Southwest Research Institute®

FOCAS® CATALYST AGING SYSTEM

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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 nearly two million square feet of laboratories, test facilities, workshops, and offices for more than 3,000 employees who perform contract work for industry and government clients.

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

FOCAS® is a computer-controlled gasoline-fueled burner system designed to simulate engine aging conditions. Southwest Research Institute® (SwRI®) designed the system to accommodate full-sized catalyst systems and provide programmable aging cycles, allowing users to create aging cycles to meet specific needs.

FOCAS Features

- Temperature control (600–1000°C catalyst inlet)
- Flow control (50–300 g/sec)
- Wide-range, closed-loop air/fuel ratio control ($0.7 < \lambda < 1.3$)
- Capable of continuous operation at stoichiometric air/fuel ratios
- Programmable secondary air injection control
- Full FMEA (failure modes and effects analysis) safety monitoring and response
- Ability to add oil component to aging

Engine-Based vs. Burner-Based Aging

Aging cycles developed on engine benches have been used to accelerate the thermal effects of catalyst aging from about 6 months of intensive driving to about 100 hours of simulated aging. With today's advanced emission solutions, however, the catalysts are moving closer to the engine, resulting in increased operating temperatures that require increased total aging time. This increases both the cost and the risk of part failure due to stand malfunction or lack of control.

The classical approach to catalyst aging has been to use an engine-based aging stand, with operating temperatures in the 850–900°C range. An alternative approach that can safely and efficiently reach higher temperatures can allow significant reductions in aging times.

The SwRI FOCAS catalyst aging system is a burner-based solution that allows the system to achieve operating temperatures of 1100°C. Because FOCAS operates more efficiently than an engine-based system, aging costs can be reduced.

In an internal study, SwRI conducted research on six catalysts which showed that burner-based aging provides results equivalent to engine-based aging [SAE 2003-01-0633]. Three catalysts were aged using a gasoline-fueled engine, and three using the FOCAS gasoline-fueled burner. The engine was configured to run a standardized cycle, and FOCAS was programmed to run to the engine test cycle specifications. Aging was conducted using the same bed temperature, air/fuel ratios, and catalyst space velocity conditions in both systems.

Catalyst performance was measured at the beginning and end of the aging cycle and compared between the two methods. The FOCAS burner-based system produced thermal aging results equivalent to the engine aging cycle.

FOCAS Advantages

- Lower maintenance
- Higher efficiency system for fuel savings
- Fewer moving parts for reduced mechanical wear
- Power fault protection for operation during thunderstorms
- Wide-range lambda operation and control window
- Operation with or without lubricating oil (optional oil system add-on)

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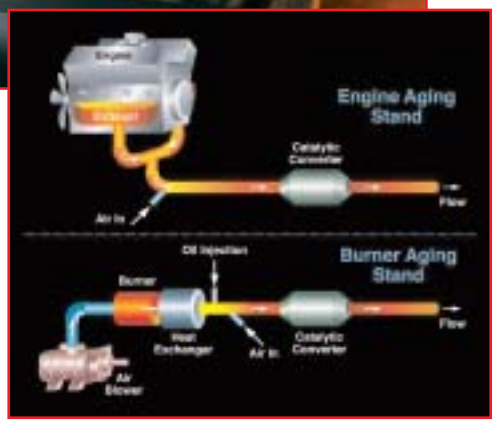

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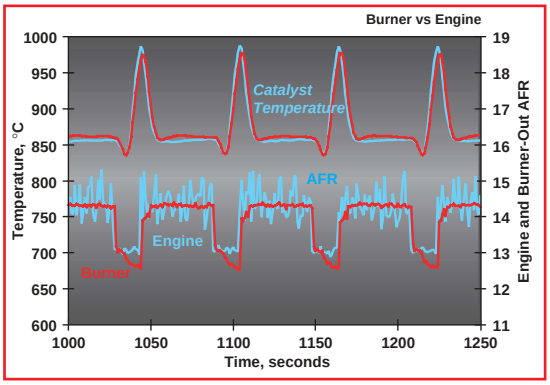

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