, including Program Manager for the congressionally mandated Defense Acquisition Challenge Program, Deputy Program Manager for the Foreign Comparative Test Program, and more than eleven years in Air Force Test and Evaluation at Eglin Air Force Base in Florida. As Test Manager, she guided the Air Force's Wind Corrected Munitions Dispenser test program (better known as WCMD), from prototype through the production and deployment phase of the Platform, earning her the Air Force Materiel Command Test Engineer of the Year Award. More importantly, her efforts transitioned this Platform to support the Warfighter in the initial phases of Operation Enduring Freedom. She is a proud alumnus of the Mississippi State University Bulldogs, earning a BS in Mechanical Engineering in 1988. In 2011 she graduated from the U.S. Army War College (in-residence) earning a MS in Strategic Art and graduated from the DoD's Defense Senior Leadership Development Program (DSLDP). She received the Secretary of Defense (SECDEF) Award for Excellence for her support of the Pilot Institute for Additive Manufacturing in March 2013.

Ralph Resnick

**President and Chief Executive Officer, NCDMM and
Founding Director, America Makes**



Ralph Resnick joined NCDMM in September 2008 as Vice President, Chief Technology Officer with over 35 years of manufacturing experience. The NCDMM is a not-for-profit 501(c)3 company whose mission is to proactively engage with all branches of the U.S. military and its industrial base to control cost and improve productivity and performance of manufactured parts and assemblies. He assumed President & Executive Director in May 2011 and led the NCDMM to winning the competitive National Additive Manufacturing Innovation Institute (NAMII) contract. Upon award, he also assumed the role of Acting Director of America Makes (formerly known as NAMII) until February 2013 when the new director was appointed. Prior to joining NCDMM, he served as Chief Technology Officer for both The Ex One Corporation and Extrude Hone where he helped establish Extrude Hone and Ex One as leaders in advanced manufacturing. He holds several patents in manufacturing processes and metrology. He serves on the Board of Directors of SME and former member of SME's International Awards and Recognition Committee. In 2010, he received the NAMRI/SME "Outstanding Lifetime Service Award". He also serves on the Board of the Association for Manufacturing Technology (AMT); MTConnect Institute Board of Trustees; Advisory Board for CANRIMT and HI-AM Network of the Natural Sciences and

Engineering Research Council of Canada; Former Board member of the National Center for Manufacturing Sciences (NCMS); the Louisiana Center for Manufacturing Sciences (LCMS); Former Chairman of the National Defense Industrial Association (NDIA); NIST Smart Machining Consortium; Navy Metalworking Center's (NMC) Industry Advisory Board; DoD's JDMTP Metals Subpanel; and the prestigious International Institution for Production Engineering Research (CIRP). Locally, he is active in the Board of Directors for the Central Allegheny Challenger Learning Center (CACLC) in Indiana County; the Westmoreland-Fayette Workforce Investment Board; and the Westmoreland Heritage Trail.

Brad Ringeisen

Deputy Director

Biological Technologies Office (BTO)

Defense Advanced Research Projects Agency (DARPA)



Brad Ringeisen joined DARPA as the Deputy Director of BTO in December 2016. Before coming to DARPA, he was the Head of the Bioenergy and Biofabrication Section at the U.S. Naval Research Laboratory (NRL) where he oversaw diverse research programs including the development and application of laser-assisted printing approaches to biology, development of organs-on-a-chip, microbial energy harvesting and extracellular electron transfer as well as microbial discovery and microbiome characterization. His personal research focused on using a variety of novel laser-based processing tools to deposit patterns and 3D structures of biological materials including living cells, fixed tissue, solid-phase environmental samples, and biopolymers. He was also the Chief Technology Officer for the DoD's Advanced Technology Biofabrication Manufacturing Innovation Institute. From 2012 to 2014, Brad was detailed at the Defense Threat Reduction Agency (DTRA) Joint Science and Technology Office as a science and technology manager, where he oversaw the development of field-forward diagnostic technology with wireless connectivity to the cloud. He is a pioneer in the field of live cell printing, having demonstrated the first living bacteria and mammalian cell printing experiment using modified laser-induced forward transfer (LIFT) technology in the early 2000s. He is a named inventor on thirteen patents, eight involving modifications to LIFT for biological applications. He has published over 65 peer-reviewed manuscripts and has edited a book on cell and organ printing. Throughout his career, he has worked across the Department of Defense (DoD) research enterprise having performed research for the Air Force Office of Scientific Research (AFOSR), the Office of Naval Research (ONR), DARPA, and the Defense Threat Reduction Agency (DTRA) in addition to his internal programs at NRL. Brad received a Doctor of Philosophy in physical chemistry from the University of Wisconsin-Madison and a Bachelor of Science in chemistry from Wake Forest University. He was named the DoD Lab Scientist of the

Quarter in December 2015 for his achievements in applying bioprinting to the fields of tissue engineering and microbial ecology.

Anand Tanikella

Vice President R&D

Saint Gobain Abrasives Worldwide



Anand Tanikella is currently the worldwide Vice President of R&D for Saint Gobain Abrasives based in Massachusetts, USA. Prior to this, Anand was the founding Director of Saint Gobain Research India, a newly setup 7th transversal R&D center in Chennai, India. Anand joined Saint-Gobain in 1996 in USA as a Senior Research Engineer in Saint Gobain North American R&D Center in Northborough, MA in Boston area. He held various positions with increasing responsibilities during the past 21 years conducting breakthrough R&D in technologies related to ceramics, abrasives, plastics and various construction materials. He is passionate about Technology management and bringing out profitable Innovations, as well as about influencing the Impact of Engineering Education on Industrial Innovation. Anand received a Ph.D. in Materials Science & Engineering and Precision Engineering from North Carolina State University in 1996 and a B.S. in Mechanical Engineering from Andhra University, India. He has authored numerous international journal publications and holds over 15 patent families with several in process. Throughout his career, he has been active in technology education and was a part time faculty member at Northeastern University in Boston, Massachusetts.

John Vickers

Principal Technologist

Space Technology Mission Directorate

National Aeronautics and Space Administration (NASA)



John Vickers serves as the principal technologist in the area of advanced materials and manufacturing within the Space Technology Mission Directorate at NASA Headquarters. He also serves as the associate director of the Materials and Processes Laboratory at the NASA Marshall Space Flight Center and as the manager of NASA's National Center for Advanced Manufacturing with operations in Huntsville, Alabama and New Orleans, Louisiana. He has over 30 years of experience in materials and manufacturing -- research and development, engineering, and production operations for propulsion, spacecraft, and scientific space systems. As principal technologist, he leads the nationwide NASA team to develop advanced manufacturing technology strategies to achieve the goals of NASA's missions. He is the Agency representative to the National Science and Technology Council, Subcommittee on Advanced Manufacturing and the Subcommittee on Critical and Strategic Mineral Supply Chains. He is a founding member of the Manufacturing USA - National Network for Manufacturing Innovation program and the Interagency Advanced Manufacturing National Program Office. His many awards include NASA's Exceptional Achievement Medal, NASA's Outstanding Leadership Medal and the AIAA Holger Toftoy award. He is a fellow of SME. He holds a Bachelor of Science in Engineering from the University of Alabama in Huntsville.

Stephen A. Walls
Senior Production Engineer and Technical Fellow
The Boeing Company



Steve Walls provides production engineering build architecture expertise that advances production technologies and supports the long-term vision of the company and the Boeing engineering and scientific communities. In this role he advances design processes to enable advanced product and production system definition and development. For 30 years Steve has provided definition and advances in the specialty field of large scale structural integration of

commercial transports (747, 767, 777, and 787) – specifically dimensional engineering and management. Steve's current technical focus is in the application of systems engineering science to the new design of full scope production system architecture for commercial air transport development programs. Specifically this includes adaption of Petri Net modeling for developing and analyzing a worldwide distributed production system, establishment of a multi-domain production system analytical framework in support of design maturity and trade study efforts, and establishing a baseline system concepts definition for Boeing Production Systems, culminating in a rich validated set of Production System requirements and measures.