

# Production System™

## Mass production

Created by the inventors of binder jetting and single-pass inkjet technologies, the Production System™ delivers the speed, quality and cost-per-part needed to compete with traditional manufacturing methods.

## 100x Faster

Breakthrough Single Pass Jetting™ technology delivers speeds up to 12,000 cc/hr at 50 µm or 28,700 cc/hr at 125 µm—more than 100x faster than quad-laser metal printers and over 4x faster than the closest binder jetting alternative.

## 20x lower cost-per-part

Low-cost MIM powder, high throughput, and simple post-processing deliver per-part costs that are competitive with traditional manufacturing processes—and up to 20x lower than today's metal 3D printing systems.



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## About Desktop Metal™

Desktop Metal™ is accelerating the transformation of manufacturing with end-to-end 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 3D printing an essential tool for engineers, designers, and manufacturers around the world.

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### \_Highlights

- Over \$438M in funding
- 200+ engineers, 25 Ph.D.s
- 4 MIT professors (co-founders)
- 100+ patents in process covering 200+ inventions
- Adopted by industrial companies
- 85 resellers in 48 countries

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### \_Customers



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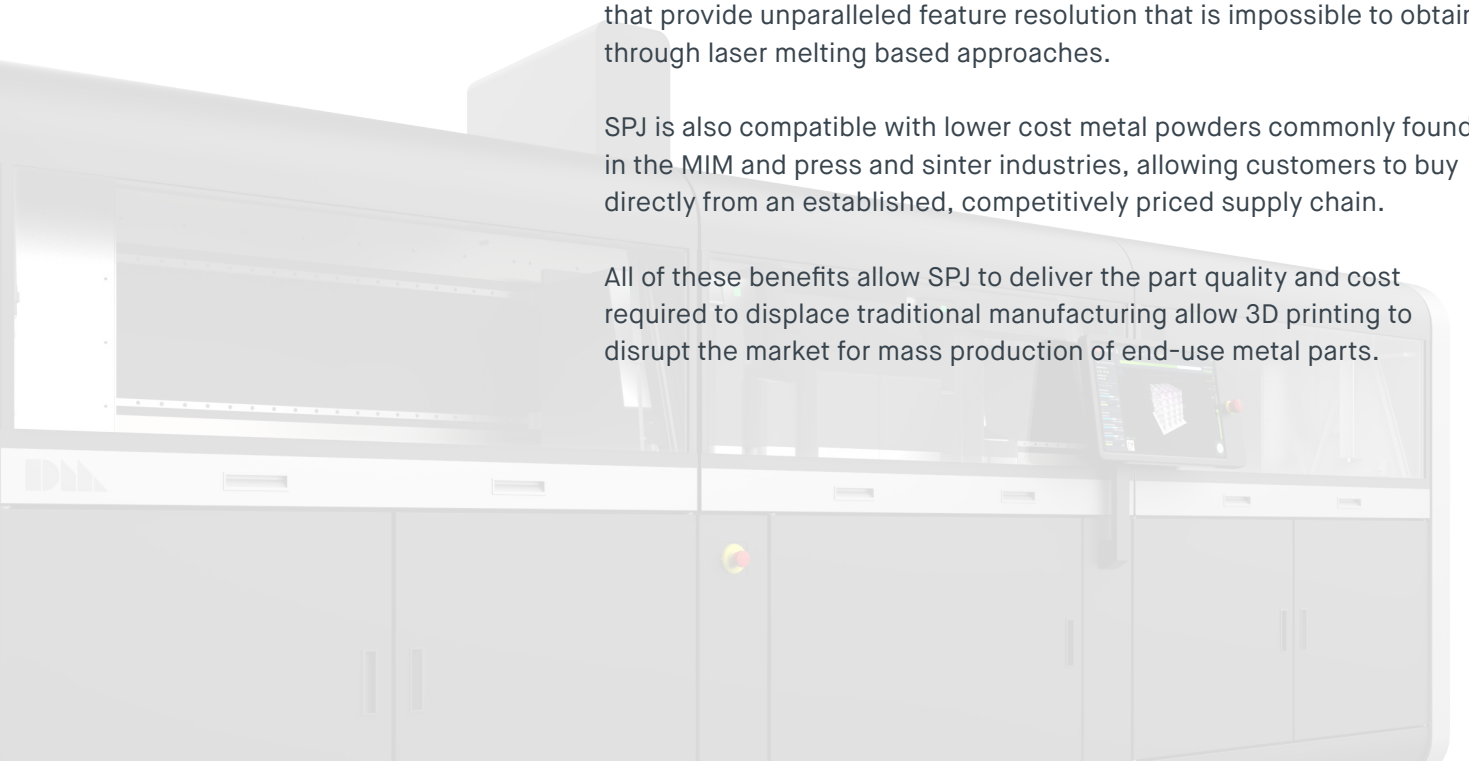
## SPJ Technology

The Production System™ is powered by Single Pass Jetting™ (SPJ), the world's fastest metal 3D printing technology. It features bidirectional printing where all steps of the print process—powder deposition, spreading, compacting, ballistic suppression, and binder jet printing—are applied with each pass over the build area, so whenever there is movement, there is printing.

This speed is combined with native 1200 DPI industrial inkjet heads that provide unparalleled feature resolution that is impossible to obtain through laser melting based approaches.

SPJ is also compatible with lower cost metal powders commonly found in the MIM and press and sinter industries, allowing customers to buy directly from an established, competitively priced supply chain.

All of these benefits allow SPJ to deliver the part quality and cost required to displace traditional manufacturing allow 3D printing to disrupt the market for mass production of end-use metal parts.



# Full End-to-end Manufacturing Solution

The Production System™ provides an industry-first solution for additive manufacturing that competes with traditional manufacturing processes for speed, cost, and capability.

## Key Process Steps

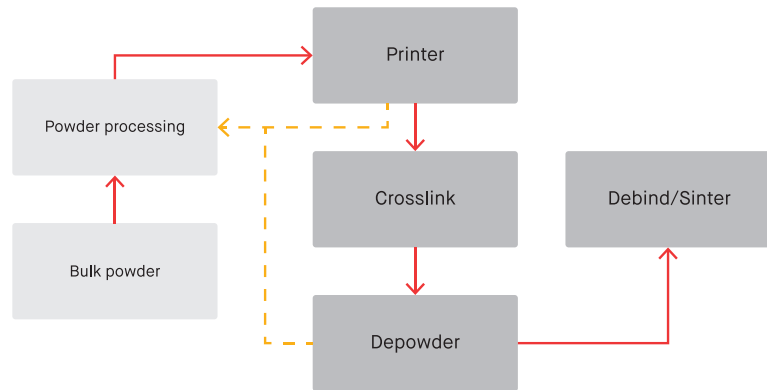
- Binder Jet Printer (with Single Pass Jetting™)
- Crosslink
- Depowder
- Sinter

## Integrated support equipment provides full process control of all aspects of manufacturing

- Powder management
- Software
- Conveyance
- Quality control

## \_Process flow

- Bulk powder is processed for quality and proper performance within the printer.
- A build box is loaded into the printer and printing begins.
- When complete, the build box is transferred to crosslink for drying and strengthening of the binder.
- The cycle continues with transferring the box to depowder, where loose powder is removed and the parts are prepped for sintering (brown parts).
- All unused powder is reclaimed from the printer and depowdering station for reprocessing and reuse in the process.



## Materials

### 01 MIM Source

The Production System™ was designed to solve for a major limitation of the laser melting based metal 3D printing solutions that require very specific types of metal powder to be successful.

By making the SPJ process compatible with the more common metal powders already widely used by the Metal Injection Molding industry, the Production System™ already has a mature supply chain and standards available for its raw materials.

This in turn makes the materials up to 5x cheaper than laser-based materials while also allowing SPJ to add material support faster since there's no need to ramp up a stable supply.

### 02 Materials Breadth

In addition to cost and supply chain benefits, the Production System™ is compatible with more common MIM powders, as well as a breadth of other materials.

Unlike laser-based metal 3D printing where each new material requires a new supply chain to be built to support it, MIM has had many more decades to adapt its process to nearly every alloy used in industry today.

They furthermore have established standards for many of these alloys which gives customers a well-understood reference when incorporating that material into their design.

By leveraging existing standards and tapping into the existing supply base for these various alloys, it is much easier to add new, qualified materials to the Production System™ offering.

### 03 Open Platform

Unlike many competitors' 3D printing solutions, the Production System™ is an open platform where customers are free to buy powder on the open market from any supplier they choose.

By not limiting where customers can purchase their metal powders, more competitive pricing on powders can be obtained to help drive part cost down even further.

Most companies have spent years or decades qualifying their metal suppliers and having to requalify a new supplier can drastically slow down adoption of the technology. With Production, you keep your existing suppliers.

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# Production System™

## Specification

### [Printer]

Print technology	Single Pass Jetting™
Max build rate	Up to 12,000 cc/hr at 50 µm post sintered Up to 28,700 cc/hr at 125 µm post sintered (in optional Plaid Mode)
Print direction	Bidirectional
Layer height	30 – 250 µm
Native DPI	1200 DPI
Finished part tolerance	+/- 0.5%
Safety features	Over-temperature protection Door interlocks Inert atmosphere for reactive metals
External dimensions	1.8 x 3.5 x 1.8 m (70.9 x 137.8 x 70.9 in)
Weight	4751 kg (10,476 lbs)
Floor loading	496 kN/m2 (72 psi)
Build box	49 x 38 x 26 cm (19.2 x 15 x 10.2 in) 52 L build box (up to 5 full prints/day at 50µm)
Maintenance	Patented anti-ballistics and non contact cleaning for continuous operation without servicing.
Binder jetting module	16 printheads Dual 100 kHz single pass print bars 32,768 nozzles
Power requirements	380-480 V, 50/60 Hz, 3 phase, 4 and 5 wire
Chamber view	Clear glass front window Multi-spectral imaging system
Environment	Inert; nitrogen + argon
Min. ceiling height	12 ft
Powder type	MIM powder Ceramics
Binder system	Aqueous

