

# Harper International's Pilot Scale Carbon Fiber Line at ORNL



## Your complete carbon fiber partner.

Harper's philosophy is to both deliver complete systems for all stages of Carbon Fiber processing with the latest technologies and support our customers with a unique portfolio of services and capabilities to help them to stay ahead of the curve:

- Piloting facilities for client testing and trialing
- Process scale up and optimization expertise
- Operational & engineering services
- Energy audits & generation al efficiency improvements
- Continual advancement of core technologies
- Comprehensive technical support and maintenance
- Complete range of lines, from scientific and research scale to piloting to full production scale

## From concept to commercialization.

Oak Ridge National Laboratory is home to the Department of Energy's Carbon Fiber Technology Facility (CFTF) which houses this 390-ft / 118-meter advanced process line, provided by Harper International. Harper was selected for the DOE contract due to its capability to successfully design, manufacture, install, and commission a fully integrated Carbon Fiber process line.

The facility aims to be a collaborative research center and is designed as one of the most sophisticated and capable lines in the industry. This highly flexible, highly instrumented line demonstrates advanced technology scalability and produces market-development volumes of prototypical Carbon Fibers, and serves as a key step before commercial production scale.

The ideal outlet for Carbon Fiber research and development, Harper designed the line to be capable of custom unit operation configuration and with a capacity of up to 25 tons per year, or 4.3kg per hour, allowing industry to validate conversion of their Carbon Fiber precursors at semi-production scale.

### Harper's Complete Pilot Scale Carbon Fiber Line Capabilities

- Rated capacity 25 tonnes/year based on 24k PAN tows
- Configured for PAN, polyolefins, lignin, and pitch precursors; Upgradable for rayon and high-modulus carbon fibers; Internals designed with high degree of corrosion resistance for alternative precursors
- Designed for 3k to 80k tows and web up to 300mm wide x 12.7mm loft
- Oxidation temperature to 400°C with airflow configurable for parallel, cross or down flow; Driven pass-back rollers for slip prevention at low loading; Optimized for faster oxidation through elimination of the chimney effect, improved velocity uniformity and range, assurance of temperature uniformity at a variety of flow rates
- Flexible internal design throughout the line allowing material processing in either tow (unsupported) or web (supported by belt) formats
- Low-temperature carbonization up to 1000°C with capability to produce structural or micro/nano-porous fibers; High-temperature carbonization to 2000°C
- Post-treatment system designed for compatibilizing fibers with performance or commodity resins



### Process Scale Up & Optimization Services from Harper

With Harper, you will find a partner uniquely qualified to support the growing needs of the Carbon Fiber market. Our exceptionally skilled and experienced technical staff supports client testing and piloting needs in collaboration with ORNL's Carbon Fiber Technology Facility as well as our other pilot and testing facilities throughout the world.