

A large industrial robotic arm, likely a KUKA model, is shown in a dynamic pose. The arm is silver and black, with joints labeled '1', '2', and '4'. It is holding a red rectangular object. The background is a vibrant, abstract blue and white liquid-like pattern. The overall image is a promotional graphic for a manufacturing demonstration facility.

# Manufacturing Demonstration Facility

A National  
Resource  
for Industry



**54**  
UNIVERSITY  
PARTNERS

**13**  
PATENT  
APPLICATIONS  
IN FY 2020

**89**  
PUBLICATIONS  
IN FY 2020

**23**  
LICENSED  
TECHNOLOGIES

**205**  
INDUSTRY  
PARTNERS

**10**  
NATIONAL  
LABORATORY  
PARTNERS

**30,000+**  
VISITORS  
SINCE 2012

## Revitalizing US Manufacturing

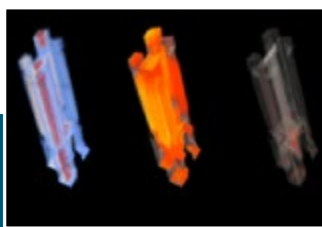
The Manufacturing Demonstration Facility (MDF), established in 2012, is one of the Department of Energy's designated user facilities focused on performing early-stage research and development to improve the energy and material efficiency, productivity, and competitiveness of American manufacturers. Research focuses on manufacturing analysis and simulation, composites and polymer systems, metal powder systems, metrology and characterization, machine tooling, large-scale metal systems, and robotics and automation.

The MDF is a 110,000 sq. ft. facility housing integrated capabilities that drive the development of new materials, software, and systems for advanced manufacturing. From binder jetting to 3D tomography to in situ monitoring, the MDF leverages a range of equipment and expertise focused on reducing the carbon footprint of the manufacturing sector, efficiently utilizing abundant and available domestic energy resources, and supporting the production of clean energy products that boost the nation's economy. Across its energy science and technology user facilities, ORNL delivers breakthroughs from generation to distribution and storage to end use, accelerating America's transformation to a clean, efficient, flexible, and secure energy future.



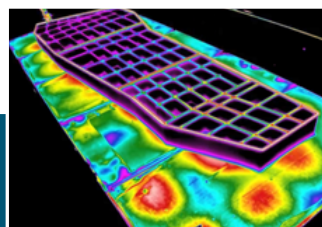
### Materials

*Developing metallic alloys and polymers designed for additive manufacturing, creating hybrid materials, and understanding the role of feedstocks.*



### Software

*Integrating in situ monitoring, machine learning, and data analysis and deploying rapid qualification tools.*



### Metrology

*Implementing physics-based simulations, 3D tomography, in situ nondestructive evaluation, and post-processing metrology techniques.*



### Systems

*Developing pick-and-place hybrid systems and optimizing advanced materials.*



### Composites and Polymer Systems

Additive and high-rate processing of discontinuous fiber composites.

### Large-Scale Metal Systems

Large-scale metal wire arc and laser systems with multi-axis controls.

### Manufacturing Analytics and Simulation

Computational modeling, in situ sensing, metrology, and artificial intelligence for nondestructive component evaluation.

### Metal Powder Systems

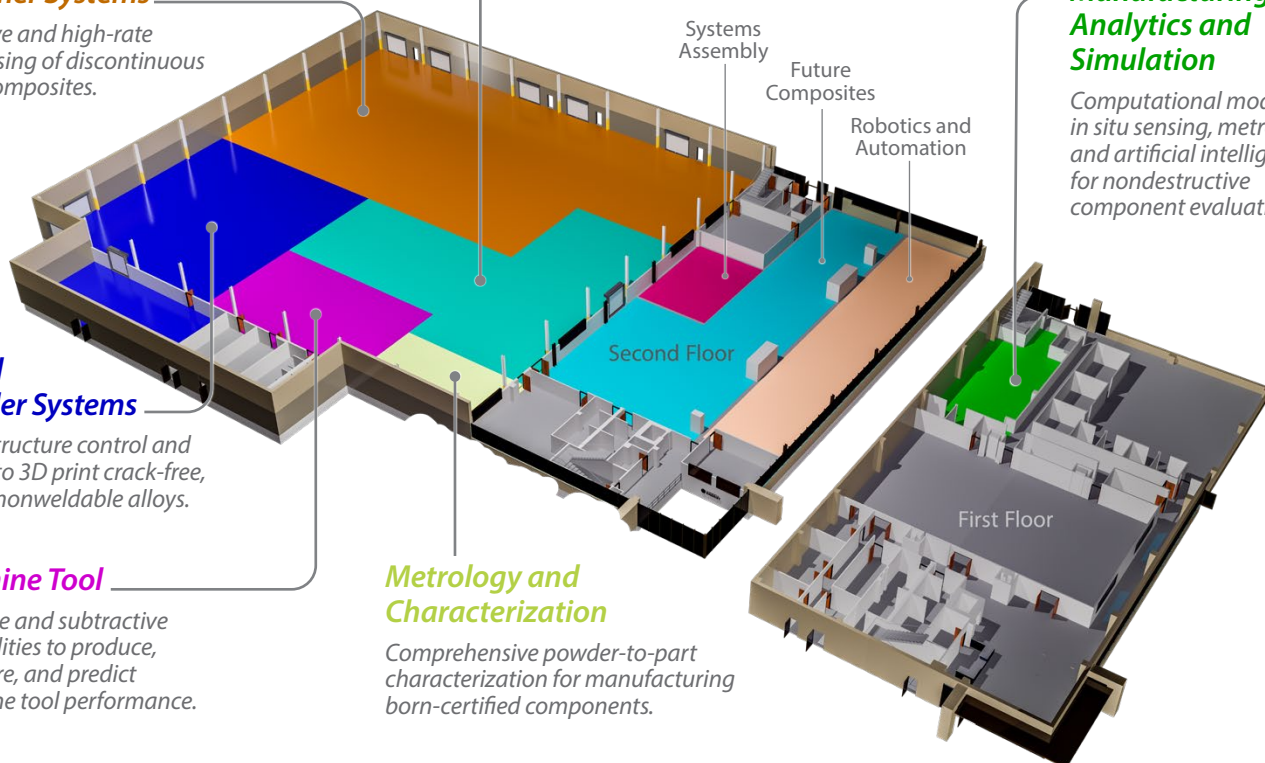
Microstructure control and ability to 3D print crack-free, highly nonweldable alloys.

### Machine Tool

Additive and subtractive capabilities to produce, measure, and predict machine tool performance.

### Metrology and Characterization

Comprehensive powder-to-part characterization for manufacturing born-certified components.



## Working with ORNL

ORNL works with numerous companies yearly for technology advancement and commercialization. More than 20 start-ups have been formed based on ORNL-developed technologies over the past 5 years. Under the MDF Technology Collaborations Program, industry can leverage world-leading capabilities and expertise in short-term collaborative projects approved by DOE. Academia, national laboratories, government agencies, and nongovernmental organizations may also access the facility through a variety of user and collaborative agreements. For more information on how to work with ORNL, visit [www.ornl.gov/partnerships](http://www.ornl.gov/partnerships).

### DOE's MDF

The Manufacturing Demonstration Facility is DOE's only designated user facility focused on advanced manufacturing research and development.



Manufacturing  
Demonstration Facility



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ORNL 2021-G00217/aas

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& **RENEWABLE ENERGY**