Ultrasonic Testing

Level I - 40 hours

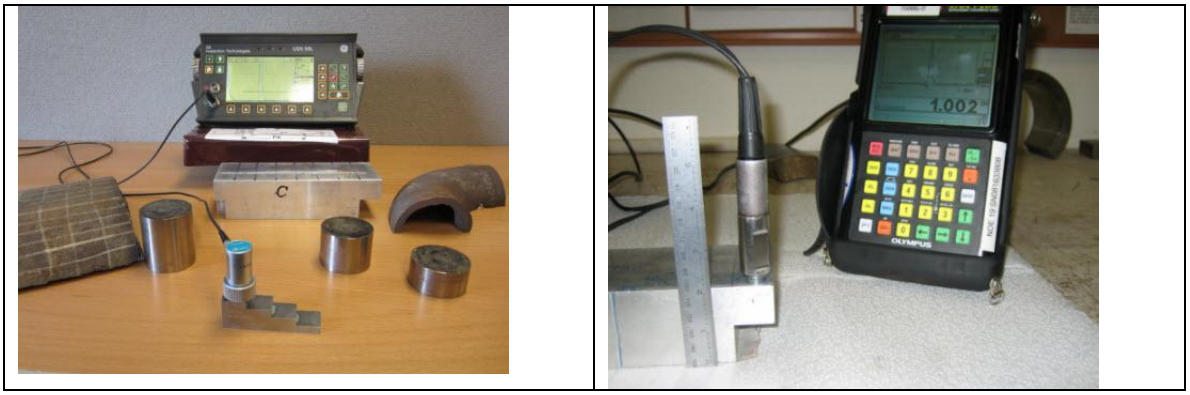
Training Course Outline

SCOPE

This course introduces the basic principles of ultrasonics and prepares the candidate for straight beam inspections and thickness measurement. (See Level II Course Outline for Angle Beam Testing)

This course prepares a candidate

- Select equipment to conduct test
- Steps to conduct test
- Calibration
- Familiarize with codes and standards
- Interpret results with respect to applicable codes and standards
- Understand limitation of the test method
- Write test reports.



UT I Practical Training (a) Various test samples (b) measuring thickness on a Aluminum Block

TRAINING

Training material is presented in modules that are followed by quizzes

PERSONNEL CERTIFICATION

ASNT SNT-TC-1A, 2011

NAS 410

Training, experience and examination requirements

Training Requirements

- Certification of NDT Personnel: Level I, Level II and Level III
- Recommended Course Outlines for NDT training
- Required Training Hours
- Practicals
- Quizzes and examinations

MODULE 2: WAVE MODES

- Waves - velocity, wavelength and frequency
- Wave Modes: Longitudinal and Shear waves

- Velocity of Waves
- Factors Affecting Velocity - temperature

MODULE 3: ULTRASONIC TRANSDUCER AND SOUND FIELD

- Piezoelectric Crystal
- Near field concept
- Beam spread and sound loss
- Reducing beam spread: frequency and diameter
- Single and Dual transducers
- Resolution in flaw detection: frequency and damping
- Transducer selection: frequency and diameter

MODULE 4: UT EQUIPMENT

- Pulser Receivers
- Instrument Controls: gain, range, velocity, delay
- Displays. A-, B- and C-scans
- Selection of UT equipment for ultrasonic testing
- UT Equipment demonstration

MODULE 5: THICKNESS MEASUREMENT

- Thickness Measurement Concept
- Probe selection: Single vs Dual
- Setting the UT equipment for thickness measurement
- Laboratory - Thickness measurement practicals

MODULE 6: SOUND ATTENUATION AND DECIBELS

- Attenuation – loss of sound with distance
- Maximum range of inspection
- What are decibels (dB)?
- Reducing attenuation – ultrasonic frequency
- Attenuation and its effects on testing of materials
- Attenuation and probe selection

MODULE 7: ACOUSTIC IMPEDANCE

- Reflection and transmission at interfaces
- Impedance matching

MODULE 8: REFRACTION AND REFLECTION

- Reflection and Refraction at interfaces
- Snell’s Law
- Mode Conversion to shear waves at interfaces
- Introduction to Angle Beam testing of welds (covered in detail in UT Level II class)

MODULE 9: FLAW DETECTION – STRAIGHT BEAM

- Flaw detection, lamination, Corrosion Mapping, Bolts
- Use of Flat bottom holes for establishing reference

- Compensating sound loss from beam spread: distance amplitude correction curves (DAC)
- Inspection of forgings and castings: ASTM Standards

PRACTICALS

- Thickness Measurement and Scanning
- Backsurface echo technique
- Flaw detection

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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