



## DEVELOPMENT OF AN ACOUSTIC SENSOR FOR ON-LINE GAS TEMPERATURE MEASUREMENT IN GASIFIERS

### Description

#### CONTACTS

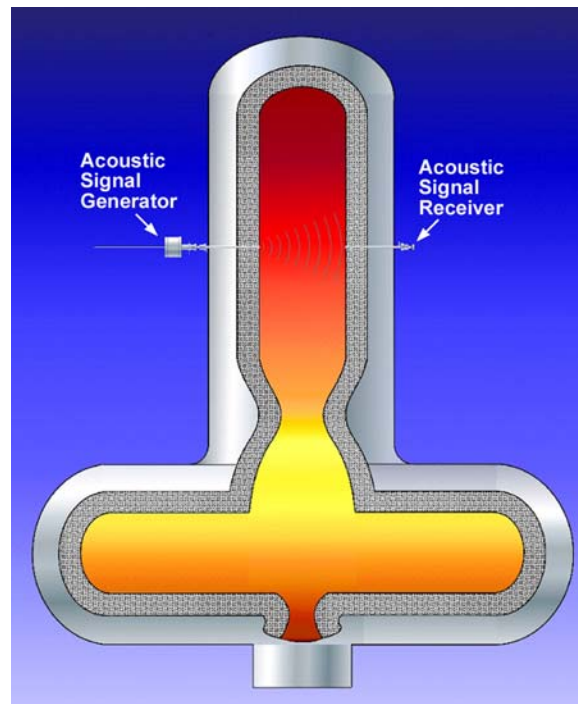
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Acoustic measurements utilize the generation and transmission of sound waves in gases, liquids, and solids to gather information about specific process characteristics and material properties. The propagation velocity of sound through gases depends on temperature. This relationship has been used to develop a powerful acoustic pyrometer, which can be used to measure temperatures in aggressive particle laden combustion environments such as utility and chemical recovery boilers. Building on expertise in the digital processing of sound signals, Enertechnix has developed acoustic measurements to detect leaks in boilers and to verify the operation of sonic cleaning devices. In this project, acoustic pyrometry is being developed to measure gas temperatures in high-pressure, high-temperature coal gasifiers. The development of a sensor that can accurately measure gasification conditions in such harsh conditions will increase the reliability and efficiency of gasifier systems.



*Enertechnix Acoustic Pyrometer  
Installed on a Coal Gasifier*



## CONTACTS (cont.)

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## PARTNER

Enertechnix, Inc.

## PROJECT COST

**Total Project Value**  
\$747,906

**DOE/Non-DOE Share**  
\$598,325 / \$149,581

## CUSTOMER SERVICE

**1-800-553-7681**

## WEBSITE

**[www.netl.doe.gov](http://www.netl.doe.gov)**

This three-year project will be conducted in three phases in collaboration with Global Energy and with support from General Electric Company. Phase I will develop a detailed understanding of sound generation, coupling, and propagation as it relates to temperature measurement in a gasifier; demonstration of suitable designs for critical components; and development of a detailed design for an experimental prototype. Phase II will consist of the fabrication of the prototype, including laboratory testing and field testing at the Wabash River Gasifier, and development of a conceptual design for an engineering prototype. Phase II will include the fabrication and bench testing of the engineering prototype sensor, designing components for interfacing the sensor to a gasifier, demonstration of sensor performance through rigorous testing at the Wabash River Gasifier, and development of a conceptual design for a commercial sensor.

## Primary Project Goal

The primary goal of this project is to develop an acoustic pyrometer, a relatively new non-intrusive technique, to continuously monitor gas temperature in a gasifier where the environment is quite severe and to demonstrate a fully functional sensor at the Global Energy Gasification facility at Wabash River.

## Accomplishments

- Completed a detailed study of sound generation, propagation, and coupling issues and identified suitable approaches to address those issues
- Developed a conceptual design and specifications for an experimental prototype sensor
- Demonstrated suitable designs for critical components through laboratory testing
- Developed a detailed design for an experimental prototype sensor and fabricated necessary components for the experimental prototype sensor

## Benefits

The development of a sensor for on-line gas temperature measurement in coal gasifiers should provide the ability to extend gasifier refractory lifetime, while increasing overall reliability, optimizing carbon conversion, and providing better gasifier control.