

# Fuel Economy Testing



Southwest Research Institute®  
San Antonio, Texas

**S**outhwest Research Institute® (SwRI®) has more than 20 years of experience in performing fuel economy testing for the trucking industry. Institute engineers have a comprehensive understanding of fuel economy tests most generally accepted by the trucking industry. These tests are conducted in accordance with Society of Automotive Engineers, Inc. (SAE) specifications J1264, J1321, J1376, and J1526.



TM139350 #5

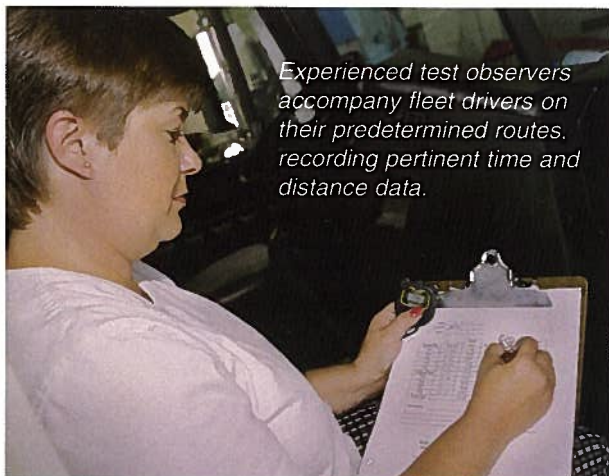
*Skilled technicians perform multiple oil flushes when changing the test oil.*

## Test Procedures

SwRI uses SAE Standards J1264, J1376, and J1526 to evaluate fuel consumption during operating cycles representative of bus, pick-up and delivery, and refuse operations. SAE Standard J1321 specifically addresses the operating conditions of long-haul truck fleets. To perform a J1321 program with Class 8 trucks, the Institute leases tractors and trailers, unless the client chooses to provide the test vehicles. In this test, the minimum test scope consists of a control truck and two test trucks driven in a baseline segment and a test segment. For example, if two test oils are being compared, oil A would be installed in the control truck and each of the test trucks during the baseline segment. During the test segment, engine oil B would be installed in each of the test trucks. Additional trucks and test laps can be added to a program to improve repeatability and confidence of final results. Results are stated as percent fuel economy improvement of the test item compared to the baseline condition. Additional segments can be added to the program to evaluate more than one test item.

## Test Roads

The Institute is located in San Antonio, Texas, which is in the transition zone between the coastal plain and the Texas Hill Country. The South Texas climate provides ideal weather for conducting on-road fuel economy evaluations year round. Public roads include city streets, grades up to 11 percent, and divided highways. SwRI maintains a paved test track with 0.6-mile straight-aways on its campus. Additional track and testing facilities are available in neighboring communities.



*Experienced test observers accompany fleet drivers on their predetermined routes, recording pertinent time and distance data.*

DE139357 #16

**About the Cover:** SwRI conducts a fuel economy test in the Texas Hill Country using three Class 8 tractor and trailer test rigs.

## Weigh Scale

In its fuel consumption test program, SwRI uses a dedicated scale accurate to 0.1 pound. Auxiliary fuel tanks are filled with the appropriate fuel, weighed, and then mounted on the truck prior to the test. While on the test lap, the truck uses fuel only from the auxiliary tank. After the test, the tank is removed and weighed to determine the amount of fuel consumed.

## Drivers

A consistent driving pattern during test laps is essential to producing accurate fuel consumption results. The Institute maintains a staff of test drivers licensed for commercial vehicles and trained to minimize the effects of operating variables, such as vehicle and engine speed while changing gears during acceleration.

## Test Condition Monitoring

To enhance the value of a program, vehicle operating conditions such as truck and engine speed, coolant temperature, and turbo boost pressure can be monitored electronically and recorded during test laps. These data yield valuable information about the effects of the lubricant or device being evaluated. SwRI has experienced observers to accompany the driver and record other pertinent time and distance data.

The Institute also uses a portable weather station to monitor and record weather conditions during each test run. Conditions such as wind speed, humidity, and ambient temperature could affect the amount of fuel consumed during a test lap. These data are taken into consideration when reporting the test results.



SwRI uses specially designed fuel tanks that are easily removed, refilled, weighed, and reinstalled on the test vehicle to measure fuel consumption accurately.



SwRI positions portable weather stations on the test circuit to monitor and record local weather conditions that can affect fuel consumption.



Daily tire pressure checks and adjustments are performed to ensure consistent vehicle performance while tests are conducted.



*Founded in 1947, Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute's main facility, located in San Antonio, Texas, occupies 1,200 acres and provides nearly two million square feet of laboratories, test facilities, workshops, and offices for more than 2,700 employees who perform contract work for industry and government clients.*

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**Certification/Accreditation — Automotive Products and Emissions Research Division**



All departments in the Automotive Products and Emissions Research Division have achieved certification to ISO 9002, the model for Quality Assurance in Production and Installation, and accreditation to ISO/IEC Guide 25 (EN 45001), General Requirements for the Competence of Calibration and Testing Laboratories, as well as several client awards.