



SOUTHWEST RESEARCH INSTITUTE



# Friction Reduction Research and Development

Southwest Research Institute® (SwRI®) has a long history of providing comprehensive friction reduction solutions to help meet increasingly stringent emissions regulations for engines and powertrains. SwRI works closely with engine manufacturers, Tier 1 suppliers, and fuels and lubricant companies to isolate, quantify, and reduce friction sources within engines.

For more than 60 years, SwRI's world-class automotive engineering staff has provided clients with innovative solutions using computer modeling and simulation, unique test stands, and state-of-the-art laboratories. SwRI uses a combination of bench, engine, and chassis dynamometer tests along with advanced computer modeling techniques to develop the most comprehensive and holistic understanding of engine friction.

## Services

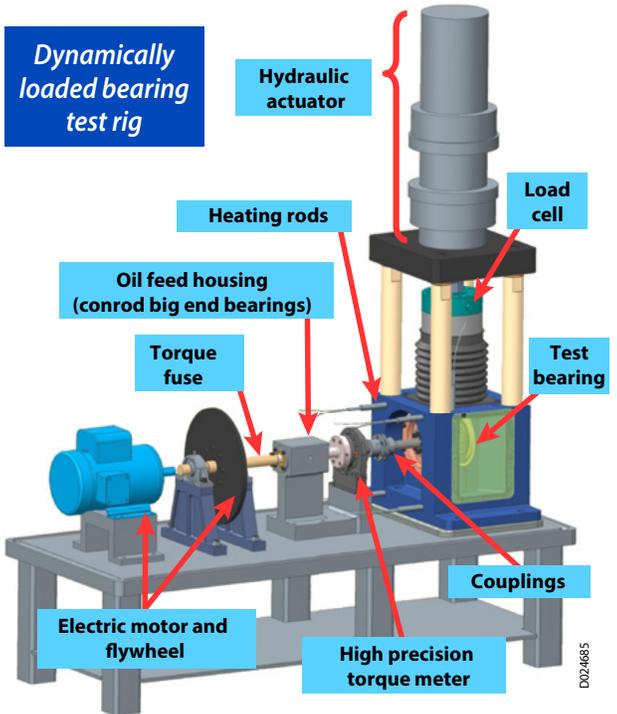
SwRI offers a wide spectrum of standard and custom services to study friction, including:

- Evaluation of friction at individual engine tribocouples
  - Hydrodynamic bearings
  - Piston rings and bore interface
  - Valvetrain contacts
- Evaluation of friction in engine systems
  - Motored and fired engine testing
  - Friction tear-down testing
  - Electrification of accessories (coolant, water pumps, etc.)
- Evaluation of friction in complete vehicles
  - Chassis dynamometer testing with customized instrumentation and data acquisition



Bearing testing

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## Facilities & Equipment

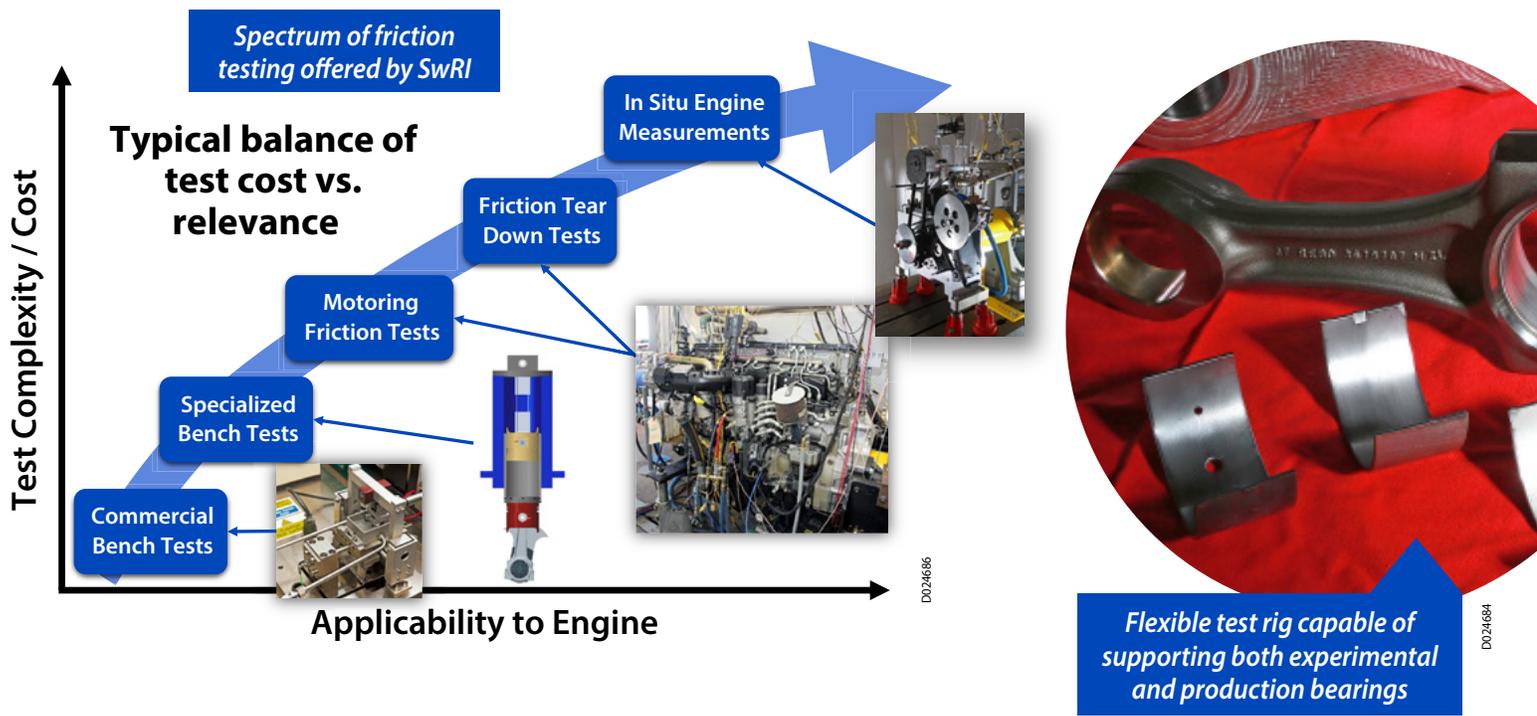
SwRI conducts friction measurement and reduction tasks using a variety of tools, including:

- Bench testing
  - Standard and customized tribometer tests
  - Dynamically loaded hydrodynamic bearing test rig
  - Reciprocating cylinder liner test rig
- Engine testing
  - Multiple engine test cells to support light-, medium-, and heavy-duty testing capability
  - Flexible single-cylinder test engines capable of accepting production or customized hardware
  - Crankshaft offset testing with single-cylinder engines
  - Battery simulator to evaluate integration of electrified components
- Vehicle testing
  - Light- and heavy-duty chassis dynamometer with climate control
- Modeling
  - Computer modeling to simulate individual tribocouples, engine systems, and complete powertrain configurations

## Previous Research Programs

SwRI is featured in numerous publications and conference proceedings. A few examples are listed below:

- Technical Approach to Increasing Fuel Economy Test Precision with Light Duty Vehicles on a Chassis Dynamometer. <https://doi.org/10.4271/2016-01-0907>
- Optimizing Engine Oils for Fuel Economy with Advanced Test Methods. <https://doi.org/10.4271/2017-01-2348>
- Engine Oil Fuel Economy Testing – A Tale of Two Tests. <https://doi.org/10.4271/2017-01-0882>
- Advanced Test Methods Aid in Formulating Engine Oils for Fuel Economy. <https://doi.org/10.4271/2016-01-2269>
- Electronic Control of Brake and Accelerator Pedals for Precise Efficiency Testing of Electrified Vehicles. <https://doi.org/10.4271/2020-01-1282>
- Optimization of Heavy Duty Diesel Engine Lubricant and Coolant Pumps for Parasitic Loss Reduction. <https://doi.org/10.4271/2018-01-0980>
- Development and evaluation of low friction TiSiCN nanocomposite coatings for piston ring applications. <https://doi.org/10.1016/j.surfcoat.2016.04.061>



## We welcome your inquiries.

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## SOUTHWEST RESEARCH INSTITUTE

Southwest Research Institute is a premier independent, nonprofit research and development organization using multidisciplinary services to provide solutions to some of the world's most challenging scientific and engineering problems. Headquartered in San Antonio, Texas, our client-focused, client-funded organization occupies 1,500 acres, providing more than 2.3 million square feet of laboratories, test facilities, workshops, and offices for approximately 3,000 employees who perform contract work for government and industry clients.

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Designed & printed by SwRI MPS 03-0321 JCN 264707 bl