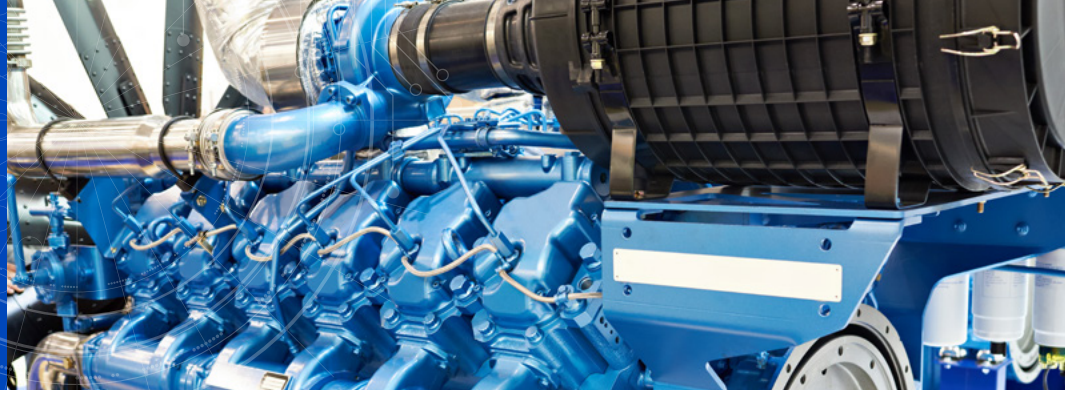




SOUTHWEST RESEARCH INSTITUTE



## Diesel Powertrain Research and Development

Southwest Research Institute® (SwRI®) has a long history of providing diesel powertrain solutions to meet fuel economy, emissions, and cost requirements for OEMs, Tier 1 suppliers, fuel and lubricant companies, government agencies, and other clients. 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.

Today, SwRI is recognized globally as the diesel powertrain solution provider of choice, evidenced by its industry-leading Clean Hybrid Electric Diesel Engines 8 (CHEDE-8) consortium and the world's lowest emission, heavy-duty (HD) engine platforms for the US Environmental Protection Agency (EPA) and the California Air Resources Board (CARB).

### Services

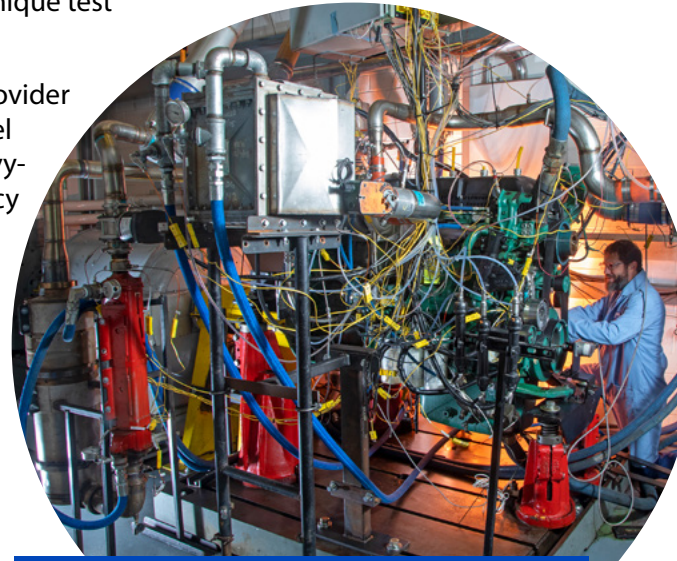
SwRI's diesel powertrain R&D services include:

- Combustion system development including piston and injector design
- Dual-fuel and alternative-fuel compression ignition engine R&D
- Air handling and EGR system layout, design, and optimization
- Engine friction reduction package development
- Diesel injector rate of injection (ROI) measurement
- Computer simulations (GT-Suite) with custom vehicle and component models
- Powertrain benchmarking and reverse engineering
- Fuels, lubricants, and additive characterization using bench testing, engine testing, and computer modeling
- Drive cycle optimization of hybrid components
- Advanced technology integration and calibration

### Facilities & Equipment

SwRI solves diesel powertrain challenges through use of:

- Powertrain test cells for engines, transmissions, and electric machines
- Fully automated EPA 1065-compliant test cells with 24/7 capability
- SwRI-designed single-cylinder research engines for production or custom hardware
- High-power two-way power supplies for engines with hybrid components
- High-speed 0.1° crank angle measurements and calculations
- Active licenses for ETAS, INCA, ATI Vision, and OEM specific interface tools
- Multiple licenses of GT-Suite, Converge CFD, Ansys Fluent, Matlab/Simulink, and many other engineering tools
- Prototype and production-intent engine and powertrain controllers
- Pump and engine accessory benchmarking and mapping stands
- Dynamic bearing test facility



*SwRI test cells include full transient dynos with dilute and raw emissions, high-speed crank angle synchronous data, and access to high voltage and power for additional accessories.*



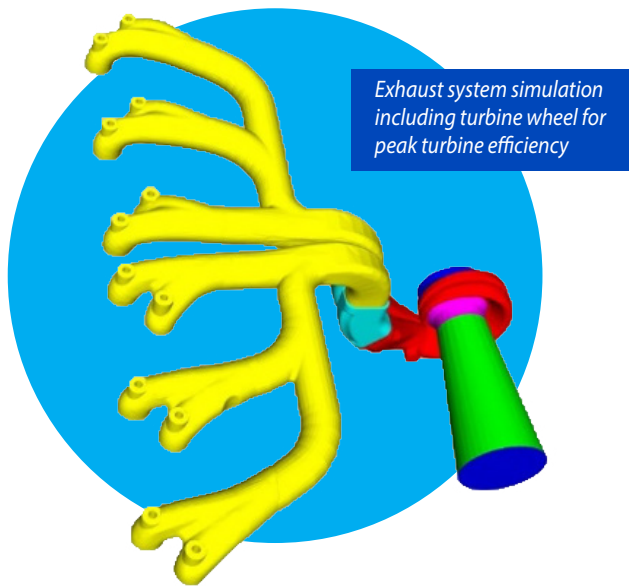
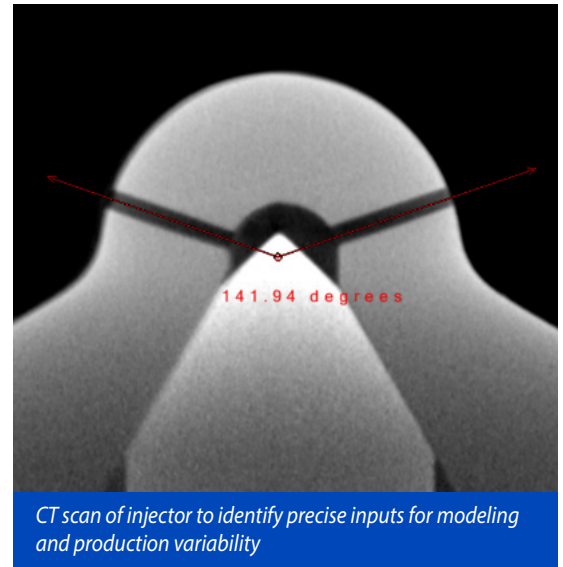
*SwRI designed and developed single-cylinder research engines used for advanced combustion and friction analysis.*

## Previous Research Programs

SwRI is featured in numerous industry publications and conference proceedings. Examples\* include:

- Evaluation of Zero Oil Cooling for Improved BTE in a Compression Ignition Engine
- Evaluation of Cylinder Deactivation on a Class 8 Truck over Light Load Cycles
- CARB Low NOx Stage 3 Program - Modified Engine Calibration and Hardware Evaluations
- FSI - MRF Coupling Approach For Faster Turbocharger 3D Simulation
- Utilizing Multiple Combustion Modes to Increase Efficiency and Achieve Full Load Dual-Fuel Operation in a Heavy-Duty Engine
- Methods of Improving Combustion Efficiency in a High-Efficiency, Lean Burn Dual-Fuel Heavy-Duty Engine
- Optimization of Heavy Duty Diesel Engine Lubricant and Coolant Pumps for Parasitic Loss Reduction

\*Papers available from the Society of Automotive Engineers (SAE)



## We welcome your inquiries.

For more information, please contact:

**Chris Bitsis**

Manager, Diesel Engine R&D

210.522.5509

[chris.bitsis@swri.org](mailto:chris.bitsis@swri.org)

**Diesel Engine and Emissions  
R&D Department  
Powertrain Engineering Division**

Southwest Research Institute  
6220 Culebra Road • PO Box 28510  
San Antonio, Texas 78228-0510

[powertrain.swri.org](http://powertrain.swri.org)

## 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.

An Equal Employment Opportunity/Affirmative Action Employer  
Race/Color/Religion/Sex/Sexual Orientation/Gender Identity/National Origin/Disabled/Veteran  
Committed to Diversity in the Workplace

Like. Share. Follow. Listen.

210.522.2122

[ask@swri.org](mailto:ask@swri.org)



[swri.org](http://swri.org)

©2020 Southwest Research Institute.  
All rights reserved.

Designed & printed by SwRI MPS 03-0820 JCN 264210 bl