TesTex
State of the Art Products and Services for NDT

TS-2000 MULTICHANNEL NDT SYSTEM FOR BOILER TUBE INSPECTION

AVOID EXPENSIVE BOILER TUBE FAILURES IN YOUR PLANT. THE **TESTEX TS-2000 NDT SYSTEM** IS THE MOST INNOVATIVE O.D. SCANNING SYSTEM AND METHOD FOR TESTING WATERWALLS, SUPERHEATERS/REHEATERS/ECONOMIZERS, AND OTHER TUBING/PIPING TO DATE.

The TS-2000 is a multichannel NDT system for scanning most any boiler tube/pipe from the O.D. It detects and quantifies I.D., O.D., and internal material defects in ferrous and nonferrous materials. The system uses a dry non-contact method based on the principles of Electromagnetics. It is forgiving to uniform surface scale and tests at a scanning speed of 10 to 15 ft. (3 to 4.5m) per minute. The system is fast, accurate, cost effective, and field proven. Furthermore, the system can be adapted to many different applications such as testing ligaments, bends, space constricted areas, and small diameter tubing.

Testing being performed on waterwall tubing inside an actual boiler.

Advantages and Design Features

- Dry non-contact method. No couplant necessary.
- Uniform rust, scale, and coatings have no impact on testing process.
- Variety of contoured scanners to fit any tube/pipe diameter.
- Special application scanners available for many different tasks such as ligaments, bends, space constricted areas, and small diameter tubing.
- Scanning speed up to 10 to 15 ft. (3 to 4.5m) per minute.
- Light weight, modular, DSP based electronics/PC operated.
- Real time data display with advanced signal processing.
- High resolution color graphics with 3D display.
- 8 or 16 sensors to achieve up to 170 degrees of coverage in a single scan.

The TS-2000 DSP (Digital Signal Processing) based 8 channel electronics.

2.5" (63.5mm) and 3.0" (76.2mm) O.D. scanners for tube testing. These scanners can be contoured to test tubes of any diameter.

A variety of low-profile special application scanners.

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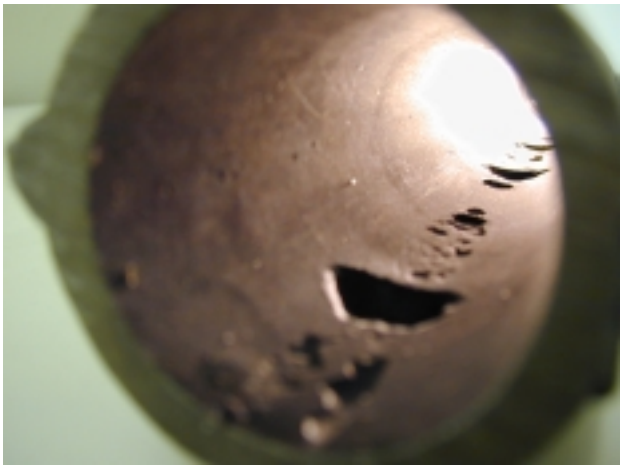
Tel: 091-22-555-8282

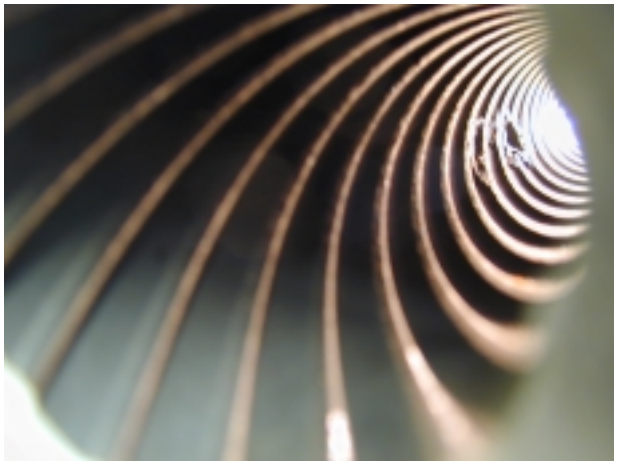
Examples of Typical Defects

The TS-2000 can detect caustic and phosphate gouging, hydrogen damage/corrosion cells, oxygen pitting, cracking (including stress corrosion cracking on stainless steel), flue gas/high/low NOx and SOx erosion, wormholing, and manufacturing defects (by baseline inspection).



Boiler tube with caustic gouging on the I.D. (end view)

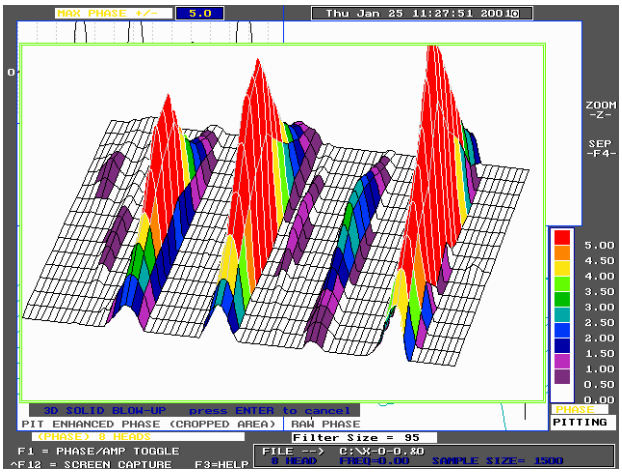
Boiler tube cut in half showing hydrogen damage (cross section)



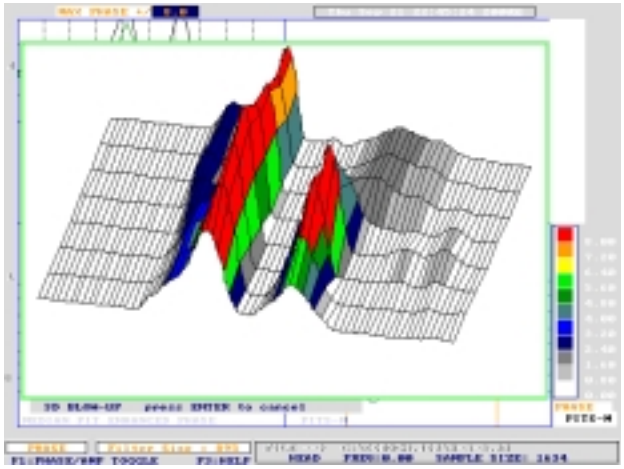
Rifled boiler tube with two localized pits (end view)

Software Representations

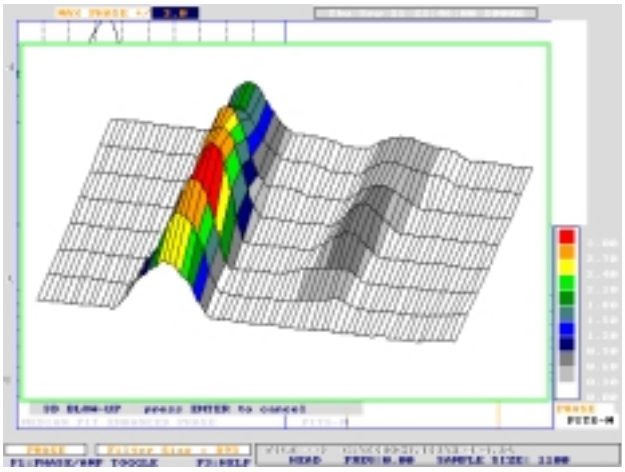
The TS-2000's **SCAN** software package contains modules for Data Acquisition, 3D Full Color Data Display, Quick View Analysis, and Advanced Digital Signal Processing. This provides accurate flaw detection, location, and quantification of boiler tube defects.



Waveform response showing caustic gouging from tube on left.



Waveform response showing severe hydrogen damage from sample on left



Waveform response showing two localized pits from sample on left

Visit our website *www.testex-ndt.com* for information on other products and services

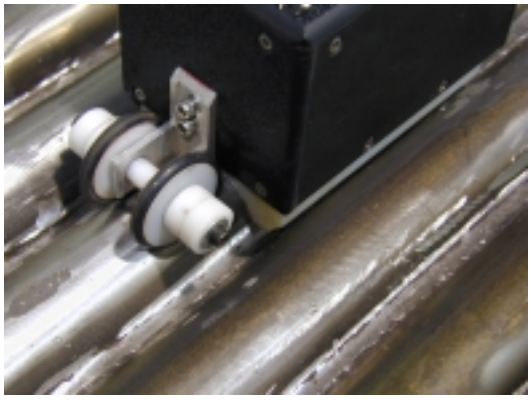
Detection Capabilities

Using a standard size O.D. scanner on material of 0.250” (6mm) or less, pitting of 0.125” (3mm) diameter at 30% depth is detected. Circumferential and axial cracks can also be detected and quantified using EDM notch calibration pieces.

Specialized Scanners

This page shows many scanners developed by TesTex for specific applications. New and innovative designs have allowed for expanded system versatility in finding solutions to some of industry’s biggest problems.

Ligament



Enhanced scanner for detecting corrosion fatigue cracking on tubes at or near ligament interface.

Ligament scanner for testing interface between tube and ligament and surrounding area on two adjoining tubes.

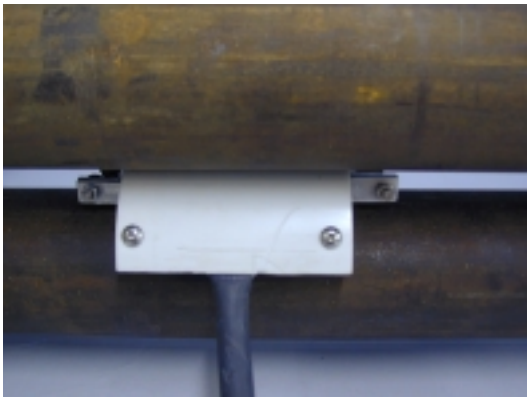
Bend

First type of bend scanner for testing the extrados of the tube bends.

Second type of bend scanner for testing the sides of the bends.

Third type of bend scanner for testing the intrados of the tube bends.

Low-Profile



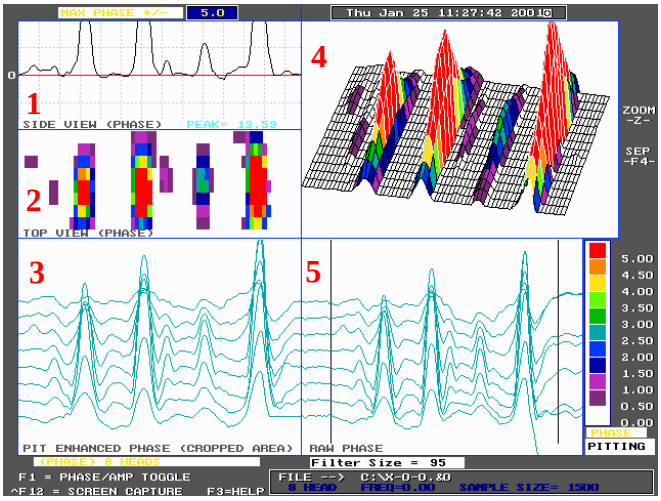
Low-profile scanners for hard to reach areas and space limited areas between tubes. These scanners can typically fit between tubes where only 0.500” (12mm) of space is available.

Small Diameter Tubing

Scanners for tube diameters less than 1” (25mm).

Software Features

- User friendly menu driven functions.
- Special real time signal processing algorithms.
- Real time 3-D full color display.
- Rotating view for seeing hidden flaws.
- C-scan type overhead view
- Digital filtering for signal interpretation.
- Zooming algorithms for detailed views.
- Uniquely separates pitting from gradual wall loss or gradual wall loss from pitting, by suppressing one or the other.



Full screen view of the display software with caustic gouging defects. 1) side view, 2) top view(c-scan), 3) 8 channel processed window, 4) 3D view, 5) raw data window.

Field Services

TesTex has been performing TS-2000 boiler tube inspections for the past several years. To date, the TS-2000 has tested tubes in over 150 boilers worldwide. It is through this experience that TesTex has developed the most state of the art, versatile products in the industry today.

Field service crew performing an inspection of a boiler waterwall.

Ligament inspection using a special scanner.

Technical Specifications

Electronics

Electronics Base	Digital/DSP based
Channels	8
Power Consumption	Max 15VA
Line Voltage	110/220 VAC (self adjusting) 50/60 Hz
Dimensions	13” (330mm)L x 11.5” (292mm)W x 3.5” (80mm)H
Weight	5 lbs. (2.27kg)

Scanner

Measuring Technique	Low Frequency Electro-magnetic Technique (LFET)
Maximum Penetration	0.750” (19mm) carbon steel
Number of Sensors/Channels	8/8 or 16/8
Inspection Width	up to 170 degrees under 4” O.D.
Scanning Speed	10 to 15 ft (3 to 4.5m)/min
Dimensions (varies with application)	
Height:	0.5” (12mm) - 3.5” (89mm)
Length:	1” (25.4mm) - 5” (127mm)
Width:	1” (25.4mm) - 4” (102mm)
Weight (varies with application)	5 oz - 1.5 lbs (0.14 - 0.7kg)

The components above are used with a standard 50 ft. (12.7m) scanner cable, serial port connector, 110/220 VAC power cord, and a pentium PC. The total weight of the system is under 15 lbs (6.8kg). It is easily packed for transport and can be taken anywhere inside the plant.

TesTex, Inc. offers the TS-2000 for lease, sale, or service performed by our professional staff. TesTex also provides services for the inspection of heat exchangers, boilers, storage tanks, pressure vessels, pipelines, etc. Please call for details.

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