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3D PRINTING TECHNOLOGIES

Advantages y Disadvantages

MATERIAL EXTRUSION TECHNOLOGIES (MEX)

FDM *(Fused Deposition Modelling) o* ***FFF*** *(Fused Filament Fabrication)*

Characteristics: *this is one of the most common and accessible technologies. It works by extruding plastic materials in filament or pellet forms through a hot nozzle, layer by layer.*

Applications: *fast prototyping, non-functional parts (aesthetic applications), parts with limited functionality (load resistance, temperature, etc. but with limitations).*

- ***Low cost***
- ***Easy to use***
- ***Range of material***
- ***Wide Ecosystem***

- ***Reduced Precision***
- ***Issues with complex geometry***
- ***Limited mechanical properties***
- ***Anisotropy of materials***
- ***Limited machinery size***

PHOTOPOLYMERIZATION TECHNOLOGIES (VPP)

SLA *(Sterolithography)*

Characteristics: *it uses an ultraviolet laser to solidify photosensitive liquid resin layer by layer, resulting in intricate details and smooth surface finishes*

Applications: *jewellery, dentistry, prosthetics, high precision engineering parts.*

- ***High precision***
- ***Low equipment costs***
- ***Smooth surfaces***
- ***Specialised applications***

- ***High - cost***
- ***Fragile materials***
- ***Post - curing process***
- ***Toxicity***

DLP *(Digital Light Processing)*

Characteristics: *similar to SLA, but instead of a laser, a digital projector is used to cure whole layers of photosensitive resin at once.*

Applications: *high precision models, jewellery, dentistry.*

- ***Speed***
- ***High precision***
- ***High - quality surface***

- ***High - cost***
- ***Limited materials***
- ***Fragility***

POWDER BED FUSION TECHNOLOGIES (PBF)

SLM *(Selective Laser Meeting)*

Characteristics: *it uses a laser to melt metal powder, layer by layer, to form a 3D object.*

Applications: *functional parts for aerospace, medical (orthopaedic implants), and automotive industries.*

- ***High resistance***
- ***Precision and control***
- ***High densities***

- ***High - cost***
- ***Post - treatment needs***

EBM *(Electron Beam Melting)*

Characteristics: *similar to SLM, but in EBM an electron beam is used to melt metal powder, layer by layer to form a 3D object.*

Applications: *functional parts for aerospace, medical (orthopaedic implants) and automotive industries.*

- ***High resistance***
- ***Precision and control***
- ***Use of advanced metals***

- ***High - cost***
- ***Controlled environment***
- ***Limited materials***

SLS *(Selective Laser Sintering)*

Characteristics: *it uses a laser to sinter powder particles, usually plastics, but also metals, creating a solid object.*

Applications: *functional parts, robust parts for industrial prototypes, tools and end-use components.*

- ***Mechanical resistance***
- ***No need for supports***
- ***Material versatility***

- ***High - cost***
- ***Rough texture***
- ***Specialised equipment***

MATERIAL JETTING TECHNOLOGIES (MJT)

PJT *(Polyjet Fusion)*

Characteristics: *based on the injection of UV-curable liquid polymers to create parts with a high degree of detail and smooth surfaces*

Applications: *functional prototypes, end-use parts in small series.*

- ***High speed***
- ***High - quality finish***

- ***High cost***
- ***Durability of parts***
- ***Post - processing required***

BINDER JETTING TECHNOLOGIES (BJT)

MJF *(Multi Jet Fusion)*

Characteristics: *ink or fusion agent jets are projected onto a powder bed. Heat from infrared lamps interacts with the agents and the powder is selectively fused.*

Applications: *functional prototypes, end-use parts, small series manufacturing.*

- ***High speed***
- ***Uniform mechanical properties***
- ***High - quality finish***

- ***High cost***
- ***Lower variety of materials***
- ***Post - processing required***

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