

High temperature weld root corrosion inspection with HotSense™ TOFD

*for applications in Offshore Oil & Gas Productions, Refining, Energy and
Process control*

1. Highlights:

- ▶ Validation of high temperature TOFD probes and modified scanner for encoded on-stream inspection of critical assets and infrastructure
- ▶ Full circumferential pipe weld inspection at 200 °C surface temperature
- ▶ Remaining ligament of the weld root was accurately determined within ± 0.2 mm of the benchmark data taken with conventional TOFD at ambient temperature.
- ▶ Suitable resolution was achieved for accurate weld root evaluation at elevated temperature

2. Key Features:

- ▶ HotSense™ Time-of-Flight Diffraction probes with integrated wedges are the only commercially available solution for continuous operation at temperatures up to 350 °C / 660 °F without cooling or duty cycling.
- ▶ The integrated design provides exceptional signal-to-noise and high sensitivity from ambient to high temperatures
- ▶ High temperature probes and wedges can be heated to the asset temperature to achieve stable signals for reliability and repeatability
- no duty cycling means no drift
- ▶ Compatible with commercial scanners and crawlers



3. Key benefits:

- ▶ *Clear, high-quality inspections of hot piping circuits with TOFD for weld root corrosion, inclusions, defect and crack detection and monitoring – don't miss a critical flaw*
- ▶ *Perform on-stream inspections of critical assets to maintain safe operation or as part of pre-shutdown planning.*
- ▶ *Standardise data collection using commercial UT flaw detectors and scanners.*
- ▶ *Compliant to ISO 22232-2 and ASTM E/1065 to meet your existing asset integrity UT procedures*
- ▶ *For use in refining, oil & gas, energy, nuclear, aerospace and process sectors.*

4. The High Temperature TOFD Challenge

- Time-of-flight-diffraction (TOFD) used widely for detection and monitoring of weld defects such as root corrosion, porosity, inclusions and cracks.
- There is increasing demand in petrochemical, energy and other industries for on-stream inspection of high temperature assets for pre-shutdown planning and safe operation of plant.
- Conventional TOFD is limited due to the temperatures at which the standard probes can operate, causing failure of the transducer, noise in the wedges which masks the signals, or drift of the lateral wave and backwall.

5. HotSense™ Solution

- Ionix HotSense™ TOFD probes with integrated wedges are suitable for continuous operation up to 350 °C/660 °F without cooling or duty cycling.
- HotSense™ TOFD probes were mounted on a modified Lyncs scanner for high temperature operation and encoding. A high temperature, pumpable couplant was used. Measurements were made on an EddyFi Mantis UT set.
- The measurement method was validated on a carbon steel pipe test piece with weld root corrosion. Measurements were made at 200 °C and validated against measurements made at room temperature using conventional equipment.
- Coupling was maintained throughout the inspection with good lateral wave signal to noise.
- Measurements made at high temperatures were within ±0.2 mm of the benchmark data taken with conventional TOFD at ambient temperature. An acceptable accuracy and validation that the setup was suitable for the on-stream detection of weld-root corrosion at high temperatures.

