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ADDITIVE MANUFACTURING 3D PRINTING HUB

Timeless material meets limitless technology

Metal 3D Printing holds a unique position in modern-day product development.
It allows for the direct manufacturing of complex end-use parts and facilitates tooling for conventional manufacturing technologies, reducing costs and lead times.
This technology is also known as Direct Metal Laser Sintering (DMLS) and Selective Laser Melting (SLM).

Metal 3D Printing

Metal 3D Printing–also known as Metal Additive Manufacturing (AM) and Direct Metal Laser Sintering (DMLS) is the process by which parts are manufactured by a laser fusing together high performance metals, layer by layer.

How it works

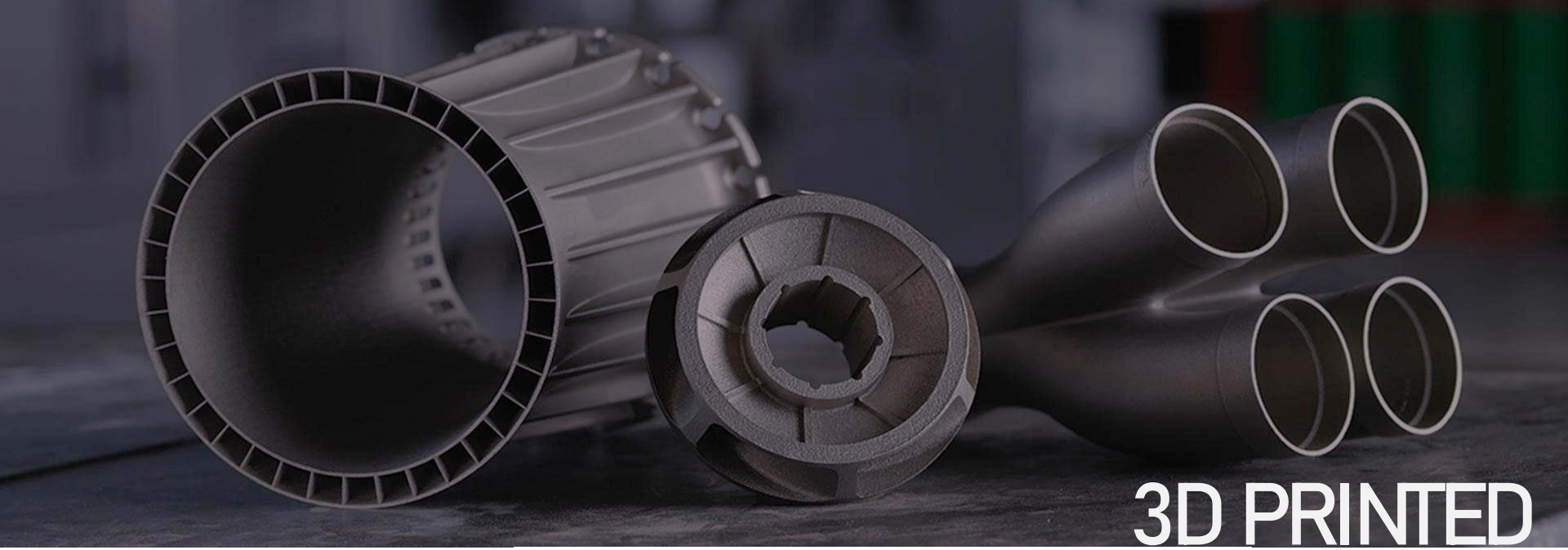
- Uses Power Bed Fusion (PBF) method.
- The laser increases the temperature of the powder in the areas where the design is being built.
- Thereby, fusing the metal powder and creating a solid layer.

PBF method involves 3 different techniques.

- Selective Laser Sintering: Uses a laser to fuse layers of metal powder together.
- Selective Laser Melting :
  Goes a step further than fusing the powder together and actually melts powder.
  This works well with composites made of one material like pure titanium or steel vs. many mixed together like most plastics.
- Fuse Deposition Method : Uses a laser to fuse layers of metal powder together.

Types Of Metal 3D Printing Materials

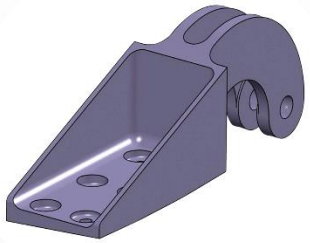
MATERIAL	PROPERTIES	APPLICATION
Titanium Alloy Powder	•High corrosion resistance •Excellent Biocompatibility •Excellent specific strength (strength to weight ratio)	•Medical Implants •Surgical tools •Aerospace and Defense
Stainless Steel	•High corrosion resistance •High Machine-ability	•Surgical tools •General Engineering
Aluminium	•High specific strength •High Thermal and Electric conductivity	•Automotive •Aerospace •Electronics •Consumer goods
Maraging Steel	•High fatigue strength and Hardness •Good machinability	•Tooling inserts •Mould and die •High strength components
Nickel Alloy - Inconel 625	•High creep, corrosion and oxidation resistance •Excellent welding characteristics	•Automotive •Aerospace •Oil and gas industry •Nuclear
Nickel Alloy - Inconel 718	•High creep, corrosion and oxidation resistance	•Aerospace •Gas turbine blades •Exhaust manifolds •Rocket motors
Cobalt Chrome	•Excellent biocompatibility •High corrosion resistance	•Medical implants •Dental coping, bridges and dentures

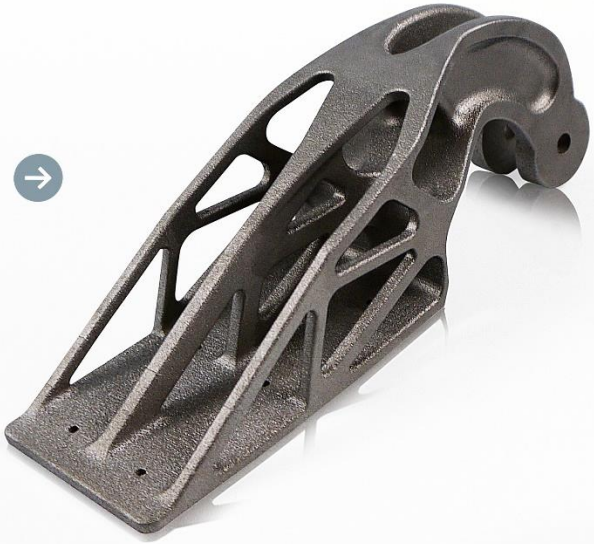


3D PRINTED

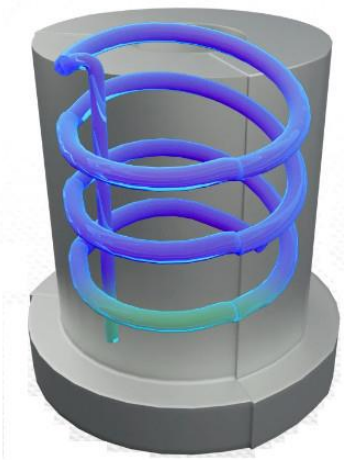
AERO SPACE & DEFENCE COMPONENTS

3D PRINTED AUTOMOTIVE COMPONENTS



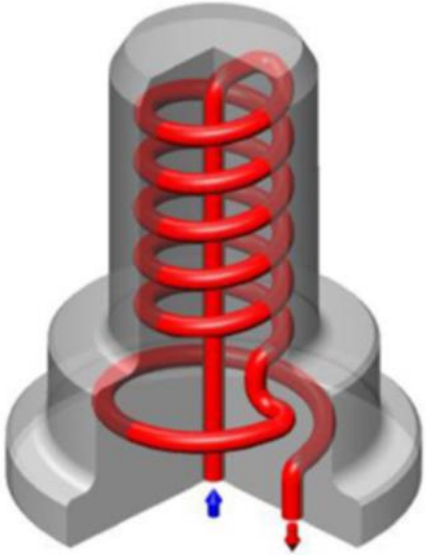


3D PRINTED SURGICAL & MEDICAL IMPLANTS



3D PRINTED CONFORMAL COOLING SYSTEM

- Improved Cycle Time 70%
- Better Part Quality
- Lower Total Cost of Ownership



Features of Metal 3D printing

▪RAPID PROTOTYPING

A tool-less process of manufacturing, basically for small quantities. Customers need to get CAD design file as an input to the printing device. Software packages slice the design into small layers and produce them into a fully functional that can be used for testing. This reduces the time, cost and efforts of product development process.

▪WEIGHT REDUCTION

Metal 3D printing has made it possible to reduce a part weight through innovative lattice structures. The material is structured in such a way that it can sustain heavy load at lowest part to weight ratio.

▪PARTS CONSOLIDATION

A group of parts joined together by a variety of means such as welding, bolting, riveting etc. These joining processes have limitations, and the chances of failure are high due to rise in temperature and pressure. In this process, parts are merged together in the CAD model with some design changes without compromising the functionality of the part.

▪CONFORMAL COOLING

Conformal cooling channels can be 3D printed in a variety of cross sections such as rectangular, circular, elliptical, half-circular etc. Cooling channels can be circular, elliptical, spiral etc. These complex cooling channels improve the overall efficiency of the metal part process resulting in reduction of cooling cycle time by up to 40% along with improvement in surface finish.

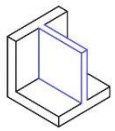
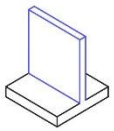
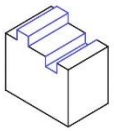
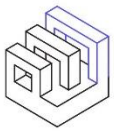
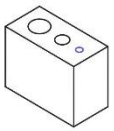
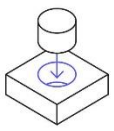
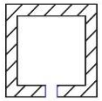
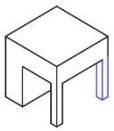
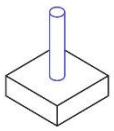
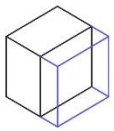
▪REVERSE ENGINEERING

Advancement in laser technology has enabled manufacturers to scan a 3-dimensional part and convert it into the CAD file. Obsolete machines can be revived through reverse engineering by scanning damaged parts and producing them through 3D printing without contacting the original manufacturer.

▪VIRTUAL INVENTORY

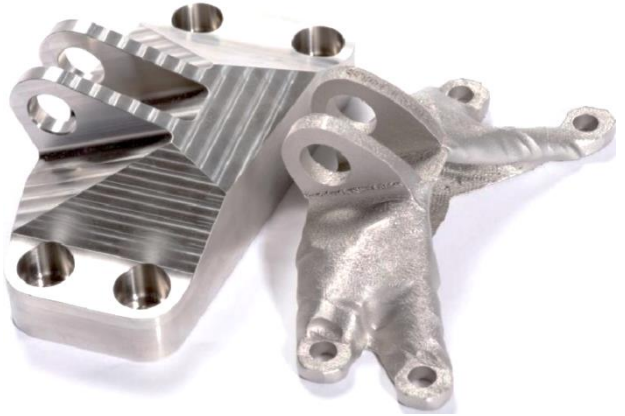
OEM's have to maintain a huge inventory throughout the year which incurs space as well as cost. However, with the advent of additive manufacturing, inventory can possibly be digitized and used whenever required

DESIGN RULES FOR 3D PRINTING

	Supported walls	Unsupported walls	Support & overhangs	Embossed & engraved details	Horizontal bridges	Holes	Connecting /moving parts	Escape holes	Minimum features	Pin diameter	Tolerance
	Walls that are connected to the rest of the print on at least two sides.	Unsupported walls are connected to the rest of the print on less than two sides.	The maximum angle a wall can be printed at without requiring support.	Features on the model that are raised or recessed below the model surface.	The span a technology can print without the need for support.	The minimum diameter a technology can successfully print a hole.	The recommended clearance between two moving or connecting parts.	The minimum diameter of escape holes to allow for the removal of build material.	The recommended minimum size of a feature to ensure it will not fail to print.	The minimum diameter a pin can be printed at.	The expected tolerance (dimensional accuracy) of a specific technology.
											
Fused deposition modeling	0.8 mm	0.8 mm	45°	0.6 mm wide & 2 mm high	10 mm	Ø2 mm	0.5 mm		2 mm	3 mm	±0.5% (lower limit ±0.5 mm)
Stereo-lithography	0.5 mm	1 mm	support always required	0.4 mm wide & high		Ø0.5 mm	0.5 mm	4 mm	0.2 mm	0.5 mm	±0.5% (lower limit ±0.15 mm)
Selective laser sintering	0.7 mm			1 mm wide & high		Ø1.5 mm	0.3 mm for moving parts & 0.1 mm for connections	5 mm	0.8 mm	0.8 mm	±0.3% (lower limit ±0.3 mm)
Material jetting	1 mm	1 mm	support always required	0.5 mm wide & high		Ø0.5 mm	0.2 mm		0.5 mm	0.5 mm	±0.1 mm
Binder jetting	2 mm	3 mm		0.5 mm wide & high		Ø1.5 mm		5 mm	2 mm	2 mm	±0.2 mm for metal & ±0.3 mm for sand
Direct metal Laser sintering	0.4 mm	0.5 mm	support always required	0.1 mm wide & high	2 mm	Ø1.5 mm		5 mm	0.6 mm	1 mm	±0.1 mm




FOR MORE INFORMATION
PLEASE CONTACT US :



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