

## On-Demand Manufacturing Process Comparison

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Process	Applications	Instant Quoting Maximum Dimensions	Layer Thickness	Material Options	Finish Options	Lead Time	Recommended Minimum Feature Size
Stereolithography (SLA) 3D Printing	<ul> <li>Excellent for fit, form, and function testing</li> <li>Design verification models for appearance and proof-of-concept models</li> <li>Best surface quality and highest resolution, ideal for trade show quality parts</li> <li>High precision and accuracy</li> <li>Easily finished and painted for demonstration/presentation models</li> </ul>	Normal/Standard Res: 1500 mm × 750 mm × 550 mm (59" × 29.5" × 21.5") High Res: 380 mm × 380 mm × 254 mm (15" × 15" × 10")	Normal/Standard Resolution: 101.6 µm (0.004") High Resolution: 50.8 µm (0.002")	Accura 25 (ABS/PP-Like) Accura Xtreme White Accura Xtreme Grey (High-Impact ABS-Like) Accura SL 7820 Black (ABS-Like) Accura 60 (PC-Like) Accura ClearVue (PC-Like) Accura Bluestone (High-Temp ABS-Like) Accura 48 (High-Temp PC-Like)	Natural Standard Paint-Ready Painted Quick Clear Clearpart Custom	As little as 2 business days	Normal/Standard Res: 635 μm (0.025") High Res: 254 μm (0.015")
Selective Laser Sintering (SLS) 3D Printing	<ul> <li>Ideal for durable, impact-resistant, functional parts with a variety of applications</li> <li>Capable of producing snap fits and living hinges</li> <li>Excellent heat and chemically resistant</li> </ul>	762 mm × 508 mm × 508 mm (20" × 20" × 30")	101.6 μm (0.004")	Duraform PA (Nylon)  Duraform GF (Glass-Filled Nylon)  Duraform HST (Composite/ High-Temperature)  Duraform EX Black (Durable Nylon)  Duraform EX Natural (Durable Nylon)  Duraform TPU (Elastomeric)	<ul> <li>Standard Uncoated</li> <li>Standard Coated</li> <li>Paint-Ready</li> <li>Painted, Dyed</li> </ul>	As little as 3 business days	762 μm (0.030")
Direct Metal Printing (DMP) 3D Printing	Perfect for complex metal parts that need to be manufactured quickly and accurately     Fully dense parts with excellent surface finish	269.24 mm × 269.24 mm × 400 mm (10.6" × 10.6" × 15.7")	Normal/Standard Res: 60 μm (0.0024") High Res: 30 μm (0.0012")	<ul> <li>Stainless Steel 17-4PH (A)</li> <li>Stainless Steel 316L (A)</li> <li>Aluminum (AlSi10Mg) (A)</li> <li>Aluminum (AlSi12) (B)</li> <li>Titanium (Ti6Al4V) Grade 23</li> <li>Inconel 625 (Ni625) (A)</li> <li>Inconel 718 (Ni718)(A)</li> </ul>	<ul><li>Anodized</li><li>EDM</li><li>Grinding</li><li>Heat-Treated</li><li>Milling</li><li>Polished</li><li>Turning</li></ul>	As little as 8 business days	254 μm (0.010")
Fused Deposition Modeling (FDM) 3D Printing	Excellent for demonstration models with full color printing     Perfect for architecture, consumer product design, healthcare, educational models, crystallography, medical teaching models, and more	914.4 mm × 609.6 mm × 914.4 mm (36" × 24" × 36")	177.8 µm, 254 µm, 330.2 µm (0.007", 0.010", 0.013") layers	<ul> <li>ABS M30, M30i, &amp; M100</li> <li>PC, PC-ISO, &amp; PC-ABS</li> <li>Ultern 9085 &amp; Ultern 1010</li> <li>Nylon 12</li> </ul>	Standard Paint-Ready Painted	3-5 (maybe longer due to size and quantity)	1524 µm (0.060")
Digital Light Processing (DLP) 3D Printing	<ul> <li>DLP delivers ultra-high speed and accuracy, with a wide range of material choices</li> <li>Ideal for low-volume production and quick-turn prototyping</li> </ul>	124.46 mm × 71.12 mm × 195.58 mm (4.9" × 2.8" × 7.7")	Contact your Sales representative for more information	<ul> <li>Pro-Black 10</li> <li>Tough Blk 20</li> <li>Med Amber 10</li> <li>High-Temp 300</li> <li>Tough 65C Black</li> <li>High-Temp 150C FR Black</li> <li>Rigid White</li> <li>Rubber 65A</li> <li>Flex Black 20</li> <li>Rubber Black 10</li> <li>Rigid Grey</li> </ul>	<ul><li>Natural</li><li>Standard</li><li>Paint-Ready</li><li>Painted</li><li>Custom</li></ul>	As little as 24 hours	254 μm (0.010") (May vary due to geometry)
Multi-Jet Printing (MJP) 3D Printing	<ul> <li>Concept modeling</li> <li>Form/fit testing</li> <li>Functional prototypes</li> <li>Jigs/fixtures</li> <li>Eggshell molding</li> </ul>	11.6" × 8.3" × 5.6"	32 μm	Engineering Class:  • Visijet Armor  Rigid Class:  • Visijet M2R-CL	Standard	As little as 2 business days	254 μm (0.010")

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Process	Applications	Instant Quoting Maximum Dimensions	Layer Thickness	Material Options	Finish Options	Lead Time	Recommended Minimum Feature Size
Cast Urethane  Traditional  Manufacturing (MFG)	Ideal for marketing samples Production-like attributes (surface finish, color, accuracy, and material properties) Focus groups Short-run production Bridge to production Viable production process for low-volume, high-value programs	N/A	N/A	ABS-Like PE-Like PE-Like PP-Like Elastomer (25A, 30A, 40A, 50A, 60A, 70A, 80A, 90A) Clear High-Strength High-Temp ABS-Like Custom (Glass-Filled) MRI Transparent ABS-Like FDA-Approved Rigid FDA-Approved Elastomeric UL94VO Polypropylene UL94VO ABS-Like Silicone	• Functional • Show • Clear (Polished)	First article in as little as 6 business days	635 µm (0.025") (May vary due to geometry)
Injection Mold Tooling & Parts Traditional MFG	<ul> <li>Pre-production and production applications</li> <li>Functional, process validation, and reliability testing</li> </ul>	N/A	N/A	All available in the market	All available for production	Tooling: 3-6 weeks minimum Parts: 1-4 weeks (depending on volume)	DFM needed
CNC Traditional MFG	<ul> <li>Pre-production and production applications</li> <li>Functional, process validation, and reliability testing</li> <li>Excellent for form, fit, and function tests</li> <li>Best choice for tighter tolerances and/or surface finishes</li> <li>Most material-specific finishes available for machined components</li> </ul>	Lathe Diameter: 203.2 mm (8") Lathe Length: 609.6 mm (24") Mill X: 1016 mm (40") Mill Y: 533.4 mm (21") Mill Z: 457.2 mm (18")	N/A	<ul> <li>Aluminum (6000, 7000, &amp; 5000 series)</li> <li>Brass (100, 200, &amp; 300 series)</li> <li>Bronze (900 series)</li> <li>Copper (100 &amp; 200 series)</li> <li>Stainless Steel (300 &amp; 400 series, 17-4)</li> <li>Steel (1000 &amp; 1200 series, A36)</li> <li>Steel Alloys (4000 &amp; 8000 series)</li> <li>Plastics (ABS, Delrin, Acrylic, G-10/FR4, HDPE, Nylon, Phenolic, Polycarbonate, Polypropylene, PTFE, PVC, Ultem, UHMW, Peek)</li> </ul>	Anodize     Custom     Heat-Treated     Natural     Standard     Paint-Ready     Painted     Powder Coat     Nickel Plating     Tin Coating     Gold Plating     Silver Plating     Black Oxide     Chemical Conversion	3-15 business days Project Specific	>0.25 mm (>0.0098")
Sheet Metal  Traditional MFG	<ul> <li>Pre-production and production applications</li> <li>Functional, process validation, and reliability testing</li> <li>Excellent for thin, simple parts, covers, and brackets with simple bends</li> </ul>	1219.2 mm × 1219.2 mm × 5.08 mm (48" × 48" × 0.200")	N/A	<ul><li>Aluminum</li><li>Brass</li><li>Bronze</li><li>Copper</li><li>Stainless Steel</li><li>Alloy Steel</li></ul>	Anodize Heat-Treated Powder Coat Paint Nickel Plating Tin Coating Gold Plating Silver Plating Black Oxide Chemical Conversion	1-4 weeks Project Specific	>0.5 mm (>0.0019")
<b>Die Casting</b> <i>Traditional MFG</i>	Pre-production and production applications  Indicate the following applications:  Functional, process validation, and reliability testing: Excellent for large-volume production, standard-toleranced, metal components.	152.4 mm × 152.4 mm × 152.4 mm (6" × 6" × 6")	N/A	• Aluminum • Zinc	• Anodized • Paint	3-6 weeks Project Specific	Project Specific



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Process	Applications	Instant Quoting Maximum Dimensions	Layer Thickness	Material Options	Finish Options	Lead Time	Recommended Minimum Feature Size
Investment Casting Traditional MFG	Complex casting patterns - protoype and production Viable production process for lower volume programs Excellent for high-volume, production-level components; very beneficial when there are complex features that are better-suited for casting Functional, process validation, and reliability testing Alternative to machined, injection-wax tooling Iterative design opportunities resulting in better time to market vs.Traditional tooled parts Excellent dimensional stability, especially in large part geometries Casings, impellors, rotors	609.6 mm × 609.6 mm × 609.6 mm (24" × 24" × 24")	SLA: 0.002, 0.004, 0.006 Wax: 16 or 42 μm	SLA:  Accura CastPro  Accura Fidelity (Antimony-Free)  WAX:  Visijet M2 Cast, Visijet M2  Industrial Cast  Stainless Steel  Low-Alloy Steel  Aluminum (AS7G60)  Carbon Steel  Cast Iron  Copper  Zamak 12	Anodize Heat-Treated Powder Coat Paint Nickel Plating Tin Coating Gold Plating Silver Plating Black Oxide Chemical Conversion  SLA Finishing: Level 1 - Support remoleak checked Level 2 - Level 1 + built Level 3 - Level 2 + surfat  WAX Finishing: Level 1 - Supports intal Level 2 - Support remolexed Level 3 - Support remolexed Level 4 - Support remolexed Level 5 - Support remolexed Level 6 - Support remolexed Level 7 - Support remolexed Level 8 - Support remolexed Level 9 -	d lines lightly sand aces sanded smoo ct, requires custon oval, some evidency y be visible	oth, clearcoat applied ner removal se of build lines, some