

CARBON FIBER

TECHNOLOGY FACILITY



Demonstrating Innovative Low-cost
Carbon Fiber for Energy Applications





Innovation in Carbon Fiber Production

Carbon fiber is a strong, stiff, lightweight enabling material for improved performance in many applications. However, its use in cost-sensitive, high-volume industrial applications such as automobiles, wind energy, oil and gas, and infrastructure is limited because of today's relatively high price. Current methods for manufacturing carbon fiber and carbon-fiber-reinforced composite structures tend to be slow and energy intensive. New, innovative manufacturing processes for low-cost precursor development and conversion technologies 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.

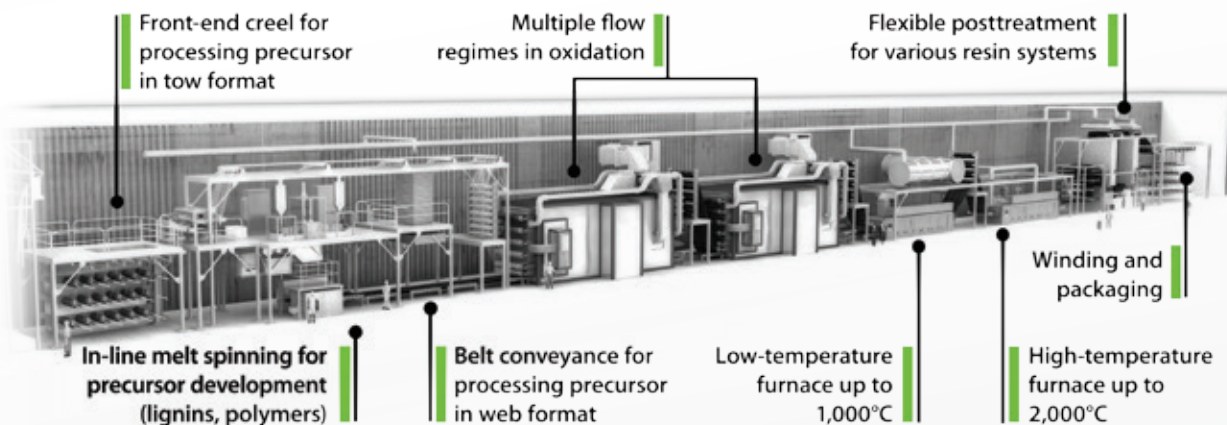
Why Low-Cost Carbon Fiber?

- Energy Independence**
Increase the nation's investment in energy technologies for a more sustainable energy future
- US Manufacturing**
Spur the development and growth of existing and new US carbon fiber and composites
- Job Growth**
Seed regional and national job growth and economic development

Role of the Carbon Fiber Technology Facility

- Demonstrate low-cost carbon fiber technology scalability with the last scaling step before full-scale commercial production
- Produce development quantities of low-cost carbon fiber needed for large-scale material and process evaluations and prototyping
- Deploy a training system, including educational internships and industrial training and recertification, for developing the future carbon fiber workforce

Conventional Carbon Fiber Production Line

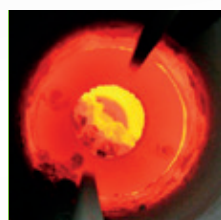




Semiproduction-Scale Carbon Fiber Pilot Plant

As the nation's leader in low-cost carbon fiber research and development, Oak Ridge National Laboratory's (ORNL) Carbon Fiber Technology Facility (CFTF) offers a 42,000 sq. ft. innovative technology facility offering a highly flexible, highly 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-foot-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 their alternative carbon fiber precursors at semi-production scale.

The facility houses a thermal (conventional) conversion line and a melt-spinning precursor fiber production line and includes space for a future advanced conversion line.



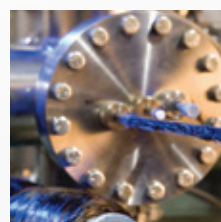
Thermal (Conventional) Conversion Line

The thermal conversion line is rated for 25 tonnes/year of polyacrylonitrile (PAN)-based fiber and can convert both melt-spun and solution-spun precursors. It is baselined for standard modulus PAN but designed with the flexibility to accommodate lignin, polyolefin, and pitch precursors and can be readily upgraded to convert rayon and high modulus PAN precursors. It is designed to process materials in either tow or web forms.



Melt-Spun Precursor Fiber Production Line

The melt-spinning line is rated at 65 tonnes/year of polyethylene fiber and designed to also spin lignin and pitch-based precursors in either tow or web form. It is upgradable to melt-spin PAN when the technology is sufficiently developed.



Advanced Technology Conversion Line

ORNL is currently developing advanced conversion technology based on microwave and plasma processing technologies. Provisions have been made for the future construction of an advanced technology line, similar in scale to the conventional conversion line, when the technologies are sufficiently mature for semiproduction-scale demonstration.

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, but 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.

The Institute for Advanced Composite Manufacturing Innovation

IACMI comprises more than 123 members committed to delivering a public-private partnership to increase domestic production capacity, grow manufacturing and create jobs across the US composite industry. Learn more at www.iacmi.org





 **OAK RIDGE** | CARBON FIBER
National Laboratory | TECHNOLOGY
FACILITY

For more information, contact

Craig Blue
Director, Advanced Manufacturing Office
Oak Ridge National Laboratory
PO Box 2008, MS 6186
Oak Ridge, TN 37831-6186
blueca@ornl.gov

The CFTF is an integral part of ORNL's broader initiatives in advanced manufacturing technologies falling under the umbrella of the Manufacturing Demonstration Facility (MDF).



U.S. DEPARTMENT OF
ENERGY | Energy Efficiency &
Renewable Energy
ADVANCED MANUFACTURING OFFICE



www.ornl.gov/manufacturing