Carbon Fibers

June 2025

Abstract

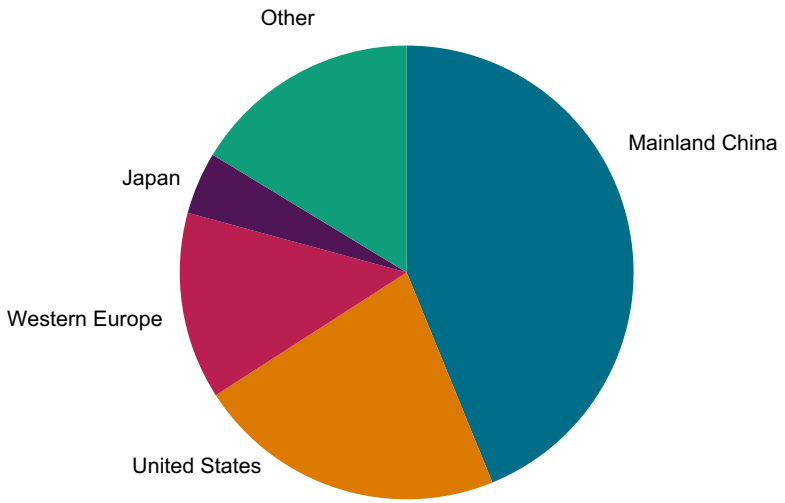
The term *carbon fiber* refers to organic materials that have been heat-treated at temperatures of 1,000-3,000 degreesC and generally contain 92%-99.99+% carbon. The term *Graphite fiber* refers to carbon fiber precursors that have been processed at temperatures exceeding 2,500 degrees C for an extended period; for the purposes of this report, however, graphite fibers will not be distinguished from carbon fibers. Carbon fibers are noted for their high strength and stiffness. These properties are quantitatively measured by tensile-strength and tensile-modulus tests. The tensile strength of a material is the rupture strength per unit area as the material is subjected to a specified dynamic load. Tensile modulus is the ratio of stress to strain of the material as it is deformed under a specified dynamic load.

Carbon fibers are used primarily as reinforcing agents in high-performance composites with synthetic resin matrices such as epoxies, polyimides, vinyl esters, phenolics and certain thermoplastics. High-performance composites, also referred to as advanced composites, are generally defined as very strong fiber-reinforced matrices having at least 60% fiber loading; composites having a fiber loading of 12%-35% are used more frequently in industrial applications such as construction panels, pipes or boats. Carbon fibers are used mainly in applications requiring high stiffness properties exceeding the tensile modulus of glass or aramid fibers.

The following pie chart shows world consumption of carbon fibers:

S&P Global
Commodity Insights

World consumption of carbon fibers — 2024



Data compiled April 16, 2025.
Source: S&P Global Commodity Insights.

Carbon fiber use will expand for industrial applications because of its importance as a lightweight and high-strength material. The growing pressure vessel market, including gas transport, compressed natural gas (CNG) vehicles and hydrogen fuel cells, will continue to be supported with carbon fiber use. In wind energy, renewable energy targets, longer wind blades, larger wind turbines and the increase in offshore wind installations will lead to more carbon fiber use in this market. For higher-value markets, carbon fibers are increasingly being used in commercial and military aircraft manufacture. Carbon fiber composites are used in the main body, wings, engines, etc. and can result in less aircraft weight, lower fuel consumption and lower emissions, as well as higher speeds, longer distance ranges and easier maintenance.

Major advances in technology and processing have expanded the demand for high-performance carbon fibers. The introduction of higher-volume and lower-cost fibers, coupled with gains in productivity, has reduced the manufacturing costs of carbon fibers. Because cost is a major factor affecting demand, continued improvements in performance, along with increased availability, are expected to support growing consumption in all regions and applications. However, cost will remain a challenge in applications such as widespread automotive use.

For more detailed information, see the table of contents, shown below.

S&P Global's Chemical Economics Handbook – *Carbon Fibers* is the comprehensive and trusted guide for anyone seeking information on this industry. This latest report details global and regional information, including


Global summary; regional coverage


Producers with annual capacities and plant sites


Production figures and trends


Consumption and forecasts by end use application


Manufacturing processes and environmental issues


Trade – imports and exports

Key benefits

S&P Global's Chemical Economics Handbook – *Carbon Fibers* has been compiled using primary interviews with key suppliers and organizations, and leading representatives from the industry in combination with S&P Global's unparalleled access to upstream and downstream market intelligence and expert insights into industry dynamics, trade and economics.

This report can help you

– Identify trends and driving forces influencing chemical markets

– Forecast and plan for future demand

– Understand the impact of competing materials

– Identify and evaluate potential customers and competitors

– Evaluate producers

– Track changing prices and trade movements

– Analyze the impact of feedstocks, regulations and other factors on chemical profitability

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