3D SYSTEMS
Additive Manufacturing Solutions

Direct Metal Solutions

Precision production metal printing with the DMP printer series, Oqton's 3DXpert® software and advanced materials

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

Small Frame Printers

DMP Flex 100

Flexible metal AM, exceptional quality

Print exceptionally detailed, high-quality parts in an automated and repeatable process ideal for R&D and serial part manufacturing at the tightest tolerances in direct metal printing. The DMP Flex 100 solution includes extensively tested parameter databases on CoCr, 316L and 17-4PH.

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

UNMATCHED PRECISION
Print the finest features with exceptional accuracy.

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

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

EXCEPTIONAL MECHANICAL PROPERTIES
Roller compaction yields higher density and uniform mechanical properties.

DMP Flex 200

Professional and precise—now with 500W laser source

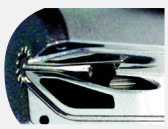
Outstanding accuracy, repeatability, and the industry's best surface finish, this printer is designed for applications that have intricate features and thin walls. It features an enlarged build platform for next-day delivery of finished parts. Parameter databases for 316L, CoCr and Titanium alloys are avaliable on the DMP Flex 200.

HIGH PERFORMANCE AT LOWER COST
The build volume and 500W laser source lead to reduced cost per part and faster delivery times. Print your high quality parts with fewer supports and visibly better surface finish, resulting in less post processing and material usage.

STREAMLINED DENTAL WORKFLOW
Oqton's 3DXpert automates part orientation, support generation, labeling and nesting. Prepare quality parts in the shortest time.

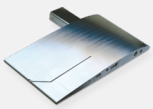
The Benefits of Direct Metal Printing

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



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

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



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

TOPOLOGY OPTIMIZATION
Topology optimized aerospace bracket reduces weight by 35%.

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

Small Frame Printer Specifications

DMP Flex 100

DMP Flex 200

SPECIFICATIONS		
Laser Power Type	100W/Fiber laser	500W/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)	140 x 140 x 115 mm (5.51 x 5.51 x 4.53 in)
Layer Thickness	10µm - 100µm	10µm - 120µm
Metal alloy choices with developed print parameters:	LaserForm CoCr (B) LaserForm 17-4PH (B) LaserForm 316L (B) LaserForm CoCr (C)	LaserForm CoCr (B) LaserForm Ti Gr5 (A) LaserForm Ti Gr23 (A) LaserForm 316L (B)
Material Deposition	Roller	Roller
Repeatability	x=20 µm, y=20 µm, z=20 µm	x=20 µm, y=20 µm, z=20 µm
Minimum Feature Size	x=100 µm, y=100 µm, z=10 µm	x=100 µm, y=100 µm, z=10 µm
Typical Accuracy	± 0.1-0.2% with ± 50 µm minimum	± 0.1-0.2% with ± 50 µm minimum
SPACE REQUIREMENTS		
Dimensions, uncrated (WxDxH)[4]	1210 x 1720 x 2100 mm (48 x 68 x 83 in)	1210 x 1720 x 2100 mm (48 x 68 x 83 in) + Chiller 377 x 521 x 650 mm (14.8 x 20.5 x 25.6 in)
Weight, uncrated	1300 kg (2870 lbs)	1400 kg (3086 lbs)
FACILITY REQUIREMENTS		
Electrical Requirements	230 V/2.7 kVa/single phase	230 V/4.5 kVa/single phase + chiller 1.2 kVa/single phase
Compressed Air Requirements	6-8 bar	6-8 bar
Gas Requirements	Nitrogen or Argon, 6-8 bar	Nitrogen or Argon, 6-8 bar
Water Cooling	Not required, air cooling included	Chiller supplied with printer
QUALITY CONTROL		
DMP Monitoring	na	na
CONTROL SYSTEM AND SOFTWARE		
Software Tools	Oqton's 3DXpert all-in-one software solution for metal additive manufacturing	
Control Software	PX Control V3	PX Control V3
Operating System	Windows 10	Windows 10
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	na
Volume Reduction Kit	na	Optional
POWDER MANAGEMENT		
Powder Management	Optional external	Optional external
Material Loading	Manual	Manual
CERTIFICATION	CE	CE

[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

Mid-Frame Printer Specifications

DMP Flex 350
DMP Flex 350 Dual
DMP Flex 350 Triple

DMP Factory 350
DMP Factory 350 Dual

SPECIFICATIONS		
Laser Power Type	DMP Flex 350: 500W/Fiber laser[1] DMP Flex 350 Dual: 2x 500W/Fiber laser[1] DMP Flex 350 Triple: 3x 500W/Fiber laser[1]	DMP Factory 350: 500W/Fiber laser[1] DMP Factory 350 Dual: 2 x 500W/Fiber laser[1]
Laser Wavelength	1070 nm	1070 nm
Single/Dual 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)	275 x 275 x 420 mm (10.82 x 10.82 x 16.54 in)
Triple Laser 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) or 350 x 350 x 350 mm (13.78 x 13.78 x 13.78)	
Layer Thickness	Adjustable, minimum 5 µm, typical values: 30, 60, 90 µm	Adjustable, minimum 5 µm, typical values: 30, 60, 90 µm
Metal alloy options for single laser configurations:	LaserForm Ti Gr1 (A)[2] LaserForm Ti Gr5 (A)[2] LaserForm Ti Gr23 (A)[2] Certified Tungsten (A)[2] Certified A6061-Ram2 (A)[3] Certified CuNi30 (A)[3] LaserForm AlSi10Mg (A)[3] LaserForm AlSi7Mg0.6 (A)[3] LaserForm Ni625 (A)[3] LaserForm Ni718 (A)[3] LaserForm 17-4PH (A)[3] LaserForm 316L (A)[3] LaserForm CoCrF75 (A)[3] LaserForm Maraging Steel (A)[3] Certified Scalmalloy (A)[3] Certified M789 (A)[3] Certified HX (A)[3] Certified CuCr2.4 (A) Certified GRCop-42 (A)[3] Certified CuCr1Zr (A)[3] Certified C-103 (A)[3] *GRX-810[3]	LaserForm Ti Gr1 (A)[2] LaserForm Ti Gr5 (A)[2] LaserForm Ti Gr23 (A)[2] Certified CuNi30 (A)[3] LaserForm AlSi10Mg (A)[3] LaserForm AlSi7Mg0.6 (A)[3] LaserForm Ni625 (A)[3] LaserForm Ni718 (A)[3] LaserForm 316L (A)[3] LaserForm CoCrF75 (A) Certified Scalmalloy (A)[3] Certified M789 (A)[3] Certified HX (A)[3] Certified CuCr2.4 (A)[3] Certified GRCop-42 (A)[3] Certified CuCr1Zr (A)[3] Certified C-103[3] *GRX-810[3]
Metal alloy options for dual laser configurations:	LaserForm Ti Gr5 (A)[2] LaserForm Ti Gr23 (A)[2] LaserForm AlSi10Mg (A)[3] LaserForm AlSi7Mg0.6 (A)[3] LaserForm 316L[3] LaserForm CoCrF75 (A)[3] LaserForm Maraging Steel[3] Certified M789 (A)[3]	LaserForm Ti Gr5 (A)[2] LaserForm Ti Gr23 (A)[2] LaserForm AlSi10Mg (A)[3] LaserForm AlSi7Mg0.6 (A)[3] LaserForm 316L (A)[3] LaserForm CoCrF75 (A) [3] Certified M789 (A)[3]
Metal alloy options for triple laser configurations:	LaserForm AlSi10Mg (A) LaserForm AlSi7Mg0.6 (A) Certified A6061-Ram2 (A) CP1 (A) LaserForm Ni718 (A) LaserForm 625 (A) Certified HX (A) LaserForm 316L (A)	
Material Deposition	Soft blade recoater	Soft blade recoater
Repeatability	Δx (3σ) = 60um, Δy (3σ) = 60um, Δz (3σ) = 60um	Δx (3σ) = 60um, Δy (3σ) = 60um, Δz (3σ) = 60um
Minimum Feature Size	200 µm	200 µm
Typical Accuracy	± 0.1-0.2% with ± 100 µm minimum	± 0.1-0.2% with ± 100 µm minimum
Build Platform Heating	250°C	250°C
SPACE REQUIREMENTS		
Dimensions, uncrated (WxDxH)	2360 x 2400 x 2870 mm (93 x 95 x 113 in)[4]	2360 x 2400 x 3480 mm (93 x 94 x 137 in)
Weight, uncrated	Approx. 4200 kg (9240 lbs)	Approx. 4900 kg (10800 lbs)
FACILITY REQUIREMENTS		
Electrical Requirements	400 V/15 KVA/50-60Hz/3 phase	400 V/15 KVA/50-60Hz/3 phase
Compressed Air Requirements	6-10 bar	6-10 bar
Gas Requirements	Argon, 4-6 bar	Argon, 4-6 bar
Water Cooling	Chiller supplied with printer	Chiller supplied with printer
QUALITY CONTROL		
DMP Monitoring	Optional	Optional
CONTROL SYSTEM AND SOFTWARE		
Software Tools	Oqton's 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 ————	
Network Type and Protocol	Ethernet 1 Gbps, RJ-45 plug	Ethernet 1 Gbps, RJ-45 plug
ACCESSORIES		
Interchangeable Build Modules	Optional secondary Removable Print Modules (RPMs) for fast material changeover	Not applicable, targeted at volume production with one single material
Volume Reduction Kit on removable print module with 275 x 275 x 420 mm build volume	Optional	Optional
POWDER MANAGEMENT		
Powder Management	Optional external	Integrated
Material Loading	Manual	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 *Only for evaluation purposes through AIG Services in the United States

Mid-Frame Printers

DMP Flex 350 and DMP Factory 350

High precision, high throughput

DMP Flex 350 and DMP Factory 350 offer fast build turnaround times in demanding serial production environments.

INTEGRATED METAL PRINTING

DMP printers, Oqton's 3DXpert software and 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 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 Flex 350 Dual and DMP Factory 350 Dual

Achieve high quality performance even faster

DMP Flex 350 and DMP Factory 350 systems now come in a two-laser configuration, reducing build times by up to 50 percent. Boosting productivity while maintaining high quality and repeatability yields lower operational costs.

Our Dual configurations feature our signature vacuum chamber with industry-leading O_2 handling and an intuitive user interface with guided print cycles. Additionally, the DMP Factory 350 Dual integrates powder management into the printer.

DMP Flex 350 Triple

Enjoy larger build volume and 3-laser configuration in a compact frame

The DMP Flex 350 Triple provides an efficient and adaptable solution for metal part production. This three-laser system includes the company's best-in-class vacuum chamber design, features full seamless stitching capability and extends the signature Removable Print Module (RPM) concept by supporting two distinct RPMs with different build volumes.

LARGER BUILD CAPACITY, SAME FOOTPRINT

The DMP Flex 350 Triple features an alternate RPM with a 350 x 350 x 350 mm build volume besides the standard RPM with 275 x 275 x 420 mm build volume. This renders the DMP Flex 350 Triple the most compact system that supports a 350 x 350 mm build area ideal for cost-effective processing of for instance impellers or cooling plates. Swap between RPMs for increased application and material flexibility.

SEAMLESS 3-LASER LOAD-BALANCED PRINT CAPABILITY

The DMP Flex 350 Triple utilizes advanced multi-laser load balancing and seamless surface quality scan strategies. There is no visible seam or perceptible change in roughness in zones where multiple lasers work together. The DMP Flex 350 Triple enables a productivity and throughput increase of up to 30% over the DMP Flex 350 Dual and DMP Factory 350 Dual.

Large-Frame Print Solution

DMP Factory 500

Modularity for a scalable factory solution

The DMP Factory 500 Solution is comprised of modules designed to maximize efficiency in order to meet production requirements. Each module is designed to execute a specific function of the additive manufacturing process, i.e., printing (Printing Module), depowdering (Depowdering Module), recycling (Powder Recycling Module), build changeover (Build Changeover Station) and transporting (Transporter Module). The modules are fully integrated with a Removable Print Module, designed to enable continuous production workflow. The Removable Print Module is sealable to ensure an inerted powder environment throughout the whole manufacturing process. Printer modules are designed for ongoing, 24/7 printing of parts.

The Depowdering Module and Powder Recycling Module are designed to efficiently depowder parts on build platforms and automatically recycle unused powder materials, respectively. Both modules can also be used to prepare a Removable Print Module for the next build. Alternatively, a Build Changeover Station can be utilized to turnover a Printing Module from one build to the next.

The Build Changeover Station is a lower initial investment compared to a Depowdering Module and Powder Recycling Module and has the added flexibility that it can serve multiple printers running different materials. Conversely, the Depowdering Module and Recycling Module both feature advanced levels of automation while the Build Changeover Station involves manual operation. Finally, a Transporter Module is used to move Removable Print Modules between the other modules.

SEAMLESS LARGE PARTS

The intelligent laser configuration and Oqton's 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 Removable Print Module 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.

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 compared to traditional fabrication methods.

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.

ACCELERATE TIME-TO-MARKET

Conduct R&D, develop prototypes and manufacture production parts all in the same system. DMP users design faster and shorten production times. Transform complex assemblies taking hundreds of hours to manufacture and assemble into a single high-value part printed in hours.

INCREASE MANUFACTURING AGILITY

Metal additive manufacturing requires no tooling. You are able to quickly update designs and change production to meet variable market demands.

Large-Frame Printer Specifications

DMP Factory 500

SPECIFICATIONS	
Laser Power Type	3 x 500W/Fiber laser[1]
Laser Wavelength	1070 nm
Build Volume (X x Y x Z) Height inclusive of build plate	500 x 500 x 500 mm (19.7 x 19.7 x 19.7 in)
Layer Thickness	Adjustable, min. 5 µm, max. 200 µm, typically 120 µm
Metal alloy choices with developed print parameters:	LaserForm Ti Gr23 (A) LaserForm AlSi10Mg (A) LaserForm Ni718 (A) Certified HX (A)
Material Deposition	Soft tube recoater, optional soft blade recoater
Repeatability	Δx (3σ) = 75um, Δy (3σ) = 75um, Δz (3σ) = 75um
Minimum Feature Size	300 µm
Typical Accuracy	± 0.1-0.2% with ± 100 µm minimum
SPACE REQUIREMENTS	
Dimensions, uncrated (WxDxH)[4]	3010 x 2350 x 3160 mm (118.5 x 92.5 x 124.5 in)
Weight, uncrated	8232 kg (18148 lb)
FACILITY REQUIREMENTS	
Electrical Requirements	400 V/20 KVA/50-60Hz/3 phase
Compressed Air Requirements	6-10 bar
Gas Requirements	Argon, 6-10 bar
Water Cooling	2 chillers supplied with printer
QUALITY CONTROL	
DMP Monitoring	Included
CONTROL SYSTEM AND SOFTWARE	
Software Tools	Oqton's 3DXpert all-in-one software solution for metal additive manufacturing
Control Software	DMP Software suite
Operating System	Windows 10 IoT Enterprise
Input Data File Formats	Native CAD files, STEP, IGES, ACIS Parasolid, STL
Network Type and Protocol	Ethernet 1 Gbps, RJ-45 plug
ACCESSORIES	
Interchangeable Build Modules	Depowdering Module / Powder Recycling Module / Parking module / Transporter module / Removable Print Module / Build Changeover Station
POWDER MANAGEMENT	
Powder Management	Powder Recycling Module, Inline sieving prior to layer deposition
Material Loading	Manual, Semiautomatic
CERTIFICATION	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

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. 3D Systems provides a print parameter database that has been extensively developed, tested and optimized with materials in 3D Systems' part production facilities. These facilities hold the unique expertise of printing over one million challenging metal production parts in various materials year over year. 3D Systems also employs a thorough Supplier Quality Management System to deliver 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)

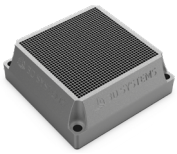
Dental partials, copings and bridges in LaserForm CoCr (C)

High corrosion resistant impeller in LaserForm 316L (A)

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

Turbine vane with corrosion resistance at high temperatures in Certified HX (A)

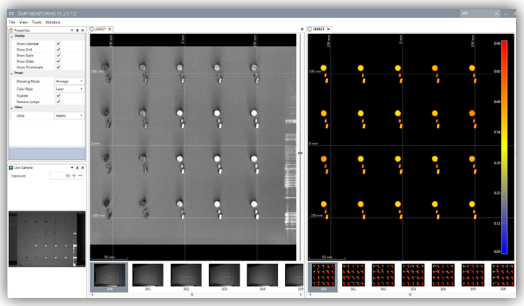
High thermal heat transfer heat exchanger in Certified CuCr2.4 (A)



Short wavelength EMS collimator in Certified Tungsten (A)

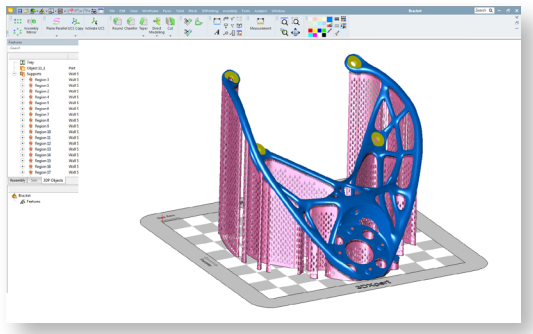
Belled end reducer in Certified CuNi30 (A)

* 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

Oqton's 3DXpert precision metal printing software, 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.

3D SYSTEMS
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