

ENVIRONMENTAL AND EMISSIONS RESEARCH FACILITY



TTI's Environmental Emissions Research Facility tests technologies to reduce vehicle emissions. The humidity- and temperature-controlled chamber offers numerous other testing opportunities.

Description

The Texas A&M Transportation Institute (TTI) opened the Environmental and Emissions Research Facility in Bryan, Texas, in January 2010. The development of the facility resulted from competitive grant awards to TTI from the U.S. Environmental Protection Agency (EPA) and the Houston Advanced Research Center (HARC), with additional funding provided by The Texas A&M University System and TTI. The Air Quality Program uses the facility as a part of emissions and fuel efficiency research. The \$2.5 million facility is one of the largest drive-in environmental chambers in the country, and the only one based at a university. The EERF can be used to conduct tests on vehicles as large as a full tractor-trailer or bus.

The initial project for the facility is to develop and apply a verification protocol for testing onboard technologies to reduce idling of heavy-duty diesel trucks. These onboard technologies that TTI is testing include diesel- and battery-powered auxiliary power units, direct-fired heaters and thermal-storage cooling units. The tests must be performed in a humidity- and temperature-controlled chamber to ensure consistency between tests and accuracy of results. The results will be provided to EPA for assistance in setting standards and protocols for heavy-duty truck emission levels.

The Need for Idle Reduction Research

The health of the Texas and U.S. economy is reliant on heavy-duty diesel trucks to move a vast array of goods across the country. About 3 million of these trucks operate in the United States, with considerable traffic throughout Texas from in-state, out-of-state and out-of-country locations. The U.S. Department of Transportation mandates that truck drivers rest for 10 hours for every 14 hours that they drive. This results in extended periods of time that drivers spend resting and sleeping in the cabs of their trucks. As a consequence, almost all long-haul drivers idle their vehicles for about 10 hours per day to operate heating systems and air conditioners, generate electricity, charge their vehicles' batteries, and warm up the engines.

A typical long-haul truck is on the road for an estimated 250 to 300 days per year, resulting in an average annual idling duration of 2,100 hours per truck. It is estimated that more than 2,000 tons of nitrogen oxide is emitted every day due to extended truck idling in the United States. In addition to emissions, extended idling also results in considerable waste of fuel and can cause wear and tear on truck engines. At an idling fuel consumption rate of 1 gallon per hour, more than 13 million gallons of fuel is wasted on a daily basis nationwide.

Other Research and Testing Opportunities

The EERF offers numerous additional opportunities for research and testing new vehicles, components and automotive products, as well as many other products, for their durability under severe temperature, humidity and other weather-like conditions. For example, the chamber can be used to test:

- Emissions from vehicle idling for cars, trucks and buses, and "cold starts"
- Engine fuel consumption and emissions
- Hybrid technologies
- Clean fuels
- Vehicle components such as air conditioners, heaters and auxiliary power units
- Infiltration of pollutants into vehicles
- Emissions reduction technologies
- Evaporative emissions
- New fuels
- Lubricants and oils
- Insulation materials
- Ability of plant material to absorb emissions
- Steel and concrete construction components
- Agricultural and food products

Facility Technical Specifications

- Temperature range: -13 °F to +131 °F (-25 °C to +55 °C)
- Relative humidity range: up to 70 percent at 104 °F (40 °C)
- 7,500 square feet of gross floor area
- Dimensions: 75 feet × 23 feet × 22 feet
(capable of holding a tractor-trailer or bus)
- Other equipment: solar loading lights and wind simulator fans



The facility is large enough to hold a heavy-duty 18-wheeler and includes offices and a research and testing preparation area. The maker of the chamber is Weiss Environmental Technology, Inc.

About TTI's Air Quality Program

The Air Quality Program at TTI performs research on transportation air quality issues related to sources and impacts of pollutant emissions and policies and actions that can be taken to improve air quality. The group's work assists sponsors with technical research to provide information to more effectively evaluate potential air quality policies, emission reduction measures, clean-fuel alternatives, and new technologies or applications that may aid in the improvement of air quality. The group also conducts emissions testing of mobile sources using portable and other emissions-testing devices.

Testing Capabilities

The Air Quality Program has the capability of conducting a wide range of testing, both at the Environmental and Emissions Research Facility and other locations. The group uses two different portable emissions measurement systems (PEMS) to measure the emissions characteristics of many different types of vehicles. The PEMS units include a SEMTECH DS from Sensors, Inc., which measures carbon monoxide, carbon dioxide, nitrogen oxide, nitrogen dioxide, and hydrocarbons. In addition, an Axion system from Clean Air Technologies is used to measure the particulate matter of emissions.



Pecos Research and Testing Center

The Pecos Research and Testing Center (PRTC), located near Pecos, Texas, is a 5,800-acre complex that includes nine different test tracks. The test tracks include a high-speed test track, a road course track and seven additional tracks for many different purposes.

The facility has the capability of testing vehicles, tires, pavements, human factors, intelligent transportation systems, and many other technologies and research areas. The facility is an ideal place to conduct SAEJ1321 testing for both passenger vehicles and heavy-duty trucks.

Potential Cooperative Relationships and Sponsors

TTI is seeking sponsors and partners from the following industries:

- Vehicle manufacturing
- Engine manufacturing
- Trucking industry
- Companies with long-haul truck fleets
- Oil industry
- Clean-fuel manufacturing
- Air conditioning and heating manufacturing
- Construction industry
- Agricultural industry



Fuel consumption and emissions testing of a heavy-duty diesel truck on one of the test tracks at the PRTC facility.

TTI's Mission

TTI delivers practical, innovative and sustainable solutions to improve the movement of people, data and goods through research, education and technology transfer.

Contact

Jeremy D. Johnson

Research Specialist
Air Quality Program
Texas A&M Transportation Institute
3100 Highway 47 South
Building 7096
Bryan, TX 77807
(979) 317-2670
j-johnson@tti.tamu.edu
<http://tti.tamu.edu/airquality/eerf>