CASE STUDY – ACOUSTIC PULSE REFLECTOMETRY

LNG Carrier (Malaysia)

Boiler Tube Inspection

Job Overview

Arise Global performed an Acoustic Pulse Reflectometry (APR) non-invasive inspection on two marine boilers (Port Side & Starboard Side) at an LNG Carrier in Malaysia consisting of a total of 550 tubes, which has peculiar configuration and has limited access for inspection. The primary reasons for selecting an Acoustic Pulse Reflectometry inspection were based on the following:

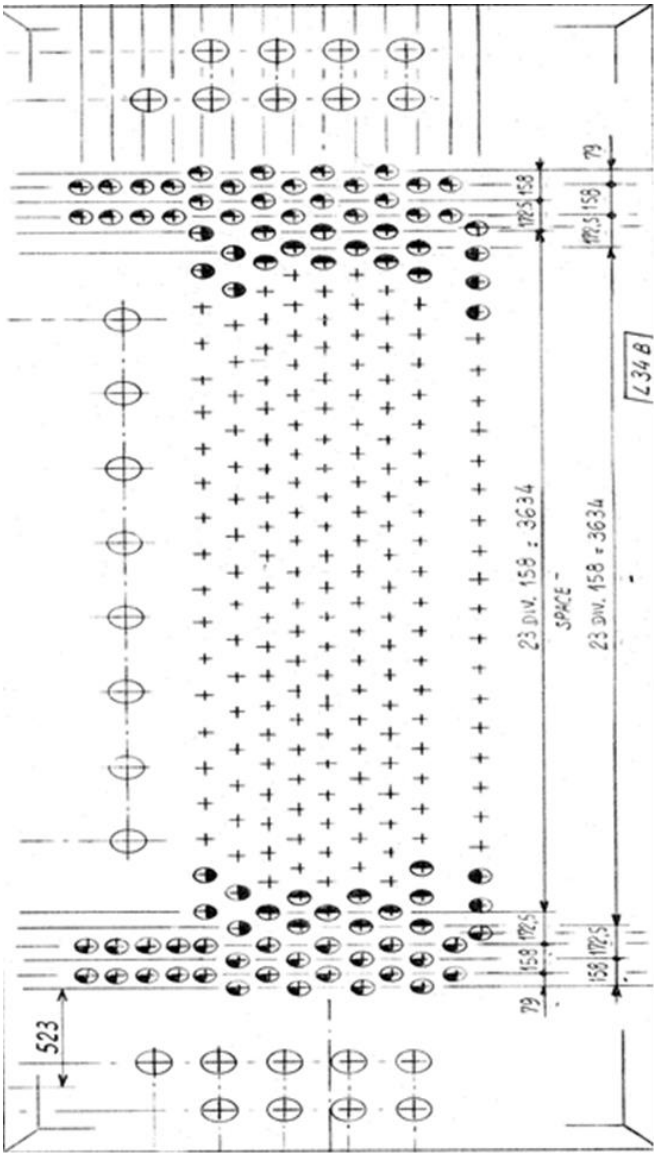
- Non-Invasive & Easy access: Acoustic waves could propagate in any configuration using air as a medium
- Accuracy: Defect type, its size and location could be reported precisely.

Each boiler inspected had different tubes with varying ID throughout the tube. Screen tubes/ Wall tubes as well down comer tubes are inspected by us within few hours and reported defects as suspected by operation personnel. Conventional technologies could not inspect such tubes easily because of the tube ID variations at beginning & throughout the tube.

Summary of Inspection Results

Tube Size	Screen/ Wall Tube (76.1mm/2.996”) OD; Down Comer Tube (137.9mm/5.4291”) OD
Tube Thickness	Screen/ Wall Tube (4.5mm/0.177”); Down Comer Tubes (6.5mm/0.255”)
Tube Length	26.2467ft (8m)-Average Exposed Length
Tube Shape	Special configuration
# of Tubes	550 (2 Equipment)
Defects Found	Hole:1 (4.5mm) Pits >40%:2 Pits 20-40%:61 Erosion 20-40%:112
Inspection Time	5 hours (1 APRIS system)
Outcome	- All tubes with hole & pitting >40% were removed and replaced with new tubes. - Client for the first time, has framed baseline for corrosion for existing boiler tubes based on the inspection carried out and will monitor corrosion growth during subsequent APR inspections.

Tube Sheet Diagram

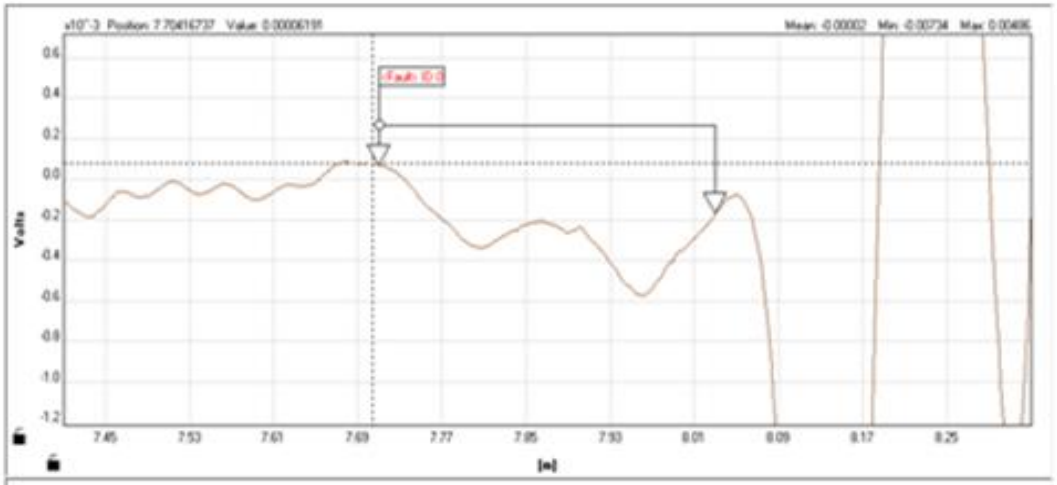


About APRIS's Non-Invasive Inspection

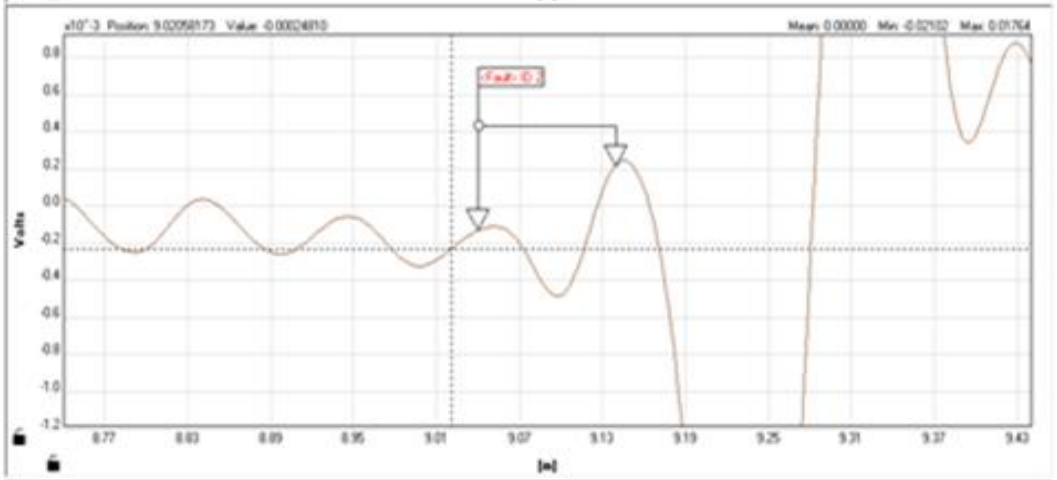
With APRIS's breakthrough capabilities for inspecting today's most challenging tube sizes and configurations up to 4", it is possible to inspect boilers, Fin Fans and other heat exchangers in any shape or material. Ultra-fast, accurate testing can be performed at a fraction of typical inspection cycle 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

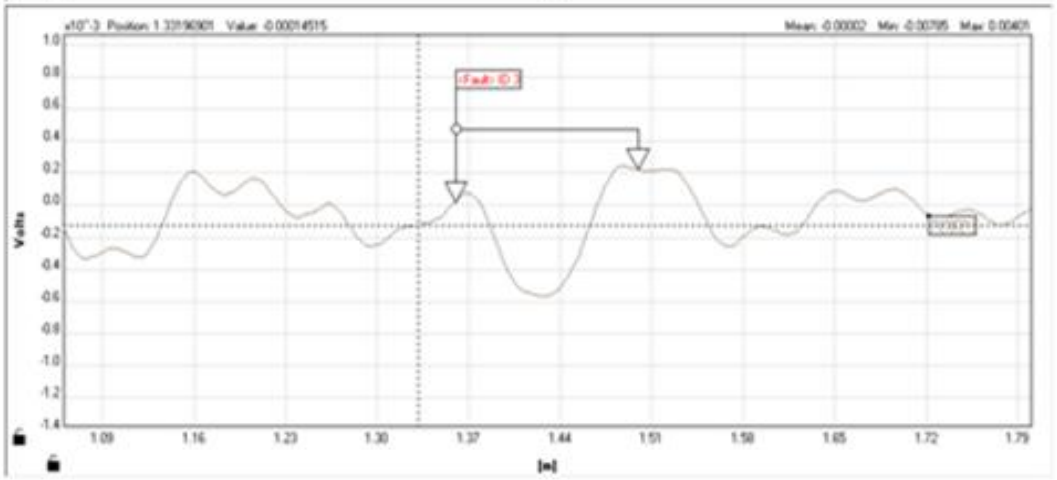
APR Defect Identification



>> Hole



>> Erosion



>> Pitting