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Academic Affairs Update, September 2014

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*From the Office of the Provost and
Executive Vice President for Academic Affairs*

Academic Affairs Update

University of Northern Iowa



Is This for "Real?" 3D Printing at UNI

**By Scott Giese, Associate Professor of Technology
Adrienne Lamberti, Associate Professor of Languages and
Literatures**

The Economist claimed that "it is likely to disrupt every field it touches." A recent article from the CNN website predicts it "could become a household appliance that saves people thousands of dollars a year." A high-productivity software corporation argues that it's a promising phenomenon only when used at the industrial level.

While companies battle over its marketability, one thing is certain: 3D printing is being pitched as the Next Big Thing in technology. In early 2014, physicians generated a 3D model of an ailing patient's skull, then printed and surgically implanted the plastic model. Three months after the surgery, the patient's case was deemed a success. Each day reveals new stories about the promise of and experiments in this technology.

UNI has had a significant hand in the 3D printing revolution. The university's newly purchased 3D printer, the largest at a North American academic institution, has propelled UNI's Metal Casting Center (MCC) into the manufacturing community limelight. In short, 3D printing has transformed what was becoming an obscure manufacturing process primarily restricted to specialty products into a process that has energized the metal casting industry.

Traditionally, metallic products were made from a mold, in this case a special mixture of sand and a binding agent that was packed around a pattern. When the pattern was lifted from the mold, a hollow cavity remained. After positioning "cores" (similar to the mold material) to define a product's complex internal and external features, molten metal was then poured into the mold and allowed to solidify, creating the product.

In comparison, the process of 3D printing is known as "additive" manufacturing, in that a computer program tells the printer to apply several layers of material which ultimately will result in a product. In this process,

- a layer of resin-coated sand is laid down and a large inkjet printer head moves across the layer of sand, curing the areas that comprise the product mold.
- Layers of sand are then continuously built to define the mold.
- Once completed, the uncured sand is extracted, leaving a core that is more complex than those

Welcome to Our New Faculty!

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- Amy Igou
Accounting

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- Cara Burnidge
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Religions*
- Melissa Dobosh
*Communication
Studies*
- Elise DuBord
*Languages and
Literatures*
- Heather Gallivan
Mathematics
- Philip Hopper
*Communication
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- Heather Jeronimo
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Literatures*
- Caroline Ledeboer
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Literatures*
- Amy Kotsonis
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- Sadik Kucuksari
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- Lindsey Leacox
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- Pavel Lukashov
Physics
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Studies*
- Alexander Pershounin
Music

available via traditional sand molding methods.

3D printing is especially helpful in its ability to increase economic efficiency, explains Brandon Lamoncha, sales manager at Ohio-based Humtown Products (an MCC industry partner). Molds for products now can be 3D printed, as opposed to requiring what once were numerous steps to physically create a product's pattern. Savings consequently are realized in lower overhead costs.

UNI is working to accelerate the speed and growth of technology to fit the demands of the industry--which currently has the capability of processing 30 ton castings and upwards of 400 molds per hour.

In addition, the innovative technology makes the MCC a vital resource for facilitating research and technology transfer between academe and industry. 3D project collaboration between the MCC and industry partners such as Humtown Products is mutually beneficial, Lamoncha emphasizes. Companies can help UNI to identify industry needs, while UNI students can broaden the scope of their experience by working at the companies.



A student operates computer software that directs a 3D printer at the UNI Metal Casting Center.

The MCC is assisting other U.S. manufacturers such as TechWorks Advanced Manufacturing Center in exploring and adopting 3D printing as a viable manufacturing process.

"The goal of [such collaborations]," says MCC director Jerry Thiel, "is to educate the industry... benefiting U.S. manufacturers by making products faster, cheaper, lighter and more complex."

"Working with the Metal Casting Center has been a good experience for [industry partner] American Pattern & CNC Works," says sales manager Steve Oesterle. The company, which makes castings for agricultural and industrial equipment manufacturers throughout the country, uses the 3D printing process to make complicated cores "that would be very difficult to make in the conventional coring process."

"By using this process, we can get castings in a very timely manner and they work really well. They are accurate and can be removed easily after the castings are poured."

- Charles Rudick
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- Christopher Schulte
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- Xinhua Shen
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- Revuru Srikant
Technology
- S. M. Ali Tabei
Physics
- Felicia Thadeison
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- Congcong Wang
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Languages and Literatures

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- Bradley Ellison
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- Kim Huckstadt
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- Amy Olson
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- Ralph Reynolds
Curriculum and Instruction
- Joan Taylor
Curriculum and Instruction

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- Michael Childers
History
- Kelly Flanagan
Interior Design

In addition to its collaboration with industries, UNI is partnering with several community colleges in eastern Iowa to train future designers and manufacturers in additive manufacturing. Because of 3D printing's infancy as a manufacturing process for the casting industry, design concepts for the casting process requires an integration of old techniques while taking advantage of the design freedom offered by additive manufacturing.

Fortunately, the manufacturing technology program at UNI is well adapted to meet future demands of these new design concepts, training students on these cutting-edge technologies and making eastern Iowa attractive to manufacturers.

"The most gratifying experience with the 3D printer is being able to bring a design to fruition," says Manufacturing Technology student Kip Woods. "Some of the projects I've worked on include an elaborately designed brass table with aluminum feathers from the UNI Art Department, a technology award plaque, and printed plastic vacuum attachments."

"The hands-on experience gained by working with the 3D printer complements classroom education."

Academic Affairs Update is edited by *Dr. Adrienne Lamberti*
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