

Saint-Gobain Research North America

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Scaling 3D printing
of technical ceramics
with binder jetting



**Customer**

Saint-Gobain Research North America

Location

Northborough, MA

Application

Material research and commercial application development across a variety of industrial sectors

Machines

InnoventX, X25 Pro

Material

High-performance technical ceramics including silicon carbide

Website

www.saint-gobain.com

About Saint-Gobain

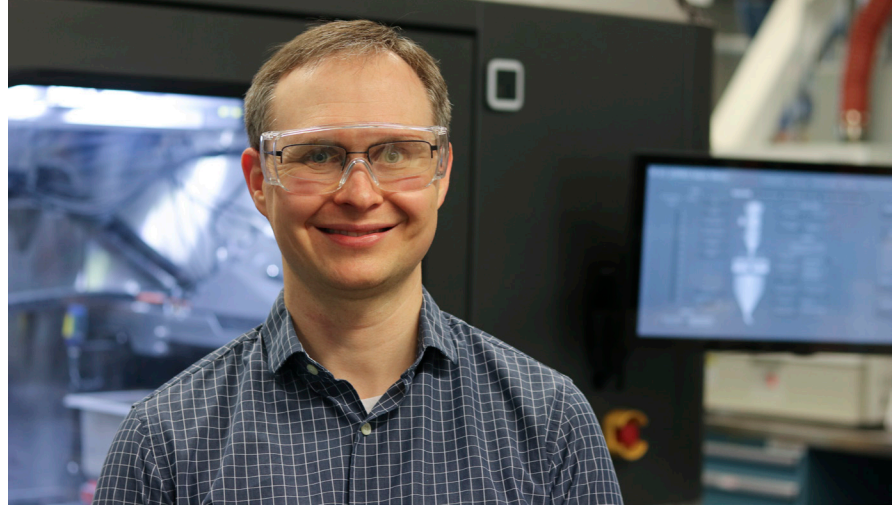
Saint-Gobain designs, manufactures, and distributes materials and solutions for the construction, mobility, healthcare and other industrial application markets. Developed through a continuous innovation process, they can be found everywhere in our living places and daily life, providing wellbeing, performance, and safety, while addressing the challenges of sustainable construction, resource efficiency and the fight against climate change.

This strategy of responsible growth is guided by the Saint-Gobain purpose, “MAKING THE WORLD A BETTER HOME”, which responds to the shared ambition of all the women and men in the Group to act every day to make the world a more beautiful and sustainable place to live in.

Developing new capabilities for ceramic binder jetting

Saint-Gobain is a global leader in innovative ceramics. The company designs, manufactures, and distributes a variety of technical materials using advanced manufacturing to develop innovative solutions in a variety of sectors. Its ceramics businesses have an unmatched range of ceramic processing technologies to solve customer challenges, including binder jet 3D printing. With two different ExOne machines, Saint-Gobain Research North America is forging the path to industrial adoption of more efficient, more sustainable designs through ceramic materials research and application development.

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Nicholas Orf, Principal Scientist and Additive Manufacturing Group Leader at Saint-Gobain Research North America with the X25 Pro



The R&D organization at Saint-Gobain comprises local teams dedicated to specific businesses, as well as a network of eight Transversal R&D centers that serve all the businesses of Saint-Gobain worldwide. These Transversal centers are knowledge hubs to develop new capabilities for the company to utilize in the future. Saint-Gobain Research North America, located in Northborough, Massachusetts, is one such Transversal R&D center and home to a 3D printing team dedicated to improving the production or performance of Saint-Gobain products via additive manufacturing, as well as advancing the use of 3D printing for ceramics within the Saint-Gobain portfolio.

“The team is a centralized service for all Saint-Gobain business,” said Nick Orf, Additive Manufacturing Group Leader. “We work closely with our business unit colleagues to identify where Saint-Gobain materials can be used in the 3D printing industry, where can we use the technology to develop new products internally, and where we can connect our business with startups and manufacturers in the AM space.”

“Being able to demonstrate scalability is important.”

Nicholas Orf, Principal Scientist and Additive Manufacturing Group Leader
Saint-Gobain Research North America

Using Desktop Metal binder jet 3D printing, Saint-Gobain works to develop innovative new products and create a more efficient manufacturing processes. “We see binder jetting as a highly scalable technology, which is obviously very important if the process is to be used for commercial production,” Orf said.

Saint-Gobain invested in its first Desktop Metal binder jetting machine, an InnoventX, in 2018. The flexibility of the machine allowed the team to perform research on a variety of their ceramic materials. To further advance the initial materials research into production-ready applications, the company added an X25 Pro in 2020.

“We chose these machines because of the ability to develop applications for a variety of materials and then scale it within the machine family,” Orf said of the Innovent entry-level machine and the X25 Pro production system. “Being able to demonstrate scalability is important. We’ve used the Innovent for years for prototyping concepts for several of our businesses. More recently, we’ve been seriously focusing on scaling a few of the most promising product designs and think we will be able to handle the yearly part production on the X25 Pro.”

The two-machine setup at Saint-Gobain takes advantage of the versatility of the Innovent as a multi-purpose tool and the increased capacity of the X25 Pro for industrial adoption. “The X25 Pro build box fits our needs for making larger-size pieces or larger numbers of parts – both for customers and for the interest we’ve see internally from our businesses here,” Orf said.

Density and porosity optimization are crucial to many of the team’s programs. “We are so happy with the powder compaction capabilities from the Triple ACT technology on the X25 Pro that we’re upgrading our InnoventX with the same capability so we have even better control of the microstructure of the parts we print,” Orf said. Projects can then be reliably scaled up to the X25 Pro for

3D printing with scalability

Binder jetting specialty materials on the Desktop Metal X-Series was developed with scalability in mind to drive innovative applications from R&D and prototyping to serial production with repeatable performance across a range of machines. Applications can be developed on an InnoventX before scaling for production on the

X25 Pro and X160 Pro. Features of the X-Series machines like top-of-the-line piezo printheads and Triple ACT powder compaction deliver industry-leading density in a variety of materials, including hard to process powders like silicon carbide and other technical ceramics.

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X160 Pro binder jet system ramps up applications developed on the innoventX or X25 Pro to mass-production volumes



production. For future growth, the company could further scale applications into the X160 Pro.

Orf offers a positive outlook for the future of binder jet 3D printing at Saint-Gobain, noting the growing interest in the technology both within the company and across the entire manufacturing industry. The Saint-Gobain Research North America team is excited to explore new additive manufacturing applications utilizing the company's materials such as alumina, zirconia, and silicon carbide, among other high performance ceramic materials in the Saint-Gobain portfolio.

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Nicholas Orf, Principal Scientist and Additive Manufacturing Group Leader, Saint-Gobain Research North America



About Desktop Metal Inc.

Desktop Metal, Inc. is accelerating the transformation of manufacturing with end-to-end metal 3D printing solutions. Founded in 2015 by leaders in advanced manufacturing, metallurgy, and robotics, the company is addressing the unmet challenges of speed, cost, and quality to make metal 3D printing an essential tool for engineers and manufacturers around the world. In 2017, the company was selected as one of the world's 30 most promising Technology Pioneers by the World Economic Forum, and was recently named to MIT Technology Review's list of 50 Smartest Companies. For more information, visit www.desktopmetal.com.