3D SYSTEMS
Additive Manufacturing Solutions

Direct Metal Solutions

Precision production metal printing with the DMP printer series, 3DXpert® software and LaserForm materials

Direct Metal Printing (DMP) gives you complete design freedom to manufacture stronger parts that are light, durable and perform better than other means. Design, test and produce metal parts that are simply not possible with standard manufacturing.

Go further with Direct Metal Printing

UNLOCK YOUR PRODUCT'S POTENTIAL

With complete design freedom, direct metal 3D printed parts can be stronger, lighter, longer lasting and higher performing than machined or cast assemblies. Manufacture superior performing products faster and at a lower cost than with traditional fabrication methods.

ACCELERATE TIME-TO-MARKET

Conduct R&D, prototyping and production all in the same system. DMP users around the world are designing faster and compressing production times. Transform complex assemblies that take hundreds of hours to machine and assemble into a single high value part printed in hours or days.

STREAMLINE SUPPLY CHAINS

With DMP, you have complete control over your production, without relying on specialty components from suppliers. Print entire assemblies on demand, with fewer components, as needed.

INCREASE MANUFACTURING AGILITY

Metal additive manufacturing requires no tooling, reducing overhead and increasing economies of scale. You are able to update designs and change your production mix to meet changing market demands.

DMP Flex 100

Flexible Metal AM, exceptional quality

Print exceptionally detailed, high-quality parts in an automated and repeatable process that is ideal for R&D and serial part manufacturing at the tightest tolerances in direct metal printing.

INDUSTRY'S BEST SURFACE FINISH
Reduce machining or polishing of final parts.

CLEAN AND SAFE
Sealed powder loading and recycling prevents material contamination and increases operator safety.

EXCEPTIONAL MECHANICAL PROPERTIES
Roller compaction yields higher density and uniform mechanicals.

UNMATCHED PRECISION
Print the finest features with exceptional accuracy.

INTEGRATED METAL PRINTING
ProX DMP printers, 3DXpert® software and LaserForm materials are fine-tuned for process reliability and repeatability.

PRINT IN CERTIFIED ALLOYS
Count on your results with certified LaserForm materials and extensively tested print parameters.

DMP Flex 350 and DMP Factory 350

High precision, high throughput

DMP Flex and Factory 350, developed from the outcome of nearly half-a-million prints, offer fast build turnaround times in demanding 24/7 production environments. The DMP Factory 350 has an integrated material recycling system.

INTEGRATED METAL PRINTING
DMP printers, 3DXpert software and LaserForm materials are fine-tuned for process reliability and repeatability.

STRONGER MECHANICAL PROPERTIES
Industry's lowest O_2-content during builds (<25 ppm) for exceptionally strong parts of high chemical purity.

EXTENSIVELY TESTED MATERIALS
Thousands of hours of parameter optimization ensure predictable and repeatable print quality with a broad range of LaserForm materials.

HIGH QUALITY POWDER MANAGEMENT
DMP Factory 350 comes with integrated and automated powder management at the same footprint as the DMP Flex 350.

DMP Factory 500

Modularity for a scalable factory solution

The DMP Factory 500 Solution is comprised of modules designed to maximize efficiency by optimizing utilization. Each module is designed to execute a specific function of the additive manufacturing process, i.e. printing (Printing Module – PTM), depowdering (Depowdering Module – DPM), recycling (Powder Recycling Module – PRM) and transporting (Transporting Module – TRM). The modules are fully integrated with a Removable Print Module (RPM), engineered to move between the modules for continuous production workflow. The RPM is sealable to ensure an inerted powder environment throughout the whole manufacturing process. Printer modules (PTM) are designed for ongoing, 24/7 printing of parts. The Depowdering Module (DPM) and Powder Recycling Module (PRM) are designed to efficiently depowder parts on build platforms and automatically recycle unused powder materials, respectively, to prepare the RPM for the next build.

Configure a factory set up with the optimum number and type of modules you need to meet your production workflow needs.

SEAMLESS LARGE PARTS
The intelligent laser configuration and 3DXpert software-driven scan technology enable the production of seamless large parts the size of the full build volume. This results in the highest surface quality for metal 3D printed parts with outstanding material properties.

UNIFORM, REPEATABLE QUALITY
The RPM provides consistent powder control, batch after batch to deliver scalable metal additive manufacturing.

HIGH PRODUCTIVITY
With a large build volume (500 x 500 x 500 mm) and high throughput enabled by multiple lasers, the DMP Factory 500 Solution delivers high productivity in metal additive manufacturing.

OPTIMIZE YOUR WORKFLOW
Workflow optimized solution for massive scalability, repeatable high-quality parts, high throughput and low total cost of operations.

PROVEN METAL AM TECHNOLOGY
Engineered for uniform, repeatable part quality, and high productivity in metal 3D printing.

Metal Alloys for the DMP Series

3D Systems' broad range of ready-to-run LaserForm® materials is formulated and fine-tuned specifically for 3D Systems DMP printers to deliver high part quality and consistent part properties. The print parameter database that 3D Systems provides together with the material has been extensively developed, tested and optimized in 3D Systems' part production facilities that hold the unique expertise of printing 500,000 challenging metal production parts in various materials year over year. And for your 24/7 production 3D Systems' thorough Supplier Quality Management System guarantees consistent, monitored material quality for reliable results.

Heat exchanger with complex cooling channels in LaserForm AlSi10Mg (A)

Minireactor for scale testing built in LaserForm 17-4PH (A)

Gas burner with integrated cooling channels in LaserForm Ni718 (A)

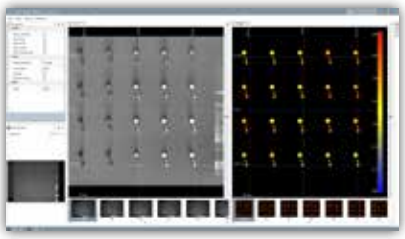
Partials, copings and bridges production in LaserForm CoCr (C)

High corrosion resistant impeller in LaserForm 316L (A)

Blow mold with conforming holes in LaserForm Maraging Steel (B)

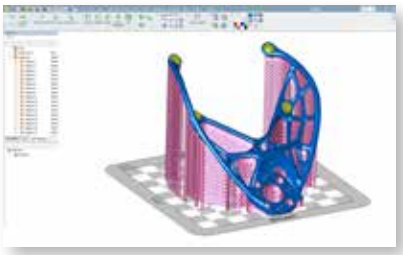
Extra High Productivity Upgrade for LaserForm Ti Gr5 (A) and Ti Gr23 (A)
Count on up to 34% speed increases and decisive per part cost reductions while maintaining the high level of consistent, repeatable part quality as published in our LaserForm data sheets.

* Availability varies by printer model



DMP MONITORING FOR REAL-TIME PROCESS MONITORING

Advanced Manufacturing requires close monitoring of process variables. DMP Monitoring is a process monitoring and non-destructive quality control system, providing a wealth of data for informed decisions on product quality and also serving as process traceability and documentation for highly regulated industries.

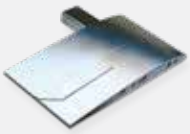


FASTER DATA PREPARATION AND EXCEPTIONAL BUILD OPTIMIZATION

3DXpert software, 3D Systems' precision metal printing solution, is delivered with every DMP printer. Benefit from intelligent design tools and fast build preparation, relying on the extensively tested build parameter database for your material of choice. No other software lets you localize print strategies for increased precision of metal parts.

CONFORMAL COOLING

Direct integration of conformal cooling channels into this blow mold increases efficiency by 30%.



ENHANCED FLUID FLOW

For this turbine inlet guide vane, computed fluid dynamics simulation predicts a 70% reduction in shock intensity.

SIMPLIFIED ASSEMBLIES

Replacing a complex assembly, this single burner component contains nine under-cuttings and six internal cavities.

TOPOLOGY OPTIMIZATION

Topology optimized aerospace bracket reduces weight by 35%.

REDUCED WEIGHT

Complex lattice structures allow significant weight reduction for this combustion chamber.

MASS CUSTOMIZATION

Designed to perfectly fit the obstructed zone, this reconstruction corrects the patient's facial asymmetry.

Direct Metal Printers

Metal Additive Manufacturing with the DMP printer series

DMP Flex 100

DMP Flex 350

SPECIFICATIONS			
Laser Power Type	100 W/Fiber laser	500 W/Fiber laser	
Laser Wavelength	1070 nm	1070 nm	
Build Volume (X x Y x Z) Height inclusive of build plate	100 x 100 x 90 mm (3.94 x 3.94 x 3.54 in)	Height inclusive of build plate 275 x 275 x 420 mm (10.82 x 10.82 x 16.54)	
Layer Thickness	10µm - 100µm	Adjustable, minimum 5 µm, typical values: 30, 60, 90 µm	
LaserForm® metal alloy choices with developed print parameters:	LaserForm CoCr (B)	LaserForm Ti Gr1 (A)[2]	LaserForm Ni718 (A)[3]
	LaserForm 17-4PH (B)	LaserForm Ti Gr5 (A)[2]	LaserForm 17-4PH (A)[3]
	LaserForm 316L (B)	LaserForm Ti Gr23 (A)[2]	LaserForm 316L (A)[3]
	LaserForm CoCr (C)	LaserForm AlSi10Mg (A)[3]	LaserForm CoCrF75 (A)[3]
		LaserForm AlSi7Mg0.6 (A)[3]	LaserForm Maraging Steel (A)[3]
		LaserForm Ni625 (A)[3]	
Material Deposition	Roller	Soft blade recoater	
Repeatability	x=20 µm, y=20 µm, z=20 µm	Δx (3σ) = 60um, Δy (3σ) = 60um, Δz (3σ) = 60um	
Minimum Feature Size	x=100 µm, y=100 µm, z=20 µm	200 µm	
Typical Accuracy	± 0.1-0.2% with ± 50 µm minimum	± 0.1-0.2% with ± 100 µm minimum	
SPACE REQUIREMENTS			
Dimensions, uncrated (WxDxH)[4]	1210 x 1720 x 2100 mm (48 x 68 x 83 in)	2360 x 2400 x 2870 mm (93 x 95 x 113 in)	
Weight, uncrated	1300 kg (2870 lbs)	Approx. 4200 kg (9240 lbs)	
FACILITY REQUIREMENTS			
Electrical Requirements	230 V / 2.7 KVA / single phase	400 V/15 KVA/50-60Hz/3 phase	
Compressed Air Requirements	6-8 bar	6-10 bar	
Gas Requirements	Nitrogen or Argon, 6-8 bar	Argon, 4-6 bar	
Water Cooling	Not required, air cooling included	Chiller supplied with printer	
QUALITY CONTROL			
DMP Monitoring	na	Optional	
DMP Inspection	na	Optional	
CONTROL SYSTEM AND SOFTWARE			
Software Tools	3DXpert® all-in-one software solution for metal additive manufacturing		
Control Software	PX Control V3	DMP Software suite	
Operating System	Windows 7	Windows 10 IoT Enterprise	
Input Data File Formats	All CAD formats, e.g. IGES, STEP, STL, native read formats incl PMI data, all Mesh formats		
Network Type and Protocol	Ethernet 1 Gbps, RJ-45 Plug	Ethernet 1 Gbps, RJ-45 plug	
ACCESSORIES			
Interchangeable Build Modules	na	Optional secondary Removable Print Modules (RPMs) for fast material changeover	
POWDER MANAGEMENT			
Powder Management	Optional external	Optional external	
Material Loading	Manual	Manual	
CERTIFICATION	CE	CE, NRTL	

[1] Maximum laser power at powder layer is typical 450W for 500W lasers [2] Set up A [3] Set up B [4] Height exclusive of signal tower

Direct Metal Printers

Metal Additive Manufacturing with the DMP Printer Series

DMP Factory 350

DMP Factory 500

SPECIFICATIONS			
Laser Power Type	500 W/Fiber laser[1]		3 x 500 W / Fiber laser
Laser Wavelength	1070 nm		1070 nm
Build Volume (X x Y x Z) Height inclusive of build plate	275 x 275 x 420 mm (10.82 x 10.82 x 16.54 in)		500 x 500 x 500 mm (19.7 x 19.7 x 19.7 in)
Layer Thickness	Adjustable, minimum 5 µm, typical values: 30, 60, 90 µm		Adjustable, min. 5 µm, max. 200 µm, typically 60 µm
LaserForm® metal alloy choices with developed print parameters:	LaserForm Ti Gr1 (A)[2] LaserForm Ti Gr5 (A)[2] LaserForm Ti Gr23 (A)[2] LaserForm AlSi10Mg (A)[3]	LaserForm AlSi7Mg0.6 (A)[3] LaserForm Ni625 (A)[3] LaserForm Ni718 (A)[3] LaserForm 316L (A)[3]	LaserForm Ti Gr23 (A)[2] LaserForm AlSi10Mg (A)[3] LaserForm Ni718 (A)[3]
Material Deposition	Soft blade recoater		Soft tube recoater
Repeatability	Δx (3σ) = 60um, Δy (3σ) = 60um, Δz (3σ) = 60um		Δx (3σ) = 75um, Δy (3σ) = 75um, Δz (3σ) = 75um
Minimum Feature Size	200 µm		300 µm
Typical Accuracy	± 0.1-0.2% with ± 100 µm minimum		± 0.1-0.2% with ± 100 µm minimum
SPACE REQUIREMENTS			
Dimensions, uncrated (WxDxH)[4]	2360 x 2400 x 3480 mm (93 x 16 x 137 in)		3010 x 2350 x 3160 mm (118.5 x 92.5 x 124.5 in)
Weight, uncrated	Approx. 4900 kg (10800 lbs)		8232 kg (18148 lb)
FACILITY REQUIREMENTS			
Electrical Requirements	400 V/15 KVA/50-60Hz/3 phase		400 V/20 KVA/50-60Hz/3 phase
Compressed Air Requirements	6-10 bar		6-10 bar
Gas Requirements	Argon, 4-6 bar		Argon, 6-10 bar
Water Cooling	Chiller supplied with printer		2 chillers supplied with printer
QUALITY CONTROL			
DMP Monitoring	Optional		Included
DMP Inspection	Optional		Not available
CONTROL SYSTEM AND SOFTWARE			
Software Tools	3DXpert® all-in-one software solution for metal additive manufacturing		
Control Software	DMP Software suite		DMP Software suite
Operating System	Windows 10 IoT Enterprise		Windows 10 IoT Enterprise
Input Data File Formats	All CAD formats, e.g. IGES, STEP, STL, native read formats incl PMI data, all Mesh formats		Native CAD files, STEP, IGES, ACIS Parasolid, STL
Network Type and Protocol	Ethernet 1 Gbps, RJ-45 plug		Ethernet 1 Gbps, RJ-45 plug
ACCESSORIES			
Interchangeable Build Modules	Not applicable, targeted at volume production with one single material		Depowdering Module / Powder Recycling Module / Parking module / Transporter module / Removable Print Module
POWDER MANAGEMENT			
Powder Management	Integrated		Powder Recycling Module
Material Loading	Manual, Semiautomatic		Manual, Semiautomatic
CERTIFICATION	CE, NRTL		CE, NRTL

[1] Maximum laser power at powder layer is typical 450W for 500W lasers [2] Set up A [3] Set up B [4] Height exclusive of signal tower

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