

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Gasification Technologies

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DESIGN, FABRICATION, ASSEMBLY, BENCH TESTING AND FIELD TESTING OF AN INFRARED RATIO PYROMETER SYSTEM FOR THE MEASUREMENT OF TEMPERATURE INSIDE SLAGGING GASIFIERS

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Description

Reliable measurement of gasifier reaction chamber temperature is important for the proper operation of slagging, entrained-flow gasification processes. Historically, thermocouples have been used as the main measurement technique, with the temperature inferred from syngas methane concentration being used as a backup measurement. While these techniques are used by plants, both techniques suffer from limitations. The response time of methane measurements is too slow to detect rapid upset conditions, and thermocouples are subject to long-term drift, as well as slag attack, which eventually leads to failure of the thermocouple.

ChevronTexaco's Montebello Technology Center (MTC) has developed an infrared ratio pyrometer system for measuring gasifier reaction chamber temperature. This system has a faster response time than both methane and thermocouples, and has been demonstrated to provide reliable temperature measurements for longer periods of time when compared to thermocouples installed in the same MTC gasifier. In addition, the system can be applied to commercial gasifiers without any significant scale up issues. The major equipment items, the purge system, and the safety shutdown system in a commercial plant are essentially identical to the prototypes at MTC.

The infrared ratio pyrometer system built for this DOE program consists of three sub-sections: 1) an optical train which bolts on to the gasifier, 2) a purge control cabinet that contains all the control valves and instrument used to monitor and control the optical access port purge gas and, 3) a control cabinet that contains the PLC that controls the operation of the system. The pyrometer system has been successfully designed, fabricated, assembled and bench tested at MTC. The field test site agreement has been signed with a commercial gasification facility. The test site is in the process of installing the mechanical, electrical and instrumentation of the pyrometer system as well as integrating the instrumentation to the test site Distributed Control System. The startup and field testing of the system will begin in Spring 2004.



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PROJECT COST

| | |
|----------------|-----------|
| Total | \$279,896 |
| DOE | \$223,896 |
| Chevron Texaco | \$ 55,974 |

PROJECT DURATION

10/01/1999 – 03/31/2005

WEBSITES

www.netl.doe.gov/coal

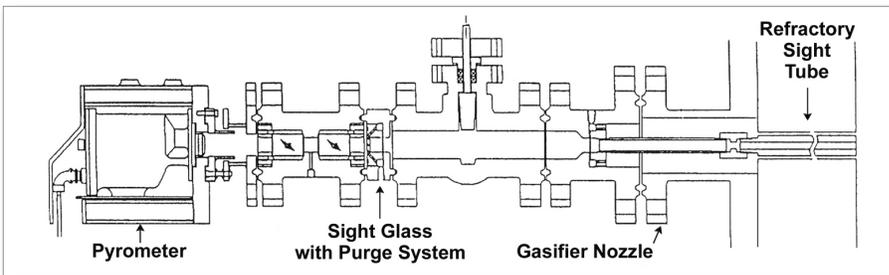
Benefits

The benefits of field-testing are 1) commercial gasifier operators will gain confidence that this system can perform reliably under true commercial plant conditions and 2) the system can be marketed as an alternative to thermocouples for gasification temperature measurement.

Improved temperature measurement of the gasifier will lead to more efficient and reliable gasifier operation.



Pyrometer System Optical Train



Texaco's Infrared Ratio Pyrometer System for the Measurement of Reaction Chamber Temperature