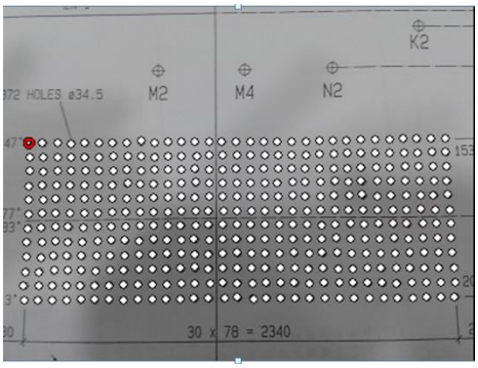
CASE STUDY – ACOUSTIC PULSE REFLECTOMETRY

Chemical Plant (Malaysia)

Waste Heater Boiler Inspection

Job Overview

Arise Global performed an Acoustic Pulse Reflectometry (APR) non-invasive inspection on two waste heat boilers at a chemical plant in Malaysia consisting of a total of 1118 tubes, which has peculiar configuration and remain untested since commissioning. The primary reasons for selecting an Acoustic Pulse Reflectometry inspection were based on the following:



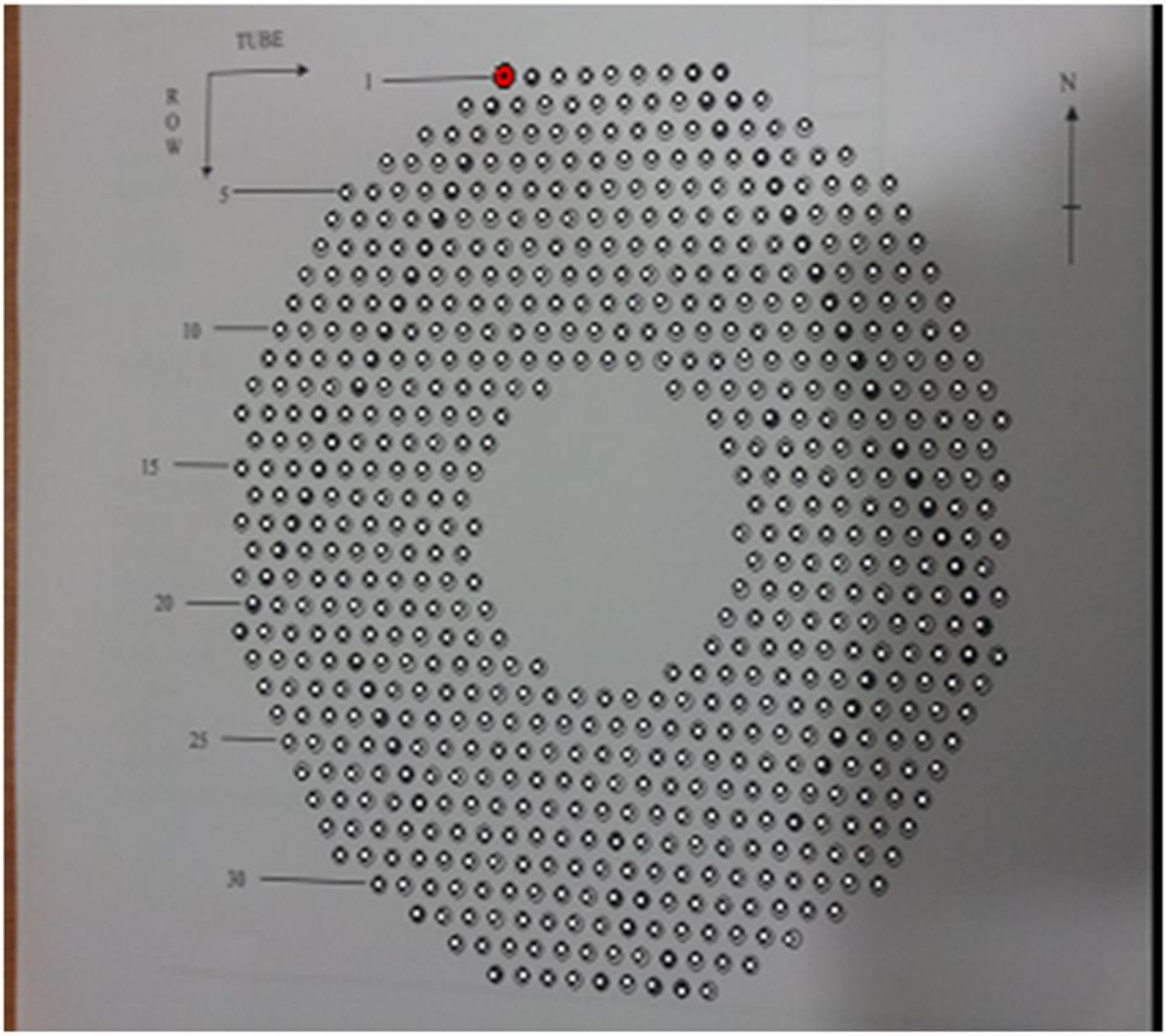
- Non-Invasive & Easy access: Acoustic waves could propagate in any configuration using air as a medium.
- Accuracy: Defect type, its size and location could be reported precisely.

Each waste heat boiler inspected had two different configurations of tubes. One is termed as plain tubes and other as stay tubes. Each type had ferrules (tube inserts) to reduce erosion at tube beginning. Conventional technologies couldn't inspect such tubes easily because of the tube ID variations at beginning & throughout the tube.

Summary of Inspection Results

Tube Size	Plain Tube(33.4mm/42.16mm) OD; Stay Tubes (53.2mm/60.14mm) OD
Tube Thickness	Plain Tube (4.85mm/5.3mm); Stay Tubes (6.1mm/7.3mm)
Tube Length	16.4042ft (5m)-Average Exposed Length
Tube Shape	Special configuration (Tube starts with 23.7mm ID and flares to 31.56mm)
# of Tubes	1118 (2 Equipment)
Defects Found	Pits >40%: 3 Pits 20-40%: 87 Erosion 20-40%: 3
Inspection Time	5 hours (1 APRIS system)
Outcome	- All tubes with pitting >60% were plugged. - Baseline for corrosion is framed based on the defects highlighted in the report.

Tube Sheet Diagram

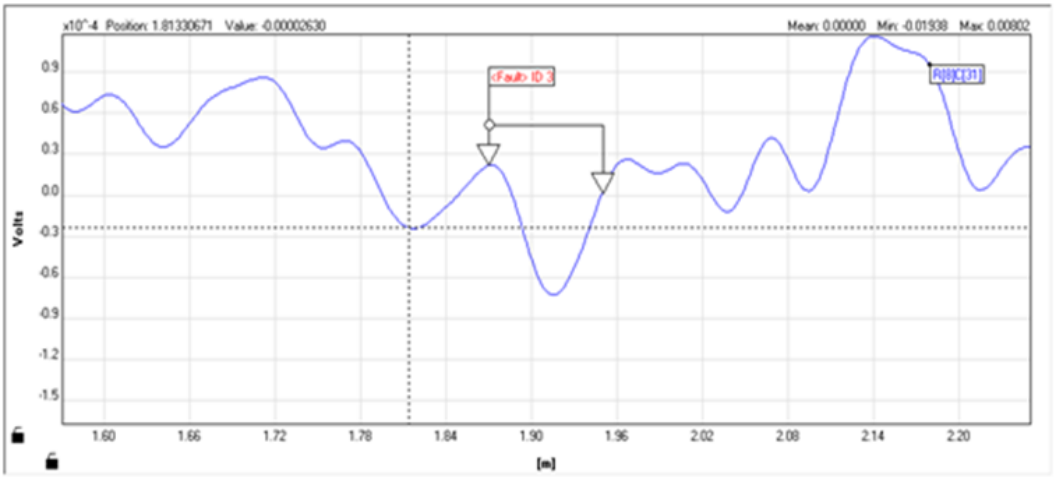


About APRIS's Non-Invasive Inspection

With APRIS's breakthrough capabilities for inspecting today's most challenging tube sizes and configurations up to 4", it is possible to inspect boilers, Fin Fans and other heat exchangers in any shape or material. Ultra-fast, accurate testing can be performed at a fraction of typical inspection cycle times and without extra inventories of consumable probes and standards. Utilizing Acoustic Pulse Reflectometry (APR) technology, APRIS is a very advanced yet easy-to-use tool. With its simple operation, automated analysis and report generation, there are minimal training requirements and far less dependency on operator expertise.

Defect Examples

APR Defect Identification



>> Pitting