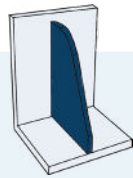


# 3D PRINTING TECHNOLOGIES, MATERIALS & APPLICATIONS FOR POLYMERS

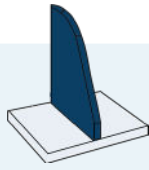


SLS	SAF™	MJF	FDR	SLA	FDM	PolyJet™														
Selective Laser Sintering	Selection Absorption Fusion	Multi Jet Fusion	Fine Detail Resolution	Stereolithography	Fused Deposition Modelling	Material Jetting														
<p><b>Technology Application</b></p> <p>SLS, SAF™, MJF and FDR are all part of the powder bed fusion technology branch within industrial 3D printing. This branch of technologies has high dimensional accuracy, is used for various applications, and can supplement traditional manufacturing technologies in small- to mid-sized serial production</p>			<p><b>Technology Application</b></p> <p>FDR is also a powder bed fusion technology based on SLS. However, FDR excels at very small parts with very fine details</p>			<p><b>Technology Application</b></p> <p>SLA has one of the best dimensional accuracies within 3DP technologies, but due to its chemical properties, its longevity is lower, which is why SLA is mainly used for prototypes and models</p>			<p><b>Technology Application</b></p> <p>FDM has lower dimensional accuracy but offers a vast selection of materials. It is used for prototypes, models, or niche production with specific material property requirements</p>			<p><b>Technology Application</b></p> <p>PolyJet™ has exceptionally high dimensional accuracy and can combine 500,000 different colors and varying hardnesses in the same print, making it ideal for prototypes and models</p>								
<p><b>Material Selection</b></p> <p>PA 2200 PA 3200 GF PA 2210 FR PA 2241 FR PA 603-CF PA 640-GSL PA 1101 (FDR only) PA 12 for Food Contact PA 12 Aluminium (Alumide) TPU 59A &amp; 88A</p>			<p><b>Material Selection</b></p> <p>PA 11 Polypropylene (PP)</p>			<p><b>Material Selection</b></p> <p>PA 11 PA 12 PA 12 White PA 12 Glass Filled</p>			<p><b>Material Selection</b></p> <p>PA 1101</p>			<p><b>Material Selection</b></p> <p>Accura ClearVue Accura Extreme Accura 25 Accura HPC Somos® WaterClear Ultra</p>			<p><b>Material Selection</b></p> <p>Ultem (9085 &amp; 1010) Polycarbonate (PC) PC/ABS &amp; PC-ISO ABS (ESD7, M30 &amp; M30i) ASA SR-30 PEKK &amp; PEKK-ESD PA6-CF PEEK &amp; PEEK-CF Polypropylene (PP) &amp; other engineering materials</p>			<p><b>Material Selection</b></p> <p>Digital Materials</p>		
<p><b>Manufacturing Details</b></p> <p>Manufacturing via ultraviolet laser from nylon (PA) or thermoplastic polyurethane (TPU) powder</p>			<p><b>Manufacturing Details</b></p> <p>Manufacturing via infrared light from polypropylene powder</p>			<p><b>Manufacturing Details</b></p> <p>Manufacturing via infrared light from nylon powder</p>			<p><b>Manufacturing Details</b></p> <p>Manufacturing via ultraviolet laser from nylon powder</p>			<p><b>Manufacturing Details</b></p> <p>Manufacturing via ultraviolet laser from epoxy resin</p>			<p><b>Manufacturing Details</b></p> <p>Manufacturing via extrusion from a polymer thread</p>			<p><b>Manufacturing Details</b></p> <p>Manufacturing via ultraviolet laser from acrylic based fluid</p>		
<p><b>Maximum Build Sizes</b></p> <p>700 x 380 x 580 mm</p>			<p><b>Maximum Build Sizes</b></p> <p>315 x 208 x 293 mm</p>			<p><b>Maximum Build Sizes</b></p> <p>380 x 284 x 380 mm</p>			<p><b>Maximum Build Sizes</b></p> <p>200 x 250 x 125 mm</p>			<p><b>Maximum Build Sizes</b></p> <p>1500 x 750 x 550 mm</p>			<p><b>Maximum Build Sizes</b></p> <p>900 x 600 x 900 mm</p>			<p><b>Maximum Build Sizes</b></p> <p>490 x 390 x 200 mm</p>		
<p><b>Post-processing Offerings</b></p> <p>Blasting, assembly, sanding, vapour smoothing (max 385 x 585 x 385 mm), coating, coloring, lacquering, painting, metal plating, threaded/non-threaded inserts &amp; vibration grinding</p>			<p><b>Post-processing Offerings</b></p> <p>Blasting, vapour smoothing (max 385 x 585 x 385 mm) &amp; coloring</p>			<p><b>Post-processing Offerings</b></p> <p>Assembly, support removal, sanding, coating, lacquering, painting, metal plating, threaded/non-threaded inserts</p>			<p><b>Post-processing Offerings</b></p> <p>Support removal, sanding &amp; threaded/non-threaded inserts</p>			<p><b>Post-processing Offerings</b></p> <p>Support removal, sanding &amp; threaded/non-threaded inserts</p>			<p><b>Post-processing Offerings</b></p> <p>Support removal, sanding &amp; threaded/non-threaded inserts</p>					

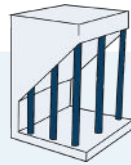
# 3D PRINTING GUIDELINES FOR EVERY POLYMER TECHNOLOGY



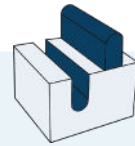
**Supported Walls**



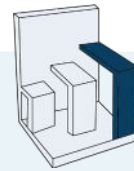
**Unsupported Walls**



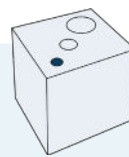
**Support & Overhangs**



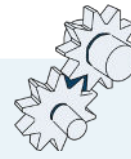
**Embossed & Engraved Details**



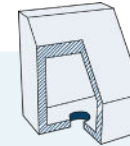
**Horizontal Bridges**



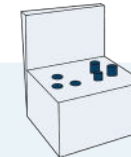
**Holes**



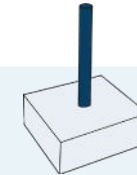
**Connecting & Moving Parts**



**Escape Holes**



**Minimum Features**



**Pin Diameter**



**Tolerance**

	Supported Walls	Unsupported Walls	Support & Overhangs	Embossed & Engraved Details	Horizontal Bridges	Holes	Connecting & Moving Parts	Escape Holes	Minimum Features	Pin Diameter	Tolerance
<b>SLS</b>	P1XX 0.6 mm P3XX 0.8 mm P5XX 0.6 mm P7XX 0.8 mm	1 mm	N/A	1 mm width & height	N/A	> Ø1.5 mm depending on thickness	>0.3 mm for moving parts; > 0.1 mm for connection assemblies; > 0.5 mm radial	> 12 mm multiple holes are preferred	P1XX 0.5 mm P3XX 0.6 mm P5XX 0.5 mm P7XX 0.6 mm	> 1 mm diameter < 15 mm height	Minimum ± 0.3 mm / ± 0.3% over 100mm
<b>MJF</b>	0.5 mm	1 mm	N/A	0.4 mm width & height	N/A	> Ø0.8 mm depending on thickness	>0.3 mm for moving parts; > 0.3 mm for connection assemblies; > 0.3 mm radial	> 6 mm multiple holes are preferred	0.5 mm	> 1 mm diameter < 15 mm height	Minimum ± 0.2 mm & ± 0.25% of dimension
<b>SAF™</b>	0.8 mm	1 mm	N/A	1 mm width & height	N/A	> Ø1.5 mm depending on thickness	>0.3 mm for moving parts; > 0.1 mm for connection assemblies; > 0.5 mm radial	> 12 mm multiple holes are preferred	2 mm	> 2 mm diameter < 15 mm height	Minimum ±0.2 mm & ±0.25% of dimension
<b>FDR</b>	0.2 mm	0.4 mm	N/A	0.4 mm width & height	N/A	> Ø0.6 mm depending on thickness	>0.3 mm for moving parts; > 0.1 mm for connection assemblies; > 0.5 mm radial	> 6 mm multiple holes are preferred	0.25 mm	> 0.5 mm diameter < 15 mm height	1-3 mm ± 0.08 mm; > 3-6 mm ± 0.11 mm; > 6-10 mm: ± 0.14 mm; >10-18 mm: ± 0.17 mm; >18-30 mm: ± 0.20 mm; >30-50 mm: ± 0.23 mm
<b>SLA</b>	HR 0.25 mm NR 0.5 mm	HR 0.5 mm NR 1 mm	Support ≤ 30°	0.4 mm width & height	N/A	> Ø0.5 mm depending on thickness	> 0.1 mm for moving parts; > 0.1 mm for connections	> 3 mm multiple holes are preferred	0.25 mm	> 0.5 mm diameter < 15 mm height	Minimum ± 0.1 mm & ± 0.15% of dimension
<b>PolyJet™</b>	0.8 mm	1 mm	Support always required	0.5 mm width & height	N/A	> Ø0.5 mm	>0.2 mm for moving parts; >0.1 mm for connection assemblies; >0.8 mm for radial	> 20 mm multiple holes are preferred	0.5 mm	> 1 mm diameter < 15 mm height	Minimum ± 0.2 mm & ± 0.25% of dimension
<b>FDM</b>	0.8 mm	1 mm	Support ≤ 45°	0.6 mm width & height	10 mm	> Ø2 mm	> 0.5 mm	> 20 mm	2 mm	> 3 mm diameter < 15 mm height	Minimum ± 0.2 mm & ± 0.25% of dimension

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FROM ONE TO ONE MILLION

\*The guide above is designed for a trouble free 3D printing experience, smaller tolerances and smaller details are possible, but will have to be verified for every geometry. The guide is intended for parts with uniform wall thickness throughout the entire model, variation in wall thickness is equal to wall thickness x 0.7 (e.g. 2 mm x 0.7 = 1.4 mm growing wall this also minimize warping). Recommended font size for embossed and engraved text is Arial Black. Use bold and font size minimum of 12 (details smaller than the recommended size can disappear). Best result is in the planar region in the z-direction. Preferred file format is .STL.