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Students to Turn Robots into Blacksmiths in New Manufacturing Competition

Student Teams Competing for at least $50,000 in Prizes

COLUMBUS – LIFT – Lightweight Innovations For Tomorrow, and the Center for Design and Manufacturing Excellence at The Ohio State University, today announced a new competition for students from around the country merging the ancient skills of the blacksmith with the digital age of robotics to create new material forming capabilities called "Robotic Blacksmithing."

Launching this fall, and running through the 2016-17 school year, the LIFT Prize in Robotic Blacksmithing introduces digital, or robotic, blacksmithing technology to students and challenges them to make arbitrary, numerically-described objects by re-shaping materials through plastic deformation and incremental forming processes.

For this competition, using robotics, students will be asked to form three useful items such as a horseshoe, goblet, and an ultralight-weight truss out of materials of increasing difficulty and importance. The first and simplest competition will use clay as the competition material. Later phases will use soft and hardened metals for respective focus materials.

Through this competition, LIFT is working to usher in robotic blacksmithing as the next wave of manufacturing technology, following on the heels of the first two revolutions in digital manufacturing we've seen change our world: Computer Numeric Control, in which cutting tools precisely remove metal to form complex shapes; and additive manufacturing and 3-D printers, which add successive volumes of material by computer control to create complicated solid components.

"This competition will bring these students to the cutting edge of manufacturing technology and prepare the industry for the next big change in technology," said Glenn Daehn, the competition's technical director. "By engaging students through competition, we are encouraging them to develop the skills they need to become the innovators and leaders the manufacturing industry needs to thrive in the future."

“The manufacturing industry is changing rapidly, and we need to ensure the workforce of the future has the skills and is confident in using new lightweighting technologies and processes,” said Emily Stover DeRocco, director of education and workforce development at LIFT. “This competition will put the latest technology in the hands of students to both provide them the skills they need and encourage them to consider manufacturing as a career in the future.”

Because robotic blacksmithing is a new manufacturing process without specific defined system requirements, the competition is “open” meaning only the materials used and desired output is defined, not the process used to achieve it, fostering important innovation.

Student teams can begin registering for the competition in August 2016 and work through March 2017. The competition is open to students from high school, community college, career and technical colleges, and colleges and universities. Judging, by industry experts, teachers and other leaders, will be done in April 2017, with winning teams announced by the end April.

For more information, please visit www.roboticblacksmithing.com. Complete official rules for the competition will be posted this fall.

To help support the competition and invest in the future of manufacturing, LIFT encourages local manufacturers to both sponsor and mentor teams in their communities.

“So many of the communities in the LIFT region of Michigan, Indiana, Ohio, Kentucky, and Tennessee rely on local manufacturers as the backbone of their economies,” DeRocco said. “To continue these synergies, we are encouraging those companies to help invest in the future by supporting competition teams in their schools.”

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ABOUT LIFT

LIFT is a Detroit-based, public-private partnership committed to the development and deployment of advanced lightweight metal manufacturing technologies, and implementing education and training initiatives to better prepare the workforce today and in the future. LIFT is one of the founding institutes in the National Network of Manufacturing Innovation (NNMI), and is funded in part by the Department of Defense with management through the Office of Naval Research. Visit www.lift.technology to learn more.

ABOUT THE OHIO STATE UNIVERSITY

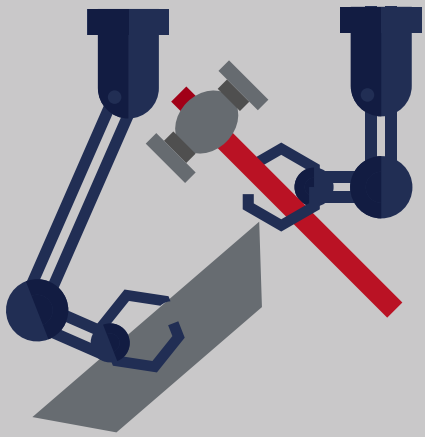
The Ohio State University’s main campus is America’s largest and most comprehensive, with more than 53,000 students, 17 colleges and 240 masters’, doctoral and professional degree programs and an annual operating budget of more than $4 billion. Ohio State’s depth and excellence is complemented by a top-five academic medical center and a premier cancer center.

Ohio State consistently ranks as one of the nation’s top research institutions, with $703 million in spending last year in areas that are critical to Ohio’s ability to compete locally, nationally, and internationally. The university ranks second nationally in the amount of industry sponsored research it conducts. Ohio State has particular strength in areas such as global warming, cancer, infectious disease, advanced materials, and ag-bio products that feed and fuel the world.

BUILDING 21ST CENTURY MANUFACTURING TALENT

The LIFT Prize in Robotic Blacksmithing: Igniting Student Interest in Manufacturing Skills and Innovation

An Education & Workforce Development Initiative for LIFT...Lightweight Innovations for Tomorrow



THE PROBLEM: MANUFACTURING TECHNOLOGY ADVANCING, WORKFORCE SUPPLY STAGNATING

Manufacturing has undergone a revolution around additive manufacturing, 3-D printers, and CNC machines. This keystone industry is more automated, requiring workers to have advanced technical and mathematical skills to program, run, and maintain complex machinery necessary for 21st century production. New manufacturing processes are emerging through LIFT and its partners such as agile processing which provides the opportunity to improve material properties, reducing waste and producing repeatable shapes while minimizing tooling and cost.

While this manufacturing renaissance is underway, fewer students are engaging in career pathways related to manufacturing, and employers are struggling to find the talent to replace their aging workforce. Currently, more than 21% of the advanced manufacturing workforce in LIFT's partner states is over age 55 and ready to retire soon. On top of this, employers in the LIFT partner states posted nearly 340,000 jobs during 2015 alone, but only 103,000 individuals completed degrees and certifications preparing them for these lucrative jobs. Postings continue to increase while sources of talent remain static. Demand is growing. Supply is stagnant.

COMPETITION: A NEW FRONTIER OF STUDENT ENGAGEMENT

To encourage students to develop the skills they need to become innovators and future manufacturing leaders, LIFT, through its Agile and Low-Cost Processing Pillar, has teamed with the Center for Design and Manufacturing Excellence (CDME) at The Ohio State University to initiate the LIFT Prize in Robotic Blacksmithing, a student competition using agile processing principles. The competition combines outreach to students, engagement with emerging cutting-edge technologies, employers working directly with students, prizes, and national recognition for the winning teams.

This competition merges the ancient skills of the blacksmith with the digital age of robotics to create new material forming capabilities called "Robotic Blacksmithing" for making useable object shapes. Like additive manufacturing and Computer Numeral Control (CNC) machining, Robotic Blacksmithing creates new methods for manufacturing, improving material properties, reducing waste, and agile manufacturing of complex and repeatable shapes with minimal tooling at low cost.

WHAT IS ROBOTIC BLACKSMITHING?

Instead of a blacksmith manipulating and forming materials by hammering, bending, twisting, or pulling, a robot is programmed to perform these movements and manipulations using a set of agile forming tools with greater efficiency and agility, and using far lighter and less expensive tools than might be used in traditional forging.

There are great opportunities for innovation in this new field to develop material forming models in a numerical or experimental modeling environment, and then translate these models into a robot environment to design and manufacture useful shapes. In the future, it is envisioned that Robotic Blacksmithing programming tools will be available to makers everywhere who seek to shape materials into objects. This technology can go beyond simple subtractive or additive manufacturing because the material can be improved by working it with deformation and heat, and sensors can record the process and assure properties. Most exciting, because the processes re-shape material, there is virtually no waste and a wide variety of materials can be processed to very high strength with other engineered properties.

Job Demand Outweighing Workforce Supply

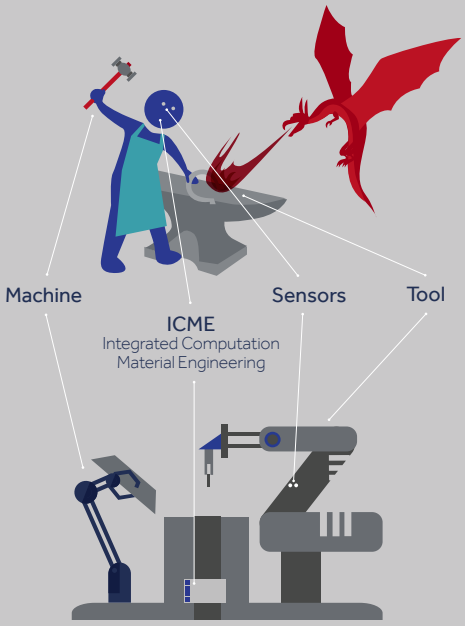
340,000

jobs were posted during 2015 but only...

103,000

individuals completed degrees and certifications preparing them for the same lucrative jobs

The Evolution of Robotic Blacksmithing



CONTINUING THE DIGITAL MANUFACTURING REVOLUTION

Robotic Blacksmithing follows on the heels of two revolutions in digital manufacturing have truly changed our world. The first was CNC, in which cutting tools process materials (plate, bar, and other wrought shapes) into more complex shapes. Instead of carving by hand, CNC machines use very large and fast metal removal tools, programmed with a digital 3-D model to subtract material from the block to create desired object features. The second manufacturing revolution was around additive manufacturing and 3-D printers, which add successive volumes of material by computer control to create complex shapes that are described by an electronic (digital) data source, such as a 3-D model. Our menu of processes and materials for additive manufacturing is expanding rapidly right now.

ELIGIBILITY

The program is open to any student team attending a U.S. high school, technical college, community college, college or university, and partnerships with regional or national companies are encouraged.

EXPECTED OUTCOMES

Students will benefit from this competition by:

- Developing and demonstrating a third robotically-controlled way of making things
- Inspiring innovation and new skills
- Showing the linkage between doing and innovation
- Showing innovation, skills, spirit and pride by competing to develop a wholly new technology

PROJECT LEAD

The Center for Design and Manufacturing Excellence at The Ohio State University

ALIGNMENT TO STRATEGIC FOCUS AREAS

Deploying educational pathways from high school, through community colleges, to universities

Ensuring more students gain STEM foundational skills

Creating enhancements to engineering curriculum using lightweighting

THE OHIO STATE UNIVERSITY

lift LIGHTWEIGHT INNOVATIONS

For more information, please see lift.technology or www.roboticblacksmithing.com.

For questions about LIFT Education & Workforce initiatives, contact Director Emily DeRocco at ederocco@lift.technology.

For technical questions on the LIFT Prize in Robotic Blacksmithing, please contact Glenn Daehn at daehn.1@osu.edu.

ABOUT THE COMPETITION

Full rules for this competition will be released in mid-September 2016, with the first prize being offered about the end of 2016. Groups may begin forming teams, partnering with industry and planning now.

The competition will be organized in a phased approach with three phases increasing in difficulty:

First Phase

CNC Shaping of Plasticine /Clay

In the first phase, student teams will develop and program a single system to develop three common shapes that will be specified with the competition rules.

Student teams will be evaluated based on the following criteria:

Component quality

Process time

Public documentation of the journey and of approach

Second Phase

Shaping of Soft Metal

Third Phase

CNC Shaping with Thermomechanical Processing

Prizes

$50,000

Winning teams will receive recognition and include total cash awards of at least $50,000.

Rules

Expected to be posted in September 2016