

# TECHNOLOGY AND A TEAM

THAT SOLVES  
YOUR CHALLENGES





# WHO WE ARE

**In 2015, the founders of Industrial Inspection & Analysis, Inc.™ (IIA) began with a vision to build a best-in-class, industrial inspection company with a breadth of high-quality service offerings for a variety of sub-sectors while ensuring a simultaneously important focus on customer service, technical leadership, and continuous improvement.**

IIA offers timely, accurate, and reliable inspections, certifications, and testing solutions in both laboratory and field settings. Our company has grown to serve the whole of North America with a presence across the entire United States and a large growing footprint in Canada and Asia.

As we grow, we remain focused on continuously improving our offerings, educating our already robust bench of expert talent, and expanding our vast service offerings. In doing so, our current and future customers benefit from our expertise, knowledge, connections, and industry leadership.

## **STORY-WORTHY SERVICE**

Whether for a routine inspection or a unique and challenging lab, field, or examination project, IIA is committed to providing professional, fast, and accurate service each and every time. Our customers' success is priority, no matter what, and this is what makes our service story-worthy.



*Current and future customers benefit from IIA's industry expertise and continued expansion.*

# THE IIA PATENTED TECHNOLOGIES ADVANTAGE

## PROPRIETARY TECHNOLOGY

IIA has innovative technology that provides reliable results and enables the safe operation of your plant. The AIRIS<sup>®</sup> robotic scanner easily moves around internal components, and our Steam Generator Nozzle Examination Tool (SG-NExT) provides internal surface inspections. IIA's ARMUT<sup>®</sup> uses QR code film on complex geometry to examine critical welds, and the Automated Nozzle Tool System (ANT2) performs nozzle exams without obstructing the center of the reactor.

## TECHNOLOGIES

We use a combination of Conventional, Specialty, and Proprietary technologies, including PASS, AIRIS, ANT2, and ARMUT<sup>®</sup>. IIA's proprietary ARMUT<sup>®</sup> technology uses QR code film on complex geometry and is used to examine critical welds and gather extremely high-resolution images. Our Automated Nozzle Tool System (ANT2) is used to perform nozzle exams without obstructing the center of the reactor and exams can be completed with or without the Core Barrel in place.



## THE ARMUT<sup>®</sup> ADVANTAGE

### Simple & Advanced Manual Encoded Ultrasonic Testing

IIA's ARMUT<sup>®</sup> technology is the most cutting-edge PAUT examination available today. It's an alternative to conventional manual and encoded track phased array examinations.

## AIRIS<sup>™</sup> ROBOTIC SCANNER

### Advanced Inspection of Reactor Vessel & Internals

We understand that time is money. IIA's advanced AIRIS<sup>™</sup> inspection method delivers more reliable data while saving plant owners time, trouble and cost.

## PASS<sup>®</sup>

### Accurate Valve Data — Without Disassembly

Valve disassembly is a costly and time-consuming prospect that requires the system to be placed in an at-risk condition. IIA's Phased Array Sectorial Scanning (PASS<sup>®</sup>) allows for highly accurate valve testing — without disassembly.

## NitroJet.<sup>®</sup>

### Ultra-High Pressure Liquid Nitrogen Technology for Precision Cleaning & Cutting

Whether you need industrial cleaning or cutting, IIA's patented NitroJet<sup>®</sup> system tackles the toughest jobs with power and precision.

# INDUSTRIES SERVED

## DOWNSTREAM

- Process Sewer, Tanks, and Vessels
- Cracks, Holes, or Joint Separation
- Collapsed Pipes
- Blockage or Debris Build Up
- Storage Tank and Vessel Inspections

## MIDSTREAM

- Pre-Commissioning/New Construction
- Stuck Pig Locating
- Foreign Object Removal/Retrieval
- General Assessment - Cleanliness, Corrosion, Water

## POWERGEN

- Foreign Object Removal/Retrieval
- Feedwater Line Inspections
- Cold and Hot Reheat Line Inspections with Magnetic Crawlers
- Boiler/Furnace Tube Inspections

## TRADITIONAL NDE

- Radiography (RT/CR/X-Ray)
- Magnetic Particle (MT)
- Penetrant Testing (PT)
- Ultrasonic Thickness Testing (UTT)
- Visual Testing (VT)
- Post Weld Heat Treatment
- Corrosion Mapping
- Ferrite Testing
- Hardness Testing
- Positive Material Identification (PMI)
- Program and Procedure Development

## ADVANCED NDE

- Automated Corrosion Mapping (Internal)
- Automated Corrosion Mapping Laser
- Profilometry (External)
- Phased Array (PAUT) Manual & Automated
- Full Matrix Capture (FMC)
- Time of Flight Diffraction (TOFD)
- Shear Wave
- Guided Wave Testing (GWT)
- In-Line Inspection (ILI Validation)
- Pulsed Eddy Current
- Weld Quality Inspection

## SPECIALTY NDE

- Proprietary Technologies
- Phased Array Sectorial Scanning PASS® Valve Examinations
- Precision Ultrasonic Testing
- Absolute Recordable Manual Ultrasonic Testing (ARMUT®)

## RVI

Internal Visual Inspections of anything from ¼" and above.

## CERTIFICATIONS AND GUIDELINES



- All Certifications Based on ASNT Guidelines
- Multiple State Licenses for Radioactive Materials
- In-Line Inspection Validation (ILI)
- Compliance to Pressure Equipment Directive 97/23/EC (European Certification)
- Compliance to Pressure Equipment Regulations 1999, ASNT Level III
- IRRSP Certified





### HUNDREDS OF EXPERTS SERVING YOU

*IIA's hundreds of employees are all knowledgeable, curious, and professional, and each has a unique skill set that ensures best-in-class service for you.*



### LOCATIONS ACROSS THE GLOBE

*IIA operates many field offices and laboratories across the United States and also operates offices in Canada and China.*

# ARMUT® TECHNOLOGY:

## PREPARATION. SCANNING. RESULTS.

ARMUT® (Absolute Recordable Manual Ultrasonic Testing) combines the best of both manual and automated UT, and Industrial Inspection & Analysis is the sole provider of critical weld examinations using this proprietary technology.

## IIA'S ARMUT® TECHNOLOGY IS TRULY INNOVATIVE



### CAMERA

A machine vision camera placed atop of the UT probe is used to track the probe's movements, skew angle allowing for UT data correlation.



### MYLAR FILM WITH QR CODES

The mylar film is wrapped on the component, and the QR codes, which facilitate the gathering of positional data, are read by scanning the film with the hand-held probe.



### POSITIONAL AND TIME ENCODED DATA ACQUISITION

ARMUT® technology allows a single individual to conduct critical weld examinations, and the system simultaneously gathers encoded positional data and encoded time data.



IIA's proprietary ARMUT® technology is the only system that combines automated and manual UT examination methods and uses a QR code film on complex geometry to gather encoded positional and encoded time data simultaneously. The ARMUT® can be used by a single technician to examine critical welds and gather extremely high-resolution images that can be stored, shared, and immediately analyzed.

## HOW IT WORKS

A machine vision camera placed on top of the UT probe tracks the probe's movements and skew angle, allowing for UT data correlation and measurement of flaw characteristics.

IIA's additional proprietary application is a gridded QR Code Mylar film, which is wrapped on the component. The QR codes facilitate the gathering of positional data. This film is used to encode complex geometry, such as reducers or nozzles, to gather encoded positional and time data simultaneously.

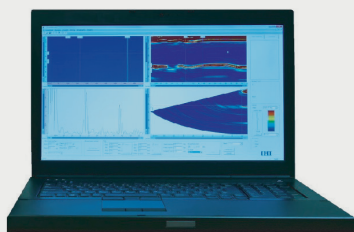
## APPLICATIONS

- Similar/Dissimilar Metal Piping Weld Inspections (provides the highest data quality for elbow welds)
- Corrosion Mapping
- Vessel Nozzle-to-Safe End Welds
- Vessel Nozzle-to-Shell Welds
- Complex geometry, such as reducers or nozzles

## BENEFITS OF ARMUT:

- High POD (Probability of Detection), especially for cracks and lack of fusion
- Higher rate of detection for planar flaws
- Higher sizing accuracy rate
- Fewer rejects and repairs
- PAUT permits defect height measurement, which enables volumetric consideration of flaw severity (instead of only flaw type and length)
- No radiation emitted
- No additional licensing or personnel required
- No chemical or waste material produced
- Real-time analysis
- Digital setup and easy-to-read electronic reports
- ARMUT allows an examiner to focus on scanning of required code volume, and does not require constant viewing of the phased array instrument during examinations.
- High-quality data due to tracking and recording of probe skew, probe movements and correlating UT data
- A single technician can conduct critical weld examinations.
- Probe scanning can be applied by non-PDI certified operators with minimal training.
- Eliminates the need to interpret ultrasonic data in real time. This reduces examination time, which means more components can be inspected in the same period of time.

## THE ARMUT® PROCESS - AS EASY AS 1-2-3



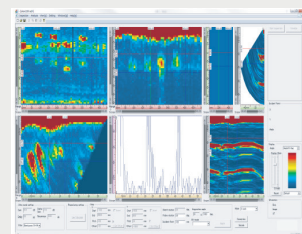
### Preparation

Attach 2D data code sheet to the examination surface.



### Examination

Scan the examination surface with head mount display. System will record location and probe skew.



### Results

Analyze the data and recreate entire scan with video mode.

## REAL-TIME RESULTS

With conventional radiography, the film needs to be developed before it can be read and analyzed. In contrast, information gathered during the ARMUT inspection can be viewed electronically and in real time. With ARMUT® technology, if an issue is identified that needs immediate attention, the customer is alerted in the field, can view the footage in real time and take immediate action.

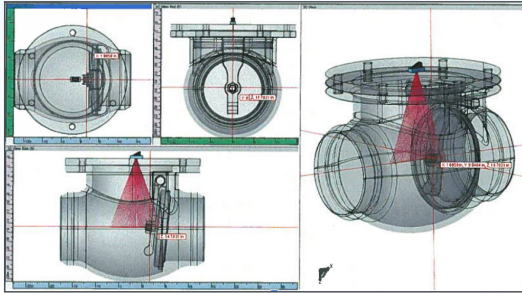
In addition, IIA's final report presentation is easy to read and understand. There is no technical jargon to sift through, and the findings are color-coded for ease of interpretation. Reporting data can be quickly transferred and shared, when necessary.

Whether choosing the right equipment or discussing options that might help mitigate your risk, our team is just a phone call away. [www.industrial-ia.com](http://www.industrial-ia.com)



# PROPRIETARY PASS®:

## MAKE CRITICAL DECISIONS REGARDING VALVE OPERABILITY AND PREDICTIVE MAINTENANCE



Industrial Inspection & Analysis Nuclear Services' division provides inspection and diagnostics services for a variety of valve configurations using our Phased Array Sectorial Scanning (PASS®) technique. In addition, our PASS® Visualization Software provides a comprehensive solution for Phased Array UT (PAUT) data analysis and field interpretation.

IIA's PASS® inspection procedure uses proven Phased Array Ultrasonic Testing (PAUT) which is a superior technique to Radiography Testing, Conventional Ultrasonic Testing, or Acoustic Emissions. IIA's skilled technicians offer complete and accurate scans of valves without the need to visually question the valve integrity or disassemble pipes and valves. IIA determines the condition of valves by deploying PAUT which sends sound beams directly through the valve body, and subsequently the echoes bouncing within the valve internals are used to evaluate and analyze the condition of the valve and its components.

Once this is complete, our PASS® Visualization Software translates the raw PAUT data into a dynamic valve simulation. We then provide a visual representation of the valve as a 3-D model. By providing a simple way to view and interpret field data, performance characteristics can be easily and quickly visualized, interpreted and analyzed. An accompanying PASS® database tracks valve performance during inspection. This enables critical decisions to be made regarding operability and predictive maintenance. IIA's unique simulation allows technicians and plant personnel, with minimum PASS® knowledge, to easily view the visual translation of the raw PAUT data and successfully analyze conditions and move forward with any necessary decisions regarding maintenance. Where field tests can be recreated for additional analysis and evaluation.

In addition to providing a simulation of the PAUT data, detailed attributes are collected and placed in the PASS® database, which can then be used to track valve performance over multiple inspections. This also allows for critical decisions to be made regarding repairs and predictive maintenance. IIA's valve inspection and PASS® Visualization Software assists in eliminating unnecessary valve disassemblies, which provide significant cost savings.

### A FEW BENEFITS OF IIA NUCLEAR SERVICES PASS® TECHNOLOGY:

- Gather, analyze and act on field data
- Minimize outage impact by using PASS® instead of RT
- Receive high-quality and well-defined data
- Plan assessments using PASS® valve data
- Generate valve work-lists to assist in outage planning
- Assist with predictive maintenance

IIA Nuclear Services offers this comprehensive suite of inspection techniques and data analysis to make valve inspection easier, more accurate, less costly and also less time-consuming.



## PASS CAPABILITIES

Using our PASS technique, IIA provides inspection and diagnostic services for a variety of valve configurations. PASS has the ability to detect and measure some of the following trend-able attributes:

- Flow Rate
- Total Disc Travel
- Disc Fluttering
- Disc Back Tapping
- Stuck Disc
- Disc Velocity
- Stroke Time
- Angular Disc Movement
- Exceeding Design Values

### PASS® has the ability to detect and/or measure some of the following trend-able attributes:

- Flow Rate
- Total Disc Travel
- Disc Fluttering
- Disc Back Tapping
- Stuck Disc
- Disc Velocity
- Stroke Time
- Angular Disc Movement exceeding design values

IIA's patented Phased Array Sectorial Scanning (PASS®) Techniques along with our proprietary software, provides technicians and plant operators an unmatched level of information regarding performance aspects of valve integrity and of how the valve reacts during operation. IIA's Valve Visualization software provides an easy to use, complete solution for PAUT data analysis.

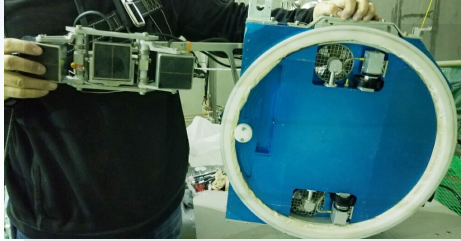


## BENEFITS OF USING PASS

- Our proprietary PASS inspection technique offers a number of benefits:
  - Uses proven Phased Array Ultrasonic Testing (PAUT), which is a superior technique to radiography testing, conventional ultrasonic testing, or acoustic emissions.
  - Delivers highly accurate and detailed data regarding valve operability and supports the customer's decision to eliminate or defer valve disassemblies.
  - PASS valve data can help plant owners plan assessments and generate valve work lists to assist in outage planning.
  - Minimizes outage impact when used in lieu of radiography.
  - PASS Visualization Software provides a complete and easy-to-use solution for PAUT data analysis and field interpretation.
  - Reduces operating costs compared to other testing methods by eliminating the need for valve and piping disassembly.
- Helps plant owners make informed decisions regarding valve operability and predictive maintenance.
- Makes valve inspection faster, easier, more accurate and less costly.

# AIRIS™ ROBOTIC SCANNER

## ADVANCED INSPECTION OF REACTOR VESSEL & INTERNALS



We understand that time is money. IIA's advanced AIRIS™ inspection method delivers more reliable data while saving plant owners time, trouble and cost.

Developed by our own in-house experts, the Advanced Inspection of Reactor Vessel and Internals System (AIRIS™) represents a vast improvement over previous inspection phased array methods.

For more than 20 years, we have successfully used the AIRIS platform to examine welds inside reactor vessels and storage tanks. AIRIS™ is the industry leader in BWR and PWR weld integrity scanning, offering the lightest single-pass scanning solution with the smallest implementation crew in the marketplace.

## AIRIS™ BENEFITS

- **SPEED & SIMPLICITY:** AIRIS allows us to perform in a single scan what others need multiple scans and a crew of several to complete.
- **COST SAVINGS:** Our method takes less time and fewer technicians, which translates to cost savings for the plant owner.
- **MORE RELIABLE DATA:** With AIRIS, the scanner sensor is able to withstand more temperature variations as it moves from top to bottom inside the tank. This means the device operates with more precision, and, in turn, data reliability greatly increases.
- **AGILITY:** It's compact size and extreme maneuverability allow the AIRIS robot to easily move around internal components and restrictive areas, providing access to a greater total scanning area. This is simply not possible with other examination devices.
- **MINIMAL SITE SUPPORT:** With a small footprint and no need for a polar crane, AIRIS™ requires minimal site support compared to other inspection methods. That means other tasks can be performed while AIRIS examinations are underway — for example, refueling, in-vessel visual examinations, and other in-vessel maintenance tasks.
- **LOWEST RADIATION EXPOSURE:** Requiring a crew that is, on average, 50% smaller than crews performing similar examination methods, AIRIS decreases radiation exposure.
- **CUSTOMIZABILITY:** Our team can fully customize the AIRIS design and quickly mobilize a trained crew to your site after completing a full testing sequence in our mockup facilities.

On average, crews conducting an AIRIS inspection are 50% smaller than crews performing similar examination methods.

Accurate, fast, and easy to use, the AIRIS robotic scanner can also be instrumental in quickly moving projects from emergency status to back-on-track, with minimal schedule and budget impact.



# PRECISE. POWERFUL. NitroJet®

## ULTRA-HIGH PRESSURE LIQUID NITROGEN TECHNOLOGY FOR PRECISION CLEANING & CUTTING

Whether you need industrial cleaning or cutting, IIA's patented NitroJet® system tackles the toughest jobs with power and precision.

Powered by liquid nitrogen technology, NitroJet delivers aggressive and superior performance. The water-free, full-dry system eliminates secondary waste, disposal, and cross contamination and leaves no thermal defects, scratches, or damage on equipment or materials.

### Industrial Cleaning

NitroJet®'s powerful stream of liquid nitrogen easily removes even the most challenging materials quickly and with fewer man-hours than traditional manual methods. As the liquid nitrogen enters solid deposit cracks and crevices, it expands nearly 700 times, causing the deposits to break up from the inside.

With operating pressures up to 55,000 PSI, NitroJet liquid nitrogen technology is ideal for industrial cleaning, from surface cleaning to coatings and contamination removal. In fact, NitroJet can increase cleaning rates by up to 300 times over other mechanical cleaning methods. The system's portability ensures that equipment can be cleaned regardless of its location.



**NitroJet®'s technology performs exceptionally well in tube cleaning applications. Some systems have realized nearly 20 percent in increased efficiency over other cleaning methods.**

### PRECISION CUTTING

NitroJet offers superior cutting for nearly any material — from soft plastics, food products, and upholstery to hardened steel, composites, and ceramics.

NitroJet®'s technology uses liquid nitrogen instead of water, which enables the use of a wider variety of entrainment materials, even those that are water soluble. This gives greater flexibility when cutting hard materials and makes cleanup of water soluble entrainment materials faster and more complete.

The user can adjust the pressure or end effector/nozzle parameters to allow more or less aggressive cutting/removal of materials. NitroJet® can be used manually or incorporated into a robotics system for automated and repeated cutting.

### NITROJET BENEFITS

- Increase cleaning rates by up to 300 times over other mechanical cleaning methods
- Portable system allows equipment to be cleaned regardless of its location
- Can be used manually or incorporated into a robotics system for automated and repeated cutting
- Superior cutting for nearly any material
- Greater flexibility when cutting hard materials
- Faster & more complete cleanup of water soluble entrainment materials
- Water-free, full-dry system eliminates secondary waste, disposal, and cross-contamination
- Aggressive & productive performance due to 700x expansion power of liquid nitrogen when it converts to a gas
- Will not scratch or damage equipment or material

### APPLICATIONS

- **NUCLEAR** - Decontamination
- **MARINE** - Coating removal
- **AEROSPACE** - Precision cast turbine blade cleaning
- **CONSTRUCTION** - Paint & coating removal
- **INDUSTRIAL** - Surface cleaning
- **NDT INSPECTIONS** - Surface cleaning & preparation
- **FOOD** - Sanitary cutting
- **HAZMAT** - Asbestos decontamination
- **MANUFACTURING** - Cutting of composite & rubber materials



***Making the World Safer***

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11/2022 IIA Technology Services