Desktop Metal

CASE STUDY

Building Technical Capability and Workforce Talent with Metal 3D Printing

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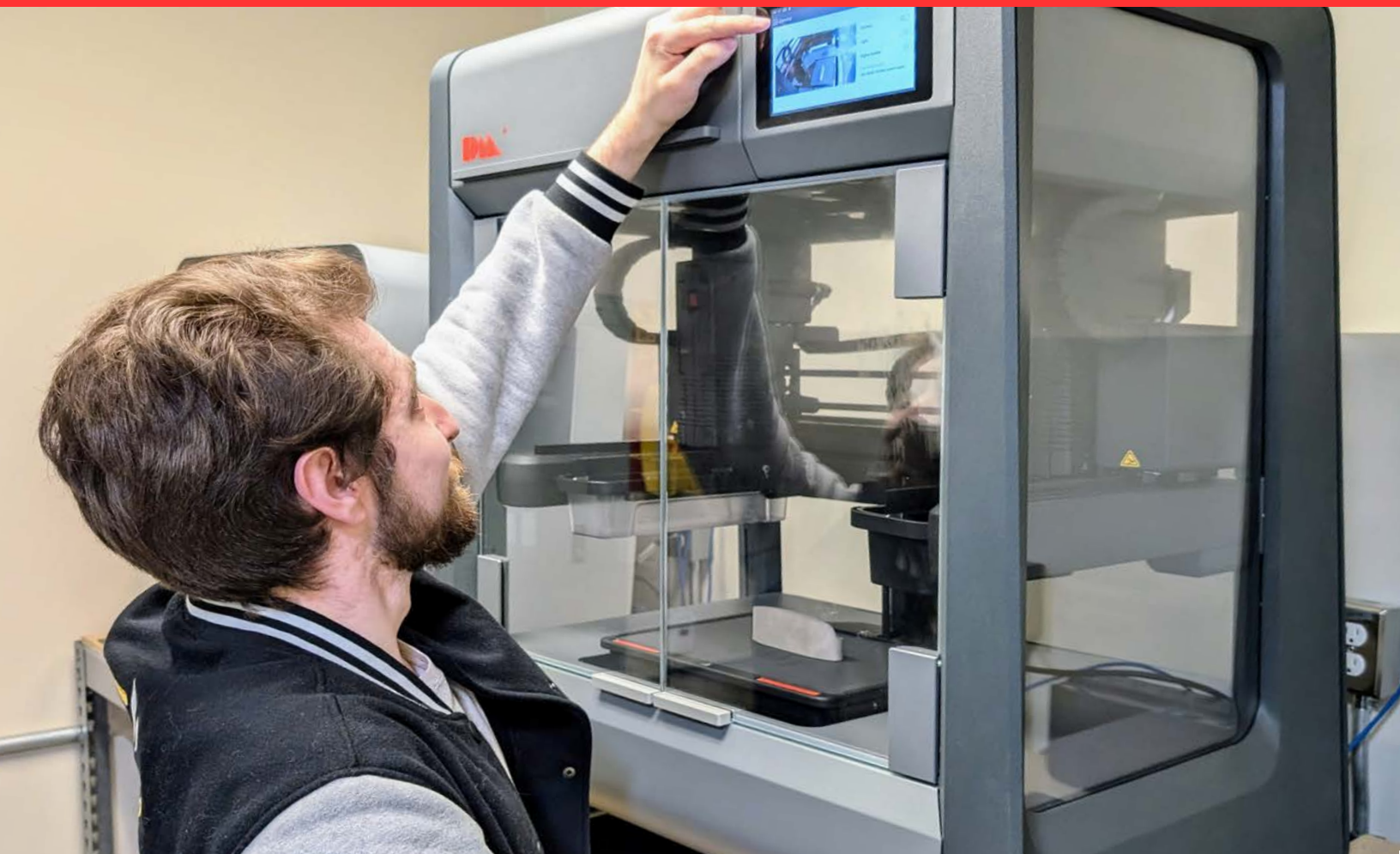
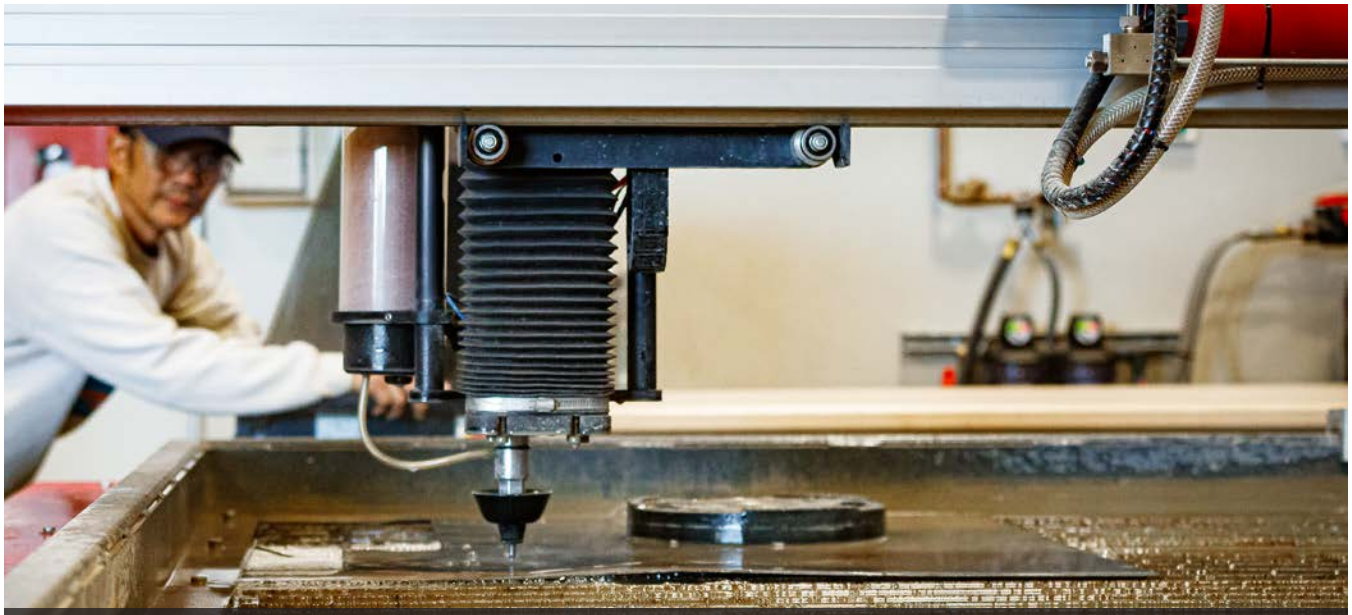
Cambrian R&D adopts the Studio System to serve regional industrial innovation needs





Cambrian R&D spurs economic growth and serves as a workforce development hub where students gain real-world experience and technical skills collaborating with companies and acting as operators of advanced manufacturing equipment.

Customer
Cambrian R&D
a division of Cambrian College

Location
Sudbury, Ontario

Industry
Applied research & development

Machine
Desktop Metal Studio System™

Material:
17-4 PH V2 Stainless Steel

Website
research.cambriancollege.ca

Powering innovation in Northern Ontario

Cambrian R&D, the applied research division of Cambrian College, catalyzes growth and innovation in the local Northern Ontario business community. Through partnerships with regional businesses, Cambrian R&D serves as an engineering house to demystify new technologies through strategic research and development partnerships that provide access to specialized equipment.

A team of engineers works with students and academic programs to help companies solve real-world manufacturing challenges, improve product development, and adopt advanced technologies. Professional engineer Patrick Galipeau-Belair, who oversees mechanical engineering for applied research projects, summarized the center's role simply: "Industries and businesses come to us with a problem."

Alongside electrical and software engineers and mechanical designers, Galipeau-Belair and the Cambrian R&D team offer businesses comprehensive capabilities to prototype, test, and refine designs locally.

The center has a range of manufacturing processes at its disposal to tailor solutions to the challenge at hand, including welding equipment, a waterjet table, laser cutter, and a prototyping room with a fleet of various 3D printing technologies — recently enhanced by Desktop Metal's Studio System, its first metal additive manufacturing solution.

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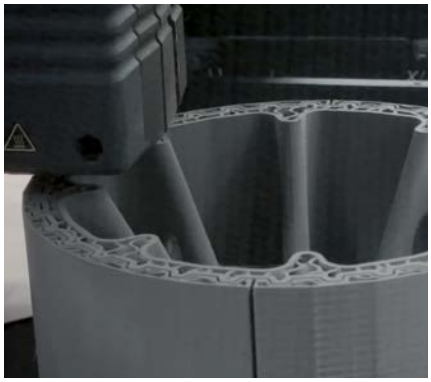
The Studio System uses Bound Metal Deposition™ (BMD) technology to extrude pre-bound metal rods, 3D printing metal into complex shapes layer-by-layer.



The center serves a diverse clientele across Northern Ontario's industrial landscape:

- Large companies with in-house engineering leverage Cambrian R&D to expand bandwidth. "We extend their capabilities by allowing them to do R&D in places they can't allocate time or resources because they're stuck on core business," Galipeau-Belair noted.
- Small and medium enterprises without dedicated engineering departments utilize Cambrian R&D as their innovation team to advance designs and stay ahead in their respective markets. "They still have products that need upgrades, or they need a new prototype for the next phase of a project," Galipeau-Belair explained. "So, they'll hire us as their engineering firm to develop that next iteration for them and for fabrication of their prototype."

Developing a regional workforce pipeline

Cambrian R&D further spurs economic growth as a crucial skills development hub by strategically integrating students from the college's academic programs into its operational workflow. The center hires students and, through hands-on experience, fosters a skilled workforce prepared to excel in the advanced manufacturing job market.

These student researchers are the workforce behind the Studio System metal 3D printer. "The students do the hands-on work – they design the parts and they print them. They learn the whole process under our supervision, but it's them who do all the work," Galipeau-Belair said.

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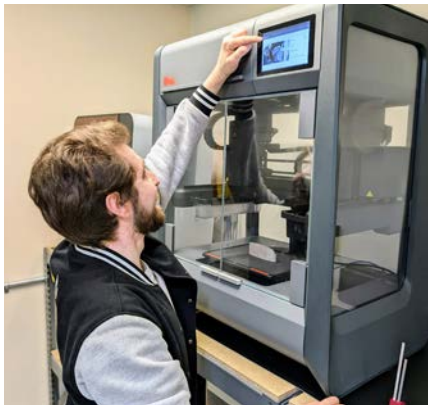
> **Patrick Galipeau-Belair, P.Eng., Mechanical Engineer Research Lead at Cambrian College**

Students gain real-world work experience and technical skills as operators of the equipment. The relationships they develop during these projects often lead to employment offers upon graduation. "The students who work at Cambrian R&D are pretty much guaranteed a job when they come and work on customer projects," Galipeau-Belair said. "They're typically scooped up when they graduate and hired by the companies that they do work for in our department."



Implementing safe, accessible metal 3D printing

The Cambrian R&D prototyping center is well-positioned with a variety of equipment to develop advanced prototypes for a range of applications. However, despite having a comprehensive range of polymer additive manufacturing systems – from resin printers to a large-format platform with a meter-cubed build volume – Cambrian R&D identified a critical capability gap, especially when serving the region's robust mining sector.

"We needed something stronger than the output from our plastic printers and also be weldable because many custom components are part of larger assemblies," explained Galipeau-Belair. This materials challenge led the team to investigate metal 3D printing solutions.

In 2024, Cambrian R&D installed a Desktop Metal Studio System metal 3D printer and Desktop Metal furnace. The safety of the platform – powder-free operation and no chemical debinding – was an essential criterion for purchase. "We have students operating the machine with limited experience. They're still learning and they're out of the classroom, so safety was a big factor for us and we like the low PPE requirements of the Studio System," Galipeau-Belair emphasized.

The Bound Metal Deposition technology deployed by the Studio System extrudes pre-bound metal rods into complex shapes layer-by-layer, similar to the FDM process for polymers.

Without lasers or loose powder, the Studio System is designed to operate safely in any studio, lab, or classroom space without extensive upgrade requirements. At Cambrian R&D, the metal 3D printer sits on a desk in the prototyping room with the other additive manufacturing equipment, and the furnace is installed in the shop with an exterior wall for efficient venting.

"The system was very easy to integrate," Galipeau-Belair explained. "The only facility adjustment we had to make was to install a simple exhaust for the furnace."

The two-step, print-and-sinter, workflow allows the center to make complex metal parts without needing specialized operators, like with a 5-axis CNC machine. "The Studio System offered us a way to make custom metal parts on-demand without having to employ a machinist," Galipeau-Belair said. "We can now just create these parts using students that design them and then 3D print them."

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Accessible metal 3D printing allows students and reseachers at Cambrian R&D to support a variety of local businesses with access to disruptive technology like metal 3D printing.

The user-friendly Studio System lets users easily load files on the classroom safe machine to start 3D printing, seen top left. After extrusion of the metal rods is complete, builds are loaded into the Desktop Metal furnace, second from top. The software-guided workflow uses pre-loaded material profiles to sinter complex 3D printed shapes to final density.

Students are easily learning the metal 3D printing workflow on the Studio System, confirmed Sara Hicks, who supports the team's mechanical engineering students, operates and maintains the 3D printing and laser cutting equipment, and oversees design and drafting.

"The user interface is very easy – we drop in our model and from there, it's very intuitive, especially for our students who might not have 3D printing experience and not know, for example, what the slicer does," she said. "Creating jobs for the Desktop Metal printer and the furnace is very simple."

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Sara Hicks, Mechanical Designer at Cambrian R&D

With a full fabrication shop, the team was also able to quickly verify the material's performance. "The first thing we did was print something in metal and then test it," Galipeau-Belair said. "We welded the 3D printed steel to other parts and didn't have any issues with the final material, everything was great."

Hicks agreed that team sometimes tackles uncertainty about the 3D printed metal material. "Some customers are a bit skeptical and find it hard to believe that, at the end of the day, it's just stainless steel," she said.

So, while the center educates local businesses on understanding the capabilities of metal additive manufacturing, its partners also sometimes benefit from the technology without even knowing it. With the speed of 3D printing and quality of the final sintered stainless steel, the team can deliver quick-turn prototypes that meet an application's needs.

"Some partners don't even know that we're using metal 3D printing when we're building their prototypes. All they really care about is the final part," Galipeau-Belair said. "They want to be able to take these prototypes and test or go to industry or get contracts. At the end of the day, they just want a product that performs. We deliver that — and they don't even know there's a metal 3D printed part," he emphasized.

Early applications showcase material advantages

The Studio System has rapidly proven its value at Cambrian R&D, enabling the transition from prototyping to functional metal parts with remarkable efficiency and precision. Unlike polymer-based prints that often fall short in demanding applications, the Studio System has allowed Cambrian's engineering teams to create durable, production-grade components capable of withstanding real-world mechanical and environmental stresses.

One such example emerged during the development of a custom-built all-terrain rover. As part of the drivetrain assembly, the Cambrian R&D team was tasked with designing motor-to-wheel hub interfaces that could sustain high torque loads and endure harsh environmental exposure, including repeated shock loads, abrasive terrain, and moisture ingress.

In early design phases, the team utilized polymer-based 3D printing to validate dimensional accuracy, assess mechanical clearances, and confirm fit within the larger wheel assembly. These initial prototypes were instrumental in quickly iterating key features like bolt patterns, bearing seats, and tolerance stack-ups.

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This wheel hub was 3D printed in stainless steel on the Desktop Metal Studio System. The motor-to-wheel hub interface required the ability to endure high torque loads and harsh environmental exposure. The in-house 3D printed components met the structural requirements and significantly reduced secondary machining operations and turnaround time.

However, it was clear that polymer materials would not provide the required strength and wear resistance for operational field testing. At this stage, the design was re-evaluated and optimized for metal additive manufacturing using the Studio System. Key changes included the strategic thickening of load-bearing walls, the addition of fillets at high-stress junctions to minimize fatigue risk, and the refinement of geometries to reduce mass without compromising structural integrity. In some cases, internal features were redesigned to ensure proper sintering and facilitate support material evacuation.

The final wheel hubs were 3D printed in 17-4PH V2 stainless steel, a material selected for its high tensile strength, corrosion resistance, and ability to maintain mechanical properties across a range of temperatures. The results exceeded expectations: the printed components not only met the structural requirements but also achieved such high dimensional fidelity that secondary machining operations were either significantly reduced or eliminated.

3D printing the wheel hubs with the Studio System reduced turnaround time from several weeks – typically required for traditional CNC fabrication – to just four business days from the final CAD model to fully a functional component. Moreover, the in-house nature of the process allowed Cambrian R&D to avoid external machine shop costs and significantly reduce fabrication overhead.

The Studio System also proved instrumental in a more design-centric, community-focused initiative: the production of 30 bespoke stainless steel golf putter heads. In partnership with Cambrian College's Alumni and Development offices, golf putters were created as high-quality donor appreciation gifts.

Designed not only for aesthetic appeal but also for functional performance, each putter head was tailored to deliver proper mass balance and swing dynamics. The Cambrian R&D team incorporated subtle weighting pockets and adjusted wall thicknesses to fine-tune the center of gravity, while the final geometry included a universal interface to accommodate various shaft configurations.

To ensure the finish matched the premium nature of the gift, branding elements and surface textures were directly integrated into the print geometry, eliminating the need for post-print engraving or milling.

The use of 17-4PH V2 stainless steel provided the necessary balance of strength, polishability, and corrosion resistance.

With the Studio System, the entire production run was completed within days, and at a cost substantially lower than what would have been required for traditional investment casting or CNC machining, especially for such a limited batch.

Importantly, this project also served as a cross-disciplinary learning experience, engaging students and staff from engineering and communications backgrounds and reinforcing the role of additive manufacturing as both a technical and creative tool.

In both projects, the Studio System delivered far more than just mechanical performance. It enabled rapid design iteration, empowered in-house manufacturing independence, and significantly compressed the product development timeline.

From robust rover components to elegant golf putters, these outcomes underscore the versatility of metal additive manufacturing in an academic research environment – delivering industrial-grade results while fostering innovation, learning, and community engagement.

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In this cross-disciplinary project, 30 golf putter heads were 3D printed in stainless steel. Weighting pockets were added and wall thicknesses adjusted to fine-tune the center of gravity, and a universal interface accommodates various shaft configurations. Branding elements and surface textures were directly integrated into the print geometry, eliminating the need for engraving or milling.

About Cambrian R&D

Established in 2009, Cambrian R&D is Cambrian College's applied research and development division. Its mission is to create an environment of partnership, development, and learning that benefits its industry partners, students, faculty, and community. Cambrian R&D helps its partners access funding, support, and skilled workers to facilitate research & development to help businesses grow. Cambrian R&D offers access to fabrication and manufacturing facilities and more than 80 programs at Cambrian College.

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