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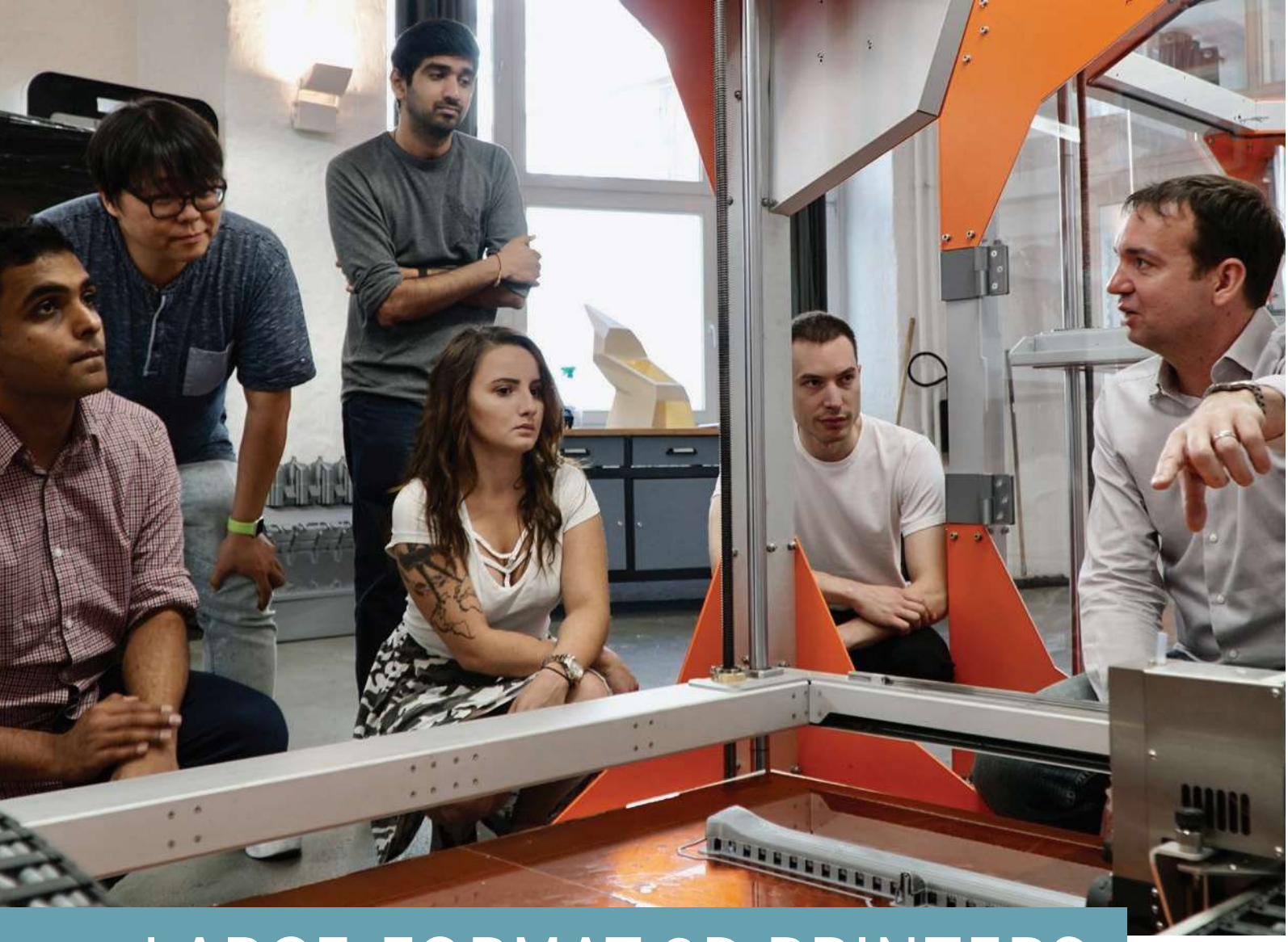
eBook

Large-Format 3D Printers for Education & Research

bigrep



LARGE-FORMAT 3D PRINTERS

FOR EDUCATION AND RESEARCH

bigrep STUDIO

bigrep ONE

bigrep PRO

bigrep EDGE

bigrep

BUILD A FUTURE-READY INSTITUTION

"STUDENTS START TO THINK ABOUT FUTURE FIELDS OF APPLICATION OF 3D TECHNOLOGY. THEY TRY TO FIGURE OUT WHAT THE STATUS OF THE TECHNOLOGY IS TODAY AND WHAT COULD BE FUTURE FIELDS OF APPLICATION. FOR THAT PURPOSE, IT'S VERY IMPORTANT FOR THE STUDENTS TO UNDERSTAND THE TECHNOLOGY – HOW IT WORKS AND WHAT IS BEHIND THE CONCEPT OF 3D PRINTING."

Dr. Dana Mietzner
Professor of General Business Administration, TH Wildau

The evolution of additive manufacturing, commonly known as 3D printing, has fully emerged and is changing the face of education and research.

Universities and colleges constantly commit resources to being future-ready institutions that prepare students for careers of dynamic change with relevant knowledge and life-long skills. Additive manufacturing has proven integral for many institutions aiming for superior teaching and experimentation, for a variety of disciplines, by balancing the modern accessibility of in-house prototyping and production with the relatively low ongoing costs of large-format 3D printers.

Where prominent institutions have developed prototyping focuses within their courses, classes and labs are used as an accessible space for learners to transform their ideas into reality. The most effective utilize technologies that allow for broad applications – a goal that large-format additive is uniquely positioned to address.

UNIVERSITIES AND COLLEGES HAVE LISTED EXCITING BENEFITS THAT ENCOURAGE THEIR CONTINUED INVESTMENT IN 3D PRINTING:

GREATER EXPERIMENTATION

With additive technology students can iterate faster to fully realize the ambitious designs they set out to create, better preparing them to innovate in their careers.

INNOVATION BEYOND ENGINEERING

Prominent institutions develop future fields of application spanning well beyond engineering to educate business, law, and other students to take advantage of additive manufacturing.

TANGIBLE RESULTS

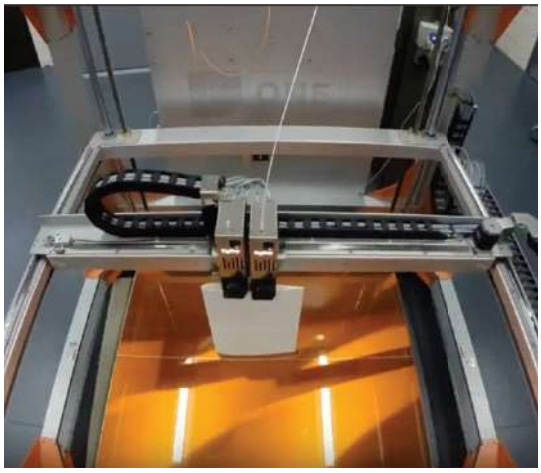
3D printing allows students to design, print, and repeat in the time constraints of an academic semester, allowing them to fully experience the product design cycle.

KINGSTON UNIVERSITY STUDENTS BRING THEIR DESIGN IDEAS TO LIFE WITH THE BIGREP ONE.

Kingston University acquired a BigRep ONE 3D printer to ensure the variety of applications their ambitious students conceived could be created and tested quickly and affordably. Engineering lecturer Dave Haskell says a main benefit of large-format 3D printers, specifically, is the noticeable absence of limitation a larger build volume affords. A practical form of manufacturing, students can work more efficiently and easily fit multiple iterations of their project into a semester, seeing a physical result each time for a greater understanding of the decision process.

The part was able to go directly from their in-house 3D printer to their wind machine for testing, eliminating the extra time and cost of creating parts with subtractive methods. Student projects at Kingston involve creating precisely engineered parts, such as the left-hand front-wing students created to improve the aerodynamics of their Caterham racing car.

Haskell says that if there's an easier way to do it, an engineer will find it. 3D printing has proven so much easier than traditionally cumbersome and unreliable prototyping methods that Kingston University's BigRep is also finding use in high-grade material projects.



One novel use was the creation of a mold for a carbon fiber door to be used in their Caterham racing car. With the help of BigRep, Kingston University is changing the way they design and build parts without size as a limitation.

VINN:LAB AT TH WILDAU, TECHNICAL UNIVERSITY FOR APPLIED SCIENCE IN GERMANY

TH Wildau, the Technical University of Applied Sciences Wildau, provides a typical use case of studying with a 3D printer. The BigRep ONE is used in its on-campus FabLab, the ViNN:Lab, to educate students in prototyping designs and creating complex parts with different functions using additive manufacturing.

The printer's accessible location enables access to additive technology from a variety of the school's faculties, allowing less anticipated disciplines to take advantage of large-format 3D printing in novel ways. TH Wildau takes advantage of this by educating their business management, law, and business informatics students in the benefits of additive manufacturing, preparing them for the new industrial revolution.

TH Wildau's BigRep ONE has become an amazing machine to help them achieve their innovative creation projects and educate a broad selection of students in the design and manufacturing process. Where other forms of production might limit a student's ability to see their designs realized fully, either through unacceptable expenses or production lead times surpassing several months, accessibility to large-format 3D printing gives students the tools they need to understand the implications of design for superior learnings.

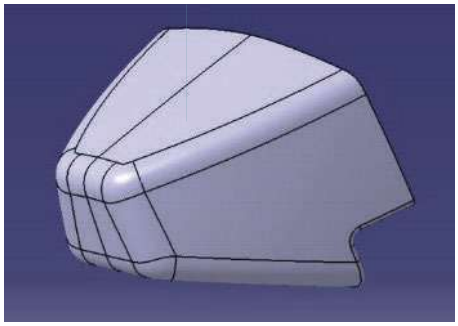
"PEOPLE ARE REALLY AMAZED BY THE THINGS THEY CAN DO WITH THE BIGREP, BECAUSE NOW THEY HAVE THE POSSIBILITY TO CREATE PROTOTYPES WITHOUT SCALING THEM DOWN, SO THEY CAN PROTOTYPES IN REAL LIFE WHICH IS AN AMAZING OPPORTUNITY FOR THEM."

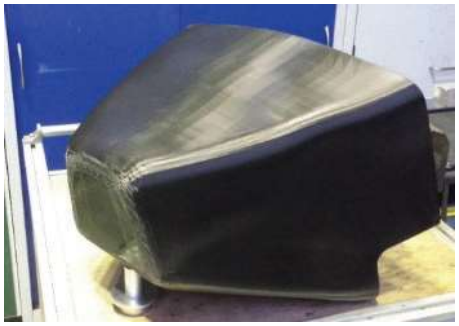
Markus Lahr
Ph.D. candidate & FabLab Manager at the TH Wildau

ELEVEN-O-SIX AT HELMUT SCHMIDT UNIVERSITY IS RACING AHEAD WITH LARGE-FORMAT 3D PRINTING

Eleven-O-Six Racing Team is the motorsport team at Helmut Schmidt University in Hamburg, Germany. Eleven-O-Six was inspired by the possibilities offered by additive manufacturing and got into gear to integrate it into their high-performance car production process.

NOSE CONE PROTOTYPE





Eleven-O-Six first produced a section of bodywork to examine its quality and performance, arranging for Open Lab in Hamburg to print a nose cone prototype on a BigRep ONE and choosing a BigRep high temperature filament for its necessary heat resistance. The team oriented the print so that there would be no support material on visible surfaces of the final part and easily created their first print.

FULL BODYWORK PROJECT

After their initial success, Eleven-O-Six raised their sights and set themselves the ambitious challenge of 3D printing one of their racing car's bodywork in its entirety. Creating a digital model of the bodywork covering the metal vehicle frame by using existing concept drawings, a full model was produced on CATIA software with support from a specialist in bodywork.

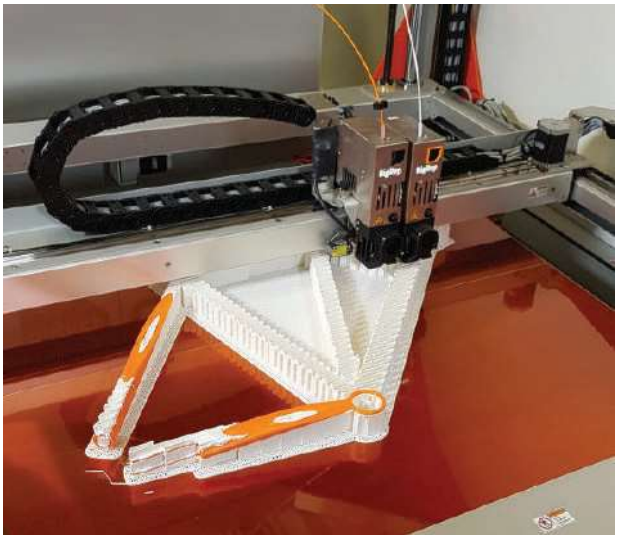
With the digital model in place, tweaking and prototyping amended designs became an easy process – with minimal expenses between iterations. As Robert Weber, Bodywork Manager for Eleven-O-Six, said, "Designing new parts for the bodywork was very comfortable when using the BigRep ONE. I just designed a new part and one or two days later I had the printed version."

AALBORG UNIVERSITY STUDENTS USE BIGREP ONE 3D PRINTER TO CREATE FUNCTIONAL BICYCLE DESIGN

Mechanical engineering students from Aalborg University, Esbjerg in Denmark use the BigRep ONE for a unique project. Led by Peter Riddersholm Lauridsen, PhD Fellow, fully functional bicycle frames are being 3D printed in a single piece.

Lauridsen led a semester project to create a functional load-carrying structure. Since a bicycle frame can fit in the 1005 x 1005 x 1005 (mm) build volume of their BigRep ONE, he decided to task his team with creating this practical machine with additive technology.

In universities across the world, 3D printing is becoming an integral tool for students in the field of engineering and design. As many projects show, additive technology leads to the actualization of some big ideas and that innovation is only amplified when a gigantic 3D printer like the BigRep ONE is available on campus.



"A BIKE IS A SIMPLE MECHANICAL CONSTRUCTION AND OBVIOUS TO USE IN A PROJECT. THE IDEA WAS TO DESIGN A TOPOLOGY OPTIMIZED BIKE FRAME BECAUSE 3D-PRINTING MAKES IT POSSIBLE TO MAKE THESE COMPLEX STRUCTURES. IN THE UNIVERSITY, WE HAVE BOUGHT A BIGREP ONE THAT MAKES IT POSSIBLE TO PRINT THE BIKE FRAME IN ONE PIECE. THAT WAS ALSO ONE OF THE REASONS WHY I SPECIFICALLY WAS GOING FOR A BIKE FRAME IN THE SEMESTER PROJECT."

Lauridsen (what´s the full name)
Position, Company Name

SLEEK AUTOMOTIVE MODELS – 1:4 CAR MODEL

“Printing on a big printer is always an advantage because gluing small, desktop printed, parts together always means deviation and it gets really imprecise,” said Maximilian Thomas, a German university student who designed a vehicle that offered a reasoned countertrend to autonomous driving as part of his Bachelor thesis.

Inspired by vehicles used in the 1950s Bonneville Speedway Salt Flat Races in the United States, Thomas designed a race car with clean lines and an aerodynamic shape for optimum speed. His model was ultimately 3D printed at a 1:4 scale at 1 meter long by 15 cm high. A portable model, but large enough for the intricate detail it required.

Thomas used a BigRep ONE to print the larger parts of his design that would not have been possible with a desktop 3D printer. He notes that printing with a large-format 3D printer improves the capacity to include complex details in the final part. Compared to other traditional methods of automotive model-making 3D printing is faster, easier and more cost-efficient – all ideal aspects when looking to save costs and resources in the prototyping process, not to mention university students working on experimental projects.

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Toll-free: 1-888-401-5885
Phone: 416-213-0533
Fax: 416-213-0538

info@cadmicro.com

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GTA
30 International Blvd, Unit #1,
Etobicoke, ON, M9W 1A2

TRI-CITIES
225 Pinebush Rd, Suite 102,
Cambridge, ON, N1T 1B9

MONTREAL
6500 Trans Canada Hwy,
Suite 400, Pointe Claire,
Quebec, H9R 0A5