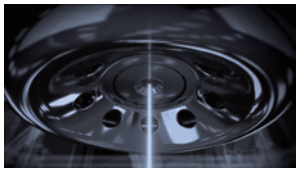
Solutions for Innovation | JEOL

JAM-5200EBM

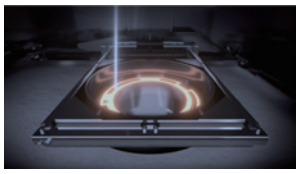
Electron Beam Metal 3D Printer



Long-life Cathode

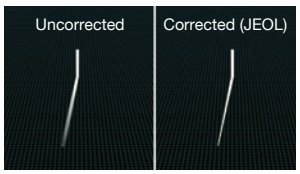
The Long-life Cathode which lasts over 1,500 hours*, can greatly reduce downtime for cathode replacement.

* Ti-6Al-4V material



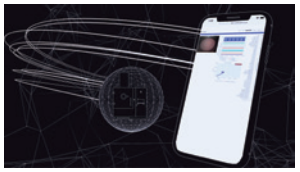
Powder dispersal prevention system "e-Shield"

No inert gas such as helium is required to prevent scattering of powder (smoke).



Automatic Electron Beam Correction

The spot shape and focus of the electron beam are automatically corrected over the entire build area.



Remote Monitoring System

The manufacturing status and the machine conditions can be checked from a remote location at any time.

Electron Beam Powder Bed Fusion Printer (EB-PBF)

High power 6 kW electron beam source

The printer has a more powerful electron beam source compared to laser sources. In addition to its high power, the electron beam features a fast scanning speed enabled by electromagnetic deflection and its thermal energy conversion efficiency is 80% or more for most metal materials, resulting in a high build speed. It is suitable for producing larger parts or a large number of smaller parts at once.

Reduction of residual stress by hot process

High-temperature preheating with high-speed electron beam scanning reduces residual stress, which prevents cracking and deformation of parts. No heat treatment is required to reduce internal stress after the build.

Reduction of oxygen, inert gas, and moisture effects by vacuum process

Since parts are built in a vacuum, the effects of residual oxygen and moisture are prevented. This makes it possible to build with even active metals such as titanium alloys. Additionally, because there is no need to introduce inert gas during the build, a clean high vacuum can be maintained.

High quality production

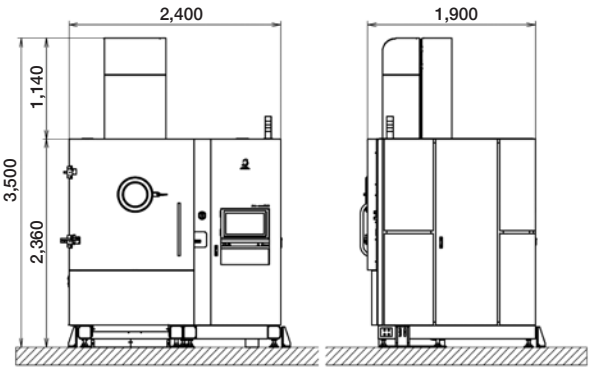
The Long-life Cathode of 1,500 hours or more and the high-precision automatic beam correction function ensure highly reproducible build quality over the entire build area. In addition the printer met AMS7032 qualification requirements, an industrial standard for qualifying AM machines for the production of aerospace parts using Ti-6Al-4V material.

Main Specifications

Manufacturing method	Powder bed fusion
Manufacturing dimensions	Maximum 250 mm (Dia.) × 400 mm (H)
Electron beam output	Maximum 6 kW
Process	Hot process
Powder bed surface heating	Maximum 900 ℃ (standard specification) Maximum 1,200 ℃ (high-temperature specification)
Lifetime of cathode	1,500 h or longer (Ti-6Al-4V material)
Powder particle diameter (standard)	Approximately 45 to 105 µm
Layer thickness	50 µm / 75 µm
Powder dispersal prevention system	e-Shield
Beam correction	Automatic (Focus, Astigmatism, Distortion)
Chamber pressure (during melting)	0.01 Pa or lower
Data format	STL
Power supply	3-phase, 200 V (±10%), 35 kVA

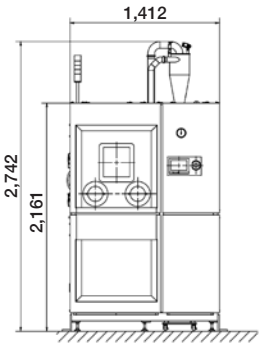
* The maximum manufacturing dimensions differ depending on the build material.

Dimensions



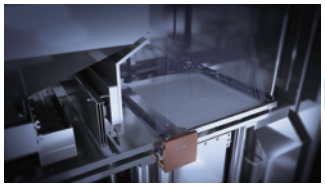
Unit: mm
Weight: 4,900 kg

Powder Recovery System

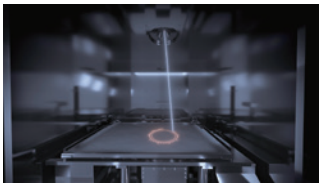


Unit: mm
Depth: 1,692 mm
Weight: 1,850 kg

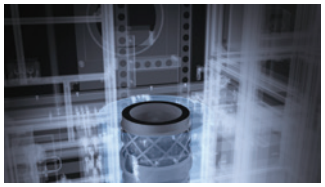
Build processes



After the build chamber is evacuated, the base plate is preheated and a layer of metal powder is spread.



The powder bed surface is preheated with an electron beam, and then focused to melt the part.



The base plate is lowered by one layer, and the process of spreading, preheating, and melting and solidifying the powder is repeated.

After the completed build is cooled, the part is depowdered by blasting in a Powder Recovery System. The recovered powder can be sieved and reused in future builds.

Build material examples

Titanium alloy (Ti-6Al-4V)

Distortion is suppressed and supportless parts possible.

Nickel alloy 718

High creep strength is achieved by controlling the microstructure.

Pure copper

101% IACS conductivity is achieved by high-density builds.

Pure tungsten

High-density parts with minimal/no crack formation

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* Specifications and appearance are subject to change without notice.

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