Ultrasonic Testing

Level II – 40 hours

Training Course Outline

Prerequisite for this Class is Level I Ultrasonics

SCOPE

This course introduces prepares the candidate for flaw detection and angle beam inspections of welds.

This course prepares a candidate to

- Select equipment to conduct test
- Setup test equipment
- Steps to conduct weld inspections, plotting and locating flaws
- Range and sensitivity calibration for weld inspections, DAC
- Familiarize with codes and standards
- Interpret results with respect to applicable codes and standards
- Understand limitation of the test method
- Write test reports.

UT Equipment and welded test samples available for the UT II class. (a) Epoch 4, USN 60, USN 58, USN Go, Epoch 600 (b) practicals on welded test samples with embedded flaws

TRAINING

Training material is presented in modules that are followed by quizzes

Modules Covered in UT Level I

Module CP: Personnel Certification
Module 1: Manufacturing Discontinuities
Module 2: Wave Modes
Module 3: Ultrasonic Transducer and Sound Field
Module 4: UT Equipment
Module 5: Thickness Measurement

Module 6: Attenuation and dB
Module 7: Acoustic Impedance
Module 8: Refraction and reflection
Module 9: Flaw Detection - 0 Degree

UT II MODULES

MODULE 10: UT TEST MODES

- Pulse-echo mode
- Pitch-catch mode
- Thru-transmission mode
- Scan Plans and weld volume coverage

MODULE 11: IMMERSION TESTING

- Normal beam
- Angle Beam
- Focused Immersion Probes
- Immersion Tanks

MODULE 12: CALIBRATION BLOCKS

- IIW Blocks Type I and II
- Miniature Angle Beam / Rompass Block
- DSC Block
- AWS Resolution Block
- Step Wedge
- Area Amplitude Block
- Distance Amplitude Block

MODULE 13A: ANGLE BEAM INSPECTIONS - BASICS

- Selection of Screen Range
- Measurement of Beam Exit Point
- Measurement of Refracted Angle
- Range Calibration using IIW, Rompass and DSC Block
- Angle Selection for Weld inspection
- Surface Distance, Skip Distance, Depth, ½ vee and full V Path
- Weld Inspection and plotting discontinuities like crack, lack of fusion, lack of penetration, slag, porosity in welds

MODULE 13B: ANGLE BEAM INSPECTIONS- DAC AND OTHER ISSUES

- Sensitivity Calibration: Piping and non-piping calibrations
- Distance Amplitude Correction (DAC) Curve
- Time Corrected Gain (TCG)
- Weld volume coverage and scan plan
- High Temp Angle Beam Inspections
- Discontinuity Length Sizing using 6 dB and 20 dB drop method

- Worksheet: Plotting of discontinuities for butt welds

MODULE 14: ASME V, ARTICLE 4, WRITING AN ULTRASONIC PROCEDURE

- ASME Section V
- Essential Variables
- Non Essential Variables

MODULE 15: ASME V CODES AND STANDARDS

- ASME Section V, Article 4 Weld Examination
- SA 388 Heavy Steel Forging
- Additional Codes Standards as per student's requirements (please discuss this at the time of registration)

MODULE 16: ASME V CLADDING INSPECTION TECHNIQUES

- Detection of disbond and cladding flaws
- Techniques: One and Two
- Calibration Blocks

MODULE 17: AWS D1.1 AND API RP 2X

- Establishing reference level (b)
- Indication rating (d) , indication level (a), attenuation factor (c)

PRACTICALS

Shear Wave Testing on Pipe Samples with embedded weld defects – ID Cracks, OD Cracks, Slag, Porosity, Lack of Fusion, Lack of Penetration

EXAMINATIONS

- General
- Specific
- Practical
- Candidates must score a minimum of 70 % in each test and a minimum of 80% average for all the three tests.

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