

THE FAB FOUNDATION/FAB LABS

SPARKING A GLOBAL NETWORK FOR INVENTION
AND EDUCATION WITH SOLIDWORKS



The Fab Lab Program relies on SOLIDWORKS design software—one SOLIDWORKS Premium commercial license is available to each officially designated Fab Lab and Fab Academy, and 10 SOLIDWORKS Education Edition licenses are available to each Fab Academy site—to provide communities around the world with digital prototyping platforms for local invention and entrepreneurship.

Challenge:

Support a global network of Fab Lab digital prototyping, fabrication, and manufacturing centers to provide greater access to production facilities and opportunities for rapid product development, as well as to offer worldwide STEM (science, technology, engineering, and mathematics) education via the Fab Academy.

Solution:

Implement 10 SOLIDWORKS Education Edition licenses and one SOLIDWORKS Premium commercial license for each Fab Lab.

Benefits:

- Facilitated design needs of global network of digital fabrication centers
- Grew total number of Fab Labs to more than 1,000
- Expanded Fab Lab network to encompass 87 countries
- Extended STEM education opportunities worldwide via Fab Academy

The Fab Foundation—and the Fab Labs and Fab Academy that it supports—emerged from the Massachusetts Institute of Technology (MIT) Center for Bits and Atoms in 2009. The nonprofit organization established the Fab Lab program to provide communities around the world with digital prototyping platforms for local invention and entrepreneurship. Fab Labs are also increasingly being adopted by schools, colleges, and organizations as the foundation for project-based, hands-on STEM (science, technology, engineering, and mathematics) education. The Fab Academy was established to provide access to advanced instruction for students and educators associated with Fab Labs that don't have local access to the educational resources required to support them.

The concept for the Fab Foundation, Fab Labs, and Fab Academy came from the How to Make (Almost) Anything course at MIT, which is taught by Professor Neil Gershenfeld, who also directs the Fab Academy. The advent of digital fabrication technology opens the door to rapid, cost-effective prototyping and manufacturing, enabling just about anyone with a design idea to make an item without having to overcome the barriers of the traditional production paradigm. Fab Labs can be established with an initial investment of roughly US \$100,000, which is far less than the millions of dollars required to build a factory, providing inventors, entrepreneurs, and students with widespread access to advanced technologies that previously were only available to engineers at large companies, major corporations, and prestigious research laboratories.

The Fab Foundation provides would-be Fab Labs with a standard recommended inventory list of the equipment they need to establish a Fab Lab—including 3D printing, CNC router, cutting, milling, molding, and casting systems—as well as the cost-saving advantages of a global purchasing framework. However, the missing ingredient for the Fab Lab recipe was a means for creating the digital 3D design geometry through use of a universal design tool that could communicate with and drive all of these diverse digital fabrication processes, according to Fab Foundation Director Sherry Lassiter.

"As Fab Labs establish themselves, they immediately recognize the need to utilize 3D design tools to drive the various digital fabrication systems in their lab," Lassiter explains. "Fortunately, we have a valuable partner in Dassault Systèmes, developer of SOLIDWORKS® 3D design software, which is not only used in the MIT course from which Fab Labs were born but also is widely used across industry."

The Fab Foundation chose to make one SOLIDWORKS Premium commercial license available to each officially designated Fab Lab and Fab Academy—as well as 10 SOLIDWORKS Education Edition licenses to each Fab Academy site—because the software is easy to learn and use, is a preferred 3D CAD package of companies and universities worldwide, and supports all of the different types of geometry data needs of the equipment within a Fab Lab. "Having access to SOLIDWORKS tools is a terrific benefit for Fab Lab users, whether they are students or entrepreneurs," Lassiter stresses. "The growth of our Fab Lab network is very exciting—there are currently about 1,000 Fab Labs in 87 countries on the official list, with the number of labs doubling every year and a half—and the availability of SOLIDWORKS has been a significant contributor to our growth and success."



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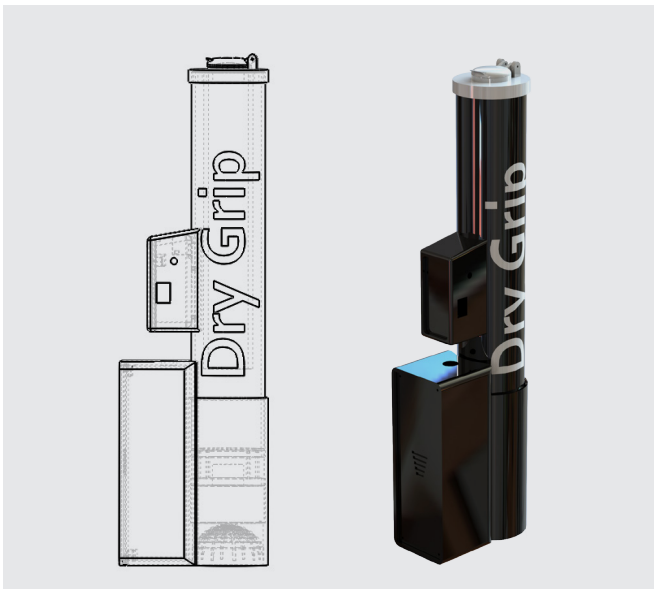
Fab Labs use SOLIDWORKS software to provide local inventors and entrepreneurs with an easy-to-use design tool that enables them to model design concepts and drive the lab's digital prototyping technologies, including 3D printing, CNC router, cutting, milling, molding, and casting systems.



DELIVERING EXCELLENCE IN MANUFACTURING IN MANCHESTER, UK

The first Fab Lab established in the United Kingdom, Fab Lab Manchester, is owned and operated by the Manufacturing Institute, an independent charity with the primary focus of supporting and improving the manufacturing sector through training, education, and consultancy. The group works to promote STEM education in the U.K. and provide greater access to advanced digital manufacturing technology, according to Dr. David Armson, who manages Fab Lab Manchester and Fab Lab Altrincham.

"Fab Lab Manchester was established in March 2010 to educate local residents about digital fabrication technology and lean manufacturing techniques, with the ultimate goal of delivering excellence in manufacturing," Armson explains. "Since we opened the doors, we've experienced fantastic growth with 16,838 visitors to Fab Lab Manchester and more than 2,500 registered users. Since establishing Fab Lab Manchester, the Manufacturing Institute has assisted in setting up an additional 15 independent Fab Labs in the U.K."



Fab Lab Manchester, owned and operated by the Manufacturing Institute, helps local entrepreneurs develop new product concepts, such as the patented DryGrip portable dryer for removing moisture from golf club grips, developed by local brothers.



"We used SOLIDWORKS software to work with two brothers who had the idea for the DryGrip to produce prototypes for certification by the governing golfing body and to secure a patent. We also used SOLIDWORKS to help them balance battery power requirements with the right combination of heat and compressed air to optimize the product."

— Michael Walsh, Fab Lab Manchester Lead Designer

"Initially, the big draw for Fab Lab Manchester was that we had the only 3D printer in Manchester that was accessible to the public," Armson continues. "Today, we offer the standard Fab Lab inventory of capabilities as well as an embroidery machine, acrylic shaping/bending equipment, and a large-format printer."

In addition to engaging with small to medium-sized enterprises to provide prototyping services at reduced costs, Fab Lab Manchester participates in the Fab Academy to expose local residents to digital manufacturing techniques, and has its own Young Fab Academy to train young people in the use of these technologies. SOLIDWORKS 3D design software plays a significant role in Fab Lab Manchester's commercial and educational operations.

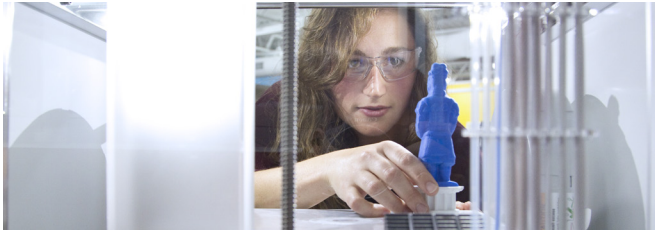
"We have a large student base that receives instruction in SOLIDWORKS, and we often work with them to apply advanced SOLIDWORKS techniques, such as using stress analysis to validate a part prior to prototyping," Armson notes. "SOLIDWORKS is also our design software of choice for all commercial engagements because it is easy to use and provides the accuracy required for digital fabrication."

An interesting commercial project that was completed in SOLIDWORKS at Fab Lab Manchester is the patented DryGrip portable dryer for removing moisture from golf club grips, which can make the grip slippery and negatively affect shots. "We used SOLIDWORKS software to work with two brothers who had the idea for the DryGrip to produce prototypes for certification by the governing golfing body and to secure a patent," recalls Fab Lab Manchester Lead Designer Michael Walsh. "We also used SOLIDWORKS to help them balance battery power requirements with the right combination of heat and compressed air to optimize the product."

BEST VALUE IN ENGINEERING EDUCATION NEAR RACINE, WI

Located just west of Racine, WI and almost halfway between Chicago and Milwaukee, Gateway Technical College made the establishment of its Fab Lab an integral part of the expansion of one of its Advanced Technology Centers in Sturtevant. The two-year technical college, which serves southeast Wisconsin, included a Fab Lab in its SC Johnson Integrated Manufacturing and Engineering Technology Center in 2013.

The Gateway Fab Lab, which has garnered statewide and regional recognition for its innovation and leading-edge practices, has embraced the educational and commercial aspects of the Fab Lab concept as a means for spurring innovation. With the addition of a Fab Lab, the two-year associate degree, technical diploma, and certificate programs at Gateway represent the best value in engineering education, according to Gateway Fab Lab Program Manager Greg Herker.



The Gateway Fab Lab at Gateway Technical College has embraced the educational and commercial aspects of the Fab Lab concept as a means for spurring innovation.

“We are fortunate to have a very forward-thinking college president, who, when he saw a Fab Lab three years ago, tasked me with making it an integral part of our 15,000-square-foot building addition,” Herker explains. “With our focus on digital manufacturing and access to equipment ordinarily only found on a factory floor, there’s no better value in engineering education than Gateway.”

The fact that SOLIDWORKS educational and commercial licenses were part of the establishment of a Fab Lab was a natural fit for Gateway because the technical college already has 100 SOLIDWORKS educational licenses that it uses year-round to support several sessions of its Introduction to SOLIDWORKS courses—for which the final exam is the Certified SOLIDWORKS Associate (CSWA) exam. “Manufacturing companies in our area are really dominated by SOLIDWORKS,” Herker stresses. “The additional licenses support our community outreach, such as the small public workshops that we offer for K-12 students, and the work of our local inventors and entrepreneurs.

“You can’t do commercial work with an educational license, so I was really glad that SOLIDWORKS stepped up to help the Fab Labs by providing a commercial license of SOLIDWORKS Premium software,” Herker added. “John Thorson, a local inventor/entrepreneur who took advantage of SOLIDWORKS software and our equipment, founded a growing pre-poured concrete forms business based on his work in our Fab Lab.

“The Fab Lab program has worked well for us, because most of our students who use SOLIDWORKS attend classes at night, leaving the lab available for workshops, summer camps for young students, and work by inventors/entrepreneurs during the day,” Herker says.



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FABRICATING RACING MOTORCYCLE IN PADOVA, ITALY

In Padova—a city in the Veneto region of northern Italy also known as Padua in English—a unique organization called Talent Lab Civitas Vitae established Fab Lab Padova as part of its efforts to provide a development ecosystem through which promising design ideas can be created, tested, and transformed into reality. Relying on the spirit of innovation and entrepreneurship, Talent Lab serves local companies and individuals seeking to capitalize on the potential opportunities of advanced technology and the web-based economy, with the overall goal of creating job opportunities for growth and development for its local community.



“I used the top-down assembly design method, interference detection, and fast correction functions in SOLIDWORKS—and Fab Lab Padova’s 3D printer and CNC machine—to develop and manufacture the motorcycle in a shorter period of time.”

— Stefano Tagliabue, Fab Lab Padova Design Engineer

Similar to other Fab Labs, Fab Lab Padova sponsors workshops, seminars, and classes to complement local educational institutions, and works with local companies and individuals to provide affordable access to digital manufacturing and prototyping technology, according to Fab Lab Padova Design Engineer Stefano Tagliabue. "In addition to using SOLIDWORKS Premium software at Fab Lab Padova, we have also chosen to use SOLIDWORKS at Talent Lab because it is one of the most-requested 3D design packages at local manufacturing companies," Tagliabue says. "This makes SOLIDWORKS attractive and useful for our students to learn and use in terms of seeking employment opportunities.

"Talent Lab provides our associates with a network of local enterprises and suppliers with which to collaborate and work, Fab Lab Padova gives them access to the latest digital fabrication technologies, and SOLIDWORKS enables them to concentrate on projects—particularly those involving mechanical design—without having to devote a lot of effort to CAD," Tagliabue adds. "The main strength of SOLIDWORKS is the versatility of the software. By using SOLIDWORKS, you can create the project design and produce a 3D model for fabrication and rendering. Thus, we don't need another CAD system."

Tagliabue leverages Fab Lab Padova's commercial license of SOLIDWORKS Premium software and digital manufacturing capabilities to work with local companies on exciting projects. For example, he used SOLIDWORKS to shorten development and production of the TS3 pitbike racing motorcycle from Casella Moto, Tagliabue's start-up and a leading motorcycle frame and component manufacturer, which helped Team Casella win the 2015 and 2016 Motoasi Italian Pitbike Championship.

"I used the top-down assembly design method, interference detection, and fast correction functions in SOLIDWORKS—and Fab Lab Padova's 3D printer and CNC machine to develop and manufacture the motorcycle in a shorter period of time," Tagliabue says.

Focus on the FAB Foundation

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www.fabacademy.org



Fab Lab Padova uses SOLIDWORKS Premium software and the lab's digital manufacturing capabilities to work with local companies on exciting projects. This TS3 pitbike racing motorcycle was developed and produced by Casella Moto, a leading motorcycle frame and component manufacturer. It helped Team Casella win the 2015 Motoasi Italian Pitbike Championship.

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