Powder bed fusion (PBF)

One of the most popular additive manufacturing (AM) techniques, PBF involves laser sintering and electron beams. A metal powder layer is rolled onto a build tray, a laser or electron beam melts the powder, then each layer is fused together to create a part. PBF offers a wide range of materials and high tolerances but is slow and difficult to repeat. Best used for low-volume, high-end applications such as patient-specific devices such as prosthetics.

Binder jetting

A powder bed process uses an inkjet to deposit a liquid binder onto a powder layer in the shape of the part. Tthe resulting green part is sintered to achieve final density. While binder jetting is low-cost and fast, parts require infiltration to prevent shrinkage and post-processing to improve surface finish.Best used for high-volume, low-cost applications such as surgical instruments.

Metal extrusion fused filament fabrication

Metal extrusion fused filament fabrication (FFF)/fused deposition modeling (FDM) – The process deposits heated metal filament – a combination of thermoplastic and metal particles – onto a platform to build a part in layers. Sintering the part melts the plastic away, fusing the metal together. Metal extrusion achieves high precision with fine layers for a low cost, but has unpredictable part properties because the nozzle requires steady, constant pressure. Best used for cost-effective metal prototyping..

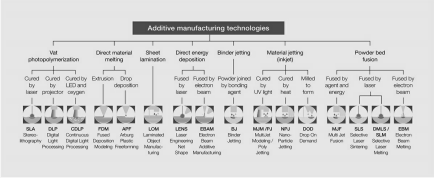
Directed energy deposition (DED)

Similar to welding – a nozzle deposits metal feedstock while a laser or electron beam melts it – DED's rapid material deposition delivers rapid production time and fully dense parts, making it the fastest AM technology to date. DED can also be used for adding metal to existing metal parts, good for welding and repair applications; however a very rough surface finish requires post-processing. Best used for the rapid production of large parts

Material Jetting

Similar to binder jetting, metal material is jetted through a nozzle onto a build tray and sintered. The process produces ultra-thin layers that result in high-resolution surface finishes, but the process is very slow and expensive. Best for small parts with complex internal geometries, tight tolerances

3D



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