



Advanced NDT Course for Asset Integrity: Phased Array UT, TOFD, Guided Wave and Corrosion Mapping



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Introduction:

Advanced NDT for asset integrity, covering phased array UT, TOFD, guided wave and corrosion mapping, is a 10-day course for inspection engineering and integrity management staff, ending with an Advanced NDT Deployment Plan for a case organisation. Plants and pipelines lose money and margin when encoded inspection is specified loosely, sized poorly or never linked to risk and remaining life decisions. Nominees already plan or review inspection scopes and work through case studies on real scan plans, encoded data files and contractor reports. CoreConcept Training Center delivers this advanced NDT for asset integrity course.

Course Objectives:

- Specify phased array UT, TOFD and automated UT scopes for welds and pipelines with scan plans, coverage and sizing requirements a contractor can price
- Review encoded PAUT, TOFD and corrosion mapping data for coverage gaps, data quality faults and flaw height sizing errors
- Select guided wave, pulsed eddy current and corrosion mapping for long-range screening and corrosion under insulation with planned follow-up verification
- Evaluate probability of detection evidence, procedure qualification and performance demonstration results before accepting an advanced technique
- Convert advanced NDT results into inspection effectiveness grades, corrosion rates and flaw data packages for RBI and FFS decisions
- Prepare an Advanced NDT Deployment Plan that sets technique choice, qualification evidence, data flow and campaign KPIs for an asset base

Target Audience:

- Inspection engineering staff responsible for setting NDT scope and approving inspection reports on static equipment and piping
 - Integrity management staff responsible for risk rankings, remaining life estimates and run or repair recommendations
 - NDT coordination staff responsible for procuring, supervising and accepting advanced NDT contractor campaigns
 - Pipeline integrity staff responsible for girth weld quality and long-range corrosion screening of buried and above-ground lines
 - Technical authority staff responsible for approving inspection procedures, technique qualification and deviations
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Course Outline:

Day 1: Advanced NDT in the Asset Integrity Context

- Conventional Versus Advanced NDT Capability Gaps for Service Damage
- Damage Mechanism to Technique Matching for Cracking and Wall Loss
- Encoded Data Acquisition Versus Manual Scanning Audit Trails
- Inspection Scope Specification Drawn From Integrity Threat Registers
- Advanced NDT Vendor Capability and Personnel Competence Screening

Day 2: Phased Array and TOFD Standards and Technique Documents

- ISO 13588 Phased Array Weld Testing Levels and Requirements
- ISO 10863 TOFD Weld Examination Setup and Coverage Rules
- EN 15617 TOFD Acceptance Levels Applied to Weld Indications
- ASME BPVC Section V Articles for Encoded Ultrasonic Examination
- Written Practice and Technique Sheet Hierarchy for Advanced Methods

Day 3: Phased Array UT and TOFD Weld Inspection and Sizing

- Focal Law Design With Sectorial and Linear Scan Coverage
- Scan Plan Drawings Showing Beam Coverage Across Weld Volume
- TOFD Probe Centre Separation and Diffracted Tip Signal Reading
- Near-Surface Dead Zone Cover Combining PAUT With TOFD
- Flaw Height and Length Sizing From Encoded Data Files

Day 4: Automated UT, Corrosion Mapping and Data Review Tools

- Automated UT Zonal Discrimination for Pipeline Girth Welds
- AUT Calibration Block Design and Reference Reflector Placement
- Corrosion Mapping Scanners Producing C-Scan Thickness Grids
- Analysis Software Views for A-Scan, B-Scan and C-Scan Data
- Data Quality Checks for Coupling Loss, Encoder Slip and Gaps

Day 5: Week-One Case Study on a Weld and Corrosion Campaign

- Case Contractor PAUT and TOFD Weld Report Review
 - Case Scan Plan Coverage Gap Identification on Nozzle Welds
 - Case AUT Girth Weld Data Set Indication Classification
 - Case Corrosion Map Interpretation for Minimum Remaining Wall
 - Week-One Findings Log With Accept, Resize or Rescan Calls
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Day 6: Guided Wave, Pulsed Eddy Current and Insulated Asset Screening

- Guided Wave Torsional Mode Screening From Single Collar Positions
- Guided Wave Sensitivity Limits Near Supports, Bends and Welds
- Pulsed Eddy Current Wall Averaging Through Insulation and Cladding
- Corrosion Under Insulation Screening Sequence With Follow-Up Verification
- Electromagnetic Acoustic Transducer Use on Hot or Coated Surfaces

Day 7: Probability of Detection, Qualification and Inspection Quality

- Probability of Detection Curves From Hit/Miss and Signal Response
- a90/95 Flaw Size Reading for Inspection Effectiveness Claims
- Procedure Qualification Through Open and Blind Performance Demonstration
- Human Factors and Analyst Fatigue in Encoded Data Evaluation
- Advanced NDT Audit Checklist for Equipment, Data and Personnel

Day 8: Feeding RBI and FFS Decisions and Briefing Stakeholders

- Inspection Effectiveness Grading of Advanced Techniques for RBI
- Flaw Sizing Data Packages Needed for FFS Crack Assessment
- Thickness Grid Statistics for Corrosion Rate and Remaining Life
- Findings Briefs for Operations Leads and Technical Authorities
- Contract Specification and Acceptance Clauses for Advanced NDT Services

Day 9: Campaign KPIs, Repeat Inspection and Continuous Improvement

- Advanced NDT Campaign KPIs for Coverage, Rescans and Rejections
- Repeat Corrosion Map Overlay for Wall Loss Trending
- Sizing Error Tracking Against Repair Excavation Findings
- Screening Cost per Metre Versus Follow-Up Verification Effort
- Lessons Learned Register for Technique Selection Improvement

Day 10: Capstone Case Study on an Advanced NDT Deployment Plan

- Case Organisation Asset Register and Threat Profile Review
 - Technique Selection Matrix Applying PAUT, TOFD, AUT and Screening
 - Qualification and POD Evidence Plan for Selected Techniques
 - Data Flow Map From Inspection Results to RBI and FFS
 - Advanced NDT Deployment Plan Completion and Peer Review
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Skills You Will Gain:

- Scan Plan Specification
- Encoded Data Review
- Flaw Height Sizing
- Long-Range Corrosion Screening
- Probability of Detection Analysis
- Technique Qualification Review
- Integrity Data Translation
- Advanced NDT Contract Control

Why Attend This Course:

- Deliver an Advanced NDT Deployment Plan to the inspection manager or integrity technical authority for approval
- Decide which welds, lines and insulated circuits need PAUT, TOFD, AUT, guided wave or pulsed eddy current, and which do not
- Avoid rescans, undersized cracks and unverified screening calls that delay shutdown decisions or hide wall loss
- Coach inspection colleagues on scan plan review, data quality checks and POD evidence before a contractor report is accepted

Conclusion:

Back at work, the participant presents the Advanced NDT Deployment Plan to the inspection manager, the integrity technical authority and the contracts team. They use it to choose techniques for the next campaign, write contractor specifications, demand qualification and POD evidence and route sizing and thickness data into RBI and FFS decisions. After the first campaign under the plan, the unit should compare coverage, rescan rates, sizing results against repair findings and screening follow-up outcomes, then revise technique choices and KPIs.

Frequently Asked Questions FAQ:

What should participants know before an advanced NDT for asset integrity course?

Participants should already understand conventional ultrasonic testing and routinely plan, procure or review inspection work on welds, vessels or pipelines. No operator certification in phased array or TOFD is expected. Bringing an anonymised contractor report or scan plan makes the case work more useful.

How does advanced NDT for asset integrity differ from a general NDT methods course?

It concentrates on encoded and long-range techniques such as phased array UT, TOFD, automated UT, guided wave, corrosion mapping and pulsed eddy current, and on qualifying and using their data. A general methods course teaches visual, penetrant, magnetic, conventional ultrasonic and radiographic testing from first principles.

Why does probability of detection matter when choosing advanced NDT techniques?

Probability of detection shows the smallest flaw a technique finds reliably, often expressed as an a90/95 size. Without it, an inspection may be credited with effectiveness it lacks, so risk rankings and remaining life estimates rest on flaws that could have been missed.

What do participants take back from the advanced NDT for asset integrity course?

Participants take back an Advanced NDT Deployment Plan for a case organisation, covering technique selection, qualification and POD evidence, data quality checks, the route from results to RBI and FFS decisions and campaign KPIs, ready to adapt to their own asset base.
