

Hybrid and Hydrogen Vehicle Research

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The mission of the Hybrid and Hydrogen Vehicle Research Center (HHVRC) at the Pennsylvania Transportation Institute (PTI) is to promote improved vehicle efficiency and a renewable hydrogen economy by providing comprehensive vehicle system modeling and testing capability to automotive and hydrogen researchers, industry, and government. The HHVRC is committed to supporting hydrogen researchers at Penn State by applying PTI facilities and expertise to hydrogen transportation research projects.

The HHVRC has access to extensive laboratory facilities within PTI for hydrogen transportation research. Laboratory equipment includes Aerovironment ABC 150 and AV 900 battery test machines that can emulate batteries, fuel cells, and ultra-capacitors within a hybrid or fuel cell vehicle. A Clayton two axle dynamometer is available for testing cars and light trucks and a Schenck Pegasus 72" roll dynamometer is available for testing heavy trucks and buses. Several electric and hybrid electric vehicle platforms are



available as test beds for research. In-house designed power electronics can be configured as AC motor inverters or buck/boost converters. Laboratory floor space includes 4000 sq. ft. for integration and testing of hybrid and fuel cell cars and light trucks and 10,000 sq. ft. for integration and testing of hybrid and fuel cell heavy trucks and buses. The bus test center provides a one mile closed track along with durability, handling, and crash areas for testing prototype vehicles. In 2004, the HHVRC will add an Air Products and Chemicals hydrogen fueling station capable of fueling 20 cars or 3 buses per day, allowing long term demonstrations of hydrogen vehicles.

HHVRC modeling software includes DOE Advisor and PSAT vehicle economy and emissions simulation packages and in-house developed HEVDEV for simulating hybrid and fuel cell vehicle dynamic handling. The HHVRC executes rapid embedded controller prototyping software/hardware using Simulink software and dSpace or Mathworks xpc rapid prototyping controllers. The HHVRC can perform hardware-in-the-loop (HIL) testing using this rapid prototype controller technology and the above laboratory equipment to support testing hydrogen vehicles or components in a complete system context.