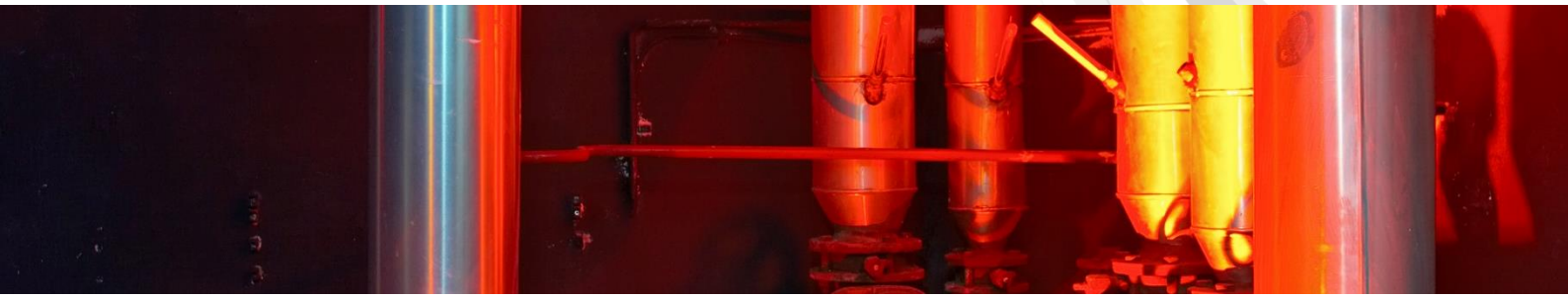
Clamp on, high temperature, steam flow metering

Ionix clamp on Lamb wave transducer for high temperature steam flow metering



Key deliverables

- **A steam flow Lamb wave transducer was delivered**, that is capable of operating at temperatures up to 220 °C (15 barg), ensuring high accuracy in measuring steam flow speed with a smaller dimension than competitors.
- Demonstrated that the developed technique can **accurately measure flow speed in conditions with up to 90% dry steam**.
- By developing this cutting-edge transducer technique, **Ionix' partner saved the time and expense** associated with researching and creating a solution independently. This accelerates their time to market, leveraging mature technology to implement high-accuracy steam flow measurement without the need for extensive development resources.
- Gaining access to a novel, market-leading technology **provides the customer with a significant competitive edge**. This advanced measurement capability can enhance their operational efficiency, reduce costs, and position them ahead of competitors who lack access to such innovative solutions.

Overview

A world-leading industrial steam equipment provider, sought to enhance its steam flow measurement capabilities. A reliable and efficient ultrasonic transducer was required, to meter steam flow velocity that could withstand high temperatures and provide accurate data without necessitating intrusive installations.

Clamp-on ultrasonic transducers offer significant advantages for steam flow measurement. Their non-intrusive installation, mounted externally on the pipeline, eliminates the need for intrusion to, or modifying infrastructure, leading to cost savings and minimal downtime. Designed for high-temperature environments, these transducers operate efficiently under extreme conditions, making them ideal for steam applications. Ultrasonic technology ensures precise flow measurements, providing reliable data for process control and optimization while reducing wear and maintenance costs. Versatile and scalable, these transducers fit various pipe materials and sizes, enhancing operational flexibility and safety by minimizing the risk of leaks and exposure to high-temperature steam.

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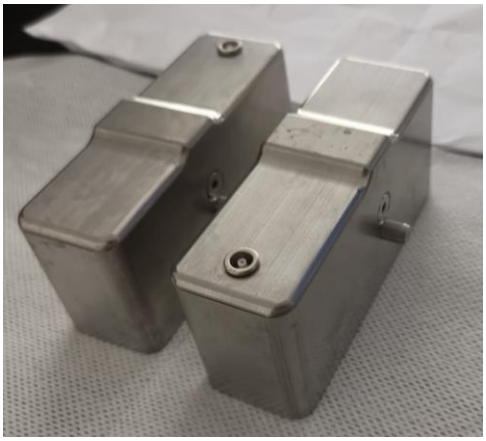
Environmentally, accurate steam flow measurements enhance energy efficiency and reduce fuel consumption, lowering greenhouse gas emissions and the carbon footprint. Precise control of steam flow conserves water and fuel resources, crucial for sustainability. Improved measurement accuracy boosts operational efficiency, decreasing the need for corrective actions and conserving additional resources.

The Challenge

Steam flow, particularly wet steam, presents significant challenges for ultrasound transmission, which is crucial in modern industrial processes. To use clamp-on ultrasonic transducers for steam flow measurement, several specific challenges were overcome:

- High operating temperature: The transducer needed to function effectively within a range of 150 to 220 °C.
- High sensitivity and beam angle control- It was essential to generate Lamb waves and overcome the high insertion loss between the pipe and steam, as well as the attenuative nature of wet steam.

The Solution



Ionix collaborated with the client to customize our existing HotSense extreme environment ultrasonic platform, resulting in advanced clamp-on ultrasonic transducers:

- HPZ high-performance piezo-ceramic technology: Enabled the transducer to achieve the highest operating temperature for its type while maintaining high sensitivity.
- Optimized wedge design: Ensured the correct Lamb wave mode was excited across the entire operating temperature range.
- Reduced transducer dimensions: Facilitated easy implementation and integration.
- High repeatability and robustness: Guaranteed long service life and minimized maintenance requirements.

Execution

By working closely with the client, Ionix significantly reduced the in-house development costs typically associated with starting from scratch. Utilizing our award-winning HotSense platform, powered by our unique HPZ high-performance piezo-technology, Ionix successfully delivered a fully developed technique within six months of the initial design phase.