



Pressure Sensors

Dynamic Pressure Measurement In High Temperature Gas Turbine Applications



Smart in sensing

BENEFITS OF DYNAMIC PRESSURE SENSORS:

- **High temperature capability:** Allows installation in close proximity to the combustion zone, enabling detection of higher frequency dynamics.
- **Simple instrumentation chain:** Requires no charge amplifiers or galvanic separators.
- **Compatibility:** Compatible with common data acquisition systems such as Bently Nevada.
- **Long-distance capability:** Distance between sensor and data acquisition can be up to kilometers with no need for signal amplification.
- **Non-electrical sensor:** Immune to electromagnetic interference (EMI).

Piezoelectric Waveguide Solution

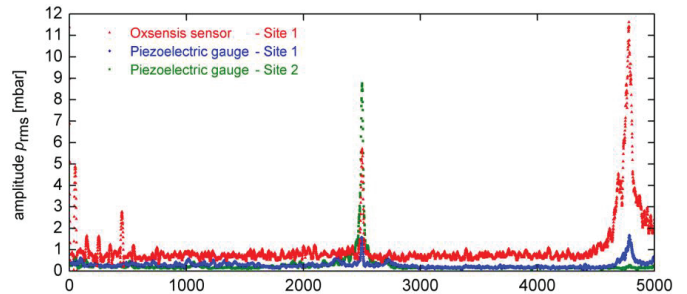
Piezoelectric sensors are not capable of being directly mounted to the combustor due to their lower temperature limit. Instead, these sensors are installed off-engine on waveguides.

Waveguide systems present numerous challenges. The semi-infinite tubes are prone to blockages from liquid fuel or water wash. Auto drain valves can fail, causing fluid buildup in the tube, potentially leading to engine shutdown. Furthermore, the large size of the semi-infinite tube can be cumbersome in multi-channel systems. Due to the length of the tube, pressure signals can be attenuated along its length, requiring extrapolation of the true amplitude of the dynamic event. These issues are particularly pronounced with high-frequency dynamics, resulting in waveguide sensors having lower sensitivity and a smaller detectable frequency range.



Test Evidence

WIKA Optical Sensing has demonstrated the superior performance of their direct mount sensors compared to waveguide sensors in collaboration with the German Aerospace Center (DLR). The tests show that the amplitude of the signal detected by the WIKA Optical Sensors at approximately 4.8 kHz is almost eight times higher than that detected by piezoelectric sensors on the waveguide.



WIKA Optical Sensing

WIKA Optical Sensing has worked with major OEMs for over 10 years and provide a replacement for waveguide sensing systems:

- **Adaptability:** Easy installation with a range of engine interfaces or via a simple adaptor, which can be designed, thermally modelled, assessed for resonances and manufactured by WIKA Optical Sensing.
- **Compatibility:** Interfaces with major data acquisition systems such as Bently Nevada, IfTA, and Allen Bradley.
- **Flexible design:** Sensor and optical cable lengths can be modified according to customer requirements. The rigid front end of the sensor can be bent up to 90° to fit into locations with limited space.

Summary

WIKA Optical Sensing dynamic pressure sensors are designed to operate in harsh environments. Their simple instrumentation chain and high temperature capability make them a well-suited alternative to waveguide dynamic sensing systems.



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WIKA Optical Sensing Ltd.
Unit 6, Genesis Building
Library Avenue, Harwell Campus,
Didcot, Oxfordshire, OX11 0SG

+44 1235 636300 | Optical.Sensing@wika.co.uk | www.wika.co.uk