

Sapphire and Sapphire 1MZ Printer

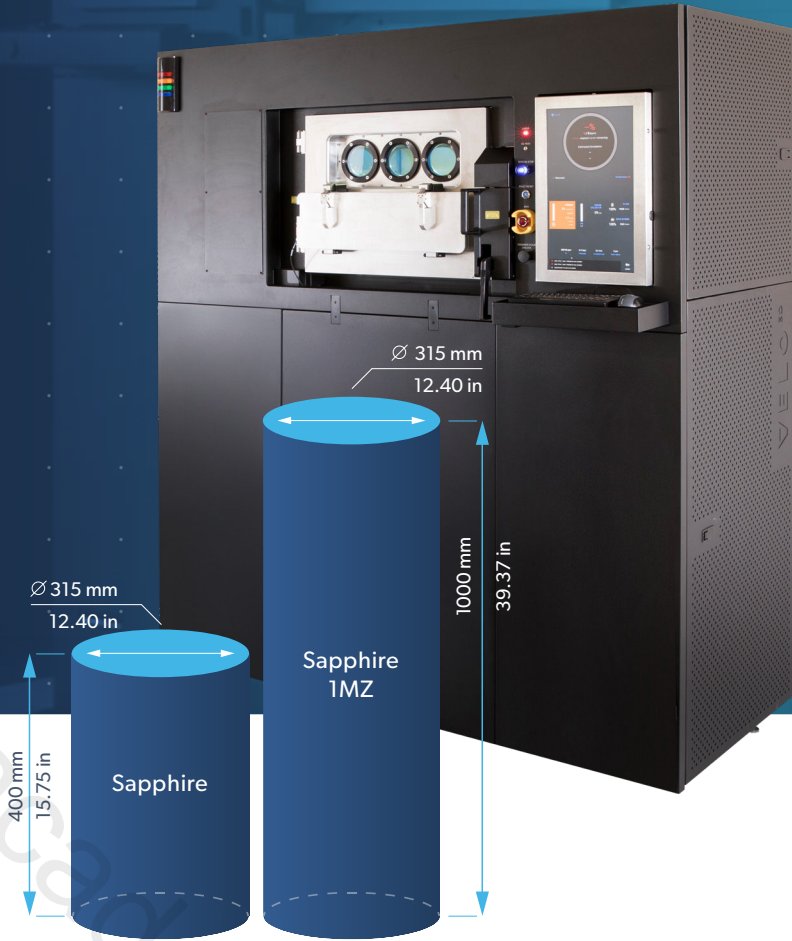
Velo3D provides a fully integrated metal additive manufacturing solution that lets engineers build the parts they need without design or quality compromises. Velo3D's intelligent solution is not just a printer, it is a highly integrated production system driven by our Intelligent Fusion manufacturing process. The solution includes Velo3D's Flow print preparation software, your choice of a Sapphire printer, and Assure quality monitoring and control software.

The Sapphire family of printers are capable of printing complex geometries including low angle prints down to zero degrees, high aspect ratio structures, large inner diameters, and many other features that traditional manufacturing technologies and conventional AM printers struggle to produce.

Sapphire Printer Family Configurations

The **Sapphire** and the **Sapphire 1MZ**

For higher volume production parts see our Sapphire XC printer



Development & Production-Level Additive Manufacturing

Print Without Compromise

Sapphire printers utilize two 1kW lasers and a proprietary non-contact recoater that eliminates the risk of part collision while enabling thinner walls and more accurate builds.

Standardized and controlled parameter sets, along with automated calibrations, ensure consistent geometric accuracy, surface finish, and validated material properties. This enables Sapphire printers to provide exceptional supply chain scalability with one print file per part that works on any Sapphire worldwide.

Made for Production

The standard build cylindrical chamber of 315 mm diameter by 400 mm height is now available in a 1000 mm height configuration for taller parts. Both feature dual 1kW lasers for faster printing and our proprietary non-contact recoater to reduce the risk of part collisions.

In-situ metrology sensors enable visibility into the quality of every layer of the build. Calibration requires no external instrumentation, enabling runtime and one-click optics calibration. Continuous powder handling and inert powder unpacking are included.

Sapphire and Sapphire 1MZ Printer

VELO 3D

US Production Facilities
2710 Lakeview Court
Fremont, CA 94538

European Technology Center
Am Technologiezentrum 5
86159 Augsburg, Germany

Laser and Optics Fidelity

- Automated pre-build and run-time optics calibrations
- Self-cleaning laser windows

Powder Bed Uniformity

- Non-contact recoater
- Per-layer 3D powder bed height mapping
- Full-height printing without interruption for powder addition or filter changes

Environmental Control

- Low ppm O₂ during normal operation
- Active humidity monitoring
- Ambient temperature and pressure operation
- Highly regulated chamber gas flows
- High efficiency spatter removal

1MZ Features

- 1000 mm tall build volume
- Same capabilities with identical build parameters as standard Sapphire model

System Features

	Standard	1MZ
Build Volume	315 mm Ø 400 mm Z	315 mm Ø 1000 mm Z
Size (L x W x H)	2.1 x 2.1 x 2.5 m (82.5 x 82.5 x 98 in)	2.1 x 2.1 x 2.5 m plus 1.37 m (54 in) pit
Weight	2,875 kg (6,325 lbs)	3,150 kg (6,930 lbs)
Lasers	Dual 1 kW lasers	
Throughput	Up to 100 cc/hr	
Surface finish	5-15 µm S _a (typical)	

Qualified Materials

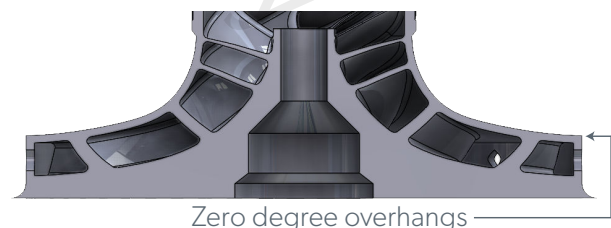
Nickel	Inconel® 718, Inconel 625®, Hastelloy® C-22, Hastelloy® X, for AM® Haynes® 282 ¹ , Haynes® 214 ¹
Copper	GRCop-42, C18150
Titanium	Ti-6Al-4V
Aluminum	F357, Scalmalloy®, Aheadd® CP1
Steel	M300 Steel

¹ Powder is produced by Höganäs under license from Haynes, International, Inc.

Metal 3D Printing Without Compromise

Velo3D separates itself from existing powder bed fusion solutions with its unique ability to print low angles and overhangs down to zero degrees, as well as large diameter circular holes and inner tubes up to 100 mm all the way down to 500 microns without the need for supports.

This not only reduces the need for post-processing, but it overcomes the “45 degree rule” for conventional AM which recommends supports for most surfaces less than 45 degrees. Velo3D frees designers to build the impossible – unlocking a wealth of designs that can now be produced with additive technology.



**Build the Part You Need
Without Design or Quality Compromise**

For more capability details visit Velo3D.com

Sapphire XC and Sapphire XC 1MZ Printer

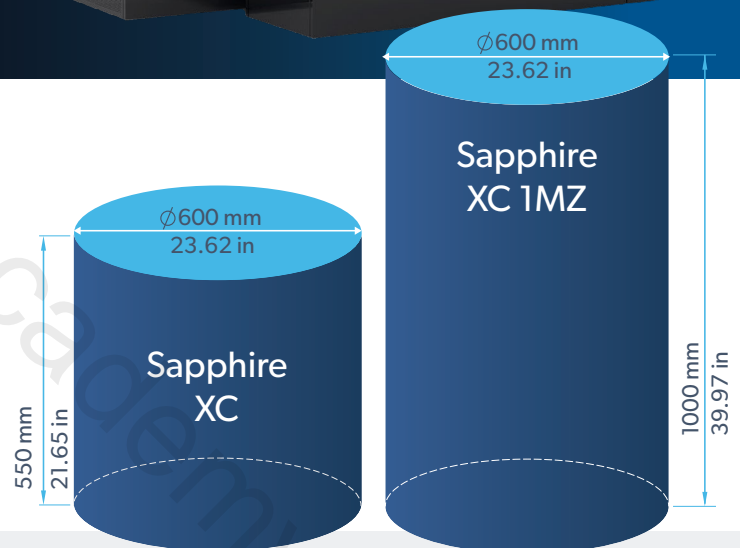
The Sapphire XC and Sapphire XC 1MZ metal laser powder bed fusion printers are production-scale machines that offer the same advanced functionality seen throughout the Sapphire family but feature a larger build volume of 600 mm Ø by 1000 mm z-height and increased throughput. This results in up to 4X productivity improvement and potential cost reduction compared to the standard Sapphire system.

The solution includes Flow print preparation software, your choice of Sapphire (XC or XC 1MZ), and Assure quality monitoring and control software.



Sapphire Printer Family Configurations:

- Sapphire (315 mm Ø x 400 mm)
- Sapphire 1MZ (315 mm Ø x 1000 mm)
- Sapphire XC (600 mm Ø x 550 mm)
- Sapphire XC 1MZ (600 mm Ø x 1000 mm)



Production-Level Metal Additive Manufacturing

Printing Without Compromise

Both Sapphire XC and XC 1MZ utilize eight 1kW lasers for faster printing at scale. A proprietary non-contact recoater eliminates the risk of part collision, protecting both the build and the recoater while enabling thinner walls and more accurate builds.

Standardized and controlled parameter sets, along with automated calibrations, ensure consistent geometric accuracy, surface finish, and validated material properties.

As with all Sapphire printers, XC and XC 1MZ provide exceptional supply chain scalability with one print file per part that works on any Sapphire worldwide.

Made for Production

To ensure consistent and successful print outcomes, Sapphire XC and XC 1MZ feature the same Intelligent Fusion underlying manufacturing process that binds and facilitates all aspects of the Velo3D fully integrated metal AM solution.

This includes intelligent part analysis and parameter assignment via Flow and intelligent tracking of each build via nearly 1,000 sensor readings. All Sapphire printers provide real-time layer-by-layer tracking of optical alignment, atmospheric validation, and powder bed health to ensure optimal quality. Meanwhile, Assure provides complete documentation and traceability of system calibration and build performance.

Laser and Optics Fidelity

- Run-time and one-click optics calibrations
- Self-cleaning laser windows

Powder Bed Uniformity

- Faster non-contact recoater
- Per-layer 3D powder bed height mapping
- Full-height printing without interruption for powder addition or filter changes

Environmental Control

- Low ppm O₂ during normal operation
- Active dew point monitoring
- Ambient temperature and pressure operation
- Highly regulated chamber gas flows
- High efficiency spatter removal

Sapphire XC 1MZ Features

- 600 mm Ø x 1000 mm z-height build volume
- Same geometric capabilities with identical build parameters as other Sapphire models

System Features

	Sapphire XC	Sapphire XC 1MZ
Build	600 mm Ø	600 mm Ø
Volume	550 mm z-height	1000 mm z-height
Size (L x W x H)	8.53 x 3.35 x 4.75 m	8.53 x 5.00 ¹ x 4.75 m
	336 x 132 x 187 in	Requires 160 cm deep pit ²
Weight	~7450 kg 16,400 lbs	~8500 kg 18,740 lbs

Lasers Eight 1 kW lasers
Throughput Up to 400 cc/hr
Surface Finish 5-15 µm Sa (typical)

¹With build module in unpack position

²Consult Sapphire XC Site Planning Guide for more information

Qualified Materials

Nickel	Inconel® 718, Inconel® 625, Hastelloy® C-22, Hastelloy® X, forAM® Haynes® 282 ^{®1} , Haynes® 214 [®]
Copper	GRCop-42, C18150
Titanium	Ti-6Al-4V
Aluminum	F357, Scalmalloy®, Aheadd® CP1
Steel	M300 Steel

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Metal 3D Printing Without Compromise

Velo3D separates itself from existing solutions with its unique ability to print low angles and overhangs down to zero degrees, as well as horizontal large diameter circular holes and inner tubes up to 100 mm all the way down to 500 microns without the need for supports. Velo3D frees designers to build the impossible – unlocking a wealth of designs that can now be produced with additive technology.

Build the Parts You Need at Lower Cost and 4x Better Productivity Without Design or Quality Compromise.

For more information on the Sapphire XC or Sapphire XC 1MZ printers: Velo3D.com

