Desktop Metal

CASE STUDY

Metal 3D Printing Solutions Benefit Students and Business

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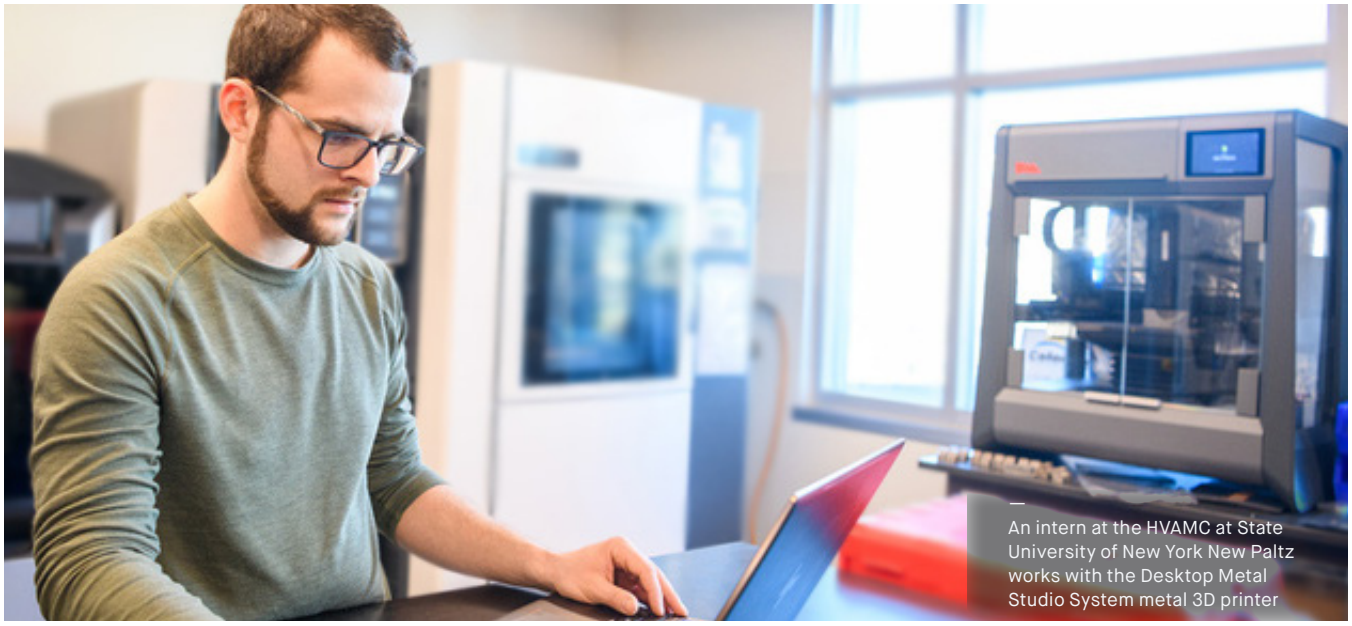
The Hudson Valley Additive Manufacturing Center at SUNY New Paltz makes additive access local



An intern at the HVAMC at State University of New York New Paltz works with the Desktop Metal Studio System metal 3D printer

Academic 3D printing center stretching beyond campus

Customer
Hudson Valley Additive Manufacturing Center at the State University of New York

Location
New Paltz, NY

Industry
Education and local business development

Machine
Desktop Metal Studio System™

Website
www.newpaltz.edu/hvamc

The Hudson Valley Additive Manufacturing Center (HVAMC) at the State University of New York (SUNY) at New Paltz provides expert advice on 3D printing process and materials to both the campus and local business communities. An academic lab, the HVAMC is primarily financed through work it does in partnership with local business partners and generous donations from private sector partners to fund capital purchases.

The HVAMC takes pride in being one of the few academic 3D printing centers at a comprehensive university, typically defined as a mid-size institution that focuses primarily on undergraduate programs. As opposed to the research-based missions of larger universities, the core focus of SUNY New Paltz is on teaching and supporting the local Mid-Hudson Valley region economically.

To this aim, the HVAMC team combines engineering, art, and science with the interdisciplinary utilization of 3D printing to make connections with a wide range of industries. Over the years, the center has successfully supported the development of new products for hundreds of manufacturers, entrepreneurs, artists, architects, and inventors by helping integrate additive manufacturing into their businesses.

As a pioneer in the academic 3D printing space, the HVAMC at SUNY New Paltz was the home of the first MakerBot Innovation Center in 2014 and became a Stratasys Superlab in 2016. In 2019, the HVAMC became an early adopter of Bound Metal Deposition (BMD) 3D printing technology, investing in a Desktop Metal Studio System for part production of both campus projects and local company partners.

Daniel Freedman, Dean of the School of Science and Engineering at SUNY New Paltz and Director of the HVAMC, knows additive manufacturing technologies won't replace traditional production processes completely, but emphasizes the educational value of introducing students, and the broader campus and business community, to the disruptive technology. "It's important to keep track of what's possible because you never know when a solution to a sticky problem will be a 3D printer," he said.

> "The Studio System print characteristics are similar enough to FDM that it was all pretty familiar to us. It has a lot of the same benefits ... relative to laser sintering. Much lower cost, no hazardous powders to deal with, and it's very easy to switch between different materials."
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> **Daniel Freedman, Dean of the School of Science and Engineering at SUNY New Paltz and Director of the HVAMC**

Unlocking antidisciplinary innovation

3D printers act as an academic and experimental tool for both education and innovation. The HVAMC brings together a variety of technologies, from Fused Deposition Modeling (FDM) and polyjet to Bound Metal Deposition and wax jetting.

And that accessibility to advanced manufacturing technology has spurred innovation around campus. Knobs were 3D printed for residence hall lamps, saving over $10,000 by repairing existing infrastructure without the need to replace an entire fleet of lights. 3D printing replacement attachment mechanisms for the electronic boxes of building key card readers saved campus $4,000. "The awareness of the potential for 3D printing should not be taken lightly. It needs to be nurtured to help to find these types of applications," Freedman said.

Part of spreading awareness of the possibilities of additive manufacturing is celebrating the multifunctional application uses of the technology. The HVAMC takes pride in not fitting into any standard academic category – "antidisciplinary" as some team members have named it. Student interns working at the center span the academic spectrum – with majors ranging from mechanical and electrical engineering to chemistry, graphic design, and theater arts design. And past interns have gone on to careers in fields such as manufacturing, art, digital design and fabrication, and computer engineering.

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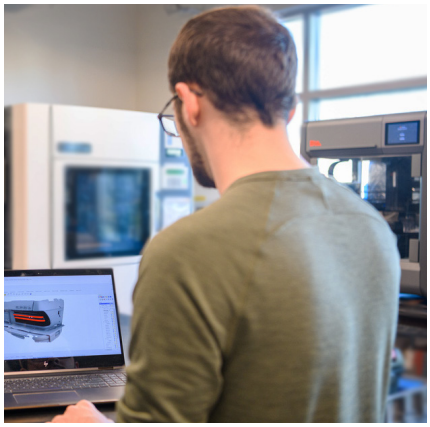
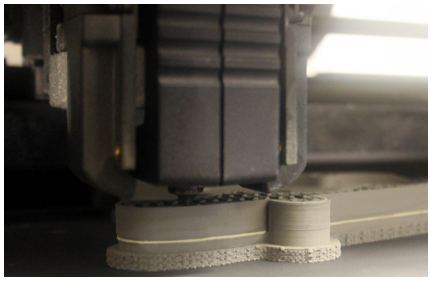
Accessible metal 3D printing allows the HVAMC to give a variety of students and the local business community access to the disruptive technology on campus at SUNY New Paltz.



Approachable, cost-effective, metal 3D printing



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Bound Metal Deposition technology extrudes pre-bound metal rods from easy-swap cartridges, top, into complex shapes to build parts layer-by-layer. The white ceramic interface, seen above, allows the final part to easily break away from any support structures after sintering.

The team at the lab long had an interest in metal 3D printing, however the laser-based process used in most metal systems at the time was too expensive to both purchase and operate for the institution. The high price-point of laser equipment, plus ancillary needs for handling loose powder such as explosion-proof vacuums, sieving stations, and filters can easily require a seven-figure investment, as well as come with new environmental, health, and safety requirements.

The Studio System offered the HVAMC an approachable opportunity to integrate metal 3D printing. Without lasers or loose powder, the Studio System is designed to operate safely in any studio, lab, or classroom space without extensive upgrade requirements to fire-suppression systems or climate-controlled material storage spaces. The HVAMC team already had experience with FDM technology, where a thermoplastic filament is extruded layer-by-layer to build a 3D shape. Similarly, with BMD technology, pre-bound metal rods are extruded into complex shapes and Freedman said the similarities in the processes was one reason the HVAMC was attracted to the Studio System.

“The Studio System print characteristics are similar enough to FDM that it was all pretty familiar to us,” Freedman said. “It has a lot of the same benefits of our Stratasys FDM polymer printers relative to laser sintering. Much lower cost, no hazardous powders to deal with, and it’s very easy to switch between different materials.”

The Bound Metal Deposition technology of the Studio System also allowed the HVAMC to be more flexible in its offerings. Without loose powder that requires extensive cleaning procedures for material changeovers, metals on the Studio System can be swapped by the HVAMC team in about an hour. The center runs 316L and 17-4PH stainless steels, as well as copper regularly and can offer Inconel 625, H13 tool steel, and Ti64 if required.

Also ideal for easy integration, the Separable Supports technology of the Studio System, automatically generates seams through support structures. With a ceramic interface printed between the support structure and the part, sintered components can be easily removed by hand. “Even with complicated parts, the supports are very easy to remove, often easier than when printing with polymers,” Freedman said. 3D printed material has performed the same as cast or billet when post-processed with a variety of techniques, from machining and welding to polishing and engraving.

This production flexibility is also essential to the mission of the center. To support the business community, HVAMC needs to be able to offer access to a range of solutions and at affordable prices. “The cost for parts on a laser sintering machine, as well as their relative material inflexibility, made that choice a non-starter,” Freedman explained. HVAMC calculated laser-based metal 3D printers produced parts at a cost five to ten times higher than those made on the Studio System, too expensive to be a viable solution for most of the local industry.

Roller guide saw nozzle block

A local branch of JBT Corporation, a leading global technology solutions provider to high-value segments of the food processing industry, out of Kingston, NY, came to HVAMC to explore using 3D printed parts as solutions for interesting manufacturing challenges. The partnership now extends from prototyping to end-use part production in both polymers and metals.

Because commercial processing equipment often consists of complex mechanical assemblies arranged in relatively small quantities to do targeted tasks, JBT's applications are prime candidates for optimization with additive manufacturing. This roller guide saw nozzle block, a small and complex part that needed to serve several different purposes in a limited space was brought to the HVAMC team. Required as part of JBT's Adaptive 3D Portioning System, a sophisticated system for the commercial processing of poultry, meat and seafood, HVAMC used the design freedom of metal 3D printing to deliver a consolidated, lightweight, and optimized 17-4 PH stainless steel component.

Two 6 x 4 x 3 cm (2.4 x 1.6 x 1.2 in) parts are printed together in about 24 hours, all without any cost or lead time for traditional tooling to be produced. Ten parts are then batch sintered together in the Desktop Metal Furnace.

HVAMC offering 3D printing technology to local businesses helps them confidently bring new products to market. The center aims to accelerate growth and is leaving a lasting impression on its partners. "Importantly, they know to ask if they run into a problem that they can't solve by any traditional manufacturing methods," Freedman concluded.

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These roller guide saw nozzle block components were produced locally at the HVAMC for JBT. The company's Adaptive 3D Portioning System, a sophisticated system for the rapid processing of poultry, meat, and seafood, was designed in the Mid-Hudson Valley economic area.

HUDSON VALLEY
ADDITIVE MANUFACTURING CENTER
at SUNY NEW PALTZ

About the Hudson Valley Additive Manufacturing Center at SUNY New Paltz

The Hudson Valley Additive Manufacturing Center (HVAMC) is an academic center at the State University of New York (SUNY) New Paltz. The HVAMC provides expert advice on 3D printing process and materials and designing for additive manufacturing to the SUNY New Paltz and the Hudson Valley business community. The center offers a collection of 3D printers that are available for the campus and wider community to print on, constituting one of the most advanced technological offerings at any academic lab in the country.

Desktop Metal

About Desktop Metal Inc.

Desktop Metal (NYSE:DM) is driving Additive Manufacturing 2.0, a new era of on-demand, digital mass production of industrial, medical, and consumer products. Our innovative 3D printers, materials, and software deliver the speed, cost, and part quality required for this transformation. We're the original inventors and world leaders of the 3D printing methods we believe will empower this shift, binder jetting and digital light processing. Today, our systems print metal, polymer, sand and other ceramics, as well as foam and recycled wood. Manufacturers use our technology worldwide to save time and money, reduce waste, increase flexibility, and produce designs that solve the world's toughest problems and enable once-impossible innovations. Learn more about Desktop Metal and our #TeamDM brands at www.desktopmetal.com