

CARBON FIBER TECHNOLOGY FACILITY

Developing low-cost carbon fiber





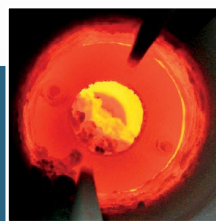
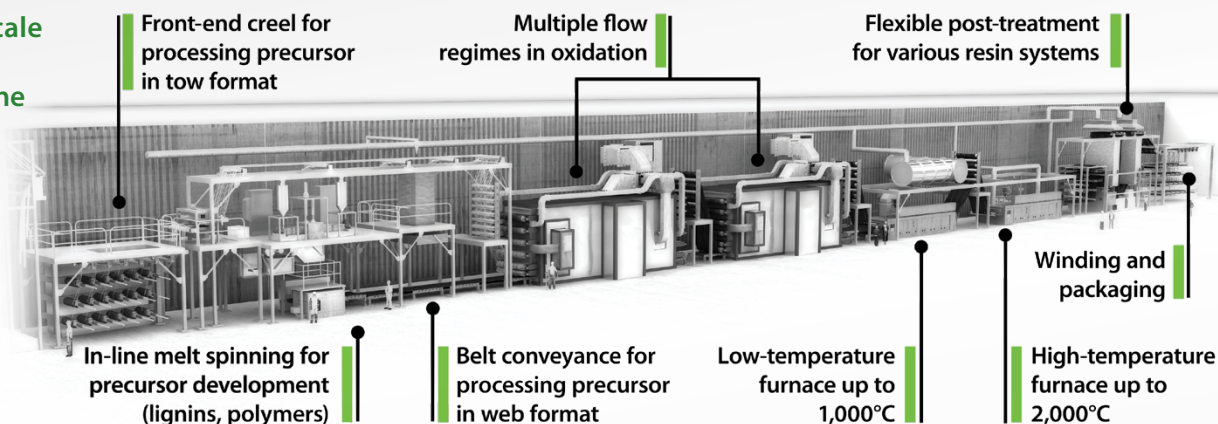
Advancing Carbon Fiber Manufacturing Technology

Oak Ridge National Laboratory (ORNL) is home to the Department of Energy's (DOE) Carbon Fiber Technology Facility (CFTF)—a 42,000 sq. ft. innovative technology facility and the nation's leader in carbon fiber innovation. The CFTF offers a highly flexible and instrumented carbon fiber line for demonstrating advanced technology scalability and producing market-development volumes of prototypical carbon fibers and serves as the last step before commercial production scale.

The facility, with its 390-ft. long processing line, is capable of custom unit operation configuration and has a capacity of up to 25 tons per year, allowing industry to validate conversion of its carbon fiber precursors at semi-production scale.

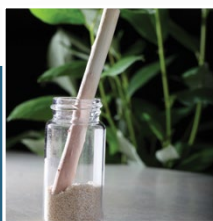
The CFTF develops technology and supports commercial deployment of carbon fiber in the US for use in clean energy applications. Additionally, research focuses on further understanding the kinetics of carbon fiber manufacturing, energy consumption and environmental impact.

Production-scale Carbon Fiber Production Line



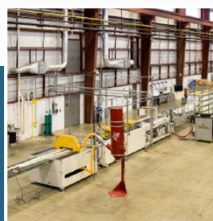
Thermal (Conventional) Conversion Line

Rated for 25 tons/year of polyacrylonitrile (PAN)-based fiber with ability to convert both melt-spun and solution-spun precursors.



Melt-Spun Precursor Fiber Production Line

Rated at 65 tons/year of polyethylene fiber and designed to also spin lignin and pitch-based precursors.



Pultruder

Speed range of 1–20 in./minute and enables manufacturing of custom composite materials with constant cross sections.



Steam Stretching

Enhances processability of textile grade fiber with 32% reduction in oxidation time.



Textile Winder/ Packaging

Provides packaging for large-tow textile carbon fibers for robust delivery.



Chopper

Designed to distribute chopped strands of fiber glass or carbon fibers; continuous carbon fiber chopping as small as 6 mm.



Carbon fiber injection-molded
automotive fender

Carbon Fiber Advantage

Carbon fiber is a strong, stiff, lightweight enabling material for improved performance in many applications for automobiles, wind energy, oil and gas, and infrastructure. New, innovative manufacturing processes for low-cost precursor development and conversion technologies at the CFTF hold the key to reducing carbon fiber cost for energy applications. Similarly, innovative performance-focused materials and processes can potentially drive significant performance improvements for national security applications.

CFTF Approach

Carbon fiber takes many product forms such as continuous, chopped, oxidized, milled and unsized or untreated fiber. By applying basic science and translational R&D, the CFTF is identifying high-potential, low-cost precursors or raw materials including textile, lignin, polymer and hydrocarbon-based precursors. The CFTF develops optimal mechanical properties for carbon fiber material, focusing on structure property and process optimization. In addition, the CFTF provides carbon fiber sample quantities to industrial partners for testing for continuous improvement and market evaluation industry feedback for improvements and market evaluation.

Carbon Fiber Intermediates and Composites

Combining carbon fiber with other materials forms intermediates which are then processed with additional materials to form new composite materials. The CFTF's R&D efforts enable a broader use for advanced composites by lowering carbon fiber costs through innovations such as use of textile precursors. ORNL is also investigating intermediate and composite production techniques including compounding, pre-peg, braiding, pultrusion, and more.

Working with ORNL

The CFTF is available to industrial collaborators throughout the value chain, with emphasis on the creation and execution of vertically integrated partnerships. Academia, national laboratories, government agencies, and nongovernmental organizations may also use the facility. Access is granted through various partnering mechanisms, and both proprietary and nonproprietary work can be conducted. All partnerships are conducted in compliance with statutory restrictions, specifically export control. For more information on how to work with ORNL, visit www.ornl.gov/partnerships.



IACMI The Composites Institute

The CFTF works with IACMI (The Institute for Advanced Composites Manufacturing Innovation), a 170-member partnership of industry, academic institutions, as well as federal, state and local governments, committed to delivering a public-private partnership to increase domestic production capacity, grow manufacturing and create jobs across the US composites industry. Learn more at www.iacmi.org.



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