NDT Services from TWI

Long Range Ultrasonic Testing (LRUT)

Description

Plant Integrity Ltd (P*i*), a TWI subsidiary, makes and operates the *Teletest Focus*™ LRUT system. This is used to inspect pipe in order to detect corrosion and other flaws. It is able to transmit ultrasound many metres (typically 30m) along the pipe in both directions from a 'tool' comprising a 5-ring transducer assembly that is clamped around the pipe by an inflatable collar.

The transducers generate guided ultrasonic waves in the pipe and detect signals reflected from any flaws present. The location of these along the pipe is determined by the time of flight of the ultrasound.

LRUT comes into its own when the bulk of the pipe is inaccessible (insulated, buried, elevated on racks, etc.). In these cases access to the pipe's surface is only required over a length of about 1m in order to mount the transducer collar.

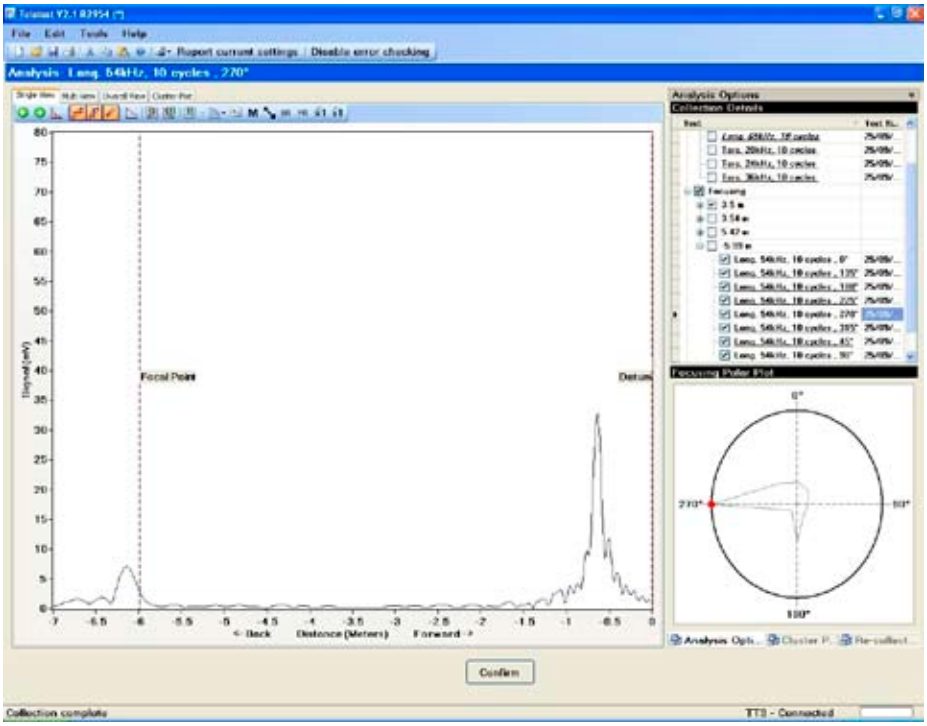
The philosophy behind the new *Teletest Focus*™ equipment has been to produce a lightweight, field-manoeuvrable, high-productivity system in order to maximise return on capital investment. The flaw detector is powered by an integral battery and the one-piece carbon fibre composite collars, which are 40% lighter than Mark 1 versions, are automatically pressurised and monitored using a pump 'on board' the flaw detector unit. A self-diagnostic capability ensures that the tool is correctly coupled to the pipe surface.

The 5 transducer rings provide multi-mode capability and are arranged so that 3 transmit longitudinal and 2 transmit torsional waves. The software, which includes a powerful template driven report generator, is designed to simplify the tasks of the operator and to collect the data with a minimum number of keystrokes. It carries out a sweep of frequencies automatically selected on either side of the theoretical optimum for each wave mode. Thus both wave mode and frequency can be optimised.

Teletest Focus™ *Mark 3 tool, flaw detector and laptop - all that is required for a test*

The multiple frequency data can be displayed and compared on a single screen. In addition, the Mark 3 flaw detector is a 24-channel unit, enabling the transducers to be fired as a phased array. This makes it possible to focus ultrasound at a selected position both along and around the pipe. Formerly, it was only possible to locate a flaw along the pipe. Furthermore, it was impossible to distinguish between a widely distributed series of flaws around the pipe and a more concentrated flaw of the same overall cross-sectional area.

Teletest Focus™ *in use for the inspection of buried pipe at a US oil terminal*



View showing focusing output. In this case ultrasound is focused on an indication at a range of 6m and at an angular position of 270° as shown on the polar plot (bottom right

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The phased array capability makes it possible to locate a flaw to within one eighth of the pipe's circumference and means that the system has the potential to move from one that can solely be used for screening to one that also has an approximate flaw sizing capability.

Teletest Focus™ is supported by TWI's LRUT Group. They currently have 20 engineers and technicians involved in research programmes concerned with LRUT to a value of 15.5 million euro (US$19.1 million or sterling £10.5 million). Information about these programmes can be found at www.twi.co.uk/lru

Selected clients and applications

Teletest® is widely used in the oil, gas and petrochemical industries. Examples are:

- Insulated oil pipes sleeved in road crossings for Phillips Petroleum in Alaska.
- Offshore risers for ExxonMobil in the Gulf of Mexico and for the Thai State Oil Company in the South China Sea.
- Buried pipes in ExxonMobil's Jay Field in Florida.
- Gas pipelines for PDVSA in Venezuela.
- Slug catchers for Transco in the UK.
- Headers at a gas compressor station for Northern Borders Pipeline in Montana.

24" sleeved road crossing in Alaska

36"dia x 44mm thick gas compression station header inspected using Teletest® to detect corrosion at concrete supports

TWI WORLD CENTRE FOR MATERIALS JOINING TECHNOLOGY

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

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