



TALCYON



APRIS

Acoustic Pulse Reflectometry  
Inspection System

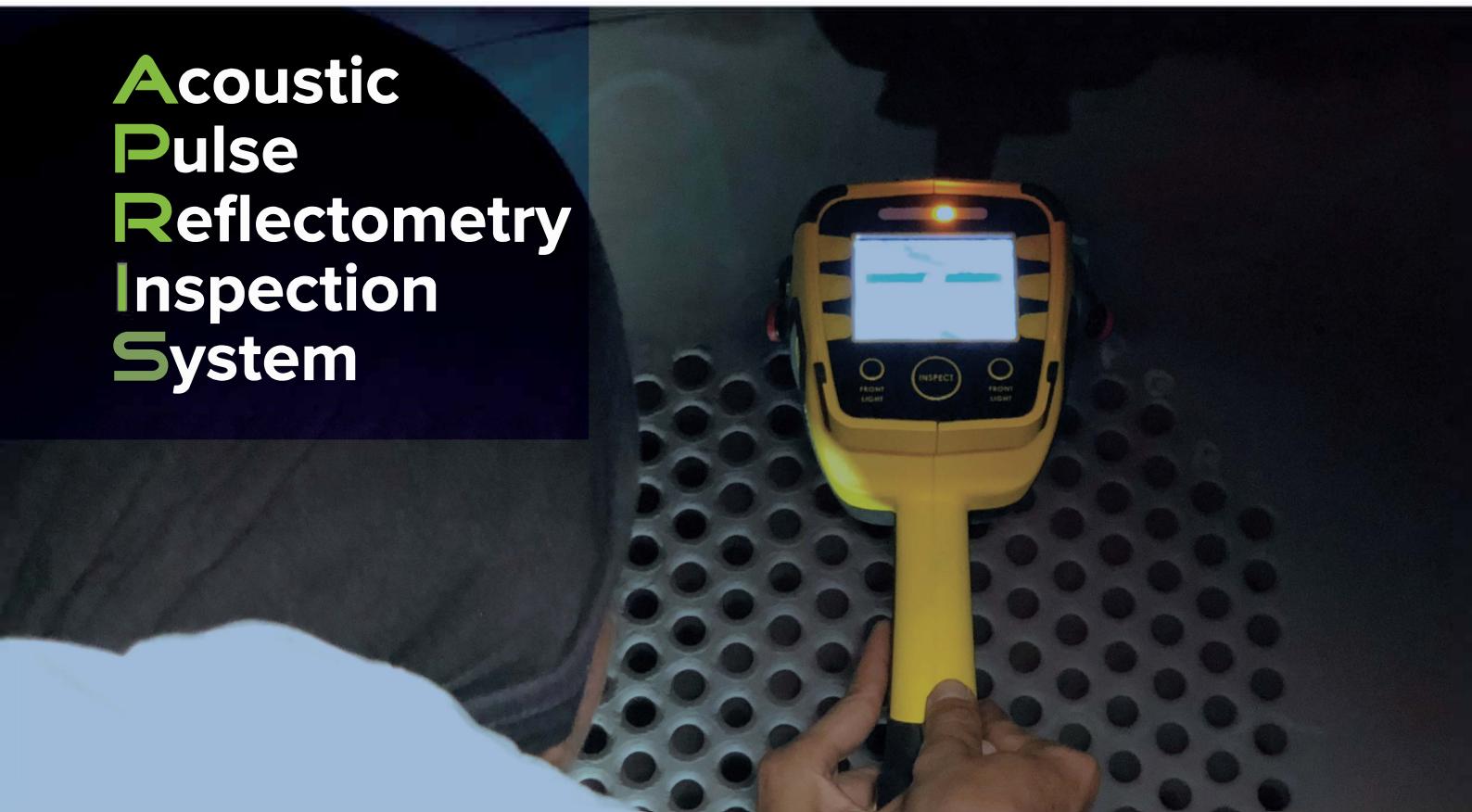
**Fast** || **Reliable** || **Intuitive**

*Key Industry:* Power Plant



## The Technology

# Acoustic Pulse Reflectometry Inspection System



The most important quality inspection function is prevention, whose most important goal is to make it before nonconformity.

— *The Journal of Power Engineering*

A delay of just

**20**

minutes

can result in tens of thousands of dollars of lost revenue depending on the size of the operation and power prices.

— *Powermag*

## Heat Exchanger Failure Mechanism

Possible factors that affect the performance and productivity within power plants



Under deposit cooling water corrosion of tubes



Process corrosion



Stress-corrosion cracking (SCC) of tubes in cooling water service



Steam/condensate corrosion



Process fouling

## How to minimize in-service tube failures using APRIS

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### MINIMIZE DOWNTIME

- Inspect 2,000 tubes per equipment during a 10-hour shift
- Use less resources and consumables for inspection

②

### EFFECTIVE DECISION-MAKING

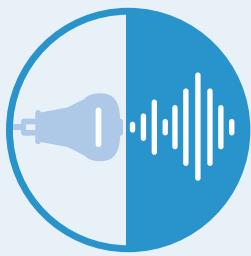
- Precise and reliable results based on 100% inspection
- Corrective actions in terms of plugging, re-tubing and design process change

③

### PREVENTIVE MAINTENANCE

- Mitigate risks associated with production output
- Conserve the lifespan of equipment

## How APRIS Works



### STEP 1

Probe injects an acoustic pulse down the tube.



### STEP 2

Returned echoes generated by defects are recorded and analysed.



### STEP 3

A set of proprietary, patented algorithms identifies and reports the exact location, type and size of inner diameter tube defects.

## APRIS Unique Key Features

Key attributes that set Talcyon's APRIS apart from conventional tube inspection tools and methods in the current market today.



### ANY TUBE SIZE UP TO 4" IN DIAMETER, REGARDLESS OF SHAPE OR MATERIAL

- U-bends, twisted and spiral wound tubes
- Ferrous & Non Ferrous, graphite and plastics



### ULTRA-FAST, NON-INVASIVE INSPECTION

- Less than 10 seconds per tube
- No need for inventory of consumable probes or standards



### LESS EXPERTISE REQUIRED

- Testing is easily performed by any operator with minimal training
- Artificial Intelligence based data interpretation & report generation

## Tube Testing

The impact of human factors is more prominent with the increased complexity and sophistication of today's NDT techniques. Root cause analysis of some of the tube failures identified the need for reliable technicians and technologies.

Technologies for inspecting heat exchanger tubes are rapidly changing and continually evolving. Variance in test results depends on both the instrument and operator expertise. APRIS delivers notable advantages in tube inspection for power plants by minimizing downtime and enhancing operator-level productivity.

### OUR POWER PLANT INDUSTRY APPLICATION

- Evaporator
- Condenser
- Pre Heater
- Raw water heater
- Interstage Cooler
- HP/LP Heater
- Drain Cooler
- Gland steam condenser
- Process heater and cooler
- Compressor cooler
- Atomizing air cooler
- Feed water heater
- Cooler of lube oil for gas turbine, steam turbine, and wind turbine

## APRIS Specifications

<b>INSPECTION RANGE</b>	Tube Size Length	7mm-100mm (0.27" – 4") inner diameter Up to 25m (82') length, if inspected from one end; Up to 50m (164') length, if inspected from both ends
<b>DETECTABLE DEFECTS</b>	5/16" – 2 1/2" (8mm – 63.5mm) Tubes	2 1/2" – 4" (63.5mm – 100mm) Tubes
	Holes	Minimum diameter 0.039" (1mm)
	Blockages	Minimum 5% of cross section reduction
	Wall Loss	Minimum 10% of wall thickness
<b>TUBE CONFIGURATION</b>	Any configuration including U-bends, finned tubes, twisted tubes, multiple bends and spiral wound tubes.	
<b>TUBE MATERIAL</b>	Any material including metals (ferrous & non-ferrous) and non-metals (graphite, composites)	
<b>INSPECTION SPEED</b>	10 seconds per tube depending on tube size, length and configuration.	
<b>HARDWARE</b>	Compact Handheld Device – Non-invasive probe assembly including a transducer, controls, LCD screen and adaptors.	
<b>SOFTWARE</b>	Data Acquisition Software – APRIS software installed on computer used for inspection setup, probe status and test data recording.	
<b>PORTAL</b>	Exclusively for interactive analysis using sophisticated algorithms based on artificial intelligence & deep learning which assist to generate quality and intuitive reports based on user needs.  Seamless interaction to enhance user experience in tracking inspection activities, reports and other support pertaining to inspection.	
<b>ALGORITHM</b>	Patented Acoustic Pulse Reflectometry (APR) technology featuring specialized, proprietary algorithms for tube inspection.	
<b>REPORTING</b>	Customizable, graphical on-line reports. Available output in PDF and HTML format.	
<b>PHYSICAL CHARACTERISTICS</b>	Compact, rugged and lightweight design. Total box weight: 14.88 lbs (6.75kg) Box dimensions: 46 L x 33 W x 21 H cm (18.1" x 12.9" x 8.2")	
<b>POWER INPUT</b>	Dual voltage system (110V/220V)	
<b>TEMPERATURE RANGE</b>	-10° to +50° C (14° to 122° F)	
<b>CERTIFICATIONS</b>	CE Declaration of Conformity; Safety Certificate IEC 61010; EMC Test Certificate; Company Quality System certified to ISO 9001:2015	
<b>STANDARDS</b>	ASTM E2906/E2906M-13 ASME BPVC.V-2017-Article 18	
<b>PREREQUISITES</b>	Tube should be cleaned prior to the inspection. Blow drying is recommended to avoid water stagnation, if water jetting is to be performed.	

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