



“ORNL strikes a good balance between basic science and applications research, and that makes us unique.”

Madhu Chinthavali,
Power Electronics Engineer



Driving Innovations in Transportation

Oak Ridge National Laboratory (ORNL) is accelerating the pace of research and development (R&D) for efficient, safe, secure, and environmentally friendly transportation. By leveraging the National Transportation Research Center (NTRC)—the Department of Energy’s (DOE’s) only dedicated user facility focused on transportation—our researchers identify new materials for next-generation systems; provide decision-making tools and intelligent technologies for secure, efficient movement of passengers and freight; and create economic opportunity for the nation by improving the energy efficiency of light-, medium-, and heavy-duty vehicles.

Next-Generation Research

Electrification and fast wired and wireless charging—

Early-stage technologies to speed deployment of electric vehicles, including extreme fast charging; advanced batteries, fuel cells, electric machinery, and power electronics; and roll-to-roll technologies.

Data science, automated technologies, and vehicle cybersecurity—

Unique security expertise to detect and prevent cyberintrusions; advanced sensors, controls, algorithms, and other technologies to safely and efficiently guide automated and connected vehicles; and analysis of transportation fuel economy and fleets.

Materials for future vehicles—Durable, cost-effective, lightweight materials and advanced processes for next-generation vehicles, including high-temperature alloys for engines, advancements in carbon fiber, 3D printing, and advanced materials joining techniques.

Fuels, engines, and emissions research—

Co-optimization of advanced fuels and engines, low-temperature catalysts, and emissions controls; breakthroughs in biofuels production; and integration of vehicle systems.



137 industry partners



26 university partners



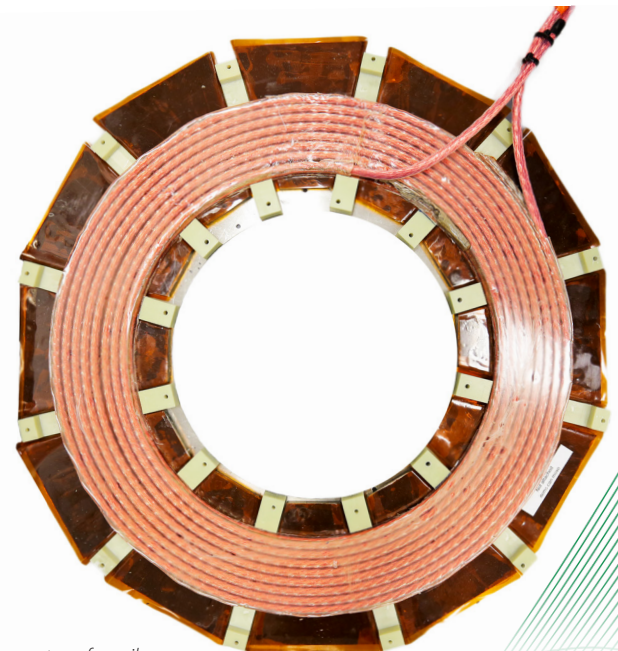
29 collaborative R&D agreements



114 strategic partnership projects



22 transportation-related R&D 100 awards



Wireless power transfer coils

DOE's Most Comprehensive Transportation R&D Facilities

National Transportation Research Facility



DOE's only designated user facility focused on transportation R&D and a portal to world-class science capabilities across ORNL.

Carbon Fiber Technology Facility



The nation's largest open-access, semi-production-scale facility for testing innovations in carbon fiber production and lightweight, strong materials for vehicles.

Impacts and Partnerships

- Using neutrons at ORNL's High Flux Isotope Reactor and Spallation Neutron Source to analyze the spray inside fuel injectors; seeking the sources of efficiency-robbing cavitation. Partner: General Motors.
- Using Titan, the nation's fastest supercomputer, to study combustion by simulating thousands of engine cycles with speed and accuracy. Partners: Ford Motor Company, General Electric, and Convergent Science.
- Applying characterization, modeling, and simulation capabilities to accelerate the design of a new traction power inverter for the 2016 Chevy Volt. Partner: Delphi.
- Developing new high-temperature aluminum alloys for automotive cylinder heads using materials characterization expertise and high-performance computing. Partners: FCA US LLC, Nemak.
- Using analytical chemistry and materials science to develop new catalyst technologies that operate effectively in the low-temperature exhaust from next-generation engines.

FuelEconomy.gov

DOE's most-visited website, managed by ORNL, marking 400 million+ visitors and 1 billion+ gallons of petroleum saved since its launch.

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Recently Licensed Technologies

- **Carbon fiber precursor**—LeMond Composites licensed ORNL's process to convert acrylic textile material into carbon fiber, cutting costs by 50%.
- **Carbon fiber production**—RMX Technologies licensed ORNL plasma oxidation technology to reduce energy consumption by 75%, shorten production time by 2.5 to 3 times, and cut production costs by 20%.
- **Lithium-sulfur batteries**—Solid Power Inc. licensed a portfolio of ORNL battery technologies to develop safe solid-state rechargeable batteries with high energy density.
- **iDriving real-time data**—SanTed Project Management LLC licensed technology to determine how driving style affects fuel economy for the trucking industry.

