Desktop Metal

CASE STUDY

Capitalizing on Opportunity with Additive Manufacturing

—

AmPd Labs offers new manufacturing solutions with metal binder jet 3D printing

Customer
AmPD Labs

Location
Houston, TX

Industry
Industrial design & fabrication

Machine
Desktop Metal Shop System™

Material
17-4 PH

Website
www.ampdlabs.llc

Additive Manufacturing Mindset

With a history in traditional manufacturing, a backbone in modern manufacturing, and product design in its DNA, AmPd Labs sees 3D printers simply as manufacturing tools. Founded in 2019, the company provides a hands-on approach to additive manufacturing, helping transform the mindset of companies away from the limitations of traditional production to solve industrial applications with the most efficient manufacturing methods possible.

"Additive Manufacturing isn't just about the machines," says Sean Harkins, President and Co-Founder of AmPd Labs Llc. "It's how to think about parts that you're printing. It's how to think about the application's purpose and what we're trying to accomplish with the part and then designing the parts for those goals.

Launching a manufacturing service company just as the global COVID-19 pandemic was shutting down countries around the world solidified the business case for additive manufacturing at AmPd Labs. Utilizing additive manufacturing alongside other traditional manufacturing technologies gave the company a unique business opportunity.

During the early stages of the pandemic AmPd Labs was able to use 3D printing to make molds and rapidly get a new manufacturing process for respirators set up in partnership with a large global company's innovation hub in Texas. "3D printing coupled with traditional mold making provided a solution to that problem, and once a company of that scale was behind the use of additive, it validated it for other companies," Harkins said.

A New Way to Solve Problems

With a background in industrial and product design, Harkins recognized the capability of 3D printing to realize complex, function-optimized geometries. He started with photopolymer systems and worked with contacts from his experience in a variety of production facilities to push the benefits of additive manufacturing. “We’d use it for testing hard to reach splines in complex systems designed to manufacture coil tubing. After a few preliminary checks we‘d design a tool to reach the area we needed to access,” Harkins explained.

> “Additive manufacturing mitigates the risk you are exposed to when using injection molders to produce short runs.”
>
> **Sean Harkins, President and Co-Founder of AmPd Labs**

—
Sean Harkins, President and Co-Founder of AmPd Labs, binder jet 3D prints metal with a Desktop Metal Shop System in a 4,000 sq. ft. manufacturing facility in Houston, TX

By applying additive manufacturing in this way AmPd Labs avoided having to purchase an expensive tool by just printing one themselves. “We did this to reduce the possibility of exacerbating manufacturing down time for our customer. Over time, as we used additive to improve the services we provided, it finally started clicking in our customers heads and we ended up getting mounting brackets and things like that into some of the larger steel manufacturing companies.”

Recognizing that manufacturers need immediate solutions to minimize production down times, including for metal parts traditionally cast or machined, AmPd Labs invested in the Desktop Metal Shop System to begin 3D printing stainless steel.

“Printing the parts is easy. Baking (crosslinking) the parts is easy. The sintering is the hard part,” Harkins said. Sintering is a key step in the 3D printing workflow for metal binder jet parts. However, many parts experience warpage in the furnace, and this can lead to unsatisfactory results. To ease the adoption of binder jetting, AmPd Labs uses Desktop Metal Live Sinter predictive simulation and geometry compensation software. “I started using Live Sinter from the get-go,” Harkins explained. “All my additive manufacturing experience over the past decade has been FDM and photopolymers. I know machining, welding, fabricating, and sheet metal forming, but not a furnace, not sintering. Live Sinter works well, and that has made it easier.”

With the Shop System at its 4,000 sq. ft. facility in Houston, Texas, AmPd Labs helps its customers unlock the full potential of their ideas with quick-turn, top-quality 3D printed stainless steel, nylon, and an array of photopolymer parts. Parts printed in 17-4 PH stainless steel have been sent for third party testing with results achieving 140 ksi tensile strength.

Application Examples

Aftermarket Headlight Adapter

—
Open Glass Van Mods brought this adapter kit to market with cost-effective metal 3D printing from AmPd Labs

"This product is a great example of the possibilities of additive," Harkins said. Explaining that the inventor of this product, Arvin Abadila, identified a market need through customer feedback in online forums. 3D printing enabled Open Glass Van Mods to find a solution, design a production, and bring headlight adapters to market when traditional manufacturing would have been cost prohibitive. "Injection molding companies will not speak to you if you don't have the volumes that they need to profit. It cost too much to produce molds. Additive manufacturing mitigates the risk you are exposed to when using injection molders to produce short runs."

The adapters had originally been designed for resin-based printing. As demand for the product grew, the SLA technology at AmPd Labs could not meet the demand due to the inherently slow nature of using a laser to cure a cross section. This lack of speed can also be seen in laser-based metal 3D printing technology but the area-wide nature of binder jetting allowed an entire layer of binder to be deposited on the print bed of stainless steel powder in one pass of the printhead, drastically reducing the build time. "With the amount of time that one of these parts takes to print on the SLA printer, we have to charge a lot more," Harkins explained.

> "It made more sense to 3D print the part in stainless steel because we were able to bring the cost down and offer a much better product."
>
> **Sean Harkins, President and Co-Founder of AmPd Labs**

Binder jetting also proved a more efficient production process, eliminating the need for supports and their expensive removal. "There's so many undercuts and small surfaces that trying to get all those touchpoints where you'd have to break off supports from SLA by hand, that labor cost is very high," Harkins said. The team could maximize the build volume of the Shop System by nesting components and print without additional supports. "When you factored all that in, it made more sense to 3D print the part in stainless steel because we were able to bring the cost down and offer a much better product."

Fork Mechanism

This fork mechanism for a piece of production gaming equipment was traditionally an assembly of seven individual components, each stamped or machined and screwed together. The customer came to AmPd Labs looking to capitalize on the benefits of consolidation – shortening its supply chain, stocking fewer part skews, eliminating lost components, reducing assembly time, and improving performance by minimizing potential points of failure of an assembled product.

"They're looking to be cost effective, and combining components is one of the best ways of doing that," Harkins said.

Live Sinter software played a key role in the success of this part printed in 17-4 PH. "For these kind of cylindrical long parts you have to use the software otherwise your final part would come out like a snake," Harkins emphasized.

Live Sinter's powerful multi-physics simulation and compensation software delivers sinter-ready, printable geometries that maintain tight shape and dimensional tolerances. "Round concentric parts have the best first-time results," Harkins explained. "They're good to go after the first print through Live Sinter. These longer, more of a pencil shape parts require scanning."

After scan-based adjustments, Live Sinter enables correcting for complex distortion effects, yielding parts that consistently fall well within 1% of target dimension with as low as +/- 0.3% deviation.

—
AmPd Labs used binder jetting to help its client reduce this assembly from seven components to one 3D printed metal part

About AmPD Labs

With a history in traditional manufacturing, a backbone in modern manufacturing, and product design in the company's DNA, AmPd Labs provides an experienced, hands-on approach to solving industrial applications with the most efficient manufacturing methods possible.

Headquartered in a 4000 sq. ft. facility in Houston, Texas, the company enables the 3D printing of metals with binder jetting technology and is home to a growing team of AM professionals that serve as a regional incubator for continuing education in the industry. The company focuses on breaking down traditional engineering design constraints, forcing the question "can this be additively manufactured?"

About Desktop Metal Inc.

Desktop Metal, Inc. is accelerating the transformation of manufacturing with end-to-end metal 3D printing solutions. Founded in 2015 by leaders in advanced manufacturing, metallurgy, and robotics, the company is addressing the unmet challenges of speed, cost, and quality to make metal 3D printing an essential tool for engineers and manufacturers around the world. In 2017, the company was selected as one of the world's 30 most promising Technology Pioneers by the World Economic Forum, and was recently named to MIT Technology Review's list of 50 Smartest Companies. For more information, visit www.desktopmetal.com.