

Additive manufacturing technology



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ADDITIVE MANUFACTURING TECHNOLOGY

1. Introduction.

Additive Manufacturing is a creation process in which an object is produced layer by layer in an option design. A 3D model made using a computer aided design (CAD), i. e. 3D scanning, is cut into individual layers that provide the tool path code for a 3D printing machine at that point. Based on the specific software, the machine performs a parallel process that replicates the model from the base to the top until the object is finished.

Additive manufacturing technology, commonly referred to as 3D printing, has captured our overall creativity, producing wild visions of 3D printed aircraft and bio-printed organs. Despite the fact that innovation guarantees the eventual destiny of assembly, it already has a great impact on our immediate environment, but these visions are still far from being fully realized. Whether the effects will occur in the immediate future or in the long term, 3D printing will change the manner in which things are done.

There are seven different types of 3D printing procedures dealing with:

- Binder jetting: A procedure which occurs when a liquid bonding agent is placed on a powder bed.
- Direct Energy Deposition: where the metal is liquified on to a substrate layer by layer
- Physical extrusion: content is deposited from an extruder on a substratum usually liquified by a heating mechanism by a thermoplastic filament.

- Material jetting: Materials that are hardened by ultraviolet light, for example, photopolymer.
- Powder bed fusion: process whereby a energy source such as a laser or an electron beam is steered to a powder bed to heat the individual particles until they are melted together.
- Sheet lamination: process where sheets of material combined, with the coveted shape carved into each shape.
- VAT photopolymerization: the resin of the photopolymer is exposed to an energy source such as a laser beam that solidifies the material bit by bit.

2. 3D Printing Innovations.

2. 1. Fused Deposition Modelling (FDM)

In the late 1980s and mid 1990s a few organizations introduced new non-SL technologies the developing 3D commercial centre. FDM is an extrusion-based process in which thermoplastic is basically heated to its melting point as filament spools and deposited in a substratum. Thermoplastics are different from thermosets and may be melted and cooled several times.

FDM requires a thermal extrusion process which is why the process is notable for producing strong parts which serve a more functional purpose of the processes made with a printing technology called stereolithography (SL) that is a form of VAT photopolymerization. This FDM parts are formed in industries with performance critical applications such as in Spacecraft Industries.

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2. 2. Selective Laser Sintering (SLS)

A powder bed modified software that selectively combines plastic powder with a laser into complete 3D objects. The process is exceptional in that the printing framework acts as an integrated support for unlike FDM sintered parts that require 3D printing of support structures. This allows the printing of very complex geometries, including interlocking and moving parts.

2. 3. Binder Jetting

Although material jetting may not have been entirely conquered by the 3D framework, it has dominated by another colourful 3D printing method. This process uses piezoelectric inkjet print heads: however, instead of keeping the photosensitive ink, it stores a fluid- restricting agent that results in sandstone like prints in full colour.

3. Metal 3D Printing.

Although 3D printing plastics can become invaluable to many industries, manufacturers of aerospace and defence are keenly interested in development.

3. 1. Direct Energy Deposition (DED)

Also known as laser cladding, which requires the addition of metal powder to a source of heat that melts particles when deposited. Due to the ability of the technology to inject metal powder directly into the heat source often attached to a 4 or 5-pivot arm, DED systems are not limited to 3D printing with a level substratum. It can be conceived instead on bent surfaces with existing metal structures. For this reason, laser cladding in the aerospace <https://assignbuster.com/additive-manufacturing-technology/>

industry is often used to repair damaged parts. Likewise, DED machines as a print volume may not be limited

3. 2. Powder Bed Fusion

Unlike DED systems, powder bed machines are housed in a high- powered energy source inert gas chamber, usually a laser that melts metal particles layer by layer, similar to the plastic SLS process. Electron beam melting is a special category of SLM technology that relies on an electron beam instead of a laser that makes construction time much faster. This technology can be better suited to the production of finely detailed parts in small lots when the machine is large enough.

4. Applications.

Although many of the newest technologies are now on the market, many of the processes mentioned are widely used for rapid prototyping, auxiliary production and the manufacture of finished parts.

4. 1. Visual and Functional Prototypes

Manifesting physical 3D printing pre- production plans was a quick prototyping technique. 3D printing can be a quicker and more precise technique than craftsmanship as a design.

The different designs mentioned above are suitable for different prototyping applications such as SL and DLP for fine features, although they may be fragile, but they reflect the details that are included in the end product and FDM for mechanical testing. PolyJet can reflect the real properties of the material, including rubber flexibility or glass transparency.

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4. 2. Tooling

These technologies can be used to produce secondary products. For example, many processes are used to print 3D objects that help to create metal parts such as tooling and investment casting models.

Tooling is defined by any type of part that is specialized in the production of a particular component. Examples of tooling include: a shape that can be used to frame the end part from the raw material; a hop designed to hold a part while other processes, such as assembly drilling; cutting tools.

5. References.

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