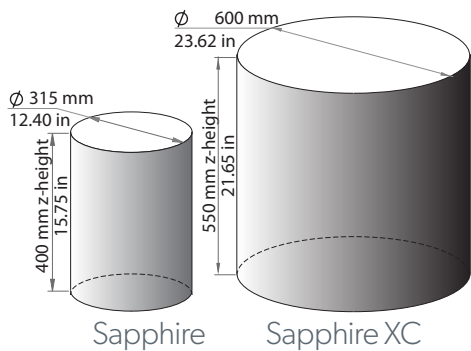


# Sapphire<sup>®</sup> XC Printer

The VELO<sup>3D</sup> Sapphire<sup>®</sup> XC is a production-scale metal laser powder bed fusion printer that gives users up to 5X productivity improvement and 75% cost reduction per part when compared to the existing Sapphire<sup>®</sup> system. Sapphire<sup>®</sup> XC uses the same advanced functionality featured in the standard Sapphire<sup>®</sup> but expands the build volume to 600 mm Ø by 550 mm z-height and increases overall throughput.

Sapphire<sup>®</sup> XC is an end-to-end metal additive manufacturing solution that is fully integrated with Flow<sup>™</sup> pre-print software and Assure<sup>™</sup> layer by layer quality monitoring and control software. The VELO<sup>3D</sup> manufacturing solution uses the same software, processes, and materials across the entire portfolio of Sapphire printers. It also utilizes the same optical-train design, recoater technology, gas-flow technology, and metrology as the current Sapphire<sup>®</sup>.



## Production-Level Metal Additive Manufacturing

### Enabling VELO<sup>3D</sup> SupportFree<sup>™</sup> Geometries

Print low angles down to zero degrees (vs 45 degrees with conventional AM) enables impossible geometries and significantly less post-processing.

Large inner diameters of up to 100 mm (vs 10 mm with conventional AM) enables manifolds, volutes and crossovers.

High aspect ratios of up to 3000:1 (vs 8:1 with conventional AM) enables high performance heat exchangers and turbomachinery parts.

### Made for Production

In-situ metrology sensors reduce variances between builds, parts, and machines.

Proprietary non-contact recoater eliminates risk of part collision protecting both the build and the recoater.

Complete documentation and traceability of system calibration and build performance.

Independent calibration per tool – one print file per part on any Sapphire – worldwide.

\*Exterior design and technical data may change without notice.



## Laser and Optics Fidelity

- Run-time and one-click optical 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

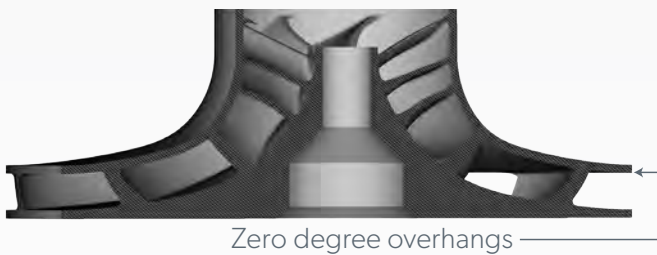
## Environmental Control

- Low ppm O<sub>2</sub> during normal operation
- Active humidity monitoring
- Ambient temperature and pressure operation
- Highly regulated chamber gas flows
- High efficiency spatter removal

## VELO<sup>3D</sup> SupportFree<sup>™</sup> Metal 3D Printing

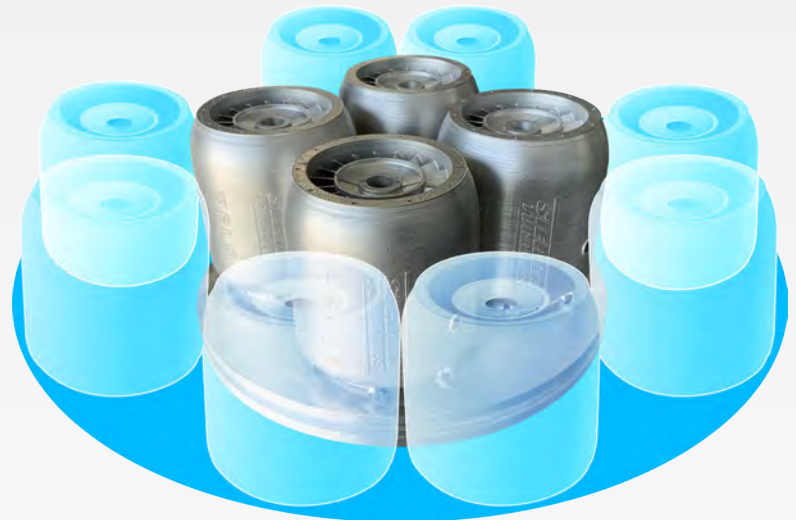
VELO<sup>3D</sup> separates itself from existing powder bed fusion solutions with its unique ability to print low angles and overhangs down to zero degrees, as well as large diameters and inner tubes up to 100 mm without the need for supports.

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. VELO<sup>3D</sup> frees designers to build the impossible – unlocking a wealth of designs that can now be produced without design or quality compromise.



## System Features

Build volume:	600 mm diameter by 550 mm height
Lasers:	Eight 1 kW lasers
Materials:	Inconel 718 & 625, Hastelloy <sup>®</sup> X, Hastelloy C22, Aluminum F357, Titanium Ti-6Al-4V
Typ. throughput:	Up to 400 cc/hr
Typ. surface finish:	5-15 μm Sa
Size (L x W x H):	8.53m x 3.35m x 4.75m (H)(336in x 132in x 186in (H))
Weight:	~ 16,400 lbs.



Print up to 4 units on a standard Sapphire build plate  
Print up to 12+ units on the Sapphire XC

**Unlock VELO<sup>3D</sup> SupportFree<sup>™</sup> Capabilities  
For The Parts You Need Without Design  
or Quality Compromise**

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*\*Exterior design and technical data may change without notice.*