

Q&A Binder Jet Commercial Activation

Our Binder Jet Series 3 system is now commercially available. We caught up with product manager, Brian Birkmeyer to get more details.



We announced the commercial availability of our Binder Jet Series 3 solution last month with little fanfare. Why was that?

Over the years, potential users of metal Binder Jet have struggled to understand the true capabilities of the technology, with varied claims and varied experiences as it has developed. Our approach in bringing any new technology to market—not just Binder Jet—is always anchored in a certain pragmatism and realism that it needs to be ready for true production.

We have been open and transparent when talking about our solution, have an ongoing dialogue with our Binder Jet customers and have given updates to the media at various stages of our solution's development. We have not wanted to rush something to the market before, but now we are ready!

What is the business case for Binder Jet?

There is a sweet spot for Binder Jet where users can achieve the geometry freedoms additive enables but with lower overall part cost compared to other metal additive technologies, largely because the raw material is less expensive, and the throughput is much higher.

Our ethos and vision remain the same: we are focused on safety, quality, cost, and scale—all of which are individually important.

We have delivered a robust system that can be operated in a non-hazardous environment that is safe for use and can deliver quality products with a repeatable output. Achieving this at a reasonable cost point has always been a key factor, and we always want to design systems that can scale in a larger factory, not just a lab.

These are the guiding principles on how we develop our products. For us, the total cost of ownership and the end part cost in scaled production are the driving factors for binder jet.

What type of manufacturers are showing the most interest?

The manufacturers we are in discussions with are typically those that want to scale. Our Binder Jet system is designed for a production floor, and it's not destined to fit in a university classroom or lab... not that it couldn't, but that is not our focus.

The manufacturers that will be able to get the most out of Binder Jet technology are those who are looking for volume and to scale into thousands or millions of components per year.

How does Binder Jet help manufacturers futureproof production strategies?

A key for the Series 3 system is that if customers start their development on this machine, they can then truly scale it into production. There is no need to worry about developing a process on one machine that may not then transfer to a larger machine.

That said, we've intentionally built off our years of development on our previous system—the Series 2—and have demonstrated that there is a high transferability to the Series 3 given it uses largely the same core process and physics, just improved upon to reduce variability, and better enable consistent, scaled production.

In terms of materials, though we're launching with 316L widely available, we have experience in, and our system has been designed to handle a range of different materials. Though we don't offer more reactive materials today, we've been mindful of our product design to incorporate them in the future, taking measured steps along our technology roadmap before we get there.

What do we do differently to our competitors?

We are focused on delivering a technology that can be multiplied into many machine installations to generate a high volume of parts in a robust repeatable process. Like I've said before, our equipment is not something that fits comfortably in a laboratory; it is a process and suite of equipment that has been developed to bring large-scale production to reality.

We have developed the equipment and process to require as little labor as possible and have endeavored to make it as safe as possible, like doing our best to ensure no powder gets into places it shouldn't or leak out of the system. We operate our fleet out on the open shop floor without powder dust leaking out, or our operators in PPE often seen in additive. Our binders are non-flammable and we have designed the system to be installed on a shop floor without any hazardous designation.

We have also developed ancillary equipment—such as our automated material handling system, the MHS-Powder—to better automate the surrounding process steps and make other process steps automatable in a customer-specific scaled factory environment.

We believe we have a higher green strength compared to our competitors. Enhanced green strength makes parts easier to de-powder, less prone to the cracking and distortion often experienced in the sintering process and is key to helping the process become more scalable overall.

The result is a combination of our proprietary binder system, the hardware design and process behind how we recoat and print, and how we've developed the specification of our powder so that the process yields consistent, repeatable, and predictable results.

Our binder system has been in development for many years now, and only needs to have a small percent of binder by volume in the printed part yet still achieves a high green strength.

A critical element we've focused on is to ensure that binder also burns out cleanly, key for many target applications out there.

Can you talk more about robustness, repeatability, and reliability?

Binder Jet has a lot more process variables than many other metal additive technologies. Therefore, there is also a lot of variation between the process and end results for different OEMs. For example, there is a wider particle size distribution and varied atomization methodologies for powder and the binder and cleaner affect the process greatly. The temperature and humidity in the build chamber can affect build results, cure, debind and sinter cycles all have their own impacts on part yields and the user typically must also think about x, y, and z variations throughout the build box.

These variables all affect the material and dimensional properties of a final sintered part, plus if a part is not strong enough in the as-printed state, then there will be part size and wall thickness limitations. If the binder cannot burn out cleanly, then residual carbide, oxide or porosity issues will arise that are going to plague users downstream in more demanding applications.

We are focused on delivering sintered, final parts that meet material properties and dimensional requirements, not just on the printing operation. We've spent years learning and developing the equipment, materials, and process, and have focused on providing tight control on certain variables while also achieving low dimensional and density variation in the final parts regardless of where they were located in the build box.

What applications are best suited for Binder Jet?

Binder Jet is generally more cost-effective than other powder bed additive technologies, but it's not best for everything – hence why we at Colibrium Additive offer two other modalities as well.

Many industrial settings could utilize Binder Jet for producing competitive or even better components for an equal or lesser cost, though the technology can play in a wide range of industries and materials.

One example we like to focus on is complex castings. The reality is it is not cost-effective to use Binder Jet to displace simple castings or stampings if there are already existing supply chains. The cost equation will likely never make sense there.

That said, if you're considering tooling up a new casting or MIM line, your suppliers are price-gouging you, you've lost the tooling for a legacy part, you can combine two or more components into one printed one, or you can redesign a casting to incorporate lightweighting or design features of downstream machining, etc.

operations for that part – these can all make a winning business case quickly.

Even better, if you need high volume of an additive enabled design, our Binder Jet technology was designed for you.

What is our materials focus?

Like I mentioned before, our launch material for Binder Jet is 316L stainless steel. This can be used straight away with the launch of the Series 3. We have the most experience with it. The material has gone through our thorough validation testing process, and we have good data showing consistency across our machines.

There are other materials that we can discuss with customers, several we have experience with on our Series 2 platform, but they will require some more development before they can be used in large-scale production on the Series 3.

We have also intentionally designed the suite of equipment to future-proof the system best we can to handle the more reactive alloys downstream—aluminum, titanium, copper, etc. – but we're stair-stepping our way there through our technology roadmap today.

Overall Outlook

The Series 3 and Colibrium Additive's Binder Jet technology is here and has been designed for scale and throughput in production environments. The Series 3, its supporting cast of equipment, our proprietary binder system and overall process is different from the other binder jetting solutions on the market today, and it has all been developed around the guiding principles of safety, quality, cost, and scale.

Don't let past experiences or preconceived notions of Binder Jet limit you – we are here to give an honest view of what we have developed and how it can work for you and your business.

If you would like to know more about how Binder Jet might benefit your large-scale production operations, then get in touch to arrange a meeting during **IMTS at booth #433200**.