PRODUCT BRIEF

# Sapphire® and Sapphire® 1Mz Printers


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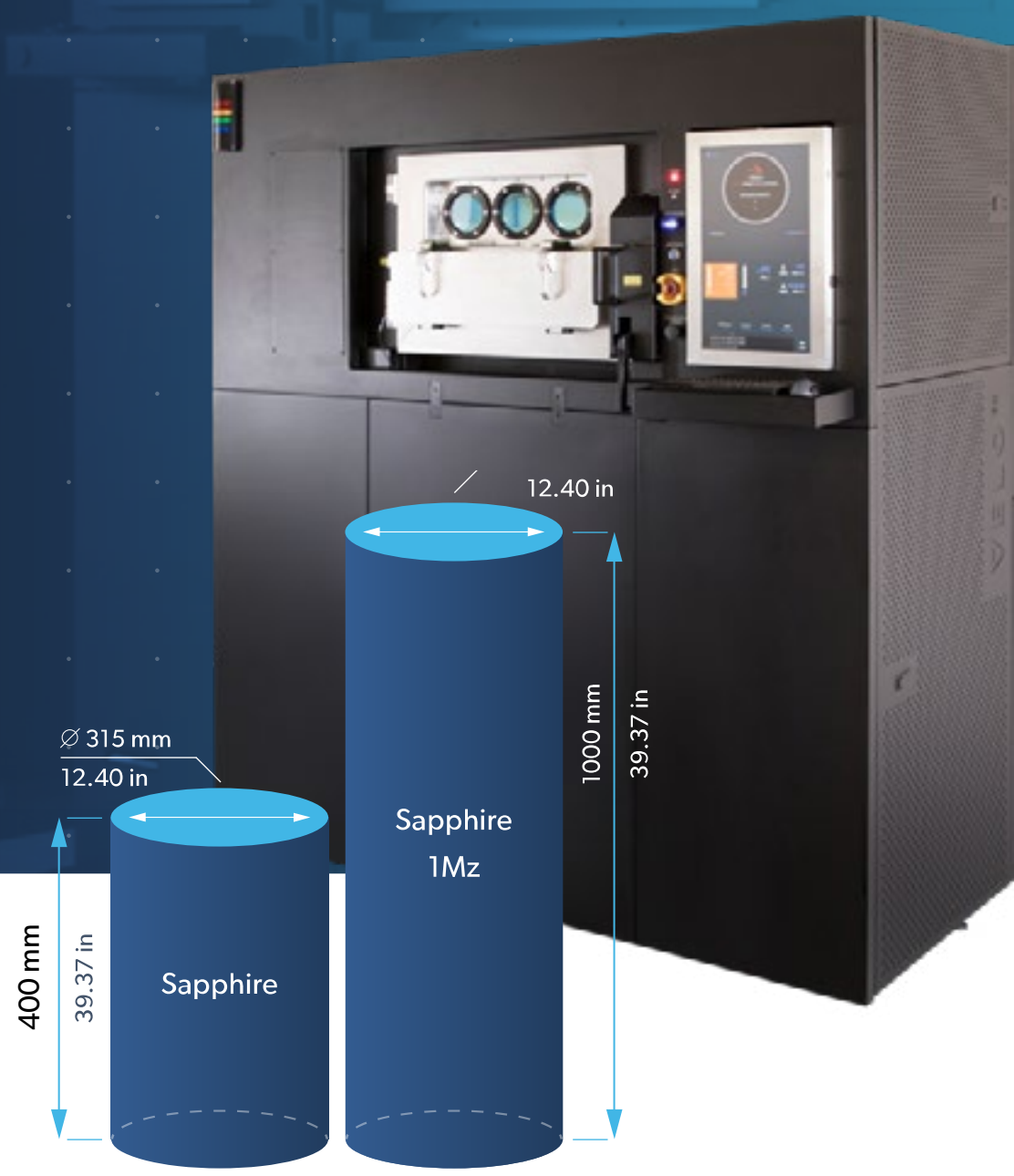
Velo3D provides a revolutionary metal end-to-end additive manufacturing solution enabling designers to build parts they need without design or quality compromises. The Velo3D intelligent solution is not just a printer, it is a highly integrated production system driven by our underlying SupportFree™ manufacturing process. The solution includes our Flow™ intelligent print preparation software, your choice of a Sapphire® printer, and our Assure™ quality monitoring and control software.

The Sapphire® family of printers are next generation laser powder bed fusion metal AM printers capable of printing complex geometries including low angle prints down to 0 degrees, high aspect ratio structures up to 6000:1, large inner diameters up to 100mm, and support free free-floating parts previously thought impossible.




## Sapphire® Printer Family Configurations

**The Sapphire®** and the **Sapphire® 1Mz**

*For higher volume production parts see our new Sapphire® XC printer*

# Development and Production-level Additive Manufacturing

## Enabling SupportFree™ Geometries

Low angles down to 0 degrees enables previously impossible geometries and significantly less post processing. Large inner diameters up to 100 mm enables manifolds, volutes and crossovers.

The Sapphire® printer prints extremely thin walls down to about 150 microns. Low angle pins (15 degrees), we can build pins as thin as 190µm in diameter, more vertical, down to 150µm.

High aspect ratios up to 6000:1 enables high performance heat exchangers and assemblies to be produced at exceptional quality.

## 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 further enabling support free builds.

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 included.

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## Laser and Optics Fidelity

- Run-time and one-click 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

- Sub-10 ppm $O_2$ 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 SupportFree™ capabilities with identical build parameters as standard Sapphire®

## System Features

| | |
|---|---|
| Lasers: | Dual 1 kW laser |
| Laser class: | Class 1 |
| Typ. throughput: | Up to 60 cc/hr |
| Typ. surface finish: | 5-15 µm Sa |
| Size (LxWxH): | 2.1 by 2.1 by 2.5 m (82.5 by 82.5 by 98 in) |
| Size (1MZ): | 2.1 by 2.1 by 2.5 plus 1.37 m (54 in) pit |
| Weight: | 2,875 kg (6,325 lbs) |
| Weight (1MZ): | 3,150 kg (6,930 lbs) |

## Qualified Materials

**Nickel:** Inconel® 718, Inconel® 625, Hastelloy® C-22,Hastelloy® X and Amerprint® 0233 Haynes® 282®[1]

**Titanium:** Ti-6Al-4V Grade 23, and Grade 5

**Aluminum:** F357, Scalmalloy®

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

## SupportFree™ Metal 3D Printing

Velo3D separates itself from existing powder bed fusion solutions with its unique ability to print low angles and over-hangs 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.

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

Zero degree overhangs

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

For more capability details visit **Velo3D.com**



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