



## CASE STUDY

# 3D Printing Solutions for High-Scrap Assembled Cores

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Kore Mart adopts S-Max® binder jet sand 3D printing system for top-quality serial core production



*“We invested the last eight years in modernizing our company, from the people to the processes... Installing an ExOne S-Max is a major milestone in our company’s innovative vision.”*

Greg Witmyer, President, Kore Mart

## Innovation inspiration from the Great One

Innovation helps businesses anticipate market changes and get ahead of opportunities, and a tradition of capitalizing on new technologies is deeply rooted in the history of Kore Mart. Its core shop was established to push a new-at-the-time warm-box binder into the market. Kore Mart’s founder purchased a core machine to supply metalcasters skeptical of the new binder with proof-of-concept cores – and the business of supplying top-quality cores took off from there.

Throughout its four decades serving foundries, Kore Mart has continued investing in new technologies, growing into a thriving one-stop supply shop that produces cores, manufactures riser sleeves and resin coated sand, and even runs a unique sand reclamation process. In 2023, the technological evolution continued when the company installed an ExOne S-Max binder jetting system to 3D print sand cores.

“Kore Mart’s motto is based on a Wayne Gretzky quote,” Greg Witmyer President of Kore Mart explained. “I skate to where the puck is going, not to where it has been.’ Kore Mart is skating to where the industrial puck is going.”

“We knew this was going to be the future,” added Ryan Tytler, Vice President of Sales for Kore Mart. He noted how the core shop has seen plenty of foundries not keep up with the technology they need to advance, and ultimately shut down. So the Kore Mart team followed cutting-edge innovations within the industry and actively investigated binder jetting technology.

“We invested the last eight years in modernizing our company, from the people to the processes,” Witmyer said. “We’ve reached a point now where our team is very young, intelligent, and forward thinking; our equipment and processes are state-of-the-art. Installing an ExOne S-Max is a major milestone in our company’s innovative vision.”

### CUSTOMER

Kore Mart Limited

### LOCATION

Hamburg, Pennsylvania

### INDUSTRY

Foundry supplies

### APPLICATIONS

Complex production cores

### 3D PRINTERS

S-Max®

### MATERIALS

Silica sand with furan binder

### WEBSITE

[www.koremart.com](http://www.koremart.com)

The S-Max sand 3D printer installed at Kore Mart is part of the company’s strategic innovative investments



*“We should have had one of these running production a few years ago for sure.”*

Ryan Tytler, Vice President of Sales, Kore Mart



## Rethinking what's possible at production levels

Operating 15 traditional shell machines and three cold box core shooters, Kore Mart is outfitted for serial production to serve foundries with top-quality core services. With early interest in 3D printing technology focused on prototyping, the team wanted to wait for the right moment to invest - gauging demand for production volumes. “We were probably a little bit too hesitant in the beginning,” Tytler laughed. “We should have had one of these running production a few years ago for sure.”

Adding 3D printing has enabled the team to create complex geometries at repeatably and at large volumes. “Our S-Max runs almost exclusively production jobs,” Tytler explained, noting the precision meets the needs of 98% of Kore Mart’s customers - anything requiring tighter tolerances is sent to the shell process.

Eliminating hard tooling by printing directly from a CAD design reduces production setup times compared to traditional processes. “You don’t have to deal with tool storage or tool maintenance,” Tytler said. “You don’t have to be cleaning vents or buildup on boxes from running them. There are a lot of things that are inherently difficult with operating traditional core rooms that you don’t have to do with the 3D printer.”

Tytler shared the story of a hydraulic valve company repeatedly turned down by foundries when trying to have a part cast. “Four foundries turned them down because nobody could make it,” he explained. Because of a backdraft in one area and a very thin wall in the core, the part proved unachievable with traditional tooling. “I told them the reason foundries were telling them no was because this part can’t be made, it can only be printed,” Tytler said. “If 3D printing didn’t exist then this part might have gone to the wayside.” That’s why he travels to foundries promoting binder jetting technology to get his customers out of the traditional mindset of what’s possible now and to start thinking about new possibilities with 3D printing, and especially the new possibilities at production levels.

He sees high-scrap-rate assembly jobs being pushed to binder jet 3D printing by foundries no longer willing to deal with a high internal scrap rate when better technology exists. Intricate assemblies traditionally made with cold box and assembled are prime candidates for 3D printing at Kore Mart, where they’re working on developing applications for water jackets, cylinder heads, and engine blocks. The manual processes involved with such assemblies inherently create a large scrap rate. “You’re depending on variables,” Tytler explained. “Did this seat down all the way? Was it glued properly? Is there excess glue that’s creating gas? When you’re 3D printing it on the S-Max, you’re just printing it and you don’t have to worry about any of that stuff.”





## Quick ramp up with eye toward future investment

As production continues the ramp up, the Kore Mart team leans on the performance of its binder jetting system to deliver quality to customers. “ExOne has always been a leader in this space,” Tytler said. “The S-Max, it makes the best parts. We don’t want to have to question if a part is good enough. We want it to just work every time, and we know the S-Max will work.”



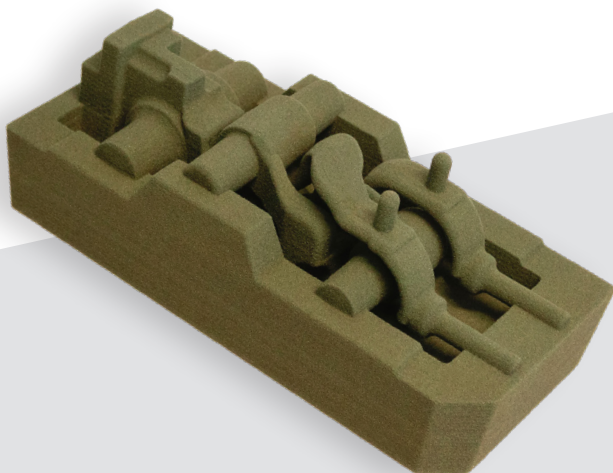
A large print is removed from the sand print bed, left, of the S-Max sand 3D printing system at Kore Mart, right



Just three months after installation, the S-Max 3D printer at Kore Mart is already running at 50% capacity, producing five to six large-format build boxes a week. And the flexibility of the machine allows the team to react quickly to customer needs. “That’s really an advantage of binder jetting; we can produce whatever we really need to make. If someone really needs something quick, we can cut a corner out of a box and fulfill that order while continuing to run our production job,” Tytler explained.

He described the return on investment of the S-Max as “pretty freaking good.” The team calculated a range of ROI scenarios depending on utilization, all falling under two years payback.

With binder jetting and other technologies, the 45-employee company plans to grow into the future. A 3D scanner has already been brought in-house for future reverse engineering projects and further investment in binder jetting is part of the roadmap. “We laid out our location to handle multiple machines and with increasing capacity we’re already planning the right time to add the second S-Max system,” Tytler concluded.



## Sand Reclamation

A unique innovation by the team at Kore Mart allows for the reclamation of 10,000 tons of sand each year for beneficial reuse within the industry. Beginning in 2021, the company, already delivering cores with its own fleet of trucks, started picking up spent sand from its customers. A mechanical reclaimer breaks the sand down to grain size followed by a thermal reclaim process to burn off any chemicals and resins from previous processes. Already having gone through thermal expansion, the resulting reclaimed sand helps foundries lessen expansion defects, making it an in-demand product supplied by Kore Mart for iron shops.

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Ryan Tytler, Vice President of Sales, Kore Mart

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#### ABOUT KORE MART

Kore Mart understands the unique challenges faced by the foundry industry and serves as a trusted partner for comprehensive solutions to meet foundry consumable needs. Beyond just offering products – the experienced Kore Mart team can help address logistics concerns, casting defect issues, and supply challenges efficiently and cost-effectively.

A focus on innovation, customized solutions, and a commitment to environmental sustainability sets Kore Mart apart. Its team prides itself on offering an extensive range of products catered to diverse needs to provide solutions for foundries seeking exceptional quality, technical expertise, and reliable logistics.



#### ABOUT EXONE

ExOne is now part of Desktop Metal’s group of #TeamDM brands, which exist to make Additive Manufacturing 2.0 a reality so we can unlock the vast benefits of 3D printing at meaningful production volumes. 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 sand binder jetting experts, ExOne also provides specialized 3D printing services, engineering, and design consulting.