

# Ultrasonic Testing II

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) USM36, USMGo, USN 60, 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 3A: Ultrasonic Transducer

Module 3B: Sound Field from ultrasonic transducer

Module 4: Thickness Measurement

Module 4A: USM 36, USN 60 Thickness measurement  
Module 5: Equipment  
Module 6: Attenuation and dB  
Module 7: Acoustic Impedance  
Module 8: Refraction and reflection  
Module 9A: Flaw Detection - 0 Degree  
Module 9B: Cladding Inspection

## **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, UT OF WELDS - PROCEDURE**

#### **MODULE 15: ASME V, ARTICLE 4, UT OF WELDS**

- Probe
- Calibration reflectors– notches and side drilled holes
- Reference Level - DAC
- Scan Plan

#### **MODULE 16: 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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