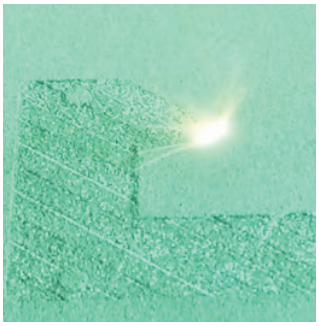
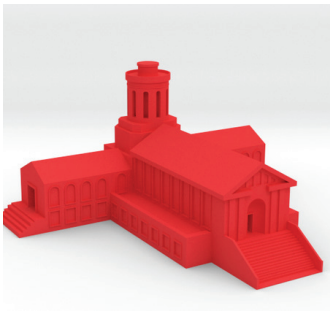
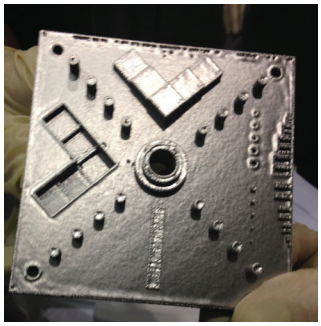
Carnegie Mellon University







NEXTMANUFACTURING CENTER

THE NEXTMANUFACTURING CENTER INTEGRATES RESEARCH FROM DISCIPLINES ACROSS THE COLLEGE OF ENGINEERING FOR COLLABORATION AND SYNERGY. MAKING USE OF THE INNOVATIVE FACILITIES IN THE NEW MAKERWING OF HAMERSCHLAG HALL, NEXTMANUFACTURING WILL ENABLE CREATIVE, HANDS-ON PROBLEM-SOLVING IN A LEARNING-BY-DOING ENVIRONMENT THAT WILL PREPARE STUDENTS AND POSITION CARNEGIE MELLON UNIVERSITY FOR LEADERSHIP IN ADVANCED MANUFACTURING.

"This [metal additive manufacturing] technology is just emerging and we are on the forefront of incorporating it into our curriculum so that our engineering students get not only the traditional machine shop experience but also this high-end, new technology experience in 'maker to metal' technology."

JACK BEUTH, Center Director

The NextManufacturing Center is a collaboration of faculty, students, research, projects, and training and outreach programs across the College of Engineering that will facilitate hands-on learning opportunities for students, researchers and community members. Capitalizing on the facilities and capabilities within the MakerWing of Hamerschlag Hall, it will provide opportunities to develop NextTools to improve manufacturing processes; introduce NextCourses to support middle and high school outreach efforts and undergraduate education programs; and provide NextTraining for high school teachers and the industrial workforce. It is a test bed for developing new tools and methods for a broad range of complex engineering processes and is the next step in additive manufacturing research at Carnegie Mellon University.

CENTER FOCUS AREAS

- Additive Manufacturing Robotics and Automation
- Bio and Electronic Applications
- Design and Process Planning
- Innovative Component Fabrication by Additive Manufacturing
- Powder and Part Properties
- Powder Spreading, Surface Properties and Finishing
- Process Modeling and Process/ Property Relationships
- Technology Commercialization Modeling, Global Manufacturing and Policy

EDUCATION AND OUTREACH INITIATIVES

- High School Teacher Training
- Workforce Training
- Middle and High School Outreach
- Undergraduate Education

Fast Facts

- The 3D metal additive manufacturing process is an extremely sophisticated one. It requires specialized machines that fuse metal powders in either a laser powder bed or an electron beam powder bed. Carnegie Mellon University is one of only three academic institutions in the nation that has both laser powder bed and electron beam powder bed metal 3D printing capabilities.
- Additive Manufacturing for Engineers is a unique undergraduate course that integrates the business, design and engineering aspects of product development while introducing students to the additive manufacturing process. The course exposes students to polymer 3D printing as well as 3D metal additive manufacturing.
- The NextManufacturing Consortium provides opportunities for industrial partners to work with the additive manufacturing faculty on design and manufacturing issues using the shared space and facilities within the MakerWing.

Carnegie Mellon University
NextManufacturing Center

Center Directors

Jack Beuth, Director
Mechanical Engineering
Additive manufacturing process maps

Anthony Rollett, Associate Director
Materials Science and Engineering
Microstructure and powders

Additive Manufacturing Equipment

Metals

- Arcam EBM S12 Electron Beam Direct Manufacturing Machines (2)
- EOS M 290 Laser Sintering System

Polymers

- Objet350 Connex Multi-Material 3D Printer
- Stratasys Dimension Elite Fusion Deposition Modeling 3D Printers (2)
- CubePro Professional 3D Printers (5)

Metrology

- Freeman Tech FT4 Universal Powder Rheometer
- Infinite Focus G4 with Real 3D Surface Measurement System
- GF Machining Solutions | AgieCharmilles AC Progress VP3 Wire EDM Machine

FOR MORE INFORMATION ABOUT THE NEXTMANUFACTURING CENTER, PLEASE CONTACT:

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Center Faculty and Areas of Expertise

Chris Bettinger – Biomedical Engineering, Materials Science and Engineering
3D printing of soft materials and polymers for medical devices

David Bourne – Robotics Institute
Additive manufacturing robotics and automation

Jonathan Cagan – Integrated Innovation Institute, Mechanical Engineering
Design and optimization

Howie Choset – Robotics Institute
Path planning

Steve Collins – Mechanical Engineering, Robotics Institute
Rehabilitative devices

Kaushik Dayal – Civil and Environmental Engineering, Materials Science and Engineering
Property modeling

Gary Fedder – Electrical and Computer Engineering, Institute for Complex Engineered Systems
Nano/electronic additive manufacturing

Adam Feinberg – Biomedical Engineering, Materials Science and Engineering
Bioprinting

Erica Fuchs – Engineering and Public Policy
Global manufacturing, future technologies and government

Fred Higgs – Mechanical Engineering
Powder spreading

Liz Holm – Materials Science and Engineering
Machine vision applied to microstructures

L. Burak Kara – Mechanical Engineering
Design tools and methods

Philip LeDuc – Mechanical Engineering, Biological Sciences
Biomanufacturing

Jon Malen – Mechanical Engineering, Materials Science and Engineering
Phase change of thermal storage devices

Granger Morgan – Engineering and Public Policy
Regulation and public policy

Burak Ozdoganlar – Mechanical Engineering, Institute for Complex Engineered Systems
Micro/metrology

Chris Pistorius – Materials Science and Engineering
Solidification

Bryan Webler – Materials Science and Engineering
Process metallurgy

Lee Weiss – Robotics Institute
Bio/electronic additive manufacturing

Katie Whitefoot – Engineering and Public Policy, Mechanical Engineering
Economics and public policy

Shi-Chune Yao – Mechanical Engineering
Thermodynamics

Jessica Zhang – Mechanical Engineering
Geometric design