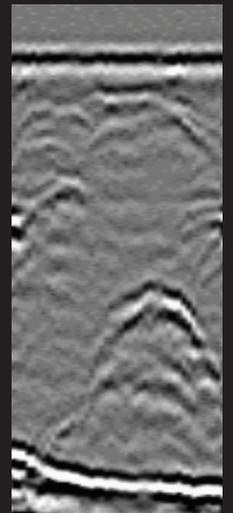


## An Integrated Approach to Weld Root Erosion and Corrosion from Sonomatic

TOFD is an ultrasonic technique originally developed for crack detection. Unlike conventional Pulse Echo, the transmitter receiver in arrangement in TOFD floods the region between the probes with ultrasound. Crack tips are identified by diffraction but it is also very effective for the detection and sizing of Weld Root Erosion or Corrosion (WRE or WRC).

The nature of the reflection of the ultrasound from eroded/corroded areas in the TOFD pitch-catch arrangement makes it ideal for the detection of Weld Root Erosion/Corrosion. This approach has a proven track record as an accurate method for the detection and monitoring of corrosion and erosion damage in the weld and heat affected zones.



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Sonomatic has offices in strategic global locations so we can respond quickly to customers' requirements wherever they may be situated. Our high quality products are matched only by our customer service. In addition to our field services, we offer training and consultancy at our sites in the UK or at clients' premises anywhere in the world.

Sonomatic is committed to improving asset performance through applied and innovative technology; to delivering these benefits to our customers in the products and services that we provide; and to working with our customers, as value-added partners, to realise the maximum benefits of inspection technology.

As illustrated in Figure 1 the digital images generated can be used for accurate interpretation and visual representation of the data which can be interpreted by the client with minimal training. Conventional UT techniques have been identified as unreliable in depending on manual interpretation of individual a-scans and a single transmit-receive transducer.

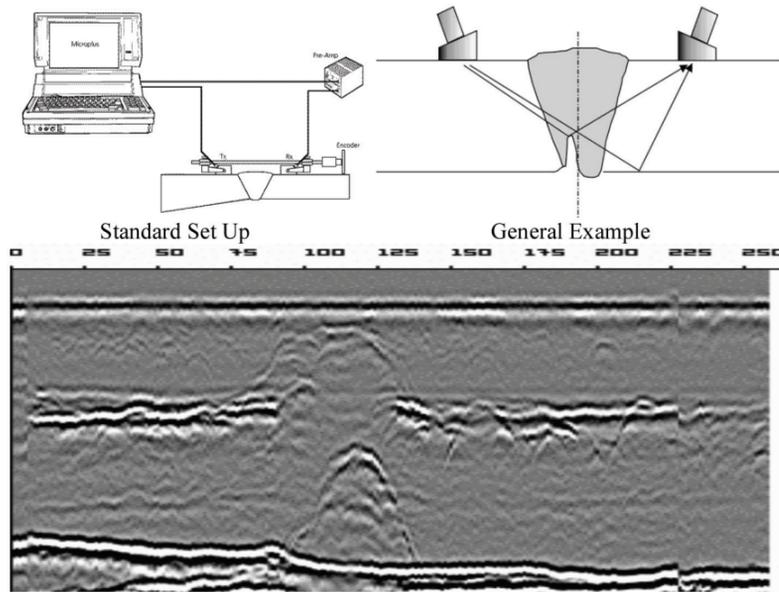


Figure 1

Unlike conventional approaches the beam spread of the TOFD probes covers and images both the weld body and heat affected zone.

**Our approach to WRE inspection:**

Sonomatic are the leaders in the deployment and advancement of the TOFD technique for WRE. With more than 20 years experience in the Oil and Gas and other industries, Sonomatic professionally develop and adapt techniques for highly accurate inspections. The WRE inspection package includes:-

- TOFD inspection of the welds including offset scans where applicable.
- 0° B-Scan digital images of the parent material adjacent to the welds.
- Taper inspections of flanges.
- Final engineering assessments of the welds with material loss.
- Inspection programme management
- Data management.
- Remote Access deployment.

**Applications:**

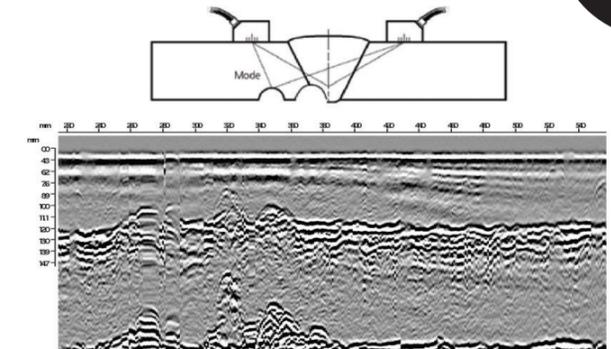
- Pipe to Pipe
- Plate
- T Sections
- Flanges
- Pipes 4"- any diameter
- Thicknesses 8mm and thicker

The technology provides an advanced detection and monitoring tool aimed at generating data that allows reliable engineering assessments. Sonomatic can assist with assessment of WRE data as follows.

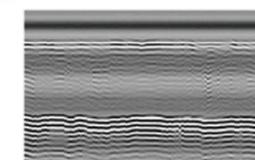
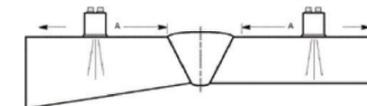
- Interpretation of inspection results for defect characterisation. A good understanding of the nature of the defect and its dimensions is essential to reliable fitness for service assessments. Our involvement in inspection services means we have firsthand experience in the interpretation and application of data from a range of inspection types.
- Fitness for service assessments in accordance with API 579, BS7910 and B31G. These codes cover the majority of in-service defect types likely to be encountered in pipework in the Oil & Gas and process industries.
- Corrosion engineering assessments to validate the type of degradation and provide estimates of potential future degradation rates. This, coupled with an understanding of defect criticality, forms the basis for defining inspection intervals in management of pipework with WRE.
- Fatigue assessments to estimate remnant life of pipework under cyclic stresses.
- Statistical analysis of WRE data to demonstrate that the required level of assurance is achieved by an inspection. This approach is applicable in cases when an inspection having limited coverage has been carried out.

- Definition of future inspection requirements to ensure ongoing integrity. A good understanding of the current condition of equipment, the likely changes in condition over time in service and the critical defect sizes allows a robust inspection strategy to be defined. This is further enhanced through specification of inspection techniques that are most effective in monitoring the type of degradation under consideration.

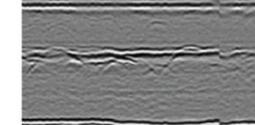
**TOFD on Welds for Weld Root Erosion**



**Zero Degree Digital Imaging**

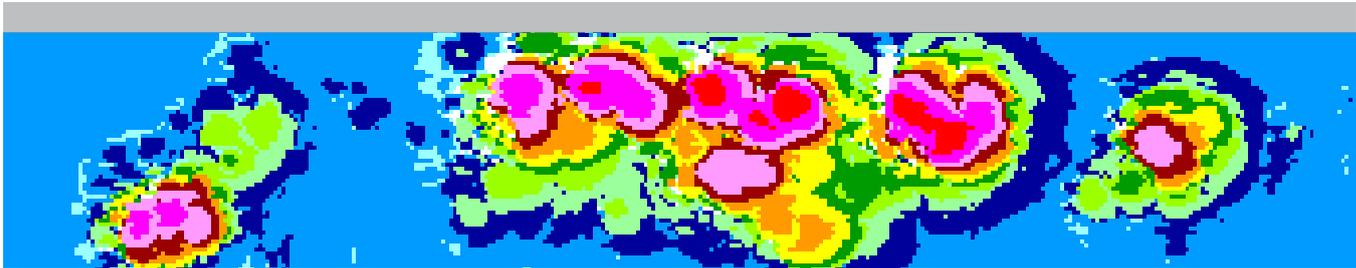


Zero B-Scan Clean Backwall

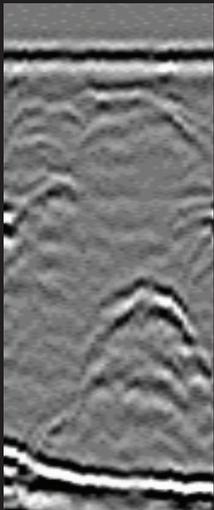


Zero B-Scan Early Stage Pitting





## An Integrated Approach to Weld Root Erosion and Corrosion from Sonomatic



### QA and HS&E

It is Sonomatic's ongoing commitment to supply services and products, through the application of technical and engineering excellence, which complement both the customer's and our own QA and HS&E requirements.

Sonomatic's commitment to quality is maintained through continuous assessment and review of our Quality Management Systems to BS EN ISO 9001:2008. Sonomatic actively promotes the development, implementation and improvement of our QMS as a part of our ongoing drive to enhance customer satisfaction by meeting or exceeding customer requirements. In 2009 Sonomatic achieved UKAS accreditation as an Inspection Body to BS EN ISO/IEC 17020 (UKAS IB4276).