



From the Director ...

NCATC Friends and Colleagues,

Over the last three years the NCATC Board's leadership has continued to raise the bar of our mission to be "*your network of technical expertise*" in workforce development and emerging technologies that impact our future. To that end, we have formally and informally partnered with many of the National Networks of Manufacturing Innovation (NNMI) now called ManufacturingUSA. We have been and will continue to be actively involved with the workforce efforts of America Makes (3D/AM), LIFT (lightweight metals), DMDII (digital mfg. & design), NextFlex (flex-electronics), IACMI (composites), AIM (photonics), AFFOA (functional fabrics), and newly formed and awarded RIME-MII (robotics) and REMADE (clean energy).

NCATC also represents community and technical colleges on the MForeSight workforce commission led by renowned manufacturing workforce expert, Emily Stover DeRocco. MForeSight was established to inform and promote regular and sustained communication and research coordination across the public and private sectors for ideas about how to facilitate the creation of quality manufacturing jobs. To that end NCATC is responsible for collecting, sharing, promoting, and increasing the promising practices that our community and technical college members are involved with for the advanced manufacturing workforce education and development with industry. The very best promising practices are known as "*Gamechangers*" and are being shared with federal decision-makers to identify actionable solutions for the next Administration to boost innovation, enhance workforce training, and strengthen U.S. manufacturing competitiveness. NCATC will once again be reaching out to our members to share their "*Gamechanger*" success stories in early 2017.

And, the **Maker Movement** – *Democratizing Manufacturing* focused on inventors, programmers, designers, and tinkerers around the country—has already impacted how new products are designed and built, and how regions approach economic development with **STEaM** – adding the Arts to STEM. We will continue to encourage, promote, and share success stories of **STEaM** initiatives with Strategic Partners like **US FabLab Network**, **NIST/MEP**, **MForeSight**, and many others in 2017 as well.

As you know, NCATC has been an **Affiliated Council** of the **American Association of Community Colleges (AACC)** and active member of their **Economic and Workforce Development Commission** for nearly three decades. We hope you visit our booth and attend our session at **WDI 2017** in Newport Beach, CA, January 26-28, 2017.

Finally, the NCATC Board of Directors and Staff look forward to seeing all of you at the **2017 NCATC National Events**. Building on our partnership with the **Fabricators & Manufacturers Association (FMA)** we have redesigned our **Summer Workshop** and will be targeting more faculty / instructors as well as workforce administrators as we are hosted by **Madison Area Technical College (WI)**, **June 5-7, 2017**. And, we return to a 2-day, NCATC-focused **Fall Conference** this year – hosted by **Portland Community College (OR)**, **October 19-20, 2017**. Mark your calendars now!



We encourage you to stay regularly connected, via the NCATC website, social media, and quarterly e-newsletters like this one.

J. Craig McAtee, NCATC Executive Director ♦

An affiliated council of



Midlands Tech Helps Smithsonian Celebrate American Innovation

The University of Virginia, Princeton University and the Smithsonian's National Museum of American History have been piloting a unique method of teaching math, science, English and social studies to middle school students in an integrated environment that uses educational kits that are based on actual inventions from the Smithsonian's American Innovations in an Age of Discovery Collection. Successful results prompted the Smithsonian Institute in Washington D.C. to invite some of the students to participate in a special event at the museum during the White House's National Week of Making.

This week is a celebration of the American innovative and risk-taking spirit, during which hundreds of middle school students converge at the National Museum of American History to participate in recreating inventions from American History.



What they did not realize was that it would take almost a year to produce enough kit components for the hundreds of people that were expected to attend. Interestingly, they turned to Midlands Technical College in Columbia, SC to design and manufacture the components.

"The Smithsonian needed a whole bunch of parts that were reverse engineered from famous inventions," said Alan Grier, Program Coordinator for the Machine Tool and Mechatronics programs. "One was a solenoid [electromagnet] that was used in many inventions, including the Morse telegraph. MTC students designed and built the injection mold that would be used to make hundreds of solenoids for the middle school students to use with their projects."

See "Innovation," page 3

FLATE Partners with MSSC to Strengthen the High School Pipeline to Its ET Degree

Marilyn Barger, Executive Director, Florida Advanced Technological Education Center



The "Florida Plan" provides schools with student career pathway options. The Florida Department of Education maintains these choice contents through curriculum frameworks within career clusters. Schools can elect to offer a program in Advanced Manufacturing, named "Advanced Manufacturing Technology" [AMT], which resides in the Manufacturing Cluster. The AMT curriculum framework was developed by FLATE and is an occupationally-focused Career and Technical Education (CTE) pathway that is closely aligned with the Manufacturing Skills Standards Council (MSSC) skill set for the production technician workforce. MSSC is focused on training and rigorous assessing of the basic entry-level skills for manufacturing within four areas – Safety, Quality and Measurement, Manufacturing Processes and Maintenance Awareness regardless of the manufacturing sub-sector. Students in the AMT program are prepared to take the MSSC tests as part of their classroom curriculum. Unfortunately, as for many industry certifications that are embedded in classroom curriculum, not all students in a program take the certification tests.



FLATE has recently partnered with NCATC Strategic Partner, MSSC, to build capacity in the AMT programs in the coming year to improve the MSSC success rate of Florida high school students and to build capacity in the high schools teachers

delivering these programs. Additional funding from the National Science Foundation will also support this project. This work will include not only providing professional development for teachers but also engaging more industry, school districts, and other stakeholders to support the MSSC Certified

Production Technician credential with the expectation that more of our high school students will earn the full CPT credential. Possession of a current CPT makes the recipient eligible to articulate that credential to the A.S. Engineering Technology program with 15 credits.

FLATE also supports Project Lead The Way (PLTW) high school engineering programs in Florida. The PLTW curriculum is housed under a framework in the "Engineering and Technology Studies" (ETS) cluster. Although a Career and Technical Education (CTE) program, many college bound/academic students enroll in ETS programs to acquire a blend of academic and technical hands-on skills. Depending on the courses offered at a particular school, students earn both academic STEM credits as well as CTE credits toward graduation.

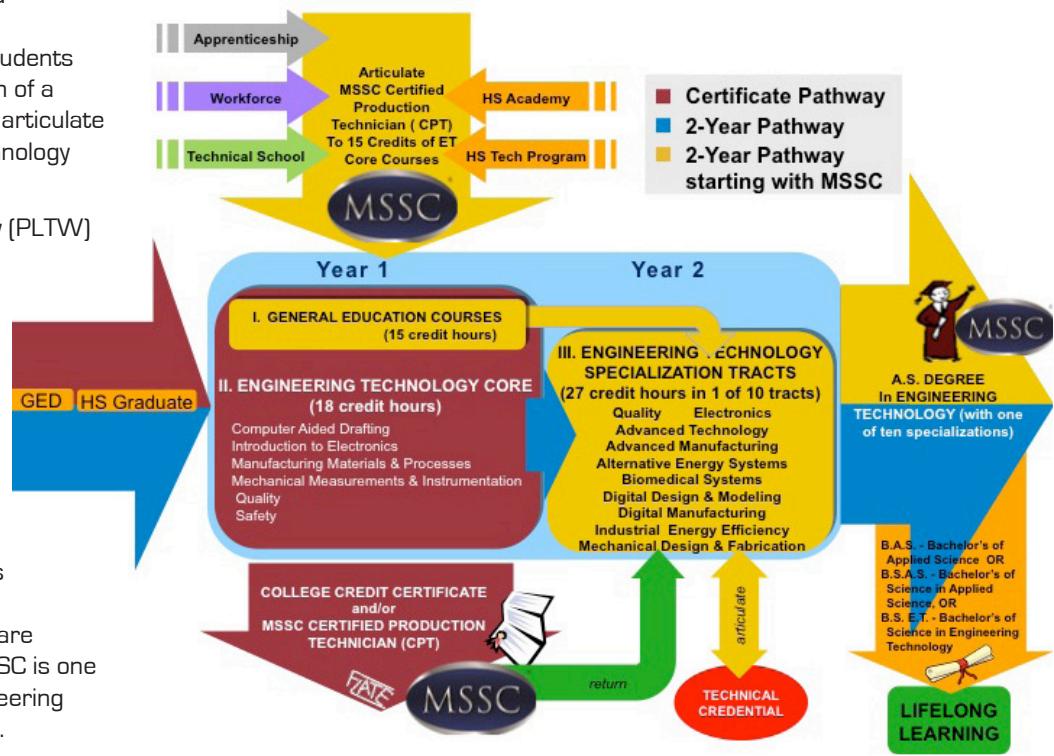
Additionally, most CTE programs in Florida are aligned to a valued industry credential. MSSC is one of the credentials aligned to Florida's engineering and manufacturing curriculum frameworks.

The PLTW high school program of study introduces

the concepts behind engineering design and fundamental engineering technologies to high school students. PLTW high school programs typically include designing products in modeling software, reading blueprints and sometimes, creating a 3D prototype. MSSC's focus on production complements this engineering focus. PLTW students get a good deal of experience manufacturing the products they design on the equipment in their school's "engineering" labs. They work with design software, 3D printers, mills and lathes, ShopBots and other manufacturing oriented equipment and tools. Although there is some overlap in the content, typically PLTW high school students require an additional course or courses, or possibly a summer camp, to learn the complete skill set covered by MSSC. However, connecting PLTW programs to MSSC is an excellent way to encourage students to enter an advanced manufacturing program after high school.

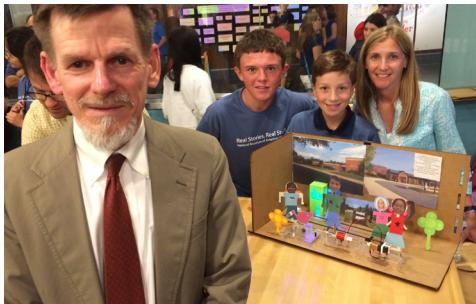
In many locations, PLTW programs attract students who aspire to pursue an engineering degree in some discipline. Students at that age do not understand the scope of engineering and the academic requirements. PLTW programs should be providing PLTW students with guidance for the many careers that fall in both engineering and engineering technology domains. Although PLTW students transition to four-year engineering programs, many students in PLTW programs learn that they are not necessarily interested in the highly academic engineering design aspect, but more in the "hands-on," applied aspects of assembling, maintaining, operating, and optimizing equipment. Many of the latter students should be encouraged to go on to a two-year engineering technology or advanced manufacturing degree, or possibly into a machining or highly skilled fabrication training program.

FLATE has helped to put a strong emphasis on manufacturing in many of Florida's pre-engineering and technical programs



See "FLATE," page 3

• Innovation (continued from page 1) •



Grier said event organizers first looked internally at the University of Virginia, but they did not have the required equipment. Next they turned to Princeton University, a longtime partner, to make the part but their injection molding machine was not operational. That's when they looked to the Palmetto State for help.

"The Department Chair of Mechanical and Aerospace Engineering from the University of Virginia had recently become the Dean of Engineering and Computing at the University of South Carolina," said Grier. "They called him from Virginia to see if the USC engineering department was able to make the part. They were not, but the new USC dean knew, from our collaboration with USC's McNair Aerospace Center, that Midlands Technical College had the capability. After a flurry of emails, they gave me the nod and Midlands Technical College Machine Tool students started designing and making the mold for the solenoid spool. We are lucky, our shop has all the advanced equipment to make complex tooling like injection molds."

Grier said a private company would have charged about \$15,000 for a project like this. After the mold was complete, MTC students made two thousand of these parts on MTC's 75-ton plastic injection molding machine. Grier drove the parts to Washington DC just in time for the museum event.

"The event was really cool," said Grier. "Lots of students learning and having fun building."

• FLATE (continued from page 2) •

by providing information and resources on manufacturing and production topics. The PLTW program is a good introduction of the many engineering applications and alternative career pathways associated with engineering design. Florida's two SME PRIME PLTW high school programs, Middleton High School in Tampa and East Lake High School in Tarpon Springs, both provide opportunities for students to learn about manufacturing (the PRIME component) that includes MSSC skill sets in after-school and/or summer programs. Middleton High School has done this now for two years with good success for testing the students. The ultimate goal is to help students learn about the many career pathways in engineering and manufacturing, and understand that the academic pathway for an engineering career is not the only high-wage pathway to a career in the world of engineering and manufacturing.

Developing career pathway options for manufacturing technicians is one of FLATE's primary goals. Working at the state level in partnership with the Florida Department of Education provides career education options with a strong statewide impact. You can learn more about FLATE's "Florida Plan" for manufacturing education (and a good model for ALL CTE education and pathways) in a previous NCATC newsletter and on the FLATE website.

To learn more, contact the author at mbarger@hccfl.edu. ♦

In addition to the students, about 2,000 members of the public, along with officials from educational associations, the Smithsonian and the National Science Foundation attended the museum event and viewed the exhibits that MTC helped create.

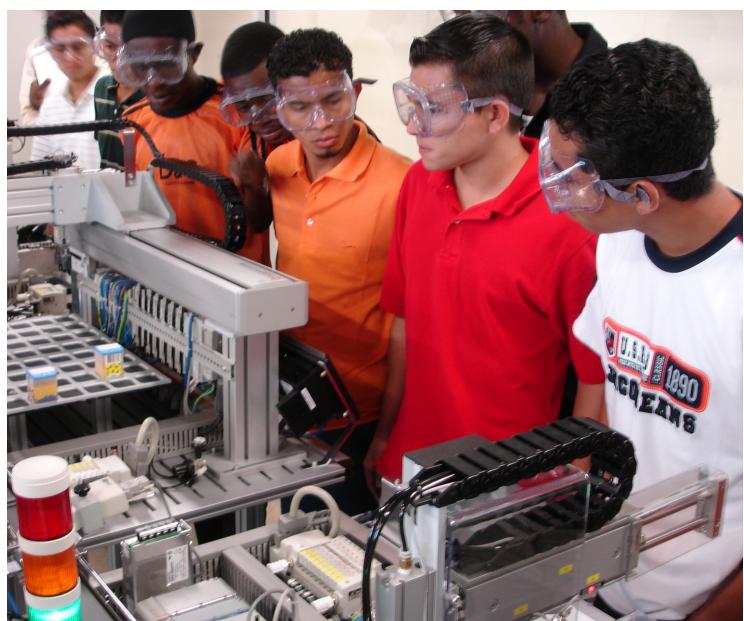
Grier said when his students learned they were making things that would be used in the museum for middle school students to reconstruct key inventions their learning suddenly had an immediate purpose.

"The students loved it," he said. "When they know they are creating things that have a purpose, their motivation level increases exponentially."

Alan Clayton, Department Chair for Industrial Technology, said it is good when students in his department are given the opportunity to make something that a younger generation of students can see and touch.

"Opportunities like this show young people how valuable industrial skills can be and the broad variety of career options that are available to them," said Clayton. "They get interested in the hands-on nature of the technologies and it leads them to exciting, lucrative career options. It's really important for people to see how these skills can turn into a great career with the right kind of training."

For more, contact Alan Clayton, claytona@midlandstech.edu. ♦



Hillsborough Community College Engineering Technology students take their first in-depth look at automated manufacturing.

Northland Aerospace Opens New Doors to the Community

Curtis Zoller, Associate Dean for Aerospace and Agriculture

For the past year, Northland Community and Technical College's Aerospace Site has been busy with major construction and remodeling. The new areas of our state-of-the-art facility were finally opened for use by students and faculty this fall. It is exciting to see the new classrooms, labs, and hangar in use and we invited the community to celebrate with us at an open house and ribbon cutting ceremony on September 22. Beyond the facility renovation there are many new highlights that can be seen while touring. These updates include 13 state-of-the-art large scale UAS recently donated by Northrop Grumman, a wide range of small UAS, the latest equipment in aircraft electronics, advanced composite structures, geospatial, and automated technology.



Located at the Thief River Falls regional airport, the NCTC's Aerospace Site is the home to the aviation maintenance, unmanned aerial systems, imagery

analysis, geospatial intelligence, electronics technology and automated systems programs. Students in these programs must have access to state-of-the-art equipment with lab space. This renovation was designed to provide the best possible education and training for aerospace students to prepare them to enter the workforce. Through much hard work and with the help of our state and our local legislators, in particular State Senator Stumpf, we received the \$6 million needed to renovate the 57 year-old facilities. This project allowed NCTC to create a 21st century learning environment tailored to the needs of students for high demand fields in advanced technology. These careers will continue to grow at an exponential rate and NCTC is on the forefront of higher education for these programs.

Another benefit of the renovation is the commitment we are seeing within industry to partner with us on equipment donations, job placement, and industry expertise to guide curriculum to what our students need to be successful. Significant equipment donations include Minnesota based manufacturer Sentera LLC, donating many small UAS including fixed wing and multi-rotor systems, camera sensor payloads, and providing engineering expertise and technical support. Insitu, a subsidiary of Boeing recently donated a quarter of a million-dollar takeoff and landing system for a tactical size UAS. Most recently, Northrop Grumman donated more than 13 airframes, including fixed wing and multi-rotor systems and all of the associated ground control station equipment for the Bat-12 and R-Bat. Partnerships such as this are paramount to setting our students up for success by allowing them access to work on the technology they will find after graduation.

These types of relationships are a defining characteristic of the high quality resources and education Northland provides to continue advancing aerospace technology and expanding the envelope in these industries. We hope you come out to Northland Aerospace to see for yourself how the change of seasons for Northland Aerospace is going to benefit our future generations of students and the community as a whole.

For more information, contact the author at curtis.zoller@northlandcollege.edu. ♦



Minnesota State Develops VETS to Award Credit for Military Courses and Occupations

Gina Sobania, Director of Military, Veteran, and Adult Learner Services, Minnesota State

Minnesota State, a system of 30 state colleges and seven state universities that serves nearly 400,000 students, is using an innovative web-based tool dubbed VETS (Veterans Education Transfer System) to help current and former service members find programs that award academic credit for military learning experiences.

According to Gina Sobania, director of Military, Veteran and Adult Learner Services at Minnesota State, "This is all about taking care of our veterans and service members by ensuring they get the most out of their education during and after their military service. Earning college credit for previous military learning enables veterans to better utilize their educational benefits (such as the GI Bill) and allows them to complete college more quickly and at a lower cost. This helps them get into the workforce sooner or pursue additional higher education opportunities."

VETS helps veterans and service members see how their military experience may transfer into academic credit at Minnesota State colleges or universities, similar to the way high school students can see how their Advanced Placement credits may transfer. The system effectively maps military training and experience to coursework at Minnesota State colleges or universities based on American Council on Education recommendations.

Since 2009, over 153,000 credits have been awarded for military courses and occupations, saving members of the military \$29 million, and saving time and preventing redundant coursework.

In 2013, a highly successful, accelerated approach for determining articulations was implemented at 17 of the 30 community and technical colleges as well as at one of the state universities. This approach resulted in credit recommendations for over 25,000 occupations from the Army, Marine Corps, Navy and Coast Guard

[the Air Force records credits through the regionally accredited Community College of the Air Force which allows for direct transfer of academic credit rather than the analysis required for the training from the other branches].

VETS and the accelerated process to award academic credit is considered to be the "gold standard" that other states wish to emulate with their own systems of higher education. Minnesota State has shared the program with over 20 other states, and plans to improve VETS by making it possible for users to do more, such as allowing users to input their military courses and explore multiple occupations simultaneously.

Minnesota State is also part of the Multi-State Collaborative on Military Credit (MCMC), an interstate partnership of 13 states working to translate competencies acquired by veterans through military training and experience toward college credits. States exchange information and share best practices in the areas of articulation of credit, certification and licensure, communication, and data and technology.

According to Sobania, "We owe veterans and service members, regardless of where they live, the same access to information so they can make informed decisions about their education. But when it comes to awarding credit for military courses and occupations, the states in MCMC are in very different stages. Minnesota State can help other MCMC states expedite their work, and this in turn will help even more veterans and service members complete their education and enter the workforce quicker than those who are not being awarded academic credit."

To learn more about the Minnesota State VETS program, visit <https://www.mnscu.edu/college-search/public/military> or contact the author at Gina.Sobania@so.mnscu.edu. ♦

Strategic Partner Spotlight

Festo Expanding in the U.S. and Bringing Back Vocational Education

Carlos Gonzalez, machinedesign.com

Festo has opened the doors on its brand-new Regional Service Center (RSC) in the center of Ohio. The service center located in the town of Mason will serve the North American market, including Canada and Mexico. With the new center, 70% of Festo's North American customers will only be a 10-hour truck drive away. Festo recently opened its doors for a tour of the facility to highlight how it is bringing the Industrial Internet of Things (IIoT) to North America and how it plans to develop a higher skilled labor force.

Festo and IIoT in North America

The investment Festo is making in the United States and American region is due to the growing manufacturing market. According to Carlos Miranda, cluster lead of the Americas, the potential market for Festo in the Americas is a projected \$3 billion. This includes not just the United States and Canada, but also Mexico and South America. Mexico is becoming an important hub for North American car manufacturing. Richard Huss, president of Festo Corp USA, said that automation is key to the rise of manufacturing in the states. It is becoming more expensive to assemble overseas with countries like China rising in cost and with the help of automation, manufacturing is rising in the Americas.

The RSC in Mason will serve as a hub for the United States, Mexico, and Canada for Festo products. The facility has a storage



At Festo's newly established logistics and assembly plant in North America, 70% of customers can be delivered with automation products in a 10-hours-truck-drive – from New York in the East to Chicago in the West, from Toronto in the North to Atlanta in the South. (Photo: Festo)

Continued on following page



What set this Regional Service Center apart from others in North America is its highly automated order picking system. [Photo: Festo]

capacity of 65,000 bins and is completely automated. The Witron company implemented the automation used inside the warehouse to prepare products for delivery. Witron designed how the bins are stored, retrieved, and delivered to each of the picking stations. The 10-aisle automated storage retrieval system has 73,000 bin locations and is designed for a variety of tote sizes. A conveyor system delivers the bins to the picking stations. Each picking station, besides having an integrated computer system, has a pick-by-light system and integrated weight scale to ensure a high pick quality. Each workstation can pick up to four customer orders at the same time. The light flashes over the correct bin per order and the scale measures the bin ensuring the correct number of pieces per shipment. The bin is then transported back on the conveyor to packaging and shipping. The system makes it possible to pack up to 10,000 order lines without any errors.

The facility is also the assembly site for many customized parts. The RSC integrates assembly into the warehouse, providing direct access to components. This helps minimize the wait time for customers to receive parts by cutting down on additional supply chains. The customizable products assembled at the RSC include: pressure switches, custom cylinders, valve terminals, cylinder/valve combinations, valve manifolds, semi-rotary drives with ball valve, and sensor boxes.

Didactic Learning

To help push manufacturing in the Americas, the need of a highly skilled labor force will be essential. According to American Manufacturing, in 2011, an estimated 600,000 manufacturing jobs went unfilled in the United States. Manufacturers could not find enough workers with the science, technology, engineering, and math (STEM) disciplines necessary to work in advanced manufacturing environments. By 2025, there will be over 3.4 million manufacturing jobs available and fewer than half of those openings will be filled due to the shortage of skilled labor force.

Festo is tackling this problem through Festo Didactic. For more than 40 years, Festo Didactic has prepared students in North America for complex industrial environment jobs by simulating smart factories in high schools and college classrooms. The students receive hands-on learning on how to build and operate IIoT-related equipment. In Mason at the RSC, Festo is taking it one step further with their Mechatronics Apprenticeship Program to equip today's workforce with the necessary skill set and help recruit more young people to manufacturing.



The automated warehouse system enables the processing of large order volumes. With storage capacity of 65,000 bins and the high performance picking and packing stations the system enables Festo to pick and pack more than 1,000 items per hour.

In Germany, 1.5 million apprenticeships are given to youth and it results in a low 7% youth unemployment rate. In the United States, the youth unemployment rate is 17% and only 358,000 apprenticeships are given to young students. Festo Didactic created the Mechatronics Apprenticeship Program in partnership with Sinclair Community College in Mason. The manufacturing partners are TechSolve, and employer partners are Art Metal Group, Clippard Instruments, Festo Automation, MQ Automation, and Nestlé. The two-year program helps train young students for careers as maintenance technicians, automation specialists, service technicians, and manufacturing technicians.

Each apprentice will earn an associate's degree in mechatronics from Sinclair Community College. Based off the German apprenticeship model, apprentices spend one day each week in educational classes at the college, one day using and learning how to operate modern IIoT equipment at the new Festo Learning Center in Mason, and three days working and training at their respective employers. Scott Markland, vice president for regional centers at Sinclair Community College, says, "We heard loud and clear from small, medium, and large manufacturers in our area that they have a skills gap and it is challenging to find young people who are interested in manufacturing. At the same time, [employers] have a workforce that is moving toward retirement, so the talent pipeline is a big concern." With the help of Festo Didactic and the Mechatronics Apprenticeship program, that talent gap will start to close.

[This article originally appeared on machinedesign.com on October 20, 2016. It is reprinted here with permission.]



Students in the Mechatronics Apprenticeship Program learn through a hands-on experience on how to operate modern IIoT-related equipment.



Welcome New Members

Clinton Community College, Pittsburgh, NY
Eastern WV Community and Technical College,
Moorefield, WV
Florida State College at Jacksonville, Jacksonville, FL
Robert C. Byrd Institute, Charleston, WV
Trenholm State Community College, Montgomery, AL

Congratulations to New Board Members

Chris Lewis
Trenholm Community College (AL)
Kathy Rentsch
Quinsigamond Community College (MA)
Linda Woodard
Florida State College at Jacksonville (FL)

Welcome New Strategic Partners

Edge Factor
Rockwell Automation

13th Annual Stratasys Extreme Redesign Challenge

Every year Stratasys calls upon tomorrow's engineers, artists, and entrepreneurs to redesign an existing product to improve how a task is accomplished or design something entirely new that addresses an unmet need.

Prizes:

- Ten finalists in each category will receive a **3D printed model** of their design and Stratasys apparel (\$50 value).
- One second-place winner in each category will receive a **\$1000 scholarship**.
- One first-place winner in each category will receive a **\$2500 scholarship**. Plus, his/her instructor will receive a demo 3D printer for limited-time classroom use.
- **Bonus prize: NCATC will award a \$1,000 scholarship to one winning entry in the engineering category.** Students from NCATC member schools are eligible.

Stratasys will accept entries through **March 9, 2017**. For more info, and to enter, visit <http://www.stratasys.com/industries/education/extreme-redesign>.



Professional Development for Welding Educators

Weld-Ed (National Center for Welding Education and Training) will provide training on the following topics during 2017. For details, and to register, visit weld-ed.org.

Welding Metallurgy
June 26–30, Wahpeton, ND
Joining and Cutting Processes
June 5–9, Peoria, IL
July 31–Aug 4, Yuba, CA
Design, Assembly, Robotics
June 26–30, Santa Clarita, CA
Codes Standards, Safety Inspection
July 24–28, Elyria, OH

Laser Welding
Closed
Instructional Design and Teaching Strategies
July 17–21, Elyria, OH
Non-Destructive Test (NDT)
June 12–16, Ogden, UT





National Coalition of
Advanced Technology
Centers
A Network of Advanced Technology Expertise

33607 Seneca Drive
Cleveland, Ohio 44139



The National Coalition of Advanced Technology Centers is a network of higher education resources that advocates and promotes the use of technology applications that enhance economic and workforce development programs and services.

www.ncatc.org

2017 NCATC National Events

Summer Workshop

June 5–7, 2017

Madison, Wisconsin

Hosted by



In partnership with



Fabricators & Manufacturers
Association, International®

Fall Conference

October 19–20, 2017

Portland, Oregon

Hosted by



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