



## CASE STUDY

# Beyond Prototyping. Sand 3D Printing Becomes a Production Strategy

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Decco Castings integrates sand  
3D prints from Hoosier Pattern to  
accelerate lead times, reduce labor,  
and meet aerospace complexity



Decco Castings



ExOne™

*"If you want [castings] fast without spending a lot of money upfront, then sand 3D printing is your solution. It reduces lead time. You can do development, and you can change things on the fly without designing and manufacturing expensive tooling. So, 3D printing is really that first stage of development, but also, now, it's kind of the cheapest solution as well."*

Chris Moakes, Managing Director, Decco Castings

## Five decades of precision aluminum casting excellence

In the heart of Southern California's aerospace hub, Decco Castings has systematically built a reputation for over five decades as one of the industry's most trusted partners for precision-cast aluminum products. As lightweight, high-strength components have become essential for next-generation aircraft and defense systems, the company has established itself as a critical supplier to aerospace giants such as Boeing and Lockheed Martin, casting everything from pump housings and vertical launch system parts to guidance system pylons and munitions frames. Components manufactured by Decco find their way into virtually every commercial aircraft that takes to the skies today.

The foundry's expertise spans both sandcasting and permanent mold casting techniques, producing precision aluminum components in various alloys such as 356, A356, A357, and C355. Decco maintains approximately 30,000 square feet (2,800 square meters) of manufacturing space across its foundry and finishing operations and provides castings in various stages of completion — from semi-raw components to a finished-machined and painted product.

Serving the most demanding sectors of modern industry, the company holds multiple critical certifications including AS9100-D, ISO 9001:2015, and NADCAP accreditation. The inspection department maintains NADCAP accreditation for X-ray inspection, fluorescent penetrant inspection, tensile testing, and welding, while coordinate measuring machine (CMM) capabilities ensure dimensional precision meets the most exacting specifications.

### FOUNDRY

Decco Castings Inc.

### LOCATION

El Cajon, CA

### INDUSTRIES SERVED

Commercial and Defense Aerospace,  
Commercial Industry

### ALLOYS POURED

Aluminum

### WEBSITE

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

### 3D PRINTING SERVICE PROVIDER

Hoosier Pattern

### 3D PRINTER

Six S-Max® binder jetting systems

### 3D PRINTING MEDIA

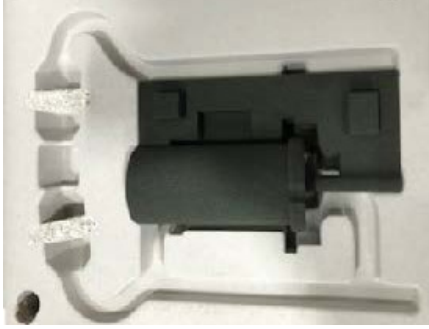
Silica sand, furan binder

### WEBSITE

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



Decco Castings, Inc. is an aluminum sand and permanent mold foundry, serving the aerospace, defense, and commercial equipment industries with its team in El Cajon, California.



At a time when many foundries are shutting down operations, Chris Moakes, Managing Director at Decco Castings, noted customers are demanding more and foundries must innovate to deliver. “They want parts quicker and cheaper,” he said “And if you want it fast without spending a lot of money upfront, then sand 3D printing is your solution. It reduces lead time. You can do development, and you can change things on the fly without designing and manufacturing expensive tooling. So, 3D printing is really that first stage of development, but also, now, it’s kind of the cheapest solution as well.”

## 3D printing becomes a manufacturing strategy



Decco’s journey with sand 3D printing began in 2019 when a customer approached them about prototyping a series of parts for testing. To offer flexibility without a large tooling investment while its customer developed the new product line, the Decco team researched suppliers of 3D printed sand to deliver the molds that measured approximately 36 in (915 mm) in every dimension.

John Urdea, Senior Engineer at Decco Castings, worked with the customer to develop three iterations each geometry. “If they wanted to make any changes, it was very simple to change the model and reprint the cores to create a new sample,” he said.



While production flexibility is what drew Decco the capabilities of binder jet 3D printing, the foundry instantly exploited even more benefits from the additive technology, notably producing a complex geometry that would have been challenging or impossible with traditional methods.

“There were things we could do with 3D printed cores that we could not in normal dry sand molds,” Urdea explained. “That had a lot of veins/fins so we put in a very sophisticated venting system to make sure they were not going to trap any air and we were going to fill the leading and trailing edges of the veins/fins – I could never do anything like that in dry sand but I was able to easily do it in a printed core. It worked out extremely well and if I ever have to build anything like that again, I would do the exact same thing with 3D printing,” he said.



What began as a solution for a specific customer request has since evolved into a core component of the foundry’s manufacturing strategy. The Decco team often first uses its in-house plastic additive manufacturing capabilities to ensure a project’s success. “We use a plastic 3D printer to see it three dimensionally before we ever get a core,” Urdea said. “We do a lot of work in order to ensure that what we’ve designed is going to work.”



To ensure 3D printed parts off its fleet of S-Max binder jet systems arrive safely on the other side of the country, Hoosier Pattern ships complex core orders from Decco in “coffins” – individual housings 3D printed around designs during the build process that encapsulates the complex core within unbound sand for secure shipping. The delicate shapes are then unpacked from the sand and cleaned once they arrive at Decco.

*“These days, you’re talking 26 to 36 weeks for someone to build a tool – with sand 3D printing, we get the job finished and into production by then.”*

Chris Moakes, Managing Director, Decco Castings

To fulfill its demand for digital sand, the foundry built a partnership with Hoosier Pattern specifically for their sand 3D printing capabilities and exceptional service. With a fleet of six ExOne S-Max binder jetting systems, today, Decco orders everything from full mold packages for early-stage prototyping to high-volume production cores for commercial aircraft castings.

## Binder jetting streamlines the casting workflow

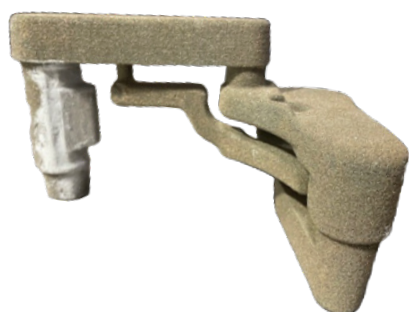
Decco has fundamentally transformed how it approaches complex casting challenges by integrating ExOne binder jet technology into its casting workflow. “3D printing allows us to totally eliminate the tooling creation step and significantly reduce the lead time for castings,” said Sergei Chekhonin, Manufacturing and Process Engineer at Decco.

Chekhonin described how their most intricate legacy cores now use 3D printing to optimize labor and precision handling. He explained, “We do some complex cores made with complicated boxes that include loose pieces and wires that require experienced personnel to make. Now, we don’t need to do that. We just ask Hoosier Pattern to print a core, we drop it in the mold, pour the metal, and the casting is ready. If we need any changes, they’re easy to implement in the software.” Chekhonin emphasized, “Basically, with 3D printing, casting gets faster, easier, much more flexible.”

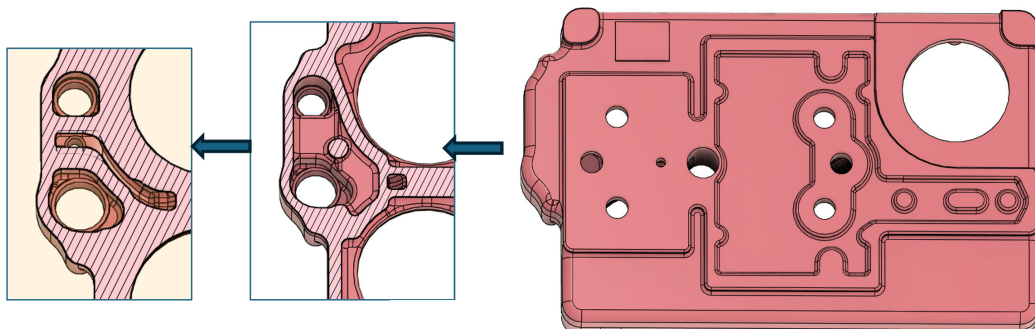
Binder jetting has yielded transformative results, helping the Decco overcome traditional foundry challenges, meet increasingly complex customer requirements, deliver faster.

## Reduced lead times keep production flowing

One of the most significant advantages Decco has realized is dramatically shortened lead times compared to traditional tooling methods. Printing directly from a digital file eliminates the need to build a tool and wait out the resulting long lead times to start production. The team now relies on 3D printing early in the quoting process, thanks to its speed, which also helps the iterative process.



The complex geometry of this internal passageway was cast with ease using 3D printing. Rather than a consolidated core, using traditional methods would’ve required the assembly of three individual pieces.



*"It's our go-to when we're bidding into new product just because it just reduces that lead time. If you've got a good model from the customer then you can be making cores immediately during the first stages of development without actually designing and building tools around the cores. It's getting rid of those multiple layered processes of design-over-a-design. The speed is fantastic. These days, you're talking 26 to 36 weeks for someone to build a tool – with sand 3D printing, we get the job finished and into production by then."*

Chris Moakes, Managing Director at Decco Castings

This agility doesn't just accelerate project kick-off - it also streamlines ongoing development. Whether refining a prototype or adjusting for late-stage design changes, the digital workflow gives Decco flexibility that hard tooling can't match.

*"Absolutely. If I had to take a hard tool and send it out to get fixed it could take two or three weeks. We can fix a model in a matter of hours."*

John Urdea, Senior Engineer at Decco Castings

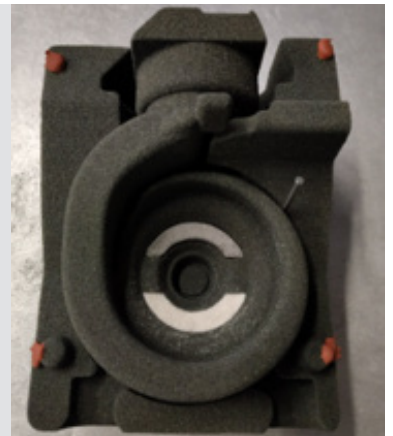
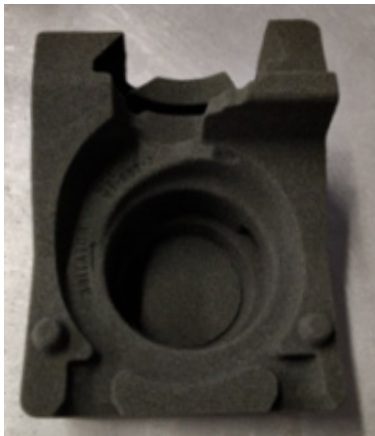


### Freedom to create the best design, not the easiest to manufacture

Building molds and cores layer-by-layer eliminates many of the manufacturability constraints of traditional processes. Binder jet 3D printing technology enables Decco to deliver complex shapes and meet previously impossible customer specifications.

*"There's some notes on blueprints that we've never been able to manufacture parts to in the past. For instance, having zero parting lines on certain areas of a part like in a round bore or other areas of a part where they've asked for zero draft in a core area. In the past we've never really*

To meet the required lead time and budget demands, this fuel transfer application project was selected for a completed 3D printed mold and core package and cast based to meet the customer's geometry and allowance requirements.



*“Consolidating cores is a key benefit - and it’s a benefit in itself that less hands are touching it. It’s tough to find the right people and train them. With 3D printing, cores and molds literally come out of the packing sand, get cleaned up, and they’re ready to go. And that’s something.”*

Chris Moakes, Managing Director, Decco Castings



Production 3D printing applications delivered from Hoosier Pattern ready for casting at Decco.

*been able to do that without extremely sophisticated and very, very expensive tooling. However, with 3D printing we can do that because we can print with zero parting line and no draft. Those are advantages of printed cores that shell cores and dry sand cores just cannot compete with.”*

John Urdea, Senior Engineer at Decco Castings

### Core consolidation reduces hand work

The design freedom of additive manufacturing has led to the key advantage of consolidating multiple cores into single, 3D printed cores with unmatched complexity. Core consolidation greatly reduces or altogether eliminates the need for manual assembly.

*“We can take two, three, or even five cores that get assembled and design them as one printed core, and that is huge so we’re doing a lot of that here. Jobs that used to be dry sand cores or shell cores we now 3D print and by combining the segments together there’s a tremendous amount of labor dollars saved, and we don’t have as much hand work to do on these cores.”*

John Urdea, Senior Engineer at Decco Castings

### Eliminating bottlenecks and enhancing repeatability

Consolidating cores through the digital workflow means less skilled assembly labor is needed. Filling skilled labor demands is a challenge for the foundry, so eliminating core assembly streamlines operations.

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Chris Moakes, Managing Director at Decco Castings

Eliminating core assembly also eliminates the alignment errors and scrap that come with manual production. Automated core production with binder jetting means that the resulting product is more reliable.

*“The classic approach to making cores is less stable because it requires individual loose pieces and a lot of factors that can vary the process. But 3D printing is a more stable process. If the design is good, the printed core will be good for the entire run.”*

Sergei Chekhonin, Manufacturing and Process Engineer at Decco

With binder jetting, Decco isn’t just making molds and cores faster – it’s changing the very foundation of how castings are designed, produced, and delivered.

## Fast-tracked aerospace fuel transfer pump casting

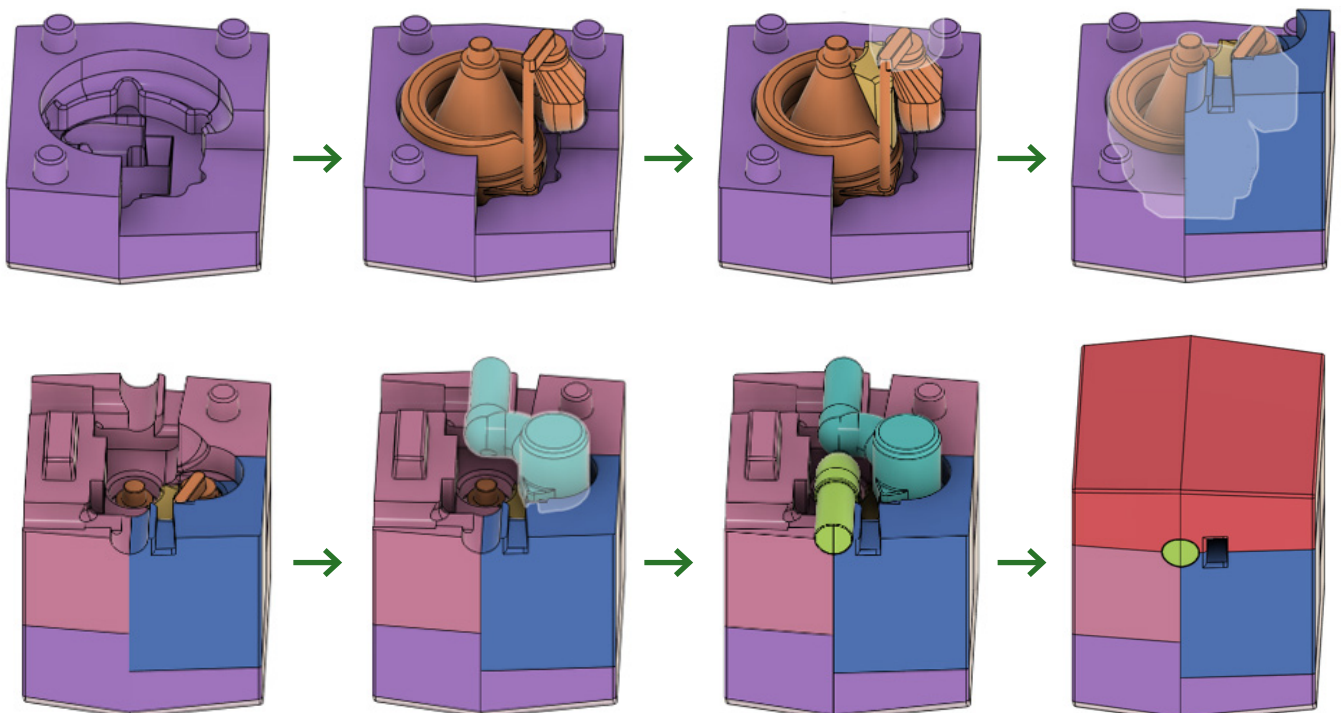
In modern commercial aircraft, fuel isn't just stored - it's actively managed throughout the flight to optimize performance, safety, and efficiency. The fuel transfer system plays a mission-critical role to reliably move fuel between multiple tanks to maintain balance, center of gravity, and continuous engine feed under demanding flight conditions.

A leading global provider of advanced aerospace components approached Decco seeking a domestic foundry with a proven track record in supporting portfolio projects.

Facing a tight timeline and the need to minimize tooling costs for a fuel transfer pump casting, Decco recommended full 3D printing of both mold and core packages. Sourcing printed sand from Hooiser Pattern, the Decco team delivered a dimensionally accurate, aerospace-grade casting for the rotating component that met Class and grade per design while slashing both lead time and upfront tooling expenses.



This aluminum fuel transfer pump was cast at Decco using a completely 3D printed mold and core package sourced from Hooiser Pattern's fleet of six S-Max binder jetting systems. Digital production enabled Decco to deliver the casting without the long lead time and high investment costs of traditional hard tooling.



*“3D printing allows us to totally eliminate the tooling creation step and significantly reduce the lead time for castings.... Basically, with 3D printing, casting gets faster, easier, and much more flexible.”*

Sergei Chekhonin, Manufacturing and Process Engineer, Decco Castings

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#### ABOUT DECCO CASTINGS

Incorporated in 1973, Decco Castings is a leading provider of precision aluminum sand and permanent mold castings for the aerospace, defense and commercial industries. The Decco team is driven by relentless focus on operational excellence to meet or exceed its customers' expectations. Decco works with sophisticated primes and job shops from all over the world to develop net shapes that meet today's demanding schedule and quality. Decco pours many alloys including 356, A356, A357, 355 and C355 while material composition and physical properties are designed to meet customer and standard industry specifications, such as ASTM B26, ASTM B108, and AMS-A-21180.

#### ABOUT HOOSIER PATTERN

Hoosier Pattern started in 1997 in a 3,500 square foot space and just a couple of machining centers. Today, Hoosier Pattern operates a 90,000 square foot facility with state-of-the-art technology allowing it to take on jobs from various customers across multiple industries. The Hoosier team prides itself on being innovative and consistently raising the bar within the industry while maintaining the level of quality it has always been known for. In 2013, Hoosier was the first service center to own and operate a 3D sand printer in the United States and today run six sand 3D printers in-house as well as over 25 machining centers.

#### 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.