

3D printing is a maturing technology suitable for producing functional prototypes, manufacturing aids, visual models, and end products. Commonly utilized 3D printing technologies include fused filament fabrication (FFF) and selective laser sintering (SLS).

**Fused Filament Fabrication (FFF)**

Material in filament form is fed through a printer's nozzle onto a build plate to print a part layer by layer based on a 3D model.

**Selective Laser Sintering (SLS)**

Laser is used to sinter material in powder form layer by layer to print a part based on a 3D model.

Fabrication Technique	Pros	Cons
Fused Filament Fabrication (FFF)	<ul style="list-style-type: none"> <li>• Desktop FFF printers are more affordable</li> <li>• Materials are lower cost</li> <li>• Scalable solution</li> </ul>	<ul style="list-style-type: none"> <li>• Post process operations to remove supports</li> <li>• Closed printing systems which limit materials to those offered solely by the 3D printer manufacturer</li> </ul>
Selective Laser Sintering (SLS)	<ul style="list-style-type: none"> <li>• Cost effective when printing multiple parts at a time</li> <li>• No support material needed</li> </ul>	<ul style="list-style-type: none"> <li>• Long print times when multiple parts are not being printed at the same time</li> <li>• More expensive and larger printers</li> <li>• Post process operation to recycle powder</li> </ul>
Computer Numerical Control (CNC)	<ul style="list-style-type: none"> <li>• Wide variety of materials and surface finishes can be utilized</li> <li>• Efficient for very high precision and repeatable results</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive initial investment</li> <li>• Machine setup and calibration can be time consuming</li> <li>• Requires training to operate</li> <li>• Subtractive process results in material cut away and wasted</li> </ul>
Injection Molding	<ul style="list-style-type: none"> <li>• Highly automated</li> <li>• Fast production times</li> <li>• Cost effective for high volume production runs</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive initial investment</li> <li>• Requires training to operate</li> <li>• High tooling cost and not cost effective for low volume production runs</li> </ul>

Filaments come in two main sizes – 1.75mm & 2.85mm depending on the 3D printer. It is important to understand what brand printer the customer has and the size filament they are using. Powders typically come in 55 lb. bags/boxes in a specific particle size, powders for SLS are more universal. Due to the lack of recyclability of powder, most customers need between 110-220 lbs. for sampling on SLS 3D printers.

3D printers are available in open and closed systems. A closed 3D printing system can only use the manufacturer's proprietary resin. 3D Systems, Stratasys, Markforged are more widely used closed systems. Open 3D printing systems can utilize filament from various manufacturers. Ultimaker, Raise3D, Prusa and MakerBot (owned by Stratasys) are open system printer manufacturers. Open systems allow more freedom in proper material selection, and multiple sources to purchase from. Chase Plastics offers materials for open and closed 3D printers. A majority of our material offering is dedicated to open system printers, with SABIC Filament Refill Models for Stratasys Fortus™ Classic 3D printers.

Most of the materials listed below are in stock at our South Bend warehouse or available within 1-2 days from the filament producer.