FOCAS® HOT GAS TEST RIG (FOCAS HGTR™)

The FOCAS® Hot Gas Test Rig (FOCAS HGTR™) is a high-flow, diesel-fueled, burner-based catalyst aging system which expands on the capabilities of the Southwest Research Institute® (SwRI®) FOCAS aging system. FOCAS is a computer-controlled, gasoline-fueled burner system designed to simulate the aging conditions of an engine with or without the presence of lubricating oil-poisoning effects. SwRI designed the rig to accommodate full-sized catalyst systems and provide user-designed programmable aging cycles, allowing users to create aging cycles to meet specific needs.

FOCAS HGTR™ Features

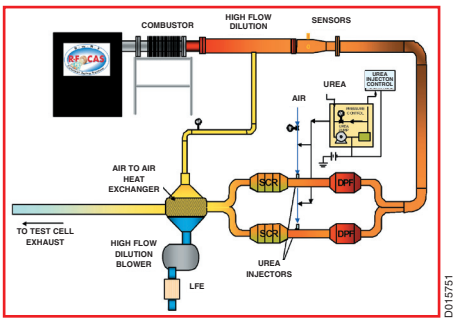
- Diesel-fueled exhaust
- Independent control of NO_x concentration (10–1200 ppm)*
- Temperature control (250–1000°C)†
- Flow control (up to 2300 kg/hr)
- Heat recovery, minimized heat loss and dilution for reduced fuel consumption
- Separate burner and dilution air controls
- Full FMEA (failure modes and effects analysis) safety monitoring and response
- Ability to add oil component to aging
- Ability to add water vapor

**Upper level limited by flow*
† Temperature range varies and is a function of total flow

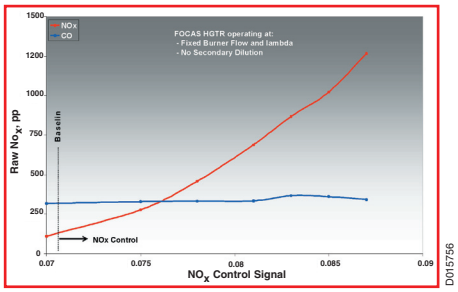
Advantages of Burner-based Diesel Aging

Because most current diesel emission systems involve NO_x control technology, simulating diesel engine NO_x levels is an important part of an aging test stand. Since NOx formation is closely linked to peak combustion temperatures (which are lower at lower pressures), burner-based aging systems produce lower NOx levels than engine-based systems. The FOCAS HGTR™ uses a patent-pending method to control the exhaust gas NO_x from diluted burner baseline levels (~10 ppm) to levels up to 1200 ppm.

The system uses closed-loop control based on NO_x sensor feedback. Varying NO_x concentration set points can be added to aging cycles, independent of temperature and flow setpoints.

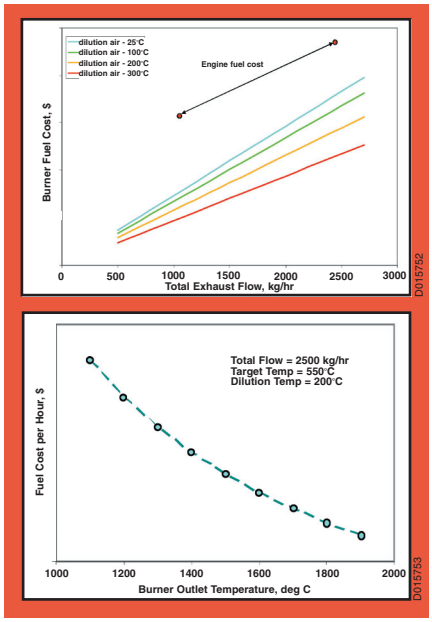


Schematic diagram of FOCAS HGTR™ with a diesel DPF–SCR emissions system installed.



Measured NO_x and CO concentration data as a function of NO_x control signal on FOCAS HGTR™.

Fuel Cost Savings



Examples of the impact of burner dilution, heat recovery, and heat loss on fuel savings. The FOCAS HGTR™ will utilize heat recovery and dilution for fuel cost savings compared to engine aging. The real fuel savings will be directly related to real burner outlet temperature (which is affected by heat loss) and the level of dilution that can be utilized (which will be affected by required catalyst inlet temperature, efficiency of heat loss recovery, and burner heat loss efficiency).

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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 3,100 employees who perform contract work for industry and government clients.

Benefiting government, industry and the public through innovative science and technology

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