

Online wall thickness monitoring of pulp mill blow line

In-service, high-temperature corrosion monitoring to provide increased asset intelligence to enhance productivity and minimise downtime.



Overview

A solution to make wall thickness measurements of pipes, during operation, at a pulp mill was sought by, a world leader in manufacturer of tissue, pulp, paper and packaging. Monitoring of remaining wall thickness of a blow line whilst in-service at temperatures cycling from ambient to 250 °C, several time a day was required to provide additional data and asset intelligence to the operations team, to directly increase productivity, enhance safety with increased measurement frequency and reduce inspection costs.

The Challenge

The pulp making process exhibits some of the most extreme and challenging environments for plant integrity. There are corrosive chemicals, high temperatures and abrasive slurries. Once the washed, cooked and 'digested' hot wood chip pulp is prepared, it is discharged from the digester through a blow line to the blow tank. Accurate control and increased data of the pulp stock discharge can obtain higher yields, reduce chemical usage, increase throughput and produce a superior product.

Previously no solution had been found to monitor wall thickness to measure corrosivity or abrasion/erosion whilst being;

- a) Non-intrusive, non-destructive, and retro-actively installed.
- b) Operate in the harsh environment, up to 250 °C with rapid, multiple thermal cycles per day
- c) Offer intrinsically safe, explosive atmosphere protection from fine dust.

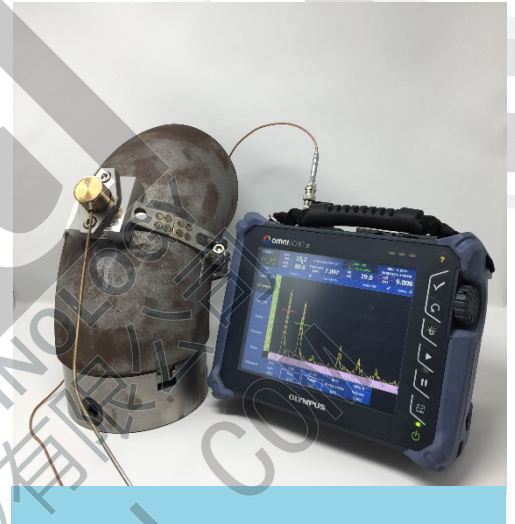
The Solution

Working with a global provider of electronic solutions, the HotSense™ ultrasonic platform from Ionix was selected as the ideal solution to meet the needs of the blow line monitoring challenge.

Our HotSense™ 380 sensor provides non-invasive, robust and stable ultrasonic wall thickness measurements across a wide temperature range (-55 to +380 °C) continuously, whilst mounted under insulation to fit congested areas where space is limited. Certified to the highest level of intrinsic safety, the sensor can operate in both explosive gas and dust environments.

Integrating the HotSense™ transducer into the ultrasonic monitoring electronics, the subsequent system was able to offer key advantages to paper mill operations team;

- Waveform (A-scan) capture for analysis.
- Flexibility in communication protocols, wireless and wired, back to the control centre.
- High precision and accurate wall thickness measurements.
- Integrated, dynamic temperature compensation.



Execution

A pilot site was identified to represent the 100s of pulp-mills across the USA, where 2 HotSense™ sensors were installed on to a carbon steel NPS 10" Sch 40 blow pipe. A short, straight section of the blow line was prepared, removing a nominal 1 m section of insulation and a ~30 mm diameter patch was surface ground SA2.5 near white metal. The two sensors were deployed using the integrated HotSense™ clamping system on the live blow line without the need for isolation or shutdown, in positions previously identified by historic maintenance and inspection.

Cabling was routed to the electronics data gathering system and connected. Data was collected over a period of 10 months to benchmark the wall thickness to operational requirements.

Highlights

- Using HotSense™ installed sensors offered reduced tolerances in wall thickness measurement realising better quality of data for plant operators
- Increased data collection frequency provided better asset intelligence and increased safety.
- Reduced inspection costs by implementing monitoring and installed sensors under existing insulation.
- Proven capability in the hostile environment of the paper-mill, with high temperatures, fast cycling and explosive atmospheres.