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Low Emissions Combustor Test and Research Facility

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CRADA facts

DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

COMBUSTION
PROJECT

LOW EMISSIONS COMBUSTOR TEST AND RESEARCH FACILITY

Capabilities

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The Morgantown Energy Technology Center (METC) recently built and began operation of a Low Emissions Combustor Test and Research (LECTR) facility with the primary objective of providing test facilities and engineering support to METC customers through programs such as the Advanced Turbine Systems (ATS) University-Industry Consortium and through CRADA participation with industrial partners.

The LECTR is a versatile test facility with capabilities for evaluating a variety of low emissions combustion concepts at temperatures and pressures representative of gas turbine applications. This facility utilizes the full range of high pressure (up to 30 atm), high temperature (800 K/1,000 °F air preheat, 2,100 K/3,300 °F combustor wall), and mass flows (3.4 lb/s combustion air) available in METC's Advanced Combustion Facility. The LECTR design incorporates a set of flanged sections or modules including an inlet plenum, combustor test sections, a gas sampling section, and a quench section. Combustor test sections can be custom designed to meet a specific application by varying the internal refractory dimensions. This modular design approach offers the flexibility to test multiple concepts with rapid turnaround thus maximizing operating time while reducing the time and cost associated with building new inlet, sampling, and quench systems for each application. The high pressure and mass flow capabilities of the LECTR facility make it uniquely suited for evaluation of advanced combustion concepts at combustion scales up to 3 MW_{th} (10 MMBtu/h).

Diagnostic Capabilities

- Multiple optical and probe access ports
- Laser-based diagnostics for flow visualization, velocity, and species measurement
- Video and high-speed imaging capabilities
- Radiation pyrometry
- Extractive gas sampling/analysis

The LECTR has recently been utilized to characterize the operating and emissions characteristics of a small industrial lean premixed gas burner at elevated pressures for potential gas turbine applications. At present, we are in the midst of a test campaign to obtain new experimental data relevant to lean-premixed combustion, and to refine and validate models for lean-premixed combustors with these data.

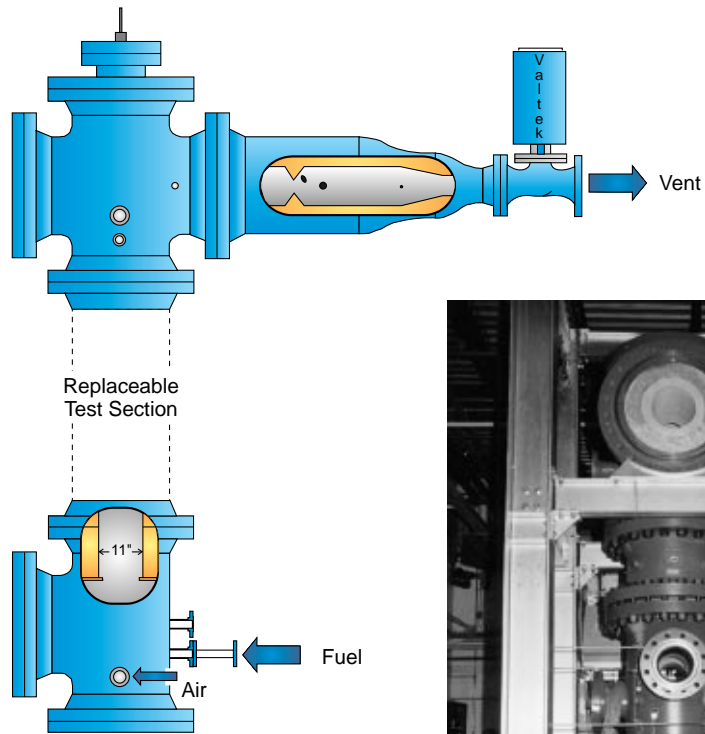
LOW EMISSIONS COMBUSTOR TEST AND RESEARCH FACILITY

Construction is under way of a gasification/cleanup Process Development Unit (PDU) and an associated high volume output Syngas Generator. When this Syngas Generator is integrated with the LECTR facility, METC will have a unique test facility capable of evaluating combustion system integration issues associated with utilizing advanced gas turbine systems in Integrated Gasification Combined Cycle (IGCC) and Advanced Pressurized Fluidized-Bed Combustion (APFBC) applications.

Opportunities

- Integration of ATS with IGCC and PFBC Systems (METC Syn-Gas Generator)
- Utilize METC Advanced Combustion Facility capabilities (P, T, Mass Flows)

Test Modules



Refractory-lined test modules with multiple ports for temperature and pressure measurement as well as optical diagnostics

