

# Fiber™

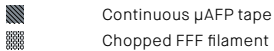
## Material data sheet

Fiber™ prints with two printheads—one dedicated to a continuous fiber prepreg tape; one dedicated to chopped fiber-reinforced filament. Designed for versatility, the printer supports a wide range of both chopped fiber filament and continuous fiber composites to enable a broad set of applications from consumer electronics to automotive.

### MATERIALS

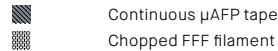
#### PEKK + Carbon Fiber

PEKK is characterized by its high tensile and compression strength, resistance to chemical abrasion, and ability to withstand high temperatures (above 250 °C). When reinforced with carbon fiber, resulting parts are exceptionally durable and well-suited for extreme environments including high-temperature applications.



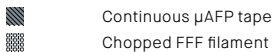
#### PEEK + Carbon Fiber

PEEK is characterized by exceptional mechanical properties, high resistance to surface abrasion, and is inherently flame retardant. When combined with continuous carbon fiber, the resulting composite is strong, stiff, and boasts a high fatigue level—making it great for high-wear manufacturing jigs and fixtures.



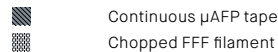
#### Nylon 6 (PA6) + Carbon Fiber

Our Nylon 6 (PA6) with carbon fiber reinforcement is safe for operations where ESD compliance is required. With a tensile strength 30x stronger than ABS, PA6 + CF is an excellent material for jigs, fixtures, and end-of-arm tooling, including those used in electronics manufacturing.



#### Nylon 6 (PA6)+ Fiberglass

Fiberglass-reinforced nylon is a low-cost material which renders lightweight, high-strength and corrosion-resistant parts—making it a great match for sporting goods or marine applications, where parts are exposed to the elements and have a low target cost per part.



### MATRIX MATERIALS

#### PEKK

- Excellent mechanical properties, chemical resistance, and surface abrasion
- Flame retardant
- High compression strength
- ESD-Safe
- Continuous Use Temperature above 250 °C

#### PEEK

- Excellent mechanical properties, chemical resistance and surface abrasion
- Flame retardant
- Continuous Use Temperature between 200-250 °C

#### Nylon 6 (PA6)

- Low cost
- High mechanical strength
- Continuous Use Temperature ~ 100 °C

### FIBER REINFORCEMENTS

#### Carbon Fiber (CF)

- High strength & stiffness
- Low coefficient of thermal expansion
- High fatigue level
- Somewhat brittle

#### Fiberglass (FG)

- Low-cost
- Corrosion resistant
- Non-conductive (insulator)
- No radio-signal interference

**MATERIAL FORMAT**

**Continuous fiber tape (μAFP)**

With up to 12K continuous fiber tows and a fiber volume fraction of up to 60%, the μAFP printhead prints fully-dense, continuous-fiber reinforcements. The 3 mm wide tapes are heated and deposited by a compaction roller with closed-loop thermal controls, resulting in reinforcements that display less than 1% porosity.


**Chopped fiber filament (FFF)**

Chopped fiber filaments offer good dimensional stability, up to 30% fiber volume fraction and improved mechanical properties when compared to standard thermoplastics. The FFF printhead heats and extrudes a chopped fiber-reinforced filament to form a high-resolution exterior shell, resulting in parts with excellent surface finish and mechanical strength.

**MATERIAL PERFORMANCE**

Material Composition	FFF Chopped Fiber Filaments				μAFP Continuous Fiber Tapes				Reference		
	PA6 + Carbon	PA6 + Glass	PEEK + Carbon	PEKK + Carbon	PA6 + Carbon	PA6 + Glass	PEEK + Carbon	PEKK + Carbon	ABS	Aluminum (6061)	Steel (4140)
Tensile Modulus (GPa)	3.8	4.2	8.1	7.9	117	30	145	139	2.3	70	200
Tensile Strength (MPa)	63	63	105	110	1416	900	2400	2300	39	310	655
Tensile Strain at Break (%)	3	6	3	3	1.3	2.4	0.8	0.8	24	17	25
Flexural Modulus (GPa)	3.7	3.6	8.3	8.1	71	29	124	124	2.4	70	200
Flexural Strength (MPa)	84	72	136	129	660	750	2000	2000	74	310	655
Density (g/cm <sup>3</sup> )	1.17	1.35	1.39	1.38	1.73	1.45	1.57	1.57	1.06	2.70	7.85