



SOUTHWEST RESEARCH INSTITUTE



## Exhaust Composition Transient Operation Laboratory (ECTO-Lab)

The Exhaust Composition Transient Operation Laboratory™ (ECTO-Lab™) represents a breakthrough technology to assist the automotive industry in developing more fuel-efficient vehicle technologies. ECTO-Lab is a fully automated, multi-fueled, burner-based continuous flow reactor system that duplicates the thermal energy and chemical composition of light-duty to line-haul size internal combustion engine exhaust gas streams. Invented and developed by Southwest Research Institute® (SwRI®), ECTO-Lab is the first fully transient, full-size reactor available in the global market today.

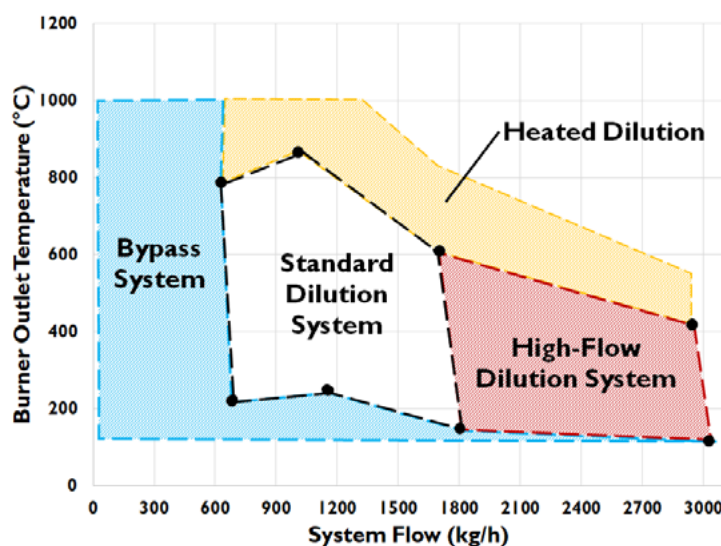
ECTO-Lab is primarily used for catalyst performance evaluation and screening, multi-dimensional mapping, control model calibration, engine/catalyst calibration integration, and engine cycle simulation. It can be applied to individual catalysts or complete exhaust aftertreatment systems and can be used for low-temperature catalyst performance or high-temperature catalyst aging.

### Features

- Diesel, gasoline, or natural gas fuel burner
- Independent control
  - $\text{NO}_x$  (20–200 ppm)
  - Temperature (120–850°C)
  - Exhaust flow (30–3,000 kg/hr)
- Optional water and oxygen control
- Modules for catalyst poisoning
  - Sulfur
- Lube oil consumption

### Applications

- Accelerated aging
  - Durability evaluation
  - Poisoning
  - On-board diagnostics (OBD) part production

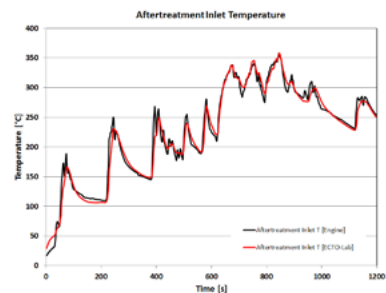
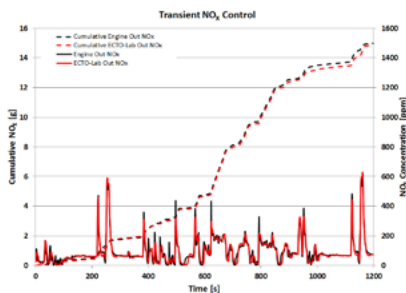
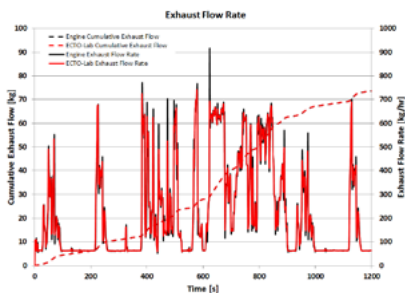


- Performance evaluation
  - Single stand for aging and evaluation
  - Transient cycle simulation
  - Full-size continuous gas reactor
- Model calibration
  - Wider range of available conditions compared to traditional engine-based approaches
- Technology and strategy screening
  - Engine calibration targeting and strategy development
  - Early technology screening before engine platform is available

ECTO-Lab bridges the gap between core testing and engine testing, allowing full-size catalyst systems evaluation. The system can be used as a full-size, fully transient continuous flow gas reactor as well as a transient engine simulator.

Independent control of variables and wide range of operation create a test stand that can simulate a variety of engines and emission test cycles, enable multi-dimensional mapping for catalyst model calibration, and use elevated temperatures that allow accelerated catalyst aging and low-temperature operation for cold-start simulation and cold-operation calibration.

ECTO-Lab can use engine model data as the input, enabling the catalyst development engineer to begin working with catalysts for engines that have not yet been produced. With one test stand, multiple engines can be simulated, allowing for work to shift from one catalyst platform to another without requiring engine removal/installation and instrumentation.



**We welcome your inquiries.**  
**For more information, please contact:**  
**Scott Eakle**  
 Manager, Aftertreatment System Integration  
 210.522.5095  
[scott.eakle@swri.org](mailto:scott.eakle@swri.org)



**CATALYST AND  
AFTERTREATMENT R&D**

A Program of **SwRI**

**Commercial Vehicle Systems Department  
Powertrain Engineering Division**

**[ecto-lab.swri.org](http://ecto-lab.swri.org)  
[card.swri.org](http://card.swri.org)**

## SOUTHWEST RESEARCH INSTITUTE

Southwest Research Institute® is a premier independent, nonprofit research and development organization. With eleven technical divisions, we offer multidisciplinary services leveraging advanced science and applied technologies. Since 1947, we have provided solutions for some of the world's most challenging scientific and engineering problems.

210.522.2122

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

Like. Share. Follow. Listen.



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

©2023 Southwest Research Institute.

All rights reserved.

Designed & printed by SwRI MPS 03-0223 JCN 268677 tp