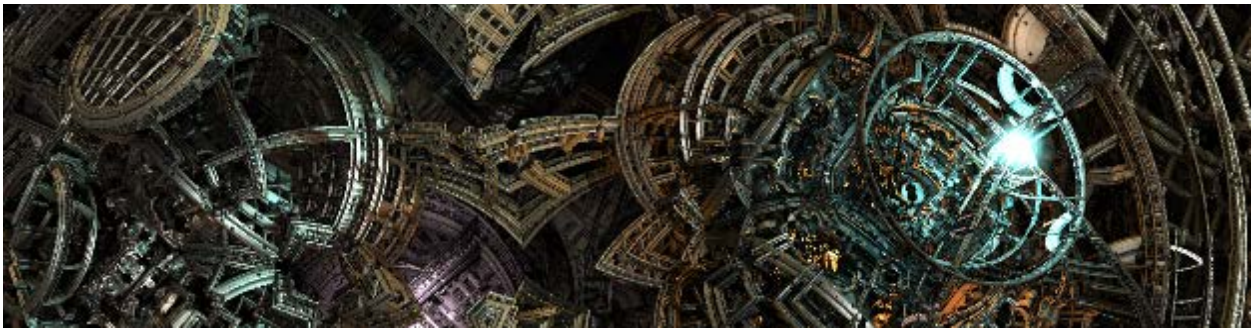
Convergent Manufacturing

A Future of Additive, Subtractive, and Transformative Manufacturing:

A Virtual Workshop



November 15, 19, and 22, from 10:30 to 3:00 pm EST

Please register at: http://convergent-manufacturing.eventbrite.com

The National Academies of Sciences, Engineering, and Medicine (NASEM) and the National Materials and Manufacturing Board (NMMB) invite you to a workshop on convergent manufacturing. The workshop, open to the public, addresses selected issues associated with research and development leading to convergent manufacturing capability for heterogeneous materials, processes, and systems. In particular, the workshop will focus on three topical areas, as follows:

- Key subject areas for R&D investments that will enable the readiness and commercial development of convergent manufacturing capabilities in the United States;
- Potential application areas for convergent manufacturing, with an emphasis on future Army and related civilian applications;
- Approaches for designing a convergent manufacturing platform

The workshop is using a mix of individual presentations, panels, and question-and-answer sessions to develop an understanding of the relevant issues. An individually-authored Workshop Proceedings will be prepared by a designated rapporteur.

Visit the planning Academy committee here: https://www.nationalacademies.org/our-work/convergent-manufacturing-platform-a-future-of-additive-subtractive-and-transformative-manufacturing-a-workshop

Program Overview

Day	Day 1 November 15, 2021	Day 2 November 19, 2021	Day 3 November 22, 2021
Start Time (EST)	**Design – Materials** (Resilient Design & Multifunctional Materials)	**Processes** (Process Hybridization in One Platform)	**Systems & Supply Chain** (Looking beyond Industry 4.0, Going to 5.0)
10:30	Introduction	Introduction	Introduction
10:40	**Keynote Presentation** Defense - Technology	**Keynote Presentation** Democratization of Innovation	**Keynote Presentation** Equity
11:15	**Panel** Multifunctional Materials Design	**Panel** Hybrid Manufacturing Processes	**Panel** Systems and Part Design at the Point of Need
12:30	Break	Break	Break
1:00	**Panel** Heterogeneous Materials Interfaces	**Panel** Design and Modelling of Hybrid Manufacturing Processes	**Panel** Supply Chain and Sustainability
2:15	Open Q&A Session	Open Q&A Session	Open Q&A Session
2:45	Closing Remarks	Closing Remarks	Closing Remarks
3:00	Adjourn	Adjourn	Adjourn

Convergent Manufacturing: A convergent manufacturing platform is defined as a system that converges heterogeneous materials and processes (additive, subtractive and transformative) in one platform, yielding functional devices and components for systems as an output, while equipped with unprecedented modularity, flexibility, connectivity, re-configurability, portability, and customization capability; all aided by Industry 4.0 principles. The manufacturing system also converges the integration of physical and digital components along with the sensor networks for process monitoring and production. This type of future manufacturing platform is the focus of this workshop.

Day	Day 1 – Monday, November 15, 2021
Time (EST)	**Design - Materials** (Resilient Design and Multifunctional Materials)
10:30	Introduction by **Ajay Malshe,** Purdue University
10:40	Keynote Presentation **Defense - Technology** **Commanding General Darren L. Werner** US Army Tank-automotive and Armaments Command, Army Materiel Command Speaker introduction by **Ajay Malshe**, Purdue University Q&A led by **Tom Kurfess**, Oak Ridge National Laboratory
11:15	Panel 1 **Multifunctional Materials Design** Speaker introductions by **Jian Cao**, Northwestern University Q&A led by **Christina Baker**, PPG industries Panelists: • **Charles Kuehmann**, Tesla/SpaceX • **Julia Greer**, Caltech • **Wei Chen**, Northwestern University • **LaShanda Korley**, University of Delaware
12:30	Break 30 min
1:00	Panel 2 **Heterogeneous Materials Design** Speaker introductions by **Christina Baker**, PPG industries Q&A led by **Jian Cao**, Northwestern University Panelists: • **Carolyn Duran**, Intel • **Abhir Adhate**, Sentient Science • **Vinayak Dravid**, Northwestern University • **Kimani Toussaint**, Brown University
2:15	Day 1 Open Q&A Session Q&A led by **Sandra DeVincent Wolf**, Carnegie Mellon University
2:45	Closing Remarks by **Tom Kurfess**, Oak Ridge National Laboratory
3:00	Adjourn

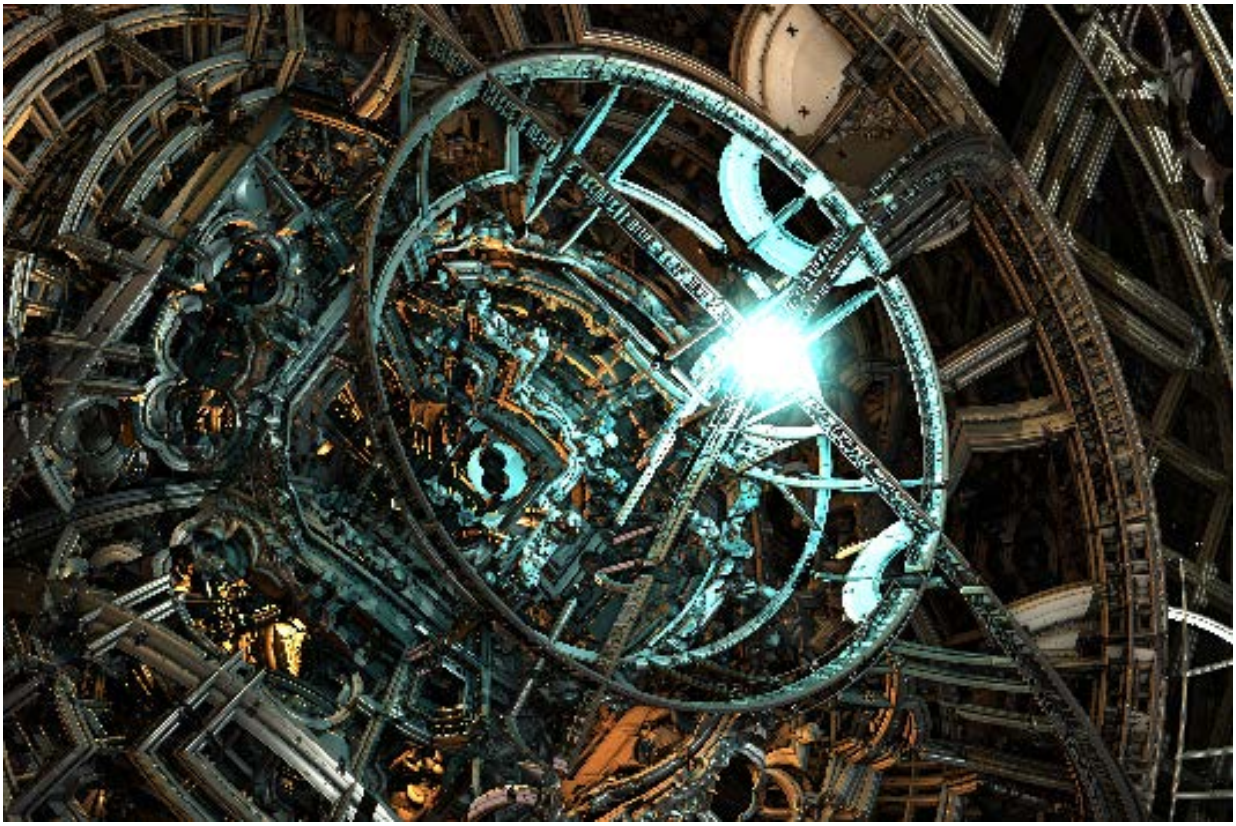
Day	Day 2 – Friday, November 19, 2021
Time (EST)	**Processes** (Process Hybridization in One Platform)
10:30	Introduction by **Tom Kurfess**, Oak Ridge National Laboratory
10:40	Keynote Presentation **Democratization of Innovation** **Tracy Frost** Director, OSD ManTech and DoD Manufacturing USA Institutes Speaker introduction by **Tom Kurfess**, Oak Ridge National Laboratory Q&A led by **Ajay Malshe**, Purdue University
11:15	Panel 3 **Hybrid Manufacturing Processes** Speaker introductions by **Cambre Kelly**, Restor3d, Inc Q&A led by **Sudarsan Rachuri**, Department of Energy Panelists: • **Michael Sealy**, Purdue University • **Aaron Stebner**, Georgia Tech • **Brian Paul**, Oregon State University • **Mary Clare McCorry**, ARMI BioFabUSA
12:30	Break 30 min
1:00	Panel 4 **Design and Modelling of Hybrid Manufacturing Processes** Speaker introductions by **Sudarsan Rachuri**, Department of Energy Q&A led by **Cambre Kelly**, Restor3d, Inc Panelists: • **Julie Chen**, University of Massachusetts Lowell • **Mark Benedict**, AFRL • **Paul Witherell**, NIST • **John Keogh**, LIFT
2:15	Day 2 Open Q&A Session Q&A led by **Amy Peterson**, University of Massachusetts Lowell
2:45	Closing Remarks by **Ajay Malshe**, Purdue University
3:00	Adjourn

Day	Day 3 – Monday, November 22, 2021
Time (EST)	**System and Supply Chain** (Looking beyond Industry 4.0, Going to 5.0)
10:30	Introduction by **Ajay Malshe**, Purdue University
10:40	Keynote Presentation **Equity** **Lonnie J Love** Corporate Fellow Energy & Transportation Science Division, Oak Ridge National Laboratory Speaker introduction by **Ajay Malshe**, Purdue University Q&A led by **Tom Kurfess**, Oak Ridge National Laboratory
11:15	Panel 5 **Systems and Part Design at the Point of Need** Speaker introductions by **Chris Saldana**, Georgia Institute of Technology Q&A led by **Craig Arnold**, Princeton University Panelists: • **Scott Reese**, Autodesk • **Lisa Strama**, National Center for Manufacturing Sciences (NCMS) • **Glaucio Paulino**, Princeton University • **Levent Burak Kara**, Carnegie Mellon University • **Nancy Currie-Gregg**, Texas A&M University
12:30	Break 30 min
1:00	Panel 6 **Supply Chain and Sustainability** Speaker introductions by **Craig Arnold**, Princeton University Q&A led by **Chris Saldana**, Georgia Institute of Technology Panelists: • **Erica Fuchs**, Carnegie Mellon University • **Alex King**, Critical Materials Institute • **Shreyes Melkote**, Georgia Tech • **John Vickers**, NASA
2:15	Open Q&A Session Q&A led by **Francisco Medina**, University of Texas at El Paso
2:45	Closing Remarks by **Ajay Malshe**, Purdue University and **Tom Kurfess**, Oak Ridge National Laboratory
3:00	Adjourn

For more information contact:

Erik Svedberg
Senior Program Officer
National Materials and Manufacturing Board
The National Academies of Sciences, Engineering, and Medicine
Email: ESvedberg@nas.edu
http://sites.nationalacademies.org/DEPS/NMMB/index.htm

The National Academies of
SCIENCES · ENGINEERING · MEDICINE



Please register at: http://convergent-manufacturing.eventbrite.com