

- **ADDITIVE MANUFACTURING (AM)**

Additive Manufacturing (AM) refers to a process by which digital 3D design data is used to build up a component in layers by depositing material

Rapid prototyping

Rapid prototyping is a group of techniques used to quickly fabricate a scale model of a physical part or assembly using three-dimensional computer aided design (CAD). Construction of the part or assembly is usually done using 3D printing or "additive layer manufacturing" technology

Types of Rapid prototyping

1. Stereolithography (SLA)
2. Ballistic particle manufacturing (BPM)
3. Directed light fabrication (DLF)
4. Direct-shell production casting (DSPC)
5. Fused deposition modeling (FDM)
6. Laminated object manufacturing (LOM)
7. Shape deposition manufacturing (SDM) (and Mold SDM)
8. Solid ground curing (SGC)
9. Stereolithography (SL)
10. Selective laser sintering (SLS)

1. **Stereolithography (SLA):** Stemming from similarities with the lithography process, SLA uses a liquid photopolymer substance to print in 3-D. SLA exposes the liquid polymer to ultraviolet light which cures (hardens) the polymer. The polymer substance starts as a liquid in a vat and then is exposed to the ultraviolet light curing the substance one layer at a time. Once the photopolymer has been exposed to the light enough times, the design is removed from the liquid and covered with a protective layer.
2. **Fused deposition modeling (FDM):** Fused deposition modeling (FDM) is an additive manufacturing technology commonly used for modeling, prototyping, and production applications. It is one of the techniques used for 3D printing. FDM works on an "additive" principle by laying down material in layers; a plastic filament or metal wire is unwound from a coil and supplies material to produce a part.
3. **Laminated object manufacturing (LOM):** LOM is a rapid prototyping system developed by Helisys Inc. In it, layers of adhesive-coated paper, plastic, or metal laminates are



successively glued together and cut to shape with a knife or laser cutter. Objects printed with this technique may be additionally modified by machining or drilling after printing. Typical layer resolution for this process is defined by the material feedstock and usually ranges in thickness from one to a few sheets of copy paper.

The process is performed as follows:

- Sheet is adhered to a substrate with a heated roller.
- Laser traces desired dimensions of prototype.
- Laser cross hatches non-part area to facilitate waste removal.
- Platform with completed layer moves down out of the way.
- Fresh sheet of material is rolled into position.
- Platform downs into new position to receive next layer.
- The process is repeated.

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