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CF & CFRP Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Raw Material Type (Polyacrylonitrile (Pan), Pitch and Rayon), By Manufacturing Process (Lay-Up Process, Compression Moulding Process, Resin Transfer Moulding Process, Others), By End User (Aerospace & Defense, Automotive, Others), By Region & Competition, 2020-2030

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Abstracts

Market Overview

CF & CFRP Market was valued at USD 32.94 Billion in 2024 and is expected to reach USD 45.40 Billion by 2030 with a CAGR of 5.63%. Carbon Fiber (CF) and Carbon Fiber Reinforced Polymers (CFRPs) are critical materials increasingly used across a wide range of industries including aerospace, automotive, rail transport, construction, and renewable energy. Their growing adoption is primarily driven by their superior strength-to-weight ratio, durability, corrosion resistance, and fatigue performance. These characteristics enable significant weight reduction, which in turn improves fuel efficiency, structural performance, and sustainability outcomes. CFRPs, which consist of carbon fibers embedded in a polymer matrix, outperform traditional materials like steel and aluminum in terms of mechanical performance and lightweight properties. Carbon fiber has approximately ten times higher specific strength than steel, depending on the fiber type. This makes it particularly valuable in high-performance applications where weight savings and structural integrity are crucial.

In the aerospace sector, CFRPs have become foundational in the design and

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production of next-generation aircraft. The Boeing 787 and Airbus A350, for example, incorporate CFRPs in more than 50% of their airframe structures. This extensive use significantly reduces overall aircraft weight, enhances fuel efficiency, and lowers carbon emissions, making these aircraft more economically and environmentally viable. The automotive industry is another major end user, where manufacturers leverage carbon fiber composites to reduce vehicle weight and boost performance. Applications include body panels, roofs, drive shafts, and floor assemblies. With the rise of electric vehicles (EVs), which demand lighter structures to offset heavy battery systems, the role of CFRPs is becoming even more vital. High-performance and luxury car brands have already integrated carbon fiber into their models, and broader adoption is expected as production costs decline.

Key Market Drivers

Growing Demand of CF & CFRP from Automotive Industry

The automotive industry is increasingly turning to carbon fiber (CF) and carbon fiber-reinforced polymer (CFRP) due to their superior material properties, particularly their high strength-to-weight ratio, excellent corrosion resistance, and exceptional fatigue performance. These characteristics make CF and CFRP ideal for a variety of automotive applications, including structural components, body panels, underbody parts, and interior elements.

As automotive manufacturers face mounting pressure to meet stringent emission regulations and improve fuel efficiency, the focus on vehicle lightweighting has intensified. Replacing traditional materials such as steel and aluminum with CF and CFRP can significantly reduce vehicle weight, thereby enhancing fuel economy and reducing carbon emissions. This trend is accelerating the adoption of these advanced composites across the industry. In 2023, global automobile production reached approximately 94 million units, highlighting the continued growth of the automotive industry. The global automotive components market was valued at USD 2 trillion, with exports accounting for around USD 700 billion. This surge supports rising demand for advanced materials like Carbon Fiber (CF) and Carbon Fiber Reinforced Polymers (CFRP), which offer superior strength-to-weight ratios essential for lightweighting and fuel efficiency. India emerged as the fourth-largest vehicle producer globally, after China, the U.S., and Japan, with an annual output of nearly 6 million vehicles, further reinforcing the expanding market opportunity for CF and CFRP applications.

The rapid growth of the electric vehicle (EV) segment is another key factor driving the

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demand for CF and CFRP. Given the weight of battery systems, EV manufacturers are increasingly leveraging lightweight materials to extend driving range and improve overall performance. CF and CFRP offer the strength and flexibility needed to meet these evolving design and engineering requirements. Continuous research and development are aimed at improving the mechanical properties of CF and CFRP while lowering production costs. Innovations in manufacturing processes, such as high-speed resin transfer molding and recycling technologies, are making CF and CFRP more accessible for mass-market automotive applications.

The rising adoption of CF and CFRP in the automotive industry is a major driver of the global CF and CFRP market. As the sector shifts toward fuel-efficient and electric mobility solutions, demand for these lightweight, high-performance materials is expected to grow significantly. With ongoing advancements in technology and manufacturing, CF and CFRP are poised to play an increasingly pivotal role in shaping the future of automotive design and production.

Key Market Challenges

Limited Production Capacity of CF & CFRP

The manufacturing process of carbon fiber (CF) and carbon fiber-reinforced polymer (CFRP) is not only complex and time-consuming but also requires advanced technology and skilled labor. These factors contribute to the high pricing of CF and CFRP, which in turn limits their widespread use.

The production of CF involves a series of chemical and thermal treatments, which often result in long production cycles. This lengthy process can create a bottleneck in the supply chain and restrict the ability to rapidly scale up production. As a result, there is a significant gap between the growing demand for CF and CFRP across industries such as automotive, aerospace, wind energy, and construction, and the limited production capacity available. This demand-supply gap can lead to price volatility and market uncertainty, presenting challenges for manufacturers and consumers alike.

The production process of CF and CFRP is energy-intensive and generates substantial amounts of waste. In an era where sustainability and environmental protection are increasingly prioritized, these factors could further restrict the expansion of CF and CFRP production capacity.

Although the limited production capacity of CF and CFRP presents a significant

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challenge for the global market, ongoing research and innovation hold the promise of overcoming this hurdle. As the industry continues to evolve, striking a balance between demand and sustainable, efficient production methods will be crucial for long-term success.

Key Market Trends

Increasing Advancements in Manufacturing Technology

Technological innovations are revolutionizing the manufacturing processes of Carbon Fiber (CF) and Carbon Fiber Reinforced Polymer (CFRP). These advancements not only enhance the properties of fibers and matrices but also improve the overall laminate properties, resulting in a superior quality product. This enhanced product is capable of meeting the diverse needs of industries such as automotive, aerospace, construction, and wind energy.

The relationship between process improvements and the increased adoption of CF and CFRP in applications, particularly in the aerospace industry, underscores the importance of continuous technological research. These advancements have the potential to accelerate market expansion on a global scale, leading to a more efficient and cost-effective production process.

Research and development efforts play a crucial role in facilitating these technological advancements. It is through these dedicated efforts that new and improved manufacturing techniques emerge, driving market growth and broadening the application scope of CF and CFRP.

One specific area of focus is the reduction of production cycle times. Given that the production of CF involves a series of intricate chemical and thermal treatments that can lead to long production cycles, advancements aimed at streamlining these processes could significantly boost production capacity, allowing for more efficient and timely manufacturing.

By continuously pushing the boundaries of technology and investing in research and development, the potential for further advancements in CF and CFRP manufacturing is vast. These advancements will not only meet the growing demands of various industries but also contribute to a more sustainable and innovative future.

Key Market Players

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Teijin Limited

Mitsubishi Chemical Corporation

Hexcel Corporation

Solvay SA

Zhongfu Shenying Carbon Co., Ltd.

Kureha Corporation

Jilin Chemical Fiber Group Co., Ltd.

Jiangsu Hengshen Co., Ltd.

Aeron Composite Pvt. Ltd.

Nippon Graphite Fiber Corporation

Report Scope:

In this report, the Global CF & CFRP Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

CF & CFRP Market, By Raw Material Type:

Polyacrylonitrile (Pan)

Pitch

Rayon

CF & CFRP Market, By Manufacturing Process:

Lay-Up Process

Compression Moulding Process

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- Resin Transfer Moulding Process
- Others

CF & CFRP Market, By End User:

- Aerospace & Defense
- Automotive
- Others

CF & CFRP Market, By Region:

- North America
  - United States
  - Canada
  - Mexico
- Europe
  - France
  - United Kingdom
  - Italy
  - Germany
  - Spain
- Asia-Pacific
  - China

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India

Japan

Australia

South Korea

South America

Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

Egypt

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global CF & CFRP Market.

Available Customizations:

Global CF & CFRP Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

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Detailed analysis and profiling of additional market players (up to five).

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