

Flow Accelerated Corrosion (FAC) Inspection Using Pocket UT™

Introduction

Physical Acoustic Corp. and NDT Automation, members of MISTRAS Group's Products & Systems division, have an innovative tool, the Pocket UT™ handheld Ultrasonic System, for flow accelerated corrosion inspection in Power Generation facilities. Our Pocket UT™ is a tool to assist with the widespread problem within the steam water circuits of power plants.

Current Condition

Flow Accelerated Corrosion (FAC) is a very serious problem in Power Generation facilities. It is an increased rate of corrosion or material dissolution caused by the fast flow of a fluid on an unprotected material surface. FAC often occurs in liquid and liquid-steam carbon steel piping at temperatures between 120°F - 550°F (35°C-290°C). The turbulent flow of the liquid is generally at velocities greater than 10 f/sec.

The pipes and elbows must be tested with ultrasonics to determine remaining wall thickness. Currently, this is being done with conventional thickness gages. The process is time consuming and provides a limited amount of data.

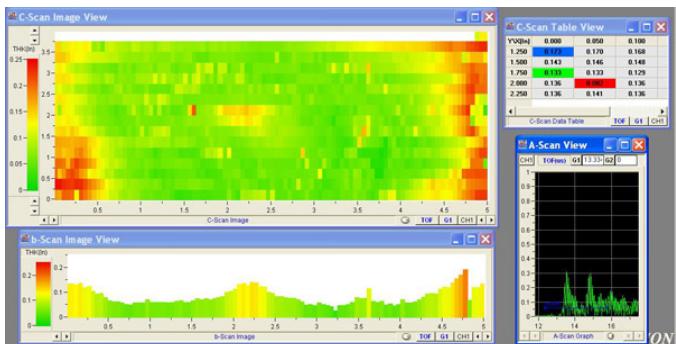


Pocket UT™

MISTRAS Products & Systems has an answer with the Pocket UT™. The Pocket UT™ is a hand held, battery powered C-scan imaging system capable of displaying A-scans, B-scans, and C-scans. With the accompanying R-scan single axis encoded scanner with magnetic wheels, an inspector can test pipes and elbows for FAC in a fraction of the time compared to conventional thickness gages. The unique dry coupled 5MHz roller transducer adds to the efficiency of the system by not requiring couplant.

The system runs on Windows CE and Pocket UT™ Win for data acquisition, analysis, and archiving. The Pocket UT™ has the capability to perform A, B, and C-scans, placing the unit in a class by itself. The heart of the 2 pound unit is a 20MHz bandwidth, 1kHz pulser/receiver board that is powered by a 7.2V NiMH battery giving the instrument 4 hours of continuous use. Thickness, amplitude, waveform and location data is stored on a 1GB compact flash card that can be transferred to a laptop computer using the USB port.

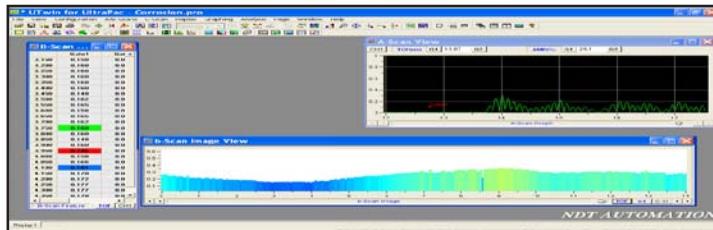
The Pocket UT™ can interface with 2 axes of motion. The open architecture allows the instrument to interface with any 2 axes encoded manual scanner or stepper motor scanners. Resolution is limited only by the scanner, with typical scans taken at .050".



C-scan of pipe showing volumetric corrosion

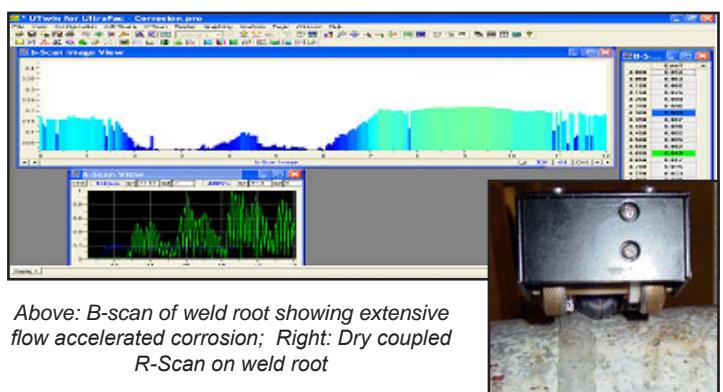
Case Study: FAC Inspection

An inspection was performed using both the Pocket UT™ and a conventional thickness gage. The elbow was prepared by manually gridding the surface for the location of thickness readings. This is very time consuming and took over an hour. The technician then took his thickness readings by applying couplant to each spot and saving the single thickness point.



Circumferential B-scan of a pipe showing corrosion

The Pocket UT™ was used next and took the same data in less than twenty minutes. By using the R-scan single encoded scanner, every location was stored along with the thickness and amplitude data. It was then analyzed in a color coded C-scan map immediately showing the areas of corrosion. The speed and effectiveness of the Pocket UT™ enables the inspector to gather more information quicker and easier.



Above: B-scan of weld root showing extensive flow accelerated corrosion; Right: Dry coupled R-Scan on weld root

During the same inspection, a weld was scanned at the root with the R-scan roller probe and found extensive corrosion/erosion on the underside. This information would not have been found the conventional way of testing.

Conclusion

The Pocket UT™ has become one of the most important ultrasonic tools for detecting FAC in pipes with flowing water or wet steam since the development of the monitoring program to aid in preventing FAC induced failures.



Pocket UT™ comes complete with hand-held unit, transducer, cables, battery charger & couplant

MISTRAS Products & Systems division, is a team of skilled researchers, engineers, technicians and manufacturing personnel dedicated to the development of practical and cost saving solutions to your challenging inspection needs.

For a demonstration or additional information, please contact our Princeton Junction headquarters at 609-716-4000.