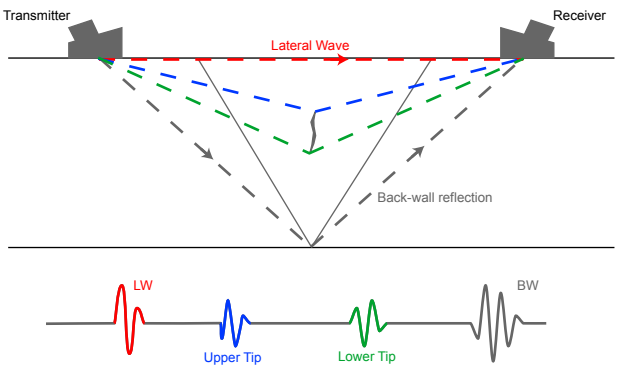
NDT Services from TWI

Time of Flight Diffraction (TOFD)

Description

The principle of Time of Flight Diffraction (TOFD) is shown here. Two probes are mounted in an assembly that straddles the area to be inspected (usually a weld). The transmitter probe floods the material with a wide beam of ultrasound. The receiver probe collects a number of signals.



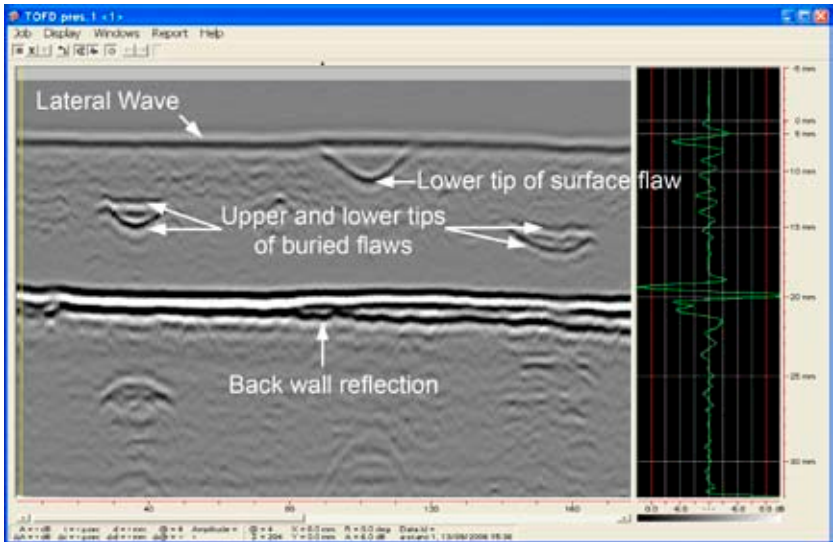
Schematic showing the principle of Time of Flight Diffraction

The first signal to arrive is the lateral wave travelling along the material's surface. If any flaw is present, its tips (upper and lower) diffract the ultrasound and the receiver collects signals from these tips. Finally, a signal is received from the back wall. The times of flight of the lateral and back-wall echo signals serve to calibrate the speed of ultrasound in the material. The time of flight of the Upper and Lower Flaw Tip signals enable the positions of these tips and hence the position and through wall height of the flaw to be accurately determined.

The advantages of TOFD over pulse echo ultrasonics are this accuracy of flaw sizing plus the fact that detailed standards exist for TOFD inspection of welds.

Zetec Tomoscan III

TOFD equipment in use



TOFD display

TWI has four systems capable of TOFD inspections: two phased array and two more conventional advanced computerised UT systems:

- Olympus NDT's Tomoscan Focus phased array system.
- Zetec Tomoscan III 128 channel phased array flaw detector.
- Sonotron NDT's Isonic 2005.
- Force Technology P-Scan 4+ 8 channel flaw detector.
- Inspection Solutions USB Sector Scan 2 channel flaw detector

TWI has a range of versatile scanners manual and mechanised, which can be used to manipulate probes and can be used with its TOFD systems. The photograph on the left shows a simple hand-held TOFD scanner being used to inspect the girth weld in an offshore riser pipe.

The computer screen display beneath shows a typical TOFD image, in this case produced by the P-Scan instrument.

Selected clients and applications

- TOFD inspection of seam welds in NGL storage bullets in Saudi Arabia.

For more information on the services offered in this leaflet, contact:

NDT Technology Group

TWI Ltd, Granta Park, Great Abington, Cambridge, CB21 6AL, UK
Tel: +44 (0)1223 899000 Fax: +44 (0)1223 892588

TWI Technology Centre (Wales) Ltd, ECM^2,
Hoel Cefn Gwrgan, Margam, Port Talbot, SA13 2EZ, UK
Tel: +44 (0)1639 873100 Fax: +44 (0)1639 864679

E-mail: ndt@twi.co.uk
Website: www.twi.co.uk

980.12/06