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# MAKE METAL GREEN

### EXONE DRIVES SUSTAINABILITY MESSAGE IN COVID-19 RESPONSE AND BEYOND

3D PRINTING & ADDITIVE MANUFACTURING INTELLIGENCE

## **EXONE PUSHES TO** MAKE METAL GREEN THE LEADER IN BINDER JETTING AMPLIFIES ITS SUSTAINABILITY

MESSAGE WITH UNIQUE COVID-19 RESPONSE AND NEW CAMPAIGN

v the time the COVID-19 crisis had been declared a pandemic in March, the global 3D printing industry had already sprung into action with a historic effort to produce valves, testing swabs, face shields and a variety of other innovative solutions in record time to fill supply chain gaps.

At ExOne, the company's global team was eager to contribute, too. But almost all of the 3D response had so far been in plastics, while ExOne specializes in binder jet 3D printing of metal, sand, and ceramics.

For John Hartner, the company's CEO, the desire to help was personal as one of his daughters is an ICU nurse in New York City, which had been hit hard by the crisis. So, Hartner started brainstorming with the R&D team about where the company's technology could best contribute a meaningful solution.

The idea of reusable, sterilizable metal filters for N95 face masks guickly rose to the top of the list. After all, ExOne customers had been 3D printing metal filters for years.

What's more, at the nearby University of Pittsburgh, Prof. Markus Chmielus had been doing research on controlling the porosity and microstructure of metal parts binder jetted on the ExOne Innovent 3D printer with different sintering approaches.

With news growing of PPE shortages worldwide and increasing concern about enormous amounts of medical waste, including at Pittburgh's own medical facilities, Pitt and Chmielus agreed to work with ExOne to rapidly develop a porous and reusable metal filter that could meet an N95 specification for filtering out contaminants while allowing the proper amount of airflow.

#### SUSTAINABLE SOLUTION GETS **POSITIVE RESULTS**

In April, after preliminary testing was positive, ExOne and Pitt announced the innovative filter, which could be 3D printed in either copper or stainless steel, to fit inside a variety of face masks and other medical devices. Copper is an attractive material because it has known disinfectant powers and research suggests

SHOWN EXONE PARTNERED WITH ALTAIR AND A MAJOR AUTOMOTIVE MANUFACTURER TO REDESIGN AN EXISTING CAR PART, REDUCING ITS WEIGHT BY 45% WITH BINDER JETTING

#### COVID-19 dies faster on copper than many other surfaces.

Most importantly, the new reusable filters will be replacing filters that must be disposed of after a single use. The volume of waste associated with masks alone is staggering. Routine annual production of N95 respirators is estimated at 1.5 billion in the U.S., according to the Washington Post. The newspaper cited a 2017 study in Health Security journal that estimated up to 3.5 billion N95 masks would be needed during a pandemic. And that doesn't count other medical equipment reauirina filters.

Today, ExOne has optimization work underway with new mask and filter designs and partners. The company now believes its filter solution will be a lasting game changer once it's fully approved for commercial use. ExOne expects that to happen by year end.

**"THE COVID-19 PANDEMIC HAS HIGHLIGHTED THE IMPORTANCE OF DE-RISKING SUPPLY CHAINS. ESPECIALLY FOR CRITICAL PARTS.**"

"The way we see it, every frontline medical worker will be able to have their own custom-fit mask with a reusable metal filter for long-term use," Hartner said. "By now, we've all seen the photos of masks littering beaches and parking lots, and we're confident that this new application is going to have an impact on reducing waste going forward. We've had an incredible response to this new application, and we're working urgently to get it to market."

#### THE #MAKEMETALGREEN SUPPLY CHAIN LINK AT EXONE

Since its inception in 1995, ExOne has always been focused on the sustainability aspects of its core binder jetting technology; it's why the company's logo is green. But the focus on these benefits has intensified under Hartner, who believes they're one of binder jetting's core value propositions for customers.

Binder jetting fabricates objects with little to no waste, offering a dramatic improvement over traditional manufacturing methods. It also enables all new lightweight part designs, including those that consolidate many pieces of a product into a single unit, while preserving function and strength. These new parts can make cars, trucks, airplanes and other equipment more fuel-efficient and dramatically shorten supply chains, consuming far less energy. In fact, this approach

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"One important aspect of sustainability is shortening supply chains," Hartner said. "Our technology can consolidate several parts into one, eliminating extra manufacturing steps, and also reduce the need for parts to be shipped around the world for final assembly. Whether you look at this as part of a reshoring or decentralized manufacturing strategy, it's clear that this is the future of manufacturing.

"The COVID-19 pandemic has highlighted the importance of derisking supply chains, especially for critical parts. ExOne can work with manufacturers to ensure critical metal parts are prepared for 3D printing in an emergency and to help manufacturers redesign their parts for metal 3D printing in the first place."

One printed part that ExOne points to as delivering on this mission was designed in partnership with Altair and a major automotive manufacturer. An existing car part was redesigned for binder jetting and took advantage of its capabilities, resulting in a part that was 45% lighter, eliminated extra manufacturing processing steps and simplified how it was integrated into the vehicle assembly, with a shorter weld seam.

"We believe this is the real future for binder jetting," Hartner



EXONE CONTINUES TO OPTIMIZE ITS METAL FILTERS IN PARTNERSHIP WITH MASK COMPANIES FOR COMMERCIAL RELEASE, WHICH IS EXPECTED LATER THIS YEAR

#### COVER STORY



can deliver on a decentralized supply chain where guick local production of parts in a crisis is simplified.

said. "Making metal parts smarter and lighter and reducing energy consumption around the world to create and deliver them. Only binder jetting can deliver on this mission at high production volumes, which is why you've seen other companies following us into this space."

#### **DRIVING METAL 3D PRINTING ADOPTION THROUGH SUSTAINABILITY**

ExOne is driving full-steam ahead with its sustainability message, with a new #MakeMetalGreen campaign, and working to document its sustainability benefits with new and existing customers.

"We're currently working to develop end-to-end research that show just how sustainable our technology is compared to traditional methods," Hartner said, "As a company that runs its own production facilities for 3D printing metal parts 24-7, we already know, instinctively, how areen our technology is compared to traditional methods. But we're eager to help customers evaluate just how much they can save and improve their sustainability.

"The potential benefits are enormous, whether you make an industrial product or even a smaller consumer device. You can streamline manufacturing processes, save energy, derisk your supply chain and even deliver new functional benefits to your customers."