ExOne to 3D Print Lightweight Ceramic-Metal Parts Under New License With Oak Ridge National Laboratory

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NORTH HUNTINGDON, Pa.--(BUSINESS WIRE)--Jan. 26, 2021-- The ExOne Company (Nasdaq: XONE), the global leader in industrial sand and metal 3D printers using binder jetting technology, today announced it has reached a commercial license agreement with the U.S. Department of Energy's Oak Ridge National Laboratory to 3D print parts in aluminum-infiltrated boron carbide (B_4C).

This press release features multimedia. View the full release here: https://www.businesswire.com/news/home/20210126005331/en/

Oak Ridge National Laboratory (ORNL) researchers developed a patent-pending method of 3D printing parts in aluminum-infiltrated boron carbide on an ExOne metal binder jet 3D printer. The material is used to produce collimators, neutron imaging components, and other objects, such as shielding equipment used to deflect or absorb energy. (Graphic: Business Wire)

Researchers at ORNL developed the patent-pending method of 3D printing aluminum-infiltrated B_4C on an ExOne M-Flex, a 3D printer that uses binder jetting technology to 3D print objects in metals, ceramics and other powder materials.

In 2019, ExOne executed an R&D license for the manufacturing process. Now, that license has been expanded to commercial use so that ExOne can begin printing aluminum-infiltrated B_4C collimators, shielding equipment, and other components used in neutron scattering research.

ExOne Technology Drives ORNL Innovation

Binder jetting is a groundbreaking 3D printing process that uses a digital file to quickly inkjet a binder into a bed of powder particles — metal, sand or ceramic — creating a solid part one layer at a time. When printing metals, the final part may be fabricated into a solid object. Other materials can also be infiltrated into the part during this process.

In this instance, a team at ORNL led by David C. Anderson, Manager of Instrument Systems Engineering for the Second Target Station Project, developed a process to 3D print objects in B_4C, a neutron-absorbing material, and then infiltrate the objects with aluminum. Infiltration is when a material is wetted or absorbed into another material like water into a sponge. The final aluminum-infiltrated B_4C material is known as a metal-matrix composite, a type of cermet. ORNL's Amy Elliott is a co-inventor of this process. Additional co-inventors of these technologies include Corson Cramer and Bianca Haberl, both of ORNL.

The development is significant because aluminum-infused B_4C has strong but lightweight properties, as well as neutron-absorbing characteristics that are particularly useful in neutron scattering instruments, which enable researchers to capture data down to the atomic level.

Using traditional methods, manufacturers face limitations in the shapes of collimators they can produce, which also limits the type of research and other work that could be done with them. The new method of creating B_4C objects opens the door to new types of objects useful in deflecting or absorbing energy, which can protect people and the environment from radiation.

The intellectual property covered in the license agreement includes pending U.S. patent application no. 16/155,134, entitled “Collimators and Other Components from Neutron Absorbing Materials Using Additive Manufacturing,” as well as two additional provisional filings. Under the agreement, ExOne will also engage in ongoing 3D printing production of a variety of B_4C matrix components used in neutron scattering experiments at ORNL.

The new B_4C material also means that ExOne can now offer its customers a method of 3D printing a metal material that is lighter than bronze. ExOne’s metal 3D printers, such as the Innovent+ ®, M-Flex®, X1 25Pro®, and X1 160Pro™are capable of 3D printing objects more than 22 materials today.

ORNL is managed by UT-Battelle for the U.S. Department of Energy's Office of Science, the single largest supporter of basic research in the physical sciences in the United States. DOE’s Office of Science is working to address some of the most pressing challenges of our time. For more information, please visit https://www.energy.gov/science.

About ExOne

ExOne is the pioneer and global leader in binder jet 3D printing technology. Since 1995, we've been on a mission to deliver powerful 3D printers that solve the toughest problems and enable world-changing innovations. Our 3D printing systems quickly transform powder materials — including metals, ceramics, composites and sand — into precision parts, metalcasting molds and cores, and innovative tooling solutions. Industrial customers use our technology to save time and money, reduce waste, improve their manufacturing flexibility, and deliver designs and products that were once impossible. As home to the world's leading team of binder jetting experts, ExOne also provides specialized 3D printing services, including on-demand production of mission-critical parts, as well as engineering and design consulting. Learn more about ExOne at www.exone.com or on Twitter at @ExOneCo. We invite you to join with us to #MakeMetalGreen™.

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