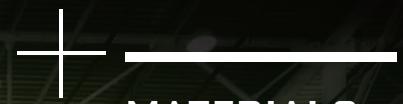




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MATERIALS

A look at the lifecycle of additive manufacturing feedstock

EDUCATION

How industry is looking to fill the skills gap



BIG METAL PRODUCTION

EXONE'S 10TH METAL 3D PRINTER DELIVERS BINDER JETTING INNOVATION

**DESIGN-TO-MANUFACTURING
INNOVATION**

BIG METAL PRODUCTION

EXONE'S 10TH METAL 3D PRINTER DELIVERS BINDER JETTING INNOVATION

In advance of Formnext, ExOne revealed its upcoming 10th metal 3D printer - the X1 160PRO - which will enter the market as the largest metal binder jetting system and one that incorporates two decades of improvements to deliver reliable, sustainable production of metal parts.

With build dimensions of 800 x 500 x 400 mm, the X1 160PRO delivers more than 2.5 times the build volume of the nearest metal binder jet system available today.

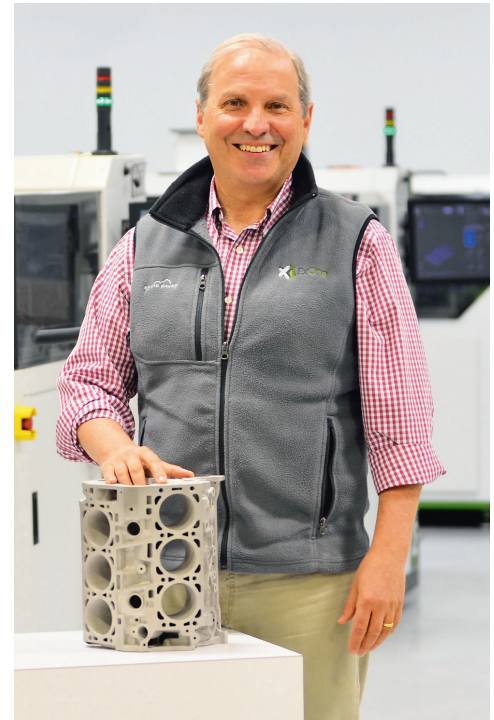
Built for high throughput and large-part production, the new machine features:

- *Patent-pending Triple ACT (Advanced Compaction Technology) for dispensing, spreading and compacting metal powders, which is critical to delivering consistent part density across the entire build area*
- *An all-new recycling system for binder fluids that delivers lower operating costs and ensures that sustainability gains delivered by 3D printing are carried through the entire process*
- *An open material system capable of printing six qualified metal materials, as well as other fine powders, such as ceramics*
- *New Industry 4.0 cloud connectivity and process-linking capabilities enabled by Siemens MindSphere*

"The X1 160PRO is big, fast and smart — built for high-quality serial production," said ExOne CEO John Hartner. "Our technology roadmap has been leading us to this machine for more than two decades, as we methodically tackled a series of process challenges. We're incredibly proud of what this model means for the future of metal 3D printing and sustainable production of large metal parts."

The X1 160PRO also rounds out ExOne's metal binder jetting line-up, which now offers three sizes. The Innovent+ entry-level system is used for research, design and small part production. The midline X1 25PRO 3D printer is large enough for production of most metal parts manufactured today and begins shipping this quarter. The new X1 160PRO, slated to ship in late 2020, enables serial 3D production of the largest parts.

▶ **RIGHT:**
EXONE CEO JOHN HARTNER WITH 3D PRINTED ENGINE BLOCK IN 316L



SHOWN:
3D PRINTED GREEN METAL PART, PRINTED IN 17-4PH STAINLESS STEEL, PRIOR TO SINTERING

A NEW ERA IN BINDER JETTING

The X1 160PRO comes at a time of unprecedented interest in metal binder jetting. Since 2015, a variety of companies have entered, or announced plans to enter, the metal binder jetting market.

For ExOne, the new competition demonstrates the real potential the market now sees in binder jetting. ExOne commercialized the first metal binder jet 3D printer in 1998, with the RTS-300, but had no metal competitors for most of the two decades that followed as it continued developing the technology.

“We’re excited about the renewed interest in binder jetting,” said ExOne CEO John Hartner. “It validates what we’ve known for decades - that binder jetting is going to be the winning technology when it comes to metal 3D printing for production. Other technologies are just too slow.

“But speed isn’t the only reason consensus is building around binder jetting. Our team has now advanced the technology to a point where it reliably produces extremely high-quality parts. Our end-to-end workflow is also far less complex than other processes. So, we welcome comparisons against new entrants, as well as other metal 3D processes.”

EXONE METAL LEADERSHIP

In fact, ExOne’s innovation is partially responsible for inviting the new competition. In 2013, while working with an aerospace manufacturer, ExOne began printing highly dense single alloys with

a median particle size of 9µm. Using ultra-fine powders such as these helps to ensure the particles sinter together to form a dense, uniform microstructure that delivers reliable functionality and performance.

Previously, ExOne metal printers processed a larger powder that delivered a porous part which required infiltration with another metal to achieve full density. Word of ExOne’s ability to print metals without infiltration spread quickly in the additive R&D community, and the new competition soon followed.

With two decades of lead time, the Pittsburgh-based ExOne is already the market share leader in binder jetting for sand, metals and ceramics, and its metal experience is unmatched. About half of its machines installed globally are metal 3D printers. ExOne also operates an on-demand metal production facility, with 25 metal binder jetting machines running 24/7 to make parts for industrial customers.

ExOne has considerable operating, service and support experience, which has been critical to its advancements. For example, the ExOne team has optimized its print speeds for each of its qualified materials to deliver the highest quality part.

NOW PRINTING MORE THAN SIX METALS

ExOne has a strict qualification process for approving materials in its open-system printers. Today, six metal materials are qualified, including the popular industrial stainless steels 304L, 316L and 17-4PH. But more metals are coming. In addition

to tool steels and Inconels, R&D work continues on reactive metals that are the most challenging to 3D print: titanium and aluminum.

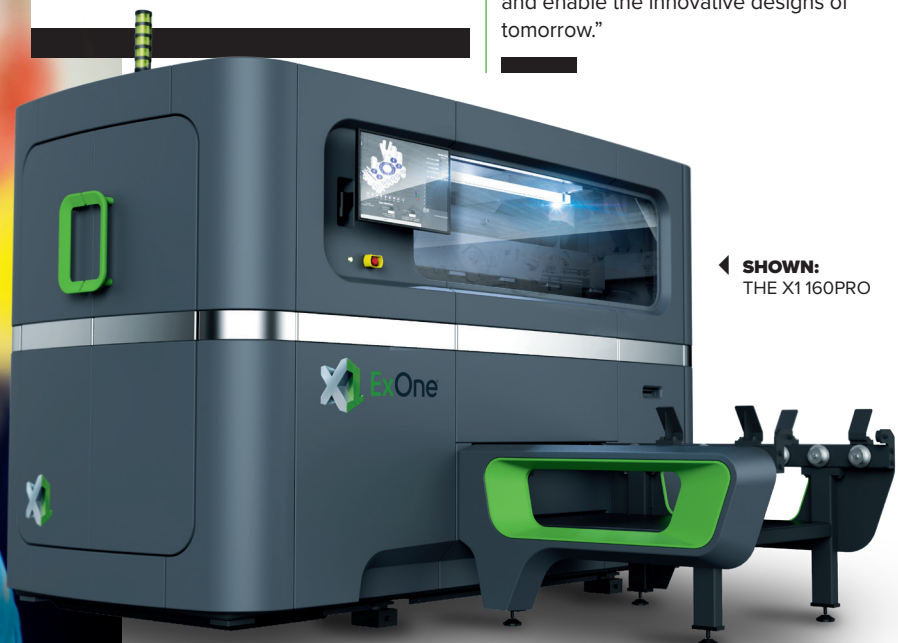
“The potential to transform metal part production with our machines, in the materials we can print today, and what we have coming, is huge,” Hartner said. “The automotive, aerospace, medical and energy industries produce billions of metal parts a year. By switching from traditional manufacturing to our 3D processes, ExOne can liberate designers and engineers to develop innovative solutions that weren’t previously possible, and they can be delivered faster and more affordably.”

A SMART PRODUCTION SOLUTION

With the reveal of its newest printer, ExOne is also showcasing its larger production vision, which includes new automation and Industry 4.0 connectivity features.

ExOne’s team has been developing automation that delivers a build box directly from the 3D printer to a curing oven and automated depowdering station, before prepping for final sintering. With on-board sensors and Siemens MindSphere, ExOne’s new machine will also offer in-process monitoring, remote access and factory integration capabilities.

“The team at ExOne believes it’s time to make metal production smarter,” Hartner said. “There’s no reason to delay – we have metal 3D printers that are commercially available today featuring mature technology. We’re ready to make metal production more sustainable and enable the innovative designs of tomorrow.”



◀ **SHOWN:**
THE X1 160PRO