

Contamination Research and Advanced Fuel Delivery System Technologies

Contamination significantly affects the performance and durability of fuel, air, and lubricant components and systems, especially with respect to automotive safety, vehicle performance, and warranty issues. Southwest Research Institute® (SwRI®) uses advanced analytical tools, testing techniques and simulation methodologies to assess the contamination sensitivity of fuel system, engine, powertrain, and hydraulic system components.

Fuel Systems and Contamination

SwRI fuel systems and contamination research focuses on:

- Investigation of interactions among contaminants, additive packages, and working fluids
- Study of physics essentials that influence component performance and service life

Fuel Systems

SwRI fuel systems research focuses on:

- Gasoline fuel delivery system evaluation
- Diesel fuel system (common rail) system evaluation
- Component-level performance evaluation
- Thermal cycle and contamination durability
- Noise and vibration evaluation of fuel pumps
- Hot fuel handling of fuel delivery pumps/modules
- Fuel compatibility study
- Fuel level gauge evaluation
- Powered pressure cycle cascaded with mechanical vibration
- Water handling under icing conditions
- Overheat evaluation of fuel pumps
- Injector flow characteristic evaluation
- System and component ESD status evaluation
- Ultra-high pressure (20,000 psi) impulse test of pressure lines

Contamination

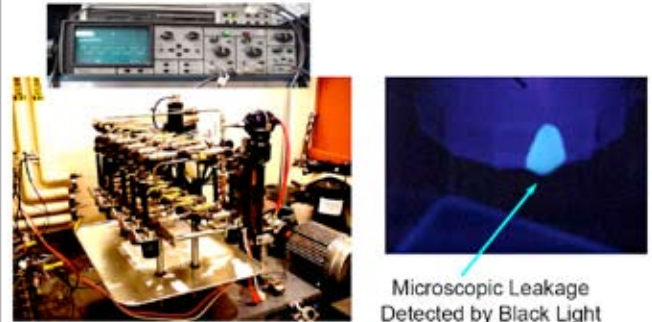
SwRI contamination research focuses on:

- Filter evaluation per ISO, SAE, military and OEM specifications
- Filter and filtration systems performance and life evaluations with cyclic flow and vibration
- Intake manifold activated carbon filter and vapor canister evaluation
- Permeation test of automotive components
- Oil mist and droplets filter evaluation
- Filter and filtration strategic analysis
- Filter impulses, cold start (-54°C) and pressure fatigue (20,000 kPa or 3,000 psid) evaluation
- ISO 4020 water removal evaluation

SwRI contamination research services also include:

- Functionality testing
- Contamination sensitivity and durability testing
- Contaminant chemical composition determination
- Contaminant particle size and dirt loading pattern evaluation
- Specialty contaminant reconstruction

Filter Impulse Evaluation



Filter impulse evaluation can be performed with a wide range of temperature conditions and a variety of pressure cycle conditions.



The SwRI Contamination Research Test Laboratory hosts 12 explosive-proof test cells with real-world simulation and automated dust suspension capabilities.

Quality Accomplishments

The Office of Automotive Engineering (OAE) at SwRI 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 addition, 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.



Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for more than 3,200 employees who perform contract work for industry and government clients.



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

Xiaojian Tao, Ph.D.

Manager

Fuel Systems and Contamination Research

Fuels and Lubricants Research Division

(210) 522-6962 • Fax (210) 522-5720

xiaojian.tao@swri.org

Southwest Research Institute
6220 Culebra Road • P.O. Drawer 28510
San Antonio, Texas 78228-0510

swri.org
contam.swri.org