Manufacturing Demonstration Facility

Next-Generation Manufacturing

Oak Ridge National Laboratory is used to working closely with industry and offers world-leading capabilities in materials development, characterization, and processing. Its specialized facilities for modeling and simulation also create an unmatched environment for breakthroughs in next-generation manufacturing.

ORNL's Manufacturing Demonstration Facility gives industries access to unique research facilities and reduces their risk for adopting cutting-edge manufacturing technologies.

The MDF offers a collaborative, shared infrastructure to facilitate the development and use of energy-efficient, rapid, flexible manufacturing technologies and promotes rapid technology dissemination.

Strategy for Success

Through collaboration with every aspect of the manufacturing supply chain, ORNL is identifying the equipment and materials advancements required to help realize next-generation manufacturing.

The MDF offers a fertile environment for innovation, ensuring that new technologies and design methodologies are developed in the United States and high-tech enterprises have the infrastructure to flourish here. Such critical advances in manufacturing technologies will provide the basis for high-quality jobs for Americans and sustain US competitiveness in the 21st century

Technology Impact/Benefits

The MDF provides physical and virtual tools from design to evaluation for rapidly prototyping new technologies and optimizing essential manufacturing processes. These technologies can reduce energy intensity, lower carbon emissions, create lower-cost production pathways, and enhance the competitiveness of US advanced manufacturing industries.

ORNL's unique advanced-manufacturing technology capabilities focus on several broad, cross-cutting technology areas:

- Additive Manufacturing: a broad range of state-of-the-art direct manufacturing technologies for metal and polymer material systems, including electron beam melting, ultrasonic, extrusion, and laser deposition
- Composites and Carbon Fiber: a broad range of carbon fiber synthesis, characterization, and compositing technologies from precursor evaluation through carbon fiber pilot scale production (22 metric tons/year)
- Roll-to-Roll Processing: pulse thermal processing and other advanced processing technologies to develop low-cost manufacturing of flexible electronics, photovoltaics, and energy storage systems
- Lightweight Metals Processing: advanced synthesis and processing technologies for low-cost titanium alloys, magnesium alloys, and metal matrix composite products
- Magnetic Field Processing: dramatic enhancement of material properties beyond today's limits, including increased fatigue life and strength and stress relief
- Low-Temperature Materials Synthesis: lower energy and processing costs through biosynthesis of unique materials at low temperature

Working with ORNL

ORNL is working with industry to develop advanced materials and manufacturing processes and help companies put these new energy-efficient processes and materials to work. Partnerships with industry will lead to advances in manufacturing across a range of industries: automotive, aerospace, renewable energy, materials, and synthetic biology and electronics.

Our research and development in this crucial field are enabling a wealth of opportunities for product customization, improved performance, multifunctionality, and lower overall manufacturing costs.

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