Automotive Fleet Testing

SOUTHWEST RESEARCH INSTITUTE®
SAN ANTONIO, TEXAS
In 2009, the Fuels and Lubricants Research Division celebrated 60 years of service to the transportation industries of the world. This photograph depicts the Institute’s original fleet lab with automotive technicians conducting a variety of tests.
For more than 60 years, Southwest Research Institute® (SwRI®) has provided fleet testing services critical to the development of new automotive technologies and the qualification of fuels and lubricants. Proof of performance and comparative data gathered in state-of-the-art facilities help clients in all segments of the automotive industry introduce new products into the global marketplace and keep them there in response to regulation and competition.

Engineers and technical support staff share decades of experience in the testing and evaluation of both on- and off-road vehicles, including conventional and unconventional powertrains and drivetrains such as hybrids and alternative fuel vehicles.

SwRI’s bumper-to-bumper fleet evaluations include a variety of automotive-related parts and components including:

- Air conditioning systems
- Automatic transmission fluids
- Axle lubricants
- Braking systems
- Coolants
- Crankcase oils
- Electronics and electrical systems
- Engines
- Evaporative emissions
- Exhaust systems
- Fuels
- Tires
- Hybrid battery technologies

SwRI provides fleet testing services using many different makes and models of cars, both foreign and domestic.
Typical Programs

- Evaluations of lubricants and additives such as engine and gear oils for deposit formation, anti-wear properties, fuel efficiency improvements, longevity and lubricant performance comparisons
- Evaluations of fuel formulations and additives for intake valve and combustion chamber deposits, injector cleaning, fuel economy improvements and specification qualification
- Durability and performance tests of prototype components and systems such as air conditioning systems using ozone-safe refrigerants, emission control systems and components, and drivetrain efficiency comparisons for conventional and unconventional vehicles
- Tire testing, including passenger, truck and agricultural tires
- Noise evaluations
- Fuel consumption comparisons on military vehicles
- Electromagnetic interference testing
- Field evaluations of hydraulic fluids, transmission and rear axle oils, and agricultural and industrial tractor fluids for braking and power transmission
- Comparison of competitive vehicles
- Evaluation and testing of fluids and fluid additives such as coolants, brake fluids and automatic transmission fluids
- Frequent opportunities for multiple testing or "piggy-back" tests for various clients using the same fleet of vehicles at a shared cost
- Durability and performance testing of CNG, LNG, and other alternative fuel systems
- Availability of mileage accumulation dynamometers for simulation of on-road mileage accumulation of up to 2,000 miles per day per dyno
- Development and research services

Test Procedures

- General Motors automatic transmission service fill fluid specification, DEXRON®-VI
- Ford Motor Company automatic transmission service fill fluid specification, MERCON®
- Allison C-4 and TES-295 heavy-duty transmission fluid specification
- Caterpillar powershift transmission fluid specification
- Intake valve deposit test for gasolines [ASTM D 5500 and California Air Resources Board (CARB)]
- Port fuel injector deposit test for gasolines (ASTM D 5598 and CARB)
- Acceleration tests (SAE)
- Fuel economy (SAE light- and heavy-duty), SAE J1321 and J1526
- Other published procedures specific to project requirements
- Client-proprietary procedures
- Road-load measurement using coast-down SAE J2263, J1263 procedures
- Noise testing

A vehicle exits the Institute’s cold box in which technicians can test the effects of temperature on a vehicle’s fuels and lubricants. Vehicles can be subjected to temperatures down to -20°F (-30°C).

Vehicles on the mileage accumulation dynamometers are run at speeds up to 100 miles per hour. The state-of-the-art mileage accumulation dynamometer facility provides rapid, cost-effective vehicle testing, accommodating up to 20 cars or light trucks.
Test Planning

SwRI uses its more than six decades of experience in automotive testing and evaluation to assist in the planning of short- or long-term fleet testing activities. Test planning services include:

- Development of a test plan that realistically meets client needs
- Statistically designed test plans
- Complete description and explanation of test services
- Review of format for presentation of test results and evaluations
- Recommendations based on purpose of testing and evaluations
- Procurement of vehicles for use in various evaluation activities

Facilities

A modern, high-bay, air-conditioned 16,000-square-foot fleet laboratory provides the perfect starting point for various fleet evaluations. The laboratory houses a four-wheel-drive chassis dynamometer that expands our fleet testing capabilities and accommodates the new generation of all-wheel-drive vehicles. We offer bumper-to-bumper fleet evaluations that provide vehicle manufacturers with proof of performance and comparative data. The SwRI automotive fleet laboratory uses the most current diagnostic equipment to keep test fleets operating at maximum performance levels. All routine and specialized maintenance is performed in-house by highly trained technicians. Data acquisition systems are available for use in programs requiring temperature, pressure, or data available through vehicle interface.

Additional facilities and equipment include:

- Borescope video recording
- Chassis dynamometers
- Cold temperature cell for vehicles
- Customized instrumentation
- Drivetrain torquemeters
- Electronic automotive monitoring system
- Emissions laboratory
- Fast-fill CNG fueling
- Fuel economy measurement systems
- 20 mileage accumulation dynamometers capable of accurately and consistently loading and driving vehicles so that comparison tests can be easily conducted
- Dyno for super cars (500 HP) to accommodate high-performance vehicles
- On-site (one-mile) track and access to various off-site test tracks
- Optical and microwave fifth wheels
- Shift feel computer
- Towing dynamometer
- 6,000-square-foot fuel blending facility

New Capability

A new dynamometer capability will not only be able to simulate normal road use of 2,000+ miles per day, but at 500 HP, the new dyno can now accommodate high-performance muscle cars at speeds up to 100 miles per hour.
The Institute’s experience is in increasing demand by the automotive industry, partly because of the Institute’s long-standing reputation and history of automotive excellence. SwRI’s around the clock testing includes:

- Ability to redirect effort
- Adherence to realistic time schedules
- Confidentiality
- Custom testing to specific client needs
- Impartial comprehensive reports
- Multidisciplinary team approach
- Quotes without obligation
- Rapid response to inquiries
- Special facilities
- Step-wise approach to limit costs
- Strong quality assurance program
- Test plan consultation
- Trained staff

In a 6,000-square foot blending facility, SwRI staff members blend automotive fuels in seven large-capacity stainless steel tanks. The facility includes a temperature-controlled room for storage of 55-gallon drums of fuel or fuel additives.

Support Services

In addition to the capabilities available in the Institute’s fleet testing programs, the Institute also offers expertise and extensive research and development capabilities in:

- Emissions
- Automatic transmission fluids
- Gasoline and diesel engine lubricants
- Petroleum products
- Statistical analysis
Founded in 1947 as an independent, nonprofit research and development organization, Southwest Research Institute provides a significant research, engineering and testing resource for industry, business and government. SwRI’s 12 technical divisions, ranging from automobile research and space science to bioengineering and intelligent systems, (swri.org) use a multidisciplinary, integrated approach to solve complex problems in science and applied technology. As part of a long-held tradition, patent rights arising from sponsored research at the Institute are often assigned to the client. SwRI generally retains the rights to Institute-funded advancements.

Benefiting government, industry & the public through innovative science & technology

We welcome your inquiries. For more information, please contact:

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ISO Certification — Engine, Emissions and Vehicle Research Division

The Office of Automotive Engineering (OAE) is certified to ISO 9001:2008 “Quality Management Systems – Requirements,” accredited to ISO/IEC 17025:2005 “General Requirements for the Competence of Testing and Calibration Laboratories” and certified to ISO 14001:2004 “Environmental Management Systems.” The OAE has also achieved Ford Tier 1 status for providing engineering services and the Engine, Emissions and Vehicle Research Division has received the Ford Q1 Quality Award. In conjunction with these divisional quality system accomplishments, the Petroleum Products Research Department is a Nuclear Procurement Issues Committee (NUPIC)-approved laboratory and the Fuels and Lubricants Research Division has maintained its status as an American Chemistry Council (ACC)-approved laboratory.