



# Heat Exchanger and Boiler Tube Inspection

## Using Acoustic Pulse Reflectometry

Acoustic Pulse Reflectometry (APR) is a specialised technology that measures the ensuing reflection from the surface abnormalities by sending sound pulses down the tube using air as a medium.

Any changes in the cross sectional area in the tubular system generates a reflection. These reflections are generated from the change in geometry in the tube when sound travels down the tube.

Each defect has its own signature and our patented algorithms identify, classify, and report the location and size of defect.

## Inspects Any Shape, Size, and Material!

APRIS has the capability to examine tubes of different geometric such as U-bend, twisted and spiral wound tube. Material such as ferrous, non-ferrous, graphite and plastic does not have any impact on APR technology results.

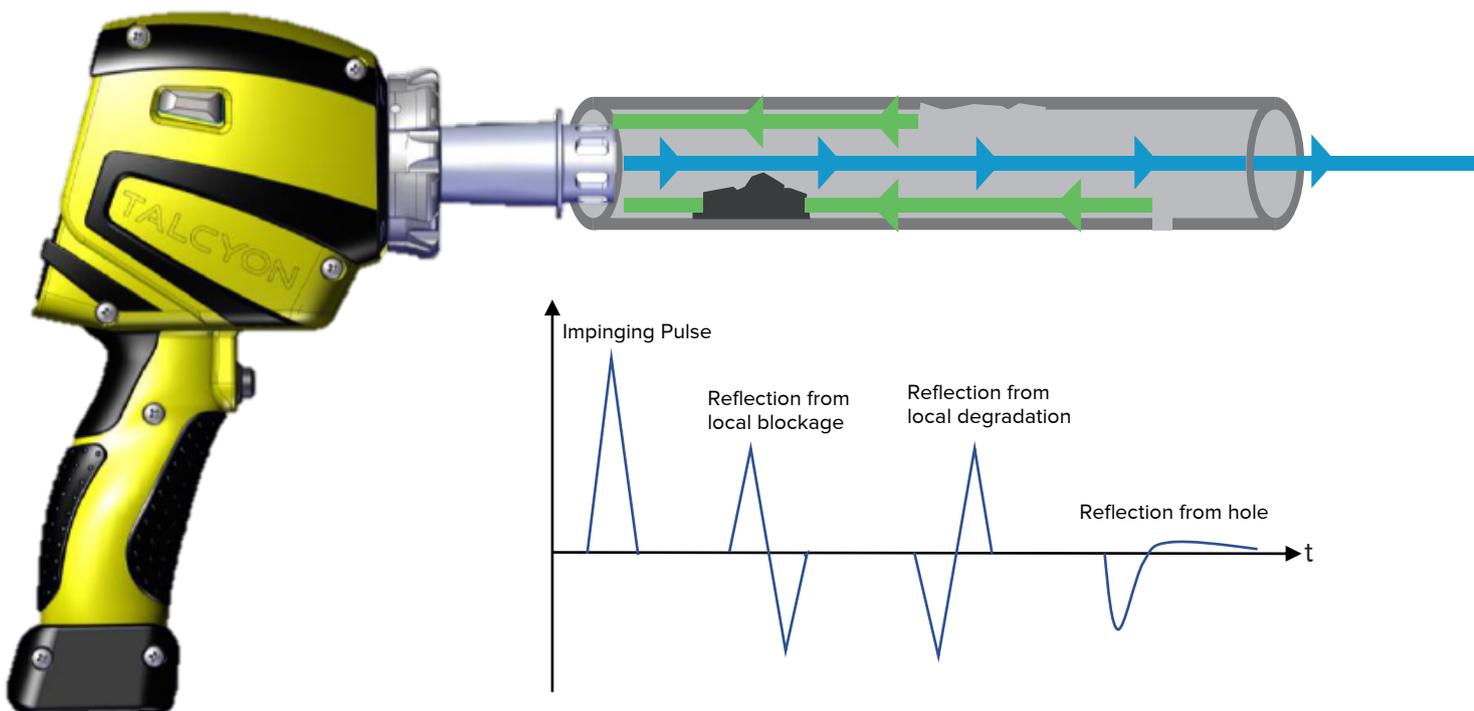
## Ultra Fast and Saves Cost!

Shutdowns in plants are a major disruption in daily operation and are expensive.

Maintenance teams have a tight schedule during shutdown to inspect the heat exchangers and boilers.

Our APRIS (Acoustic Pulse Reflectometry Inspection System) uses APR technology with a patented algorithm that examines each tube in just 10 seconds. This speedy examination allows the maintenance team to

- ||| Reduce overtime
- ||| Meet the plant's turnaround schedule
- ||| Reduce unplanned downtime



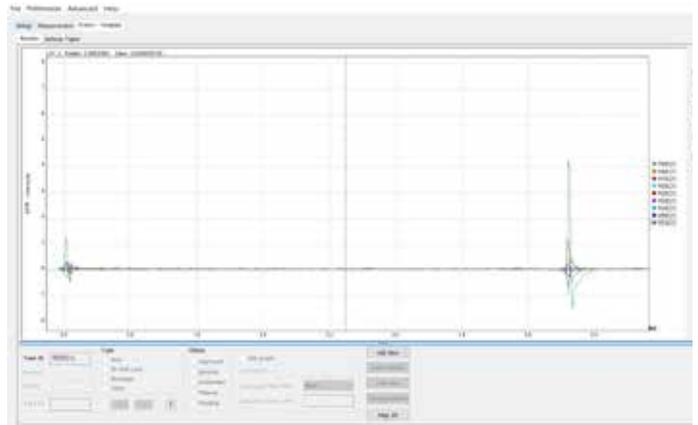
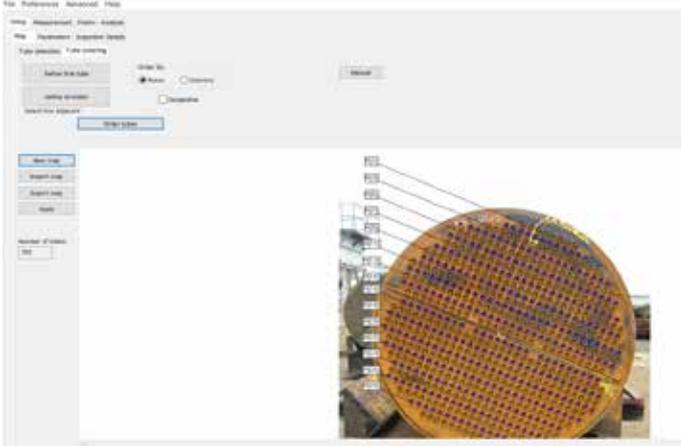
## User-Friendly Software!

APRIS software is simple to use with an intuitive tube mapping function.

The advance software is smart enough to detect tube diameter which allows you to do tube sheet mapping in minutes.

The interactive analysis feature allows you and operators to generate preliminary reports on-site.

Built on artificial intelligence that interacts with you when detecting, classifying, and sizing defects. You can then generate a customised report.



## APRIS Specifications

Tube ID Range	7mm to 100mm, 9/32" to 4"	
Max. Tube Length	Up to 25m (from one end). Up to 50m (from two ends).	
Inspection Range	8mm to 83.5mm (5/16" to 2.5") Tubes	63.5mm to 100mm (2 1/2" to 4") Tubes
Holed Diameter	1mm (3/64")	3mm (1/8")
Blockages	5% of cross section reduction	10% of cross section reduction
Wall loss	10% of wall thickness	20% of wall thickness
Tube Configuration	U-bends, finned tubes, twisted tubes, multiple bends and spiral wound tubes.	
Tube Material	Ferrous and non-ferrous metal. Graphite, composites, polymers	
Inspection Speed	10 seconds per tube.	
APRIS Weight	Handheld device: 1.24Kg (2.73lbs) Total weight with box: 6.75Kg (14.88lbs)	
Software	APRIS Measurement (PTS M) and data analysis software (PTS A)	
PC OS	Windows 7, 10.	
Reports	Tube sheet mapping, customizable report. PDF format.	
Input Voltage	110-220V, 50-60Hz	
Temperature Range	-10° to +50° C (14° to 122° F)	
Compliance	CE Declaration of Conformity; Safety Certificate IEC 61010; EMC Test Certificate; Company Quality System certified to ISO 9001:2015	
Standards Code	ASTM E2906/E2906M-13 ASME BPVC.V-2017-Article 18	
Cleaning Requirement	Tube ought to be cleaned prior to the inspection. If the cleaning method involves water jetting, blow drying is recommended to avoid water stagation.	