Manufacturers' MONTHLY

The next wave

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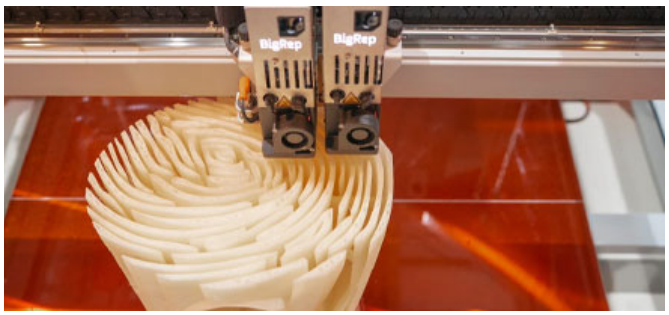
Often seen as a prototyping tool, a new understanding of 3D printing is emerging.



Forty years ago, the first 3D printer entered the market. Designed by Chuck Hull, the machine had all the hallmarks of its age, including a bulky design, and a control system run from a CRT monitor. But, the core ability to print an object from a digital design was there and has spawned four decades of innovation and experimentation with the technology.

Taking the latest technologies in this field and bringing them together in the one space is the ProtoSpace at the University of Technology, Sydney (UTS). Opened in March 2019, the facility provides a sandbox for industry to come and experiment with what 3D printing, also known as additive manufacturing, can mean for the Australian manufacturing industry.

Part of the UTS Faculty of Engineering and Information Technology, director of ProtoSpace, Hervé Harvard explains that the facility is there for the benefit of industry.

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“The ProtoSpace gives industry access to high end Additive Manufacturing capabilities with the help of an operational and engineering team. This is a very different model to a close door facility managed by a research team and supports our vision of allowing industry to just walk in and explore how to leverage 3D Printing.”

Buried underneath Building 7 at UTS’s main campus off Broadway, in Sydney, the bare, cinder block walls encase a space in which the latest in 3D printing technology awaits the next project. All in all, there are eight individual additive manufacturing machines spread across 900 sqm. One of the researchers there to assist businesses make the most of the array of technologies is Matthias Guertler, lecturer in mechanical and mechatronic engineering.

“As a basic first step of our engagement model, we allow industry to have a tour of ProtoSpace, so they gain a better understanding of what additive manufacturing is, and what machines are out there,” he said.

Unlike other spaces where 3D printers are displayed, such as a trade show or a tech expo, ProtoSpace encourages c hands-on experimentation, without the price tag.

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“We’re not promoting particular machines or technology,” said Harvard. “. “We’re advising on additive manufacturing and provide equipment for industry to use, and we’re more than happy if they want to be hands on.”

In total, UTS have assembled one of the largest collections of 3D printers in Australia, something that would be out of reach for many manufacturing businesses.

“There’s very few companies that would be said Harvard. “Certainly, many SMEs in my view have very little chance of affording a space like this, so I think coming into this space, they can explore 3D printing and the relevance of 3D printing in their business, without having to spend millions of dollars.”

Before getting stuck into designing a business’s first prototype, both Harvard and Guertler note that 3D printing is only as useful as a business makes it.

“We offer training and assist businesses to decide how they could use a 3D additive manufacturing machine placed in their factory, and adjust the process around that,” said Guertler.

Indeed, for businesses that don’t already have 3D orienting as part of their roster of manufacturing tools, ProtoSpace will be able to guide a business to how the technologies there can best serve a manufacturer.

“If you’re not going to be hands on, we’re going to redirect you to a printing bureau,” said Harvard. “For us, it’s for and about people who really want to understand the technology and explore, even if they don’t quite know yet how it may be relevant.”

From design to manufacturing

In a history of Google searches, 3D printing spikes in 2013 and continues steadily after that time, signalling its entry into public consciousness. Meanwhile additive manufacturing begins to grow at that time but continues to rise in prominence to the present day. This difference, highlights Harvard, is partly due to the successive wave of how the technology has been understood.

When first invested, the technology was used for rapid prototyping, but quickly the 3D printing industry realised that the technology could do more than this. Subsequently, businesses began using 3D printing for tooling. In the meantime, mainstream consumers have also adopted the technology for their own uses.

“Every single day, there was a news item about 3D printing; the first 3D printed chair, table, and I think the media thought that everybody was going to have a 3D printer in their home like a coffee machine,” said Harvard.

In some ways, Harvard noted, this may have been a disservice to the 3D printing industry.

“Because it’s not new – people have been hearing about 3D printing for decades – there’s a bit of 3D printing fatigue. People think we’ve heard it, nothing’s happening. Well that’s not true, the world is moving and there’s significant advances in 3D printing all over the world, in the automotive, aerospace, medical industries.”

What makes the current wave of excitement around 3D printing different, according to Harvard, is the potential to use the technology as part of the manufacturing process, rather than just in design or prototype phases. Signifying this shift was GE’s announcement in 2017 that 3D printed parts will be used in their turboprop engine.

Driving this shift are three converging trends, the reduction in cost of the 3D printing machines themselves, the increase in speed, with an associated increase in throughput, and the improvement in the performance of 3D printing materials. Harvard likes to call the new wave bespoke 3D printing.

Making sense of 3D printing

One project that is emerging from ProtoSpace and Rapido, UTS’s bridge between its academic expertise and industry-led design challenges, is a mineral separating device produced for Mineral Technologies. The spiral shaped object was manufactured using 3D printing technology, however from the perspective of the industry partner, the significance of the projects was its utility, not its method of manufacturing – a shift that Harvard sees as occurring more broadly across 3D printing.

“We can do many other parts, but that’s the one Mineral Technologies want to 3D print because that’s the one that makes economic sense.” said Harvard. “This machine does it, but they want the best machine to do a spiral, because when you make it more generic, there are always compromises.”

Being focussed on providing a service for businesses, not just the university, encourages ProtoSpace to focus on the best outcome for the project, not necessarily the most innovative use of a 3D printer.

“It comes down to sense making,” said Guertler. “We are not a trade show, and also not a consultancy, so we are not interested in selling stuff, we really want to help you to make sense with these new technologies.”

With this in mind, Guertler encourages manufacturers not to see the machines as objects on their own, but potential methods to reach a solution that is relevant for a commercial outcome. Guertler emphasises that businesses should ask themselves a question before getting caught up in the latest technology.

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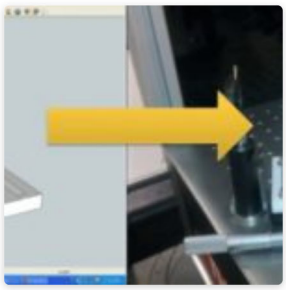

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