



Spectrographic Sensor for Precisely Measuring Gas Parameters in an Internal Combustion Engine

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WARF: P07135US

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a device capable of accurately and quantitatively measuring gas temperature and concentration within a cylinder.

Overview

Although knowing gas composition and temperature in an engine combustion cylinder is important for engine research and development, current methods for obtaining this information are qualitative and imprecise.

The Invention

A UW-Madison researcher has developed a device capable of accurately and quantitatively measuring gas temperature and concentration within a cylinder. The device includes a fiber optic light source installed in a spark plug. The fiber optic source introduces a light signal into the combustion space within the cylinder. A high-speed spectrographic sensor, such as a spatial heterodyne spectrometer, analyzes the strength of the light after it interacts with the combustion gases. A computer can then use this information to automatically determine gas temperature and water concentration, and to measure the absorption spectra of the combustion gases.

Applications

- Optimizing engines during research and development

Key Benefits

- Measures gas concentration and temperature accurately and quantitatively
- Can be easily and non-destructively installed in an engine
- Light source may be a laser.
- Uses more than 100 spectrum colors to enhance accuracy
- Provides real-time, multi-spectral absorption measurements of combustion gases to accurately capture the dynamic process of combustion
- Eliminates the standard optical slit required of grating spectrometers, thus avoiding energy loss and allowing the rapid creation of high-resolution spectrographs
- Wavelengths of light between 2400 and 2600 nm are used because these wavelengths lack interference from species like CO₂, and water vapor absorbs more strongly in this range.
- System is implemented through a fiber optic device installed in a spark plug, which is commonly used for in-cylinder testing.

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For More Information About the Inventors

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Related Intellectual Property

- [View Continuation Patent in PDF format.](#)

Tech Fields

- [Analytical Instrumentation, Methods & Materials : General analytical instrumentation](#)
- [Analytical Instrumentation, Methods & Materials : Spectroscopy.](#)

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867

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