

EBM Point Melt Technology



GE Additive



Point Melt is an Electron Beam Melting strategy, used in additive manufacturing, where the powder bed is melted through small spots instead of lines as commonly done. This technology enables a more accurate temperature control, reducing temperature gradients and sintering needs. As result, metal parts produced using Point Melt can benefit from a reduction of support needed to build overhangs and an improved surface quality. Point Melt also enables additional strategies such as multiple passes on the same area allowing melt pool control and the resulting microstructure.

ADVANTAGES OF POINT MELT

Point Melt helps control the microstructure and influences the mechanical properties at macro level. The accurate control temperature and solidification process enables:

- Isotropic solidification, with small and nearly equally distributed grains
- Directional Solidification (DS), with grains oriented in the build direction
- Hybrid solidification, with different heights of the part having different solidification strategies.

This will enable material properties tailored to the different functions of the part, for example, printing turbine blades using isotropic solidification for the blade root and directional solidification for the main blade body.

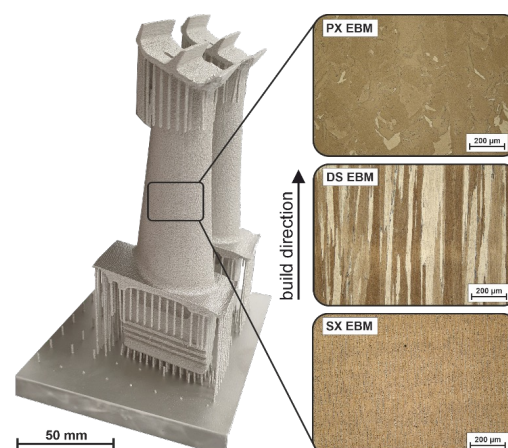


Microstructure control as enabled by EBM Point Melt technology



CAPABILITIES

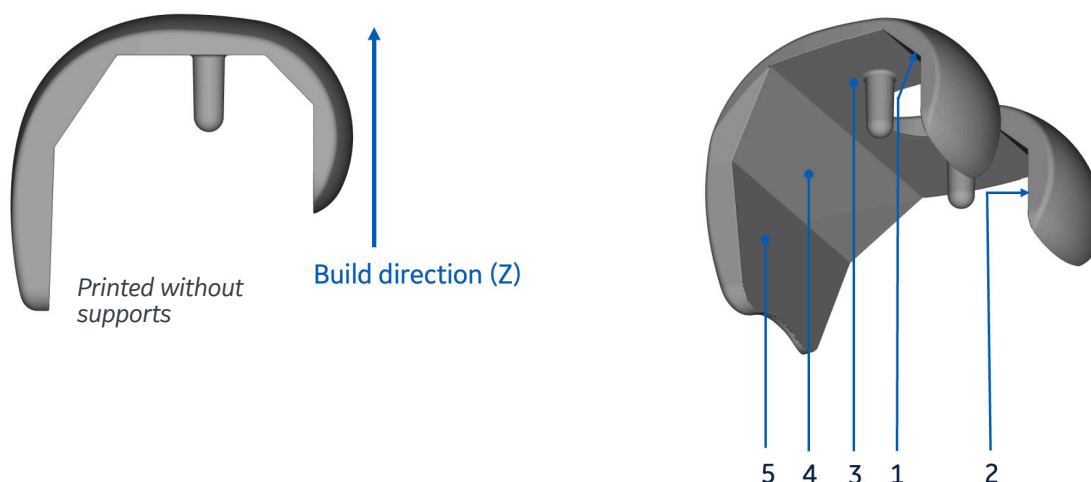
Additionally to the microstructure control, EBM process developed using Point Melt can reduce the need of sintering, facilitating the depowering of internal channels. However, the process adopting Point Melt still achieves the highest density possible and is capable of building watertight walls down to 1-2 mm. The reduced energy density applied when using Point Melt will also enable high angle overhangs, i.e., up to horizontal surfaces, to be built supportless.



Turbine blade demonstrator

POINT MELT APPLICATION: KNEE IMPLANT

The example below illustrates the ability to print overhangs without supports and to measure surface roughness in different orientations. NOTE: This is not the preferred print orientation. It is used to demonstrate the capabilities of Point Melt.



	Pos. 1 (90°)	Pos. 2(45°)	Pos. 3 (0°)	Pos. 4 (45 °)	Pos. 5(90°)
Ra (µm)	13,5-19,5	10,0-11,3	13,9-18,3	10,2-11,0	12,6-14,8
Rz (µm)	73,4-104,5	51,3-61,6	66,5-91,3	49,5-55,2	61,1-72,7

EBM Point Melt support-less building capabilities