

## Contact

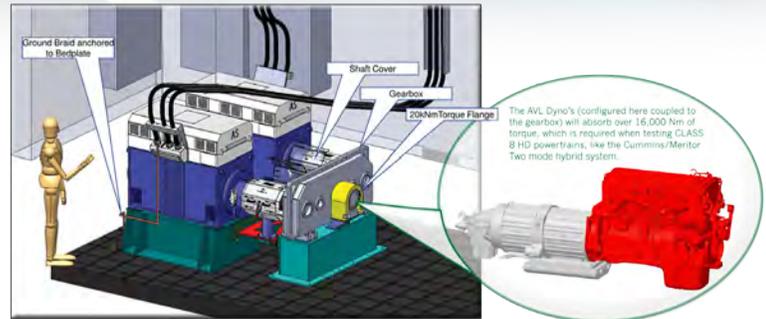
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## Advanced Vehicle Systems Research Program

Oak Ridge National Laboratory's Advanced Vehicle Systems research program provides key expertise in the understanding, simulation, and integration of advanced vehicle technologies to offer new insight on the potential benefits for hybrid electric, plug-in hybrid electric, and other advanced powertrain vehicles. The program draws upon ORNL expertise in advanced engine technologies, advanced power electronics and electric machines, and laboratory-to-roadside testing, evaluation, modeling, and analysis to meet the research needs of the DOE Office of Vehicle Technologies and to support public decision making regarding the benefits of adopting advanced energy efficient transportation technologies.

### Vehicle Systems Integration (VSI) Laboratory

Supporting the program and complementary to established research efforts, the Vehicle Systems Integration laboratory is a unique new research facility designed to bridge numerous research areas to address the complex interactions of advanced prototype vehicle technologies. It provides system-level research that integrates the best of ORNL's advanced combustion, electric drive, controls, and fuels research within applicable emissions constraints.



## Core R&D Strengths

- Advanced Engine Technologies – advanced combustion modes, fuels, thermal energy recovery, emissions aftertreatment, etc.
- Advanced Power Electronics and Electric Machines – motor drives, components, power electronics devices, advanced converter topologies, etc.
- Vehicle Testing and Evaluation – chassis and component dynamometers, integrated powertrain stands, test track evaluations, field operational testing, etc.
- Modeling, Simulation, and Analysis – data collected from vehicle testing and evaluation are used to develop and utilize sophisticated models and simulations, and through appropriate analyses develop an understanding of the performance and benefits of advanced transportation technologies.

# INNOVATIONS IN TRANSPORTATION

## Cross-cutting Capabilities

Dedicated light-duty and heavy-duty propulsion dynamometer laboratory supports prototype component and subsystems integration (i.e., powerpack testing) R&D to achieve maximum efficiency and lowest possible emissions.

Adds significant value to existing R&D program areas by identifying transient, thermal, interfacial, and other important performance characteristics not found with routine experiments.

Integrates detailed vehicle systems modeling and simulation with laboratory testing for thorough system characterization, analytical model enhancement, and advanced technology sub-model development.

Enables hardware-in-the-loop experiments that integrate modeling and simulation with actual hardware components for laboratory testing at a full vehicle level without the expensive cost and lead time for building a complete prototype vehicle.

Supports policies. Example: EPA-NHTSA rule with coupled experiments and simulation to assess fuel consumption of heavy duty vehicles.

Gathers critical information to direct long-term, high risk R&D technologies and accelerate commercialization pathways.

*Meritor Inc. is the first industry CRADA partner to make use of the VSI Laboratory. The facility will enable ORNL researchers to bridge modeling/simulation/analysis to full experimental testing and evaluation of the Meritor Class 8 tractor.*