



From the Director ...

NCATC Friends and Colleagues,

NCATC has been working diligently the last few years with many advanced technology businesses, national organizations, and education leaders in the area of 3D Printing, Rapid Prototyping, and Additive Manufacturing (3DP/RP/AM).

With NCATC member institutions like Mott Community College, Gateway Technical College, Lorain County Community College, Cuyahoga Community College, Saddleback College, Sierra College, Fox Valley Technical College, Edmonds Community College, The Southeastern Institute of Manufacturing and Technology (SiMT), Westmoreland Community College, and Northampton Community College leading the way, we're tracking emerging and promising practices in the 3DP/RP/AM training arenas.

NCATC partners with some of the industry's best equipment manufacturers such as NextEngine, Stratasys, ExOne, Materialise, and others to connect them with our benchmarks in educational training programs. And, we continue to garner support from many of the best 3DP/RP/AM manufacturing companies across the landscape including Boeing, rp+m, Alcoa, TTI, Technology House, Parker, Eaton, Swagelok, NASA, and many others.

NCATC is working closely with America Makes: National Additive Manufacturing Innovation Institute, DOL, NSF, and the MAKE organizations (Dale Daugherty, CEO) to ensure our member network is linked to the best 3DP/RP/AM resources in the country. The industry is constantly evolving and we want our members to have access to best practices so resources can be shared and not re-invented.

Many of our sessions and strategic partners at upcoming NCATC events will continue to showcase the best 3DP/RP/AM curriculum, certificates, degrees, and CEU-based training programs in the country. Mark your calendars for the 2014 Summer Workshop hosted by Central Maine Community College in Auburn, Maine, June 11-13.

This year's Fall Conference will be in Houston, Texas, hosted by Lone Star College, October 8-10, 2014, and showcasing Lone Star's new Energy and Advanced Manufacturing Centers.

Last but not certainly not least, I invite you to visit NCATC's website at www.ncatc.org for continuous updates on our summer workshop, fall conference, and strategic partners. Feel free to send us suggestions for our website and social media outreach as we

continue to evolve our communications for the benefit of our members.

Wishing you a very successful 2014 and looking forward to seeing you at our NCATC national events this year.

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J. Craig McAtee

NCATC Executive Director ♦



MatEdU, Project TEAM Lead the Way in Additive Manufacturing Competency Development

NCATC member institution Edmonds Community College houses two valuable resources for the field of additive manufacturing in the form of the National Resource Center for Materials Technology Education (MatEdU) and Project Technician Education in Additive Manufacturing, funded by the National Science Foundation's Advanced Technological Education Program. Through a wide range of leadership and professional development activities, MatEdU is advancing materials technology education nationally. It serves as a focal point for collaboration among the materials community, industry, and educators as they strive to meet the needs of the materials technology workforce. MatEdU's website provides quick access to curriculum resources, professional development opportunities, and industry-approved and industry-accepted core competencies.



Scientists test the capabilities of an additive manufacturing printer to create a part in zero gravity conditions in an orbiting space station.

The MatEdU staff works closely with Edmonds Community College faculty on its Materials Science Technology (MST) degree program, the only associate's degree program of its kind in the State of Washington. Through targeted recruitment and outreach activities supported by MatEdU, the program has grown steadily and its graduates enjoy an extremely high job placement rate in the field of materials science. A key factor in the program's success is a unique, replicable educational internship model. The MatEdU staff was instrumental in the internship's design and implementation, producing a model that exposes students to high-tech materials testing and research labs over two summers. Both employers and students give high ratings to the internship model that has helped generate strong program completion rates as well as matriculation to bachelor's degree programs.

MatEdU's collection of modules, labs, and demonstrations supports educators across the country who are preparing technicians to understand a broad array of materials and their diverse uses. MatEdU's modules consist of hundreds of peer reviewed, classroom-

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ready materials on material science topics including metals, ceramics and glass, polymers/composites, biomaterials, and materials sustainability. The center's mentoring and instructional materials are helping colleges around the country add materials science to technician education programs. The MatEdU staff has also played important roles in curriculum development for K-12, creating the framework for materials science adopted by K-12 educators for the State of Washington.

Professional development for educators is also a key service provided by MatEdU. Through the National Educators Workshop (NEW), MatEdU serves two- and four-year college instructors, K-12 teachers, and industry representatives by sharing with workshop participants the latest developments in material science and technology while offering strategies for improving teaching techniques. The next NEW workshop is November 2-4 in Seattle and the *call for presentations* is currently open.



A Veterans Workshop participant carefully removes her designed and printed part from the build box on a Z-Corp 510 additive manufacturing printer.

Perhaps one of the most significant roles played by MatEdU is its current effort to develop Additive Manufacturing (AM) core competencies and replicable modules. Through a separate NSF grant, Project TEAM: Technician Education in Additive Manufacturing represents

an unprecedented opportunity for educators to be involved at the ground level of global standards development, focused on AM technician education. The project is designed to accelerate skills development by decreasing the lag time between global AM standards development, their translation into core competencies, active integration into curriculum, and their delivery in the classroom. Project TEAM is providing technical and educational input in the areas of terminology, test methods, processes, materials, and design that is facilitating the creation of AM core competencies. The work is a part of a larger partnership between SME and ASTM to undertake the effort to establish global standards for AM. The MatEdU/TEAM staff have been involved in the standards work from its inception and were instrumental in helping establish an Educational Working Group to focus on education and training concurrent with standards development and approval. The TEAM project's goal is to develop and disseminate core competencies for both the emerging workforce (students) and the incumbent workforce (working technicians). TEAM project personnel are part of ASTM's F-42 technical committee, tasked with identifying major areas of concern for the additive manufacturing technology industry, establishing subcommittees to identify and review standards, and achieving consensus among committee members to not only produce global standards but to continuously review and revise the standards as the industry evolves.

To learn more about the MatEdU Center, visit: <http://materialseducation.org/> or contact Mel Cossette, Principal Investigator, mel.cossette@edcc.edu. A white paper on Project TEAM's contributions to the global AM standards effort is also available for download. ◆

America Makes: The National Additive Manufacturing Innovation Institute Aims to Accelerate Additive Manufacturing Adoption and Innovation

President Obama has proposed building a National Network for Manufacturing Innovation (NNMI), consisting of regional hubs that will accelerate development and adoption of cutting-edge manufacturing technologies for making new, globally competitive products. These regional hubs—public-private partnerships called Institutes for Manufacturing Innovation (IMIs)—will help strengthen the competitiveness of U.S. manufacturers, initiate new ventures, and boost local and state economies. The President unveiled his plan for the NNMI in March 2012 and has since renewed his call for a nationwide network devoted to innovating and scaling advanced manufacturing technologies and processes. A significant investment by Congress is being matched by private and other non-federal funds to create a network that the President hopes will eventually encompass 45 IMIs over 10 years.

Over the past year, the Administration has made significant progress in planning the network and took the first step toward building this 21st century "industrial commons" by launching, through executive action, a pilot manufacturing institute as a public-private partnership. The competitively selected National Additive Manufacturing Innovation Institute (NAMII) was launched in August 2012. NAMII was established with an initial federal investment of \$30 million, using existing authorities in the Departments of Defense and Energy and other federal agencies. A consortium that includes manufacturing firms, universities, community colleges (all of which are NCATC member institutions), and non-profit organizations from the Ohio-Pennsylvania-West Virginia 'Tech Belt,' NAMII is led by the non-profit National Center for Defense Manufacturing and Machining (NCDMM). NAMII partners more than matched the federal investment, contributing almost \$40 million in support.



In October 2013 NAMII was rebranded as America Makes: The National Additive Manufacturing Innovation Institute and has a clear focus on helping the U.S. grow its capabilities and strength in 3D printing, also known as additive manufacturing.

Based in Youngstown, Ohio, America Makes is an extensive network of nearly 100 companies, non-profit organizations, academic institutions and government agencies from all over the U.S. Growing a workforce capable of designing, specifying, making and supporting 3D printed products is just as essential as advancing the technology. To meet that need, America Makes is working to gather, develop and maintain the nation's most complete resource library for training and education in 3D printing.

One of America Makes' greatest challenges is that today's technologies are developing at such a rapid pace that traditional curricular programs can't easily keep up. To augment those programs, America Makes is identifying and developing non-traditional programs that help inspire ingenuity, facilitate experience, and empower all. America Makes believes that our nation's success in educating students, the workforce and industry leaders about this technology requires a dynamic and connected community.

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Additive Manufacturing Resources

Numerous NCATC member institutions are leading 3D printing/additive manufacturing efforts in their communities. As the technology evolves and practices are scaled, more and more colleges will find themselves immersed in the industry. Below are resources from some of our partner organizations and industry leaders that offer information and provide food for thought.

- Sierra College publication – **Additive Manufacturing: Turning Mind into Matter**
<http://sierracollegegetraining.com/uploads/201307/sierra-college-cact-additive-manufacturing-report-and-recommendations-may2013.pdf>
- **ASTM Committee F42 on Additive Manufacturing Technologies** – <http://www.astm.org/COMMITTEE/F42.htm> and **Fact Sheet** – http://www.astm.org/COMMIT/F42_Fact_Sheet_2013_revised.pdf
- **America Makes** – <http://americamakes.us/>
- **United States FabLab Network** – <http://www.usfln.org>
- **MIT FabCentral** – fab.cba.mit.edu
- **Additive Manufacturing Fact Sheet** – <http://www.commerce.gov/news/fact-sheets/2012/08/15/fact-sheet-additive-manufacturing>
- **Makerspace Playbook** – School Edition
<http://makerspace.com/wp-content/uploads/2013/02/MakerspacePlaybook-Feb2013.pdf>
- Google+ Hangout held on September 27, 2013 – **The Future of Additive Manufacturing** – http://www.ge.com/research/live/additive_manufacturing/
- **A 3-D Printed World** Terry Wohlers at TEDx Traverse City May, 2013 – <http://www.youtube.com/watch?v=ARFq41GroZI>
- **Terry Wohlers' blog** – <http://wohlersassociates.com/blog/>



Tri-C Department of Labor Grant Focuses on Additive Manufacturing Curriculum

NCATC member institution Cuyahoga Community College (Tri-C) in Cleveland, Ohio, was awarded a \$2.5 million three-year grant from the U.S. Dept. of Labor titled “Engineering Innovation: Additive Manufacturing Curricula.” The objectives of the grant include revising or developing curriculum in two areas: [1] Digital Design and Product Innovation and [2] Digital Manufacturing and Product Launch.

The grant is focused on providing training to 200 new, displaced, and incumbent workers for the industry, awarding short-term certificates in each of the two areas above which when combined culminate in a one-year certificate of proficiency in 3D Digital Design & Manufacturing Technology.

NCATC is providing technical assistance that includes identifying best and promising practices in product development and Additive Manufacturing at institutions of higher education, ATCs, NSF ATE centers, and joint employer/education councils. Tri-C is focused on reducing time spent on curriculum revision and development by leveraging proven instructional materials created by partner institutions. NCATC is also helping Tri-C engage regional and national companies involved in Additive Manufacturing in a virtual advisory council, providing third-party project evaluation assistance, helping coordinate business and community forums, and providing guidance on facility design, program development, and marketing. ♦

Summer Workshop Offers Great Setting for Networking and Professional Development

This year's summer workshop in Maine offers an impressive line-up of keynote speakers, concurrent sessions and industry tours, all in the idyllic setting of Auburn, Maine. This is a summer workshop you will absolutely **not** want to miss! For program and schedule details, **download the workshop brochure** from the NCATC website. Don't delay — the Early Bird registration deadline is May 12.



Keynote Speakers

- Luke Livingston, Baxter Brewing Co.
- Rick Malinowski, HR Manager, Procter & Gamble
- Dr. Scott Knapp, President, Central Maine Community College

Industry Tours

- L.L. Bean Boot and Bag Manufacturing
- Poland Spring/Nestlé Waters North America
- Auburn Manufacturing Inc.



Sessions

Creating a Diverse Workforce in Manufacturing

Karen Wosczyzna-Birch, Executive Director, Regional Center for Next Generation Manufacturing

“The VOLT ... Transforming Student Potential into Workforce Muscle”

CMCC Faculty: Maurice Nadeau (Robotics), Kevin Latendresse (Electronics), and Jeff Joiner (Process Control)

After the Associate Degree: Multi-Axis Machining

CMCC Faculty: Devin Watson

Dealer Trax: A Partnership That Launches Automotive Students into Career Paths

CMCC Faculty: Carl G. Hinkley

Architectural Restoration Using 3D Technologies

David Kempskie, Senior Technology Consultant, Advanced Educational Technologies, LLC

Using e-Portfolio Software to Power Technical Education

CMCC Staff: James Feagin

Critical Scene Management During High Stress Situations in Law Enforcement

CMCC Faculty: Matt Tifft, David King ♦

NCATC Member Services Support Grants, Facilities and Programmatic Efforts

NCATC's member support encompasses a wide range of services, including grant evaluation and our Member Assistance Program. NCATC provides leadership, either through advisory committees or external evaluations, for the following member institution grants.

- NSF National Center – AMTEC (Automotive Mfg.), National Visiting Committee
- NSF Regional Center – RAMP (Advanced Mfg.), External Evaluation
- DOL TAACCCT – Cuyahoga Community College (3DP/RP/Additive Manufacturing), Technical Support
- NSF National Center, Weld-Ed (Welding Technicians), External Evaluation
- NSF National Center, NACK (Nano-Technicians), Advisory Committee
- NSF National Center, SpaceTEC (Aerospace Technicians), Strategic Partner
- DOE, Smart Grid Technician, University of Hawaii/HCC, External Evaluation

NCATC's Member Assistance Program, known as MAP, is a benefit that assists member colleges that are planning a new Advanced Technology Center or a significant enhancement or change for an existing ATC. NCATC team members provide analyses, recommendations, and guidance through services such as:

- Business and strategic plans
- Business and community forums
- Economic development surveys
- Facility design concepts and technology integration
- Management structures
- Marketing
- Program development

To learn more about engaging NCATC as a partner in one of the above service areas, please contact Craig McAtee, Executive Director, at ncatc1@gmail.com. ♦

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America Makes' focus is to accelerate the adoption of additive manufacturing technologies in the U.S. manufacturing sector and to increase domestic manufacturing competitiveness by:

- Fostering a highly collaborative infrastructure for the open exchange of additive manufacturing information and research.
- Facilitating the development, evaluation, and deployment of efficient and flexible additive manufacturing technologies.
- Engaging with educational institutions and companies to supply education and training in additive manufacturing technologies to create an adaptive, leading workforce.
- Serving as a national institute with regional and national impact on additive manufacturing capabilities.
- Linking and integrating U.S. companies with existing public, private or not-for-profit industrial and economic development resources, and business incubators, with an emphasis on assisting small- and medium-sized enterprises and early-stage companies (start-ups).

For more about America Makes, visit <http://americamakes.us>. ♦

CALL FOR PRESENTATIONS



2014 NCATC Fall Conference
October 8-10
Houston, Texas

Making It: Energizing the Manufacturing Workforce through Innovation



NCATC conferences are well-known for the sharing of ideas and exchanging of useful information both in breakout sessions and during networking time provided for attendees. Your willingness to be a presenter and to share your expertise and experiences makes NCATC conferences even more valuable. You are invited to submit a proposal for a forum session (60-minutes in length) that supports the conference theme of **Making It: Energizing the Manufacturing Workforce through Innovation** and focuses on one or more of the topics listed below or related issues.

Suggested topics for forum sessions include but are not limited to:

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| • Designing and investing in programs for emerging technologies | • Additive manufacturing |
| • Innovative funding strategies | • FabLabs |
| • Industry partnerships | • Grant-funded program innovation |
| • ATC planning, programming, and management | • STEM outreach programs |
| • Entrepreneurship and business incubation | • Integrated technologies |
| • Economic development partnerships | • Summer manufacturing camps |
| • Career Pathways and stackable credentials | • Robotics and automation |
| | • Modeling and simulation |

Presenters are strongly encouraged to engage session participants in hands-on activities and meaningful discussions in addition to providing tools participants can use immediately.

Audio/Visual Note: All breakout rooms will be equipped with a data projector and screen. You are responsible for bringing your own laptop and providing handouts.

Proposal Submission Deadline: June 9, 2014

To submit a proposal, visit www.ncatc.org.



Jason Scales of Lincoln Electric congratulates Raritan Valley Community College (NJ) as the lucky winner of Lincoln's MIG/TIG Stick Welder, valued at over \$9,000. As a Strategic Partner, Lincoln made the donation on behalf of NCATC at AACC's Workforce Development Institute in January.

