

FDM Printers and Materials

Material	Highlights
Antero™ 800NA (polyetherketoneketone)	<ul style="list-style-type: none"> • High heat and chemical resistance • Low outgassing and high dimensional stability • Excellent strength, toughness and wear-resistant properties
ULTEM™ 1010 resin (polyetherimide)	<ul style="list-style-type: none"> • Food safety and bio-compatibility certification • Highest heat resistance, chemical resistance and tensile strength • Outstanding strength and thermal stability
ULTEM 9085 resin (polyetherimide)	<ul style="list-style-type: none"> • FST (flame, smoke, toxicity)-certified thermoplastic • High heat and chemical resistance; highest flexural strength • Ideal for commercial transportation applications such as airplanes, buses, trains and boats
PPSF (polyphenylsulfone)	<ul style="list-style-type: none"> • Mechanically superior material, greatest strength • Ideal for applications in caustic and high heat environments
ST-130™ (Sacrificial Tooling)	<ul style="list-style-type: none"> • Designed specifically for hollow composite parts • Fast, hands-free dissolution time • High heat and autoclave pressure resistance
FDM Nylon 6™ (polyamide 6)	<ul style="list-style-type: none"> • Combines strength and toughness superior to other thermoplastics • Produces durable parts with a clean finish and high break resistance
FDM Nylon 12™ (polyamide 12)	<ul style="list-style-type: none"> • The toughest nylon in additive manufacturing • Excellent for repetitive snap fits, press fit inserts and fatigue-resistance applications • Simple, clean process – free of powders
FDM Nylon 12CF™ (polyamide 12CF)	<ul style="list-style-type: none"> • Carbon-filled thermoplastic with excellent structural characteristics • Highest flexural strength • Highest stiffness-to-weight ratio
PC (polycarbonate)	<ul style="list-style-type: none"> • Most widely used industrial thermoplastic with superior mechanical properties and heat resistance • Accurate, durable and stable for strong parts, patterns for metal bending and composite work • Great for demanding prototyping needs, tooling and fixtures
PC-ISO™ (polycarbonate - ISO 10993 USP Class VI biocompatible)	<ul style="list-style-type: none"> • Biocompatible (ISO 10993 USP Class VI)¹ material • Sterilizable using gamma radiation or ethylene oxide (EtO) sterilization methods • Best fit for applications requiring higher strength and sterilization
PC-ABS (polycarbonate - acrylonitrile butadiene styrene)	<ul style="list-style-type: none"> • Superior mechanical properties and heat resistance of PC • Excellent feature definition and surface appeal of ABS • Hands-free support removal with soluble support
ASA (acrylonitrile styrene acrylate)	<ul style="list-style-type: none"> • Build UV-stable parts with the best aesthetics of any FDM material • Ideal for production parts for outdoor infrastructure and commercial use, outdoor functional prototyping and automotive parts and accessory prototypes
ABS-ESD7™ (acrylonitrile butadiene styrene - static dissipative)	<ul style="list-style-type: none"> • Static-dissipative with target surface resistance of 10⁷ ohms (typical range 10⁹ – 10⁶ ohms)² • Makes great assembly tools for electronic and static-sensitive products • Widely used for functional prototypes of cases, enclosures and packaging
ABS-M30i™ (acrylonitrile butadiene styrene - ISO 10993 USP Class VI biocompatible)	<ul style="list-style-type: none"> • Biocompatible (ISO 10993 USP Class VI)¹ material • Sterilizable using gamma radiation or ethylene oxide (EtO) sterilization methods • Best fit for applications requiring good strength and sterilization
ABSi™ (acrylonitrile butadiene styrene - translucent)	<ul style="list-style-type: none"> • Translucent material available in natural, red and amber colors • Good blend of mechanical and aesthetic properties • Ideal for automotive design and monitoring fluid movement such as in medical-device prototyping
ABS-M30™, ABSplus™ (acrylonitrile butadiene styrene)	<ul style="list-style-type: none"> • Versatile material: good for form, fit and functional applications • Familiar production material for accurate prototyping
PLA (Polylactic acid)	<ul style="list-style-type: none"> • Fast printing • Good tensile strength • Economical and user-friendly • Ideal for concept models
FDM TPU 92A (thermoplastic polyurethane)	<ul style="list-style-type: none"> • Elastomer material with Shore A value of 92 • Flexible, resilient material • Compatible with soluble support • Accelerates elastomer prototyping without the need for molds

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² Actual surface resistance may range from 109 to 106 ohms, depending upon geometry, build style and finishing techniques.

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FDM 3D Printers use a variety of engineering-grade thermoplastics to manufacture functional parts direct from digital data. FDM thermoplastics are environmentally stable, so overall shape and part accuracy don't change with ambient conditions over time, unlike the powders in competitive processes. Materials are easy to change on FDM 3D Printers, with no mess or complicated processes. When combined with FDM 3D Printers, FDM thermoplastics give you high-quality thermoplastic parts that are ideal for concept modeling, functional prototyping, manufacturing tools or production parts.

	Antero 800NA	ULTEM 1010 resin	ULTEM 9085 resin	PPSF	ST-130
System Availability	Fortus 450mc Stratasys F900	Fortus 400mc Fortus 450mc Stratasys F900	Fortus 400mc Fortus 450mc Stratasys F900	Fortus 400mc Stratasys F900	Fortus 450mc Stratasys F900
Layer Thickness	0.010 inch (0.254 mm)	0.020 inch (0.508 mm) ¹¹ 0.013 inch (0.330 mm) 0.010 inch (0.254 mm)	0.013 inch (0.330 mm) ¹⁰ 0.010 inch (0.254 mm)	0.013 inch (0.330 mm) ⁹ 0.010 inch (0.254 mm)	0.013 inch (0.330 mm)
Support Structure	Breakaway	Breakaway	Breakaway	Breakaway	Breakaway
Available Colors	■ Natural	■ Natural	■ Tan ■ Black	■ Tan	■ Natural
Tensile Strength (Ultimate) ²	XZ: 13,504 psi (±57 psi) ZX: 6,650 psi (±765 psi)	XZ: 11,735 psi (81 MPa) ZX: 5400 psi (37 MPa)	XZ: 9,950 psi (69 MPa) ZX: 6,100 psi (42 MPa)	XZ: 8,000 psi (55 MPa)	N/A
Tensile Elongation ²	XZ: 6.40 ± 1.05% ZX: 1.22 ± 0.28%	XZ: 3.3% ZX: 1.3%	XZ: 5.8% ZX: 2.2%	XZ: 3.0%	N/A
Flexural Stress	XZ: 20,548 ± 477 psi (142 ± 3 MPa) ZX: 9,349 ± 1,514 psi (64 ± 10 MPa)	XZ: 20,835 psi (144 MPa) ZX: 11,184 psi (77 MPa)	XZ: 16,200 psi (112 MPa) ZX: 9,900 psi (68 MPa)	XZ: 15,900 psi (110 MPa)	N/A
IZOD Impact, notched	XZ: 0.69 ± 0.12 ft-lb/in (37 ± 6 J/m) ZX: 0.51 ± 0.09 ft-lb/in (27 ± 5 J/m)	XZ: 0.8 ft-lb/in (41 J/m) ZX: 0.4 ft-lb/in (24 J/m)	XZ: 2.0 ft-lb/in (120 J/m) ZX: 0.9 ft-lb/in (48 J/m)	XZ: 1.1 ft-lb/in (59 J/m)	N/A
Heat Deflection at 264 psi	147 °C (297 °F)	213 °C (415 °F)	153 °C (307 °F)	189 °C (372 °F)	108 °C (226 °F)
Unique Properties	High strength, and heat and chemical resistance, low outgassing	Food-safety and bio-compatibility certification	Flame, smoke, toxicity (FST) certified, ULTEM 9085 Aerospace grade available	Highest heat and chemical resistance	Sacrificial tooling

¹ 0.005 inch (0.127 mm) layer thickness not available for Stratasys F900.

² See individual material spec sheets for testing details.

³ 0.013 inch (0.330 mm) layer thickness for PPSF not available on Stratasys F900.

⁴ It is the responsibility of the finished device manufacturer to determine the suitability of all the component parts and materials used in their finished products.

⁵ PC can attain 0.005 inch (0.127mm) layer thickness when used with SR-100 soluble support.

⁶ Annealed.

⁷ Actual surface resistance may range from 109 to 106 ohms, depending upon geometry, build style and finishing techniques.

⁸ Available only on the Stratasys F123 Series.

⁹ Available only on the Stratasys F370.

¹⁰ Available on Fortus 400mc and Stratasys F900.

¹¹ Available on the Stratasys F900 only.

* Available on Fortus Classic only.

** Mechanical properties are measured on the Fortus systems and may vary with other printers.

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	FDM Nylon 6	FDM Nylon 12	FDM Nylon 12CF	PC	PC-ISO
System Availability	Stratasys F900	Fortus 360mc Fortus 380mc Fortus 400mc Fortus 450mc Stratasys F900	Fortus 450mc Stratasys F900	Fortus 360mc Fortus 380mc Fortus 400mc Fortus 450mc Stratasys F900	Fortus 380mc Fortus 400mc Fortus 450mc Stratasys F900
Layer Thickness	0.013 inch (0.330 mm) 0.010 inch (0.254 mm)	0.013 inch (0.330 mm) 0.010 inch (0.254 mm) 0.007 inch (0.178 mm)	.010 inch (0.254 mm)	0.013 inch (0.330 mm) 0.010 inch (0.254 mm) 0.007 inch (0.178 mm) 0.005 inch (0.127 mm) ^{1,5}	0.013 inch (0.330 mm) 0.010 inch (0.254 mm) 0.007 inch (0.178 mm)
Support Structure	Soluble	Soluble	Soluble	Breakaway, Soluble	Soluble
Available Colors	■ Black	■ Black	■ Black	□ White	□ White ■ Translucent Natural
Tensile Strength (Ultimate) ²	XZ: 9,800 psi (67.6 MPa) ZX: 5,300 psi (36.5 MPa)	XZ: 6,650 psi (46 MPa) ZX: 5,600 psi (38.5 MPa)	XZ: 10,960 psi (75.6 MPa) ZX: 4,990 psi (34.4 MPa)	XZ: 8,300 psi (57 MPa) ZX: 6,100 psi (42 MPa)	XZ: 8,300 psi (57 MPa)
Tensile Elongation ²	XZ: 38% ZX: 3.2%	XZ: 30% ZX: 5%	XZ: 1.9% ZX: 1.2%	XZ: 4.8% ZX: 2.5%	XZ: 4%
Flexural Stress	XZ: 14,100 psi (97.2 MPa) ZX: 11,900 psi (82 MPa)	XZ: 9,700 psi (67 MPa) ZX: 8,800 psi (61 MPa)	XZ: 20,660 psi (142 MPa) ZX: 8,430 psi (58.1 MPa)	XZ: 13,000 psi (89 MPa) ZX: 9,900 psi (68 MPa)	XZ: 13,100 psi (90 MPa)
IZOD Impact, notched	XZ: 2.0 ft-lb/in (106 J/m) ZX: 0.8 ft-lb/in (43 J/m)	XZ: 2.5 ft-lb/in (135 J/m) ZX: 1 ft-lb/in (53 J/m)	XZ: 1.6 ft-lb/in (85 J/m) ZX: 0.4 ft-lb/in (21.4 J/m)	XZ: 1.4 ft-lb/in (73 J/m) ZX: 0.5 ft-lb/in (28 J/m)	XZ: 1.6 ft-lb/in (86 J/m)
Heat Deflection at 264 psi	93 °C (199 °F)	82 °C ⁶ (180 °F) ⁶	143 °C (289 °F)	127 °C (261 °F)	127 °C (260 °F)
Unique Properties	Very high strength and toughness combined	Fatigue-resistant, high elongation at break	Highest flexural strength of any FDM material	Strong (tension)	ISO 10993 USP Class VI ⁴

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	PC-ABS	ASA	ABS-ESD7	ABS-M30i	ABSi
System Availability	Fortus 360mc	Fortus 360mc	Fortus 380mc	Fortus 380mc	Fortus 400mc
	Fortus 380mc	Fortus 380mc	Fortus 400mc	Fortus 400mc	
	Fortus 400mc	Fortus 400mc	Fortus 450mc	Fortus 450mc	
	Fortus 450mc	Fortus 450mc	Stratasys F900	Stratasys F900	
	Stratasys F370	Stratasys F170			
	Stratasys F900	Stratasys F270 Stratasys F370 Stratasys F900			
Layer Thickness	0.013 inch (0.330 mm)	0.020 inch (0.508 mm)	0.010 inch (0.254 mm)	0.013 inch (0.330 mm)	0.013 inch (0.330 mm)
	0.010 inch (0.254 mm)	0.013 inch (0.330 mm)	0.007 inch (0.178 mm)	0.010 inch (0.254 mm)	0.010 inch (0.254 mm)
	0.007 inch (0.178 mm)	0.010 inch (0.254 mm)		0.007 inch (0.178 mm)	0.007 inch (0.178 mm)
	0.005 inch (0.127 mm) ¹	0.007 inch (0.178 mm)		0.005 inch (0.127 mm) ¹	0.005 inch (0.127 mm) ¹
		0.005 inch (0.127 mm) ¹¹			
Support Structure	Soluble	Soluble	Soluble	Soluble	Soluble
Available Colors	■ Black □ White ²	■ Ivory ■ Black ■ Dark Gray ■ Light Gray □ White	■ Red ■ Orange ■ Yellow ■ Green ■ Dark Blue	■ Black □ Ivory	■ Translucent Natural ■ Translucent Amber ■ Translucent Red
Tensile Strength (Ultimate) ²	XZ: 5,900 psi (41 MPa)	XZ: 4,750 psi (33 MPa) ZX: 4,300 psi (30 MPa)	XZ: 5,200 psi (36 MPa)	XZ: 4,650 psi (36 MPa)	XZ: 5,400 psi (37 MPa)
Tensile Elongation ²	XZ: 6%	XZ: 9% ZX: 3%	XZ: 3.0%	XZ: 4%	XZ: 4.4%
Flexural Stress	XZ: 9,800 psi (68 MPa)	XZ: 8,700 psi (60 MPa) ZX: 6,900 psi (48 MPa)	XZ: 8,800 psi (61 MPa)	XZ: 8,800 psi (61 MPa)	XZ: 8,980 psi (62 MPa)
IZOD Impact, notched	XZ: 3.7 ft-lb/in (196 J/m)	XZ: 1.2 ft-lb/in (64 J/m)	XZ: 0.5 ft-lb/in (28 J/m)	XZ: 2.6 ft-lb/in (139 J/m)	XZ: 1.8 ft-lb/in (96 J/m)
Heat Deflection at 264 psi	96 °C (205 °F)	91 °C (196 °F)	82 °C (180 °F)	82 °C (180 °F)	73 °C (163 °F)
Unique Properties	Strong (impact)	UV stable with the best aesthetics of any FDM material	Static-dissipative, target surface resistance of 107 ohms ⁷	ISO 10993 USP Class VI ⁴	Translucent material

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	ABS-M30**	ABSplus	PLA	FDM TPU 92A
System Availability	Fortus 360mc	uPrint SE Plus	Stratasys F170	Stratasys F170
	Fortus 380mc		Stratasys F270	Stratasys F270
	Fortus 400mc		Stratasys F370	Stratasys F370
	Fortus 450mc			
	Stratasys F170			
	Stratasys F270			
	Stratasys F370			
Layer Thickness	0.013 inch (0.330 mm)	0.013 inch (0.330 mm)	0.010 inch (0.254 mm)	0.010 inch (0.254 mm)
	0.010 inch (0.254 mm)	0.010 inch (0.254 mm)		
	0.007 inch (0.178 mm)	0.007 inch (0.178 mm)		
	0.005 inch (0.127 mm) ¹			
Support Structure	Soluble	Soluble	Breakaway	Soluble
Available Colors	■ Ivory ■ Blue	■ Ivory ■ Blue	■ Black ■ Olive Green	■ Natural Translucent ■ Black
	□ White ■ Orange ³	□ White ■ Olive Green	□ White ■ Nectarine	■ Red Translucent ■ Blue Translucent
	■ Black ■ Yellow ³	■ Black ■ Nectarine	■ Light Gray ■ Flourscent Yellow	■ Blue Translucent ■ Yellow Translucent
	■ Dark Gray ■ Green ³	■ Dark Gray ■ Flourscent Yellow	■ Medium Gray ■ Red	■ Yellow Translucent ■ Green Translucent
	■ Red □ Custom Colors	■ Red	■ Blue	■ Green Translucent
Tensile Strength (Ultimate) ²	XZ: 4,650 psi (32 MPa) ZX: 4,050 psi (28 MPa)	XZ: 4,700 psi (33 MPa)	XZ: 6,990 psi (48 MPa) ZX: 3,830 psi (26 MPa)	XZ: 2519 psi (17.4 MPa) XY: 2432 psi (16.8 MPa)
	Tensile Elongation ²	XZ: 7.0% ZX: 2%	XZ: 6%	XZ: 2.5% ZX: 1.0%
Flexural Stress	XZ: 8,700 psi (60 MPa) ZX: 7,000 psi (48 MPa)	XZ: 8,450 psi (58 MPa) ZX: 5,050 psi (35 MPa)	XZ: 12,190 psi (84 MPa) ZX: 6,750 psi (45 MPa)	XZ: 351 psi (2.4 MPa) XY: 255 psi (1.8 MPa)
	IZOD Impact, notched	XZ: 2.4 ft-lb/in (128 J/m)	XZ: 2.0 ft-lb/in (106 J/m)	XZ: 0.5 ft-lb/in (27 J/m)
Heat Deflection at 264 psi	82 °C (180 °F)	82 °C (180 °F)	51 °C (124 °F)	38 °C (100 °F) (@ 66 psi)
Unique Properties	Variety of color options	Variety of color options	Low cost, fast-draft printing	Elastomer

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