

Carbon Fiber Technology Facility

Developing
Low-Cost
Carbon Fiber

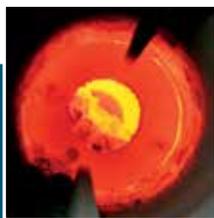




Advancing Carbon Fiber Manufacturing Technology

The Carbon Fiber Technology Facility (CFTF), established in 2013, is the Department of Energy’s only designated user facility for carbon fiber innovation. The CFTF, a 42,000 sq. ft. facility, provides a platform for identifying high-potential, low-cost raw materials, including textile, lignin, polymer, and hydrocarbon-based precursors. Using the CFTF, ORNL is developing optimal mechanical properties for carbon fiber material, focusing on structure property and process optimization.

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



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



Pultruder

Speed range of 1 to 120 in./min. 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.



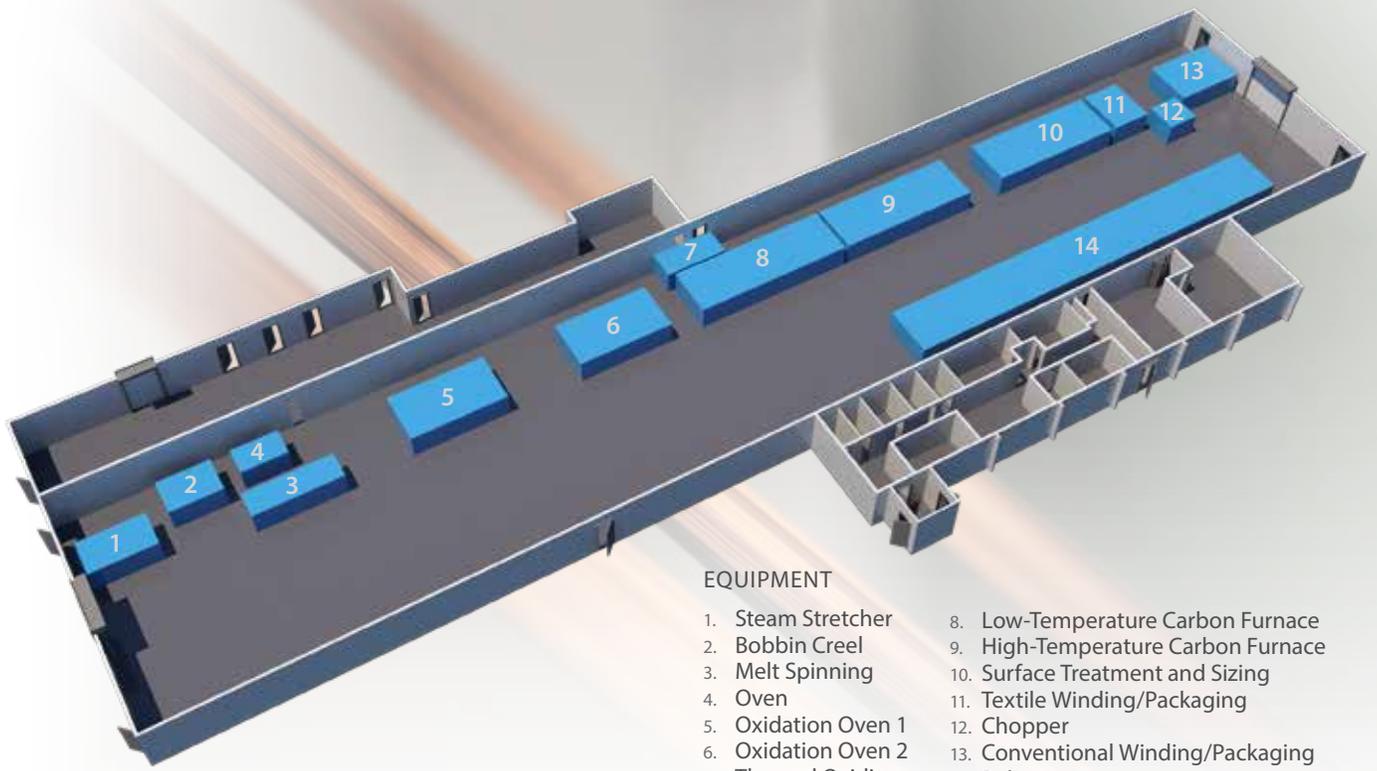
Textile Winder/ Packaging

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



Chopper

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



EQUIPMENT

- | | |
|---------------------|------------------------------------|
| 1. Steam Stretcher | 8. Low-Temperature Carbon Furnace |
| 2. Bobbin Creel | 9. High-Temperature Carbon Furnace |
| 3. Melt Spinning | 10. Surface Treatment and Sizing |
| 4. Oven | 11. Textile Winding/Packaging |
| 5. Oxidation Oven 1 | 12. Chopper |
| 6. Oxidation Oven 2 | 13. Conventional Winding/Packaging |
| 7. Thermal Oxidizer | 14. Pultrusion |

The 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 could drive significant performance improvements for national security applications.

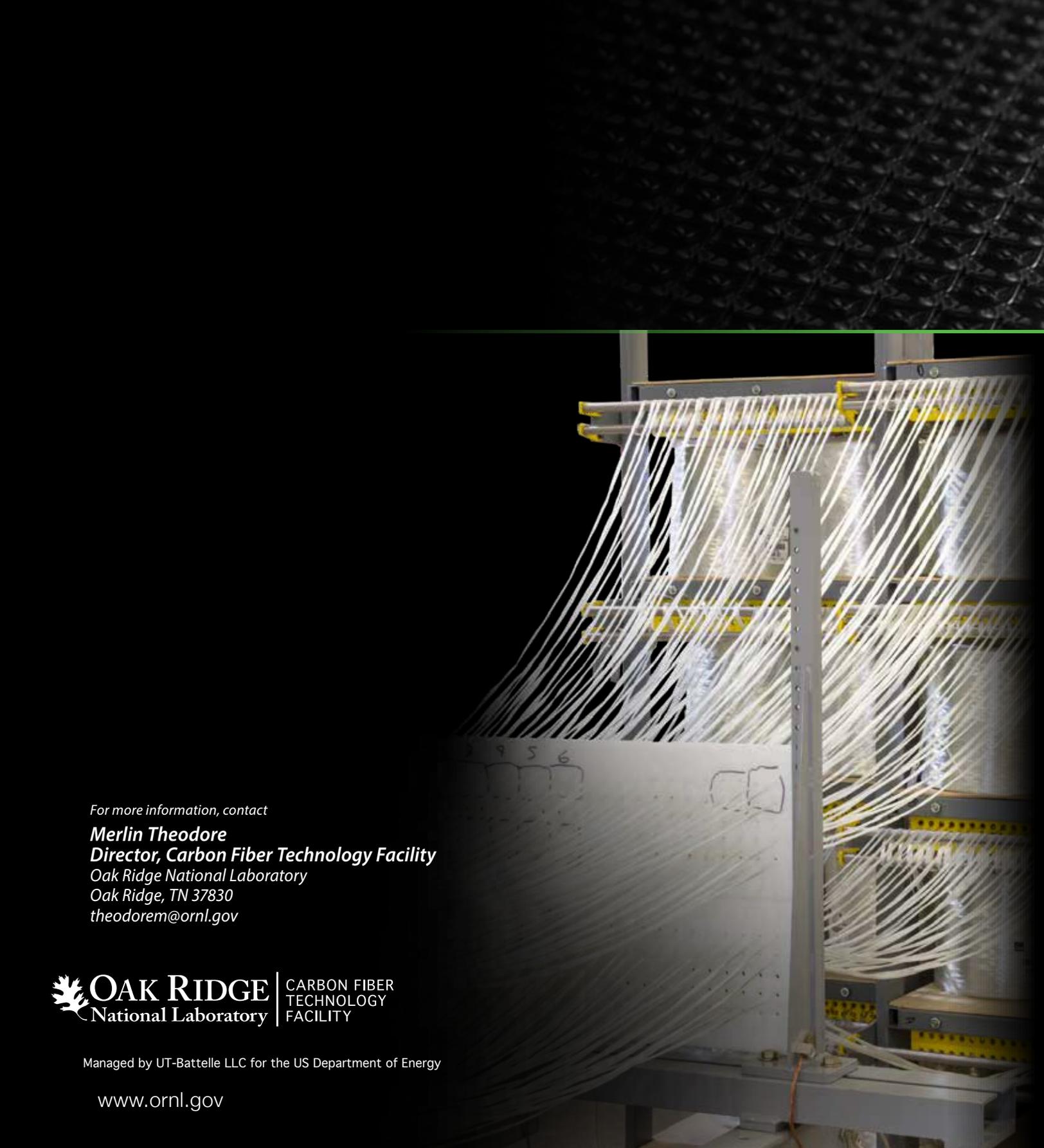
Working with ORNL

As a DOE designated user facility, the CFTF is available to industry, academia, national laboratories, government agencies, and nongovernmental organizations. 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.



DOE's CFTF

The Carbon Fiber Technology Facility is DOE's only designated user facility focused on carbon fiber innovation.



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