



Advanced Industrial Highlights Glass-Filled PEEK for Demanding Applications

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Advanced Industrial, a supplier of high-performance plastic shapes and CNC-machined components, has outlined the properties, applications, and selection considerations for its 30 percent glass-fiber-reinforced PEEK. The company machines the grade from rod, plate, and custom stock shapes for manufacturers in aerospace, oil and gas, semiconductor, and medical device production, and its technical overview is intended to help engineers compare the material with other PEEK grades before committing to a design.

PEEK, or polyether ether ketone, is a semi-crystalline thermoplastic known for its chemical resistance and high-temperature capability. Adding glass fiber increases stiffness compared with unfilled PEEK and improves creep resistance and dimensional stability, which is why the reinforced grade is commonly specified for structural and load-bearing parts.

According to the company's published data for its extruded glass-filled grade, the material has a tensile strength of 14,000 psi (96.5 MPa), a tensile and flexural modulus of 1,000 ksi (6.89 GPa), and a specific gravity of 1.51. Advanced Industrial lists a maximum continuous service temperature in air of 480 degrees Fahrenheit (249 degrees Celsius), a heat deflection temperature of 450 degrees Fahrenheit (232 degrees

Celsius) at 264 psi, and a coefficient of thermal expansion of 12.0 microinches per inch per degree Fahrenheit. These are typical values, and actual performance varies with resin source, glass loading, processing conditions, part geometry, and service environment.

"Glass-filled PEEK occupies an important space in the world of engineering plastics," said Paul Cedrone, CEO of Advanced Industrial. "The combination of high-temperature performance, chemical resistance, and added rigidity makes it a strong candidate for precision components in demanding industrial settings."

In aerospace and defense, Advanced Industrial's glass-filled PEEK is used for brackets, housings, and structural components where engineers are working to reduce weight compared with metal parts. In the oil and gas sector, the material is specified for valve seats, seals, and downhole tool components exposed to elevated temperatures, high pressure, and corrosive fluids. Semiconductor and electronics manufacturers use it for insulators, wafer-handling components, and other parts that require electrical insulation and tight dimensional tolerances.

The lower thermal expansion of the glass-reinforced grade, compared with unfilled PEEK, is a primary reason it is selected for tight-tolerance parts that must hold dimensions through thermal cycling. The reinforcement also introduces trade-offs that engineers weigh during design. Fiber orientation can cause properties to differ by direction, and glass fibers are more abrasive to mating surfaces than unfilled or bearing-grade PEEK, which can affect performance in sliding and wear applications.

Glass-filled PEEK is produced at different fiber loadings, with 30 percent the most widely supplied. Higher glass content generally increases stiffness and creep resistance, while lower loadings retain more of the toughness and wear behavior of unfilled PEEK.

Advanced Industrial also provides technical context on the differences between glass-filled, carbon-filled, and unfilled PEEK. Carbon-fiber-reinforced grades typically offer higher stiffness and better wear performance but are not electrical insulators, while glass-filled grades retain PEEK's insulating properties. Unfilled PEEK offers the greatest elongation and toughness of the three. Comparing compressive strength, fatigue resistance, wear behavior, and thermal performance across grades allows procurement and engineering teams to match material to operating conditions.

"What sets glass-filled PEEK apart is its consistency," Cedrone noted. "Engineers can count on predictable performance across a wide range of operating conditions, which simplifies design work and reduces the risk of unexpected component failures in critical systems."

PEEK as a material family has an established history in medical devices and is generally regarded as compatible with steam autoclave, gamma radiation, and ethylene oxide sterilization. Suitability for a specific

medical application depends on the grade and its certifications. Advanced Industrial's standard extruded glass-filled grade does not carry FDA, USP Class VI, NSF, or USDA certifications, and implantable devices typically use unfilled or carbon-reinforced PEEK grades produced and tested specifically for implant use. Device manufacturers remain responsible for qualifying materials under applicable regulatory requirements.

Glass-filled PEEK costs more than widely used engineering plastics such as nylon, acetal, and polycarbonate. It is typically considered for applications in which temperature, chemical exposure, sustained load, or dimensional requirements exceed what lower-cost materials can reliably deliver.

Advanced Industrial was incorporated in 1995 and operates a 20,000-square-foot manufacturing facility in Mooresville with 16 CNC mills and 8 CNC lathes. In addition to PEEK, the company stocks and machines acetal, nylon, Ultem, Torlon, Vespel, and PTFE in sheet, plate, rod, and tube form, and provides cut-to-size services. For more information, visit cncplastics.com.

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Advanced Industrial is a plastic Distributor/Fabricator, specializing in high-performance plastic shapes and CNC-machined components.

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