SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution
Coimbatore-35

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DEPARTMENT OF MECHANICAL ENGINEERING

SOLID BASED MANUFACTURING SYSTEM

IN

ADDITIVE MANUFACTURING

SOLID BASED AM

Solid-based additive manufacturing (AM) systems utilize solids as the primary medium to create the part or prototype. As such, they are very different from the liquid-based photo-curing systems described . They are also different from one another in that the primary form of solid materials in some systems may come as filaments or wires, some as sheets or rolls while others may be as pellets. A special group of solid-based AM systems that uses powder as the medium will be covered separately .

TYPES OF SOLID BASE AM

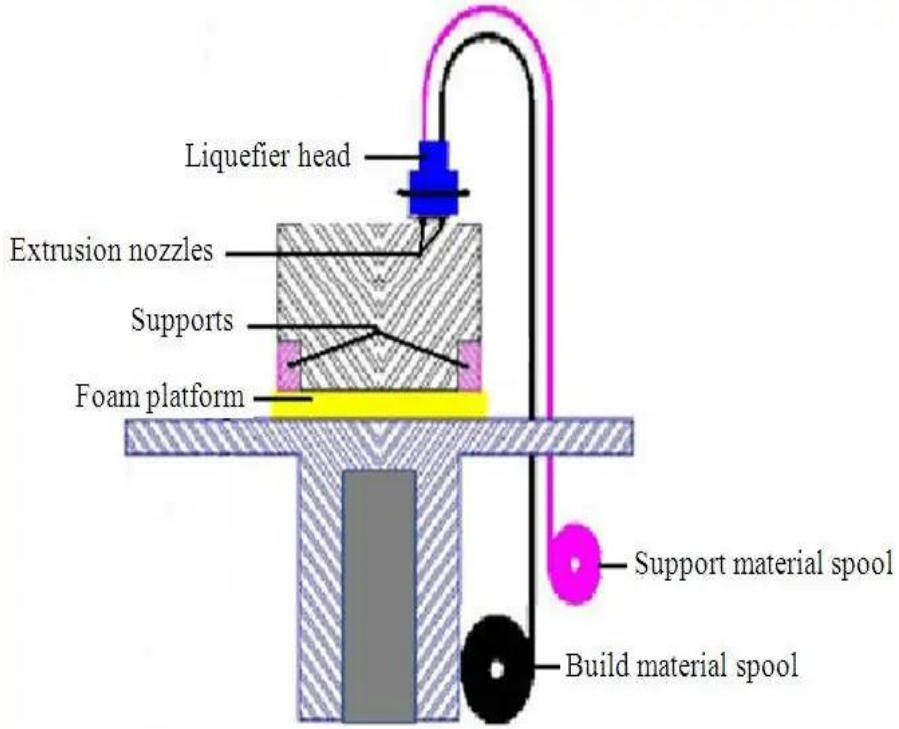
1.Fused Deposition Modeling (FDM)

2.Wire Arc Additive Manufacturing (WAAM)

3.Electron Beam Freeform Fabrication

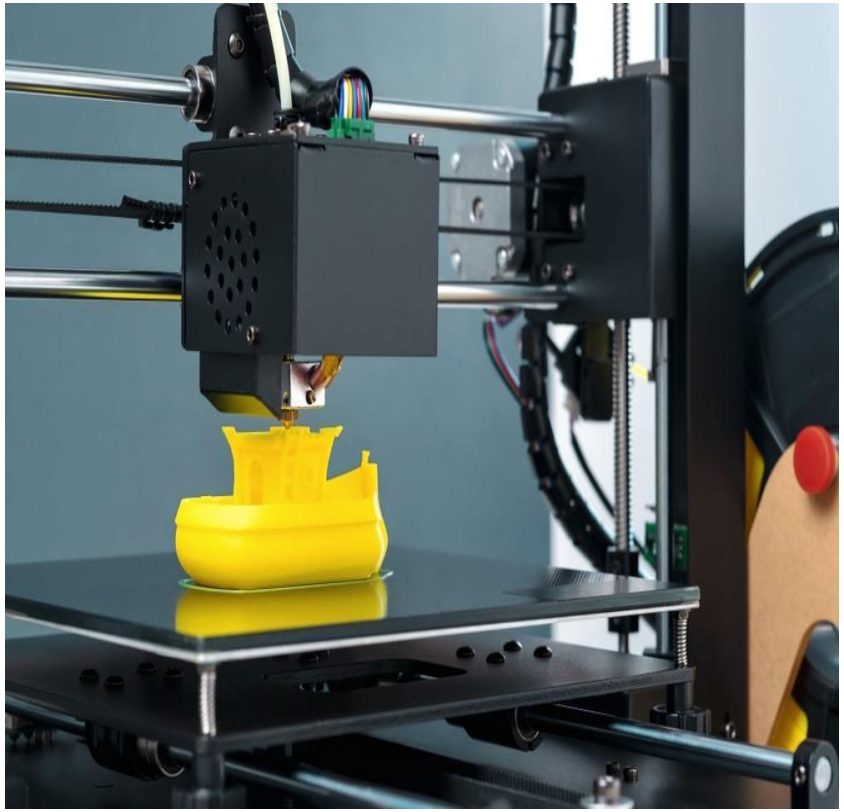
Fused Deposition Modeling (FDM)

Fused Deposition Modeling (FDM) is an extrusion-based 3D printing technology. The build materials used in FDM are thermoplastic polymers and come in a filament form. In FDM, a part is manufactured by selectively depositing melted material layer by layer in a path defined by the CAD model. Due to its high accuracy, low cost and large material selection, FDM is one of the most widely used 3D printing technologies across the world.



Working fused deposition modeling (FDM)

- FDM technology uses the build input material in the form of thermoplastic filaments which is liquified and re-solidified into the desired shape according to the defined CAD model.
- An FDM printer consists of two spools: one for the build material and the other for the support material respectively. The Fused deposition modeling 3D printing process follows these main steps:



- **Step 1** – After the CAD data is input, the already loaded solid build material filament is liquified with the help of heat in the liquefier head
- **Step 2** – This molten liquid plastic is fed onto the foam build platform as a layer through the extrusion nozzle that moves in all directions as defined in the CAD data. This process of adding the liquid/semi-solid layers one above the other is repeated. If the design consists of over-hangs or structures that might potentially warp or bend, support structures are used. The support material can be the same as the build material or any other material according to the choice.
- **Step 3** – In case support structures were used, they are later removed once the build is complete.

Materials for FDM 3D printing

- Amongst the most widely rigid plastic used for fused deposition modeling,Xometry offers: ABS, ABS ESD7, ABS M30, ASA, Nylon PA12, Nylon PA12 Carbon-Filled, Carbon Fiber Reinforced Polyamide 12, PC-ABS Polycarbonate, PC-ISO Polycarbonate, PC-like Heat Resist Translucent, PC-Polycarbonate, PLA, PETG, PEEK, ULTEM 1010, and ULTEM 9085.
- ASA, an amorphous thermoplastic with improved weather resistance, is widely used in prototyping thanks to its excellent mechanical properties. Plus, it is available in a large variety of colours.

Advantages of FDM

- Cost-effectiveness
- Quick turnaround
- Can print in full color
- Less material wastage
- Wide variety of materials

Disadvantages of FDM

- Significant layer stepping
- Sweats small details

THANK YOU