

Ultrasonic Testing

Level I

Training Course Outline

SCOPE

This course introduces the basic principles of ultrasonics and prepares the candidate for Thickness Measurement and other 0-degree inspections. (See Level II Course Outline for Angle Beam Testing)

This course prepares a candidate to

- Perform Specific Calibrations
- Specific NDT
- Specific Evaluations for Accept or Reject Determinations according to written Instructions
- Record Results

TRAINING

Training Material is presented in Module that are followed by Quizzes

CERTIFICATION MODULE

Personnel Certification : ASNT SNT-TC-1A and NAS 410

MODULE 1: MANUFACTURING DISCONTINUITIES

- Types of Discontinuities :- Inherent, Processing and Service
- Casting Discontinuities :- Hot Tear, Cold Shut, Porosity, Shrinkage
- Primary Processing Discontinuities including discontinuities in Rolling, Forging, Drawing, Extruding
- Secondary Processing Discontinuities including discontinuities in Grinding, Heat Treating, Machining, Welding, Plating
- Service Discontinuities:- Erosion, Wear, Fatigue, Corrosion, Creep, Hydrogen Attack

MODULE 2: WAVE MODES

- Time Period and Frequency
- Wavelength
- Wave Modes including Longitudinal, Shear, Surface and Lamb Waves
- Velocity of Waves
- Calculation of Velocity
- Factors Affecting Velocity - Temperature, Stress

MODULE 3: ACOUSTIC IMPEDANCE

- Acoustic Impedance
- Calculation of Acoustic Impedance
- Reflection and Transmission Coefficients
- Transmission through a layer

MODULE 4: REFRACTION AND REFLECTION (Covered in Level I and II training)

- Reflection and Refraction
- Snell's Law
- Mode Conversion
- First and Second Critical Angle
- Problems on Mode Conversion

MODULE 5: PIEZOELECTRIC TRANSDUCER

- Wave Interference: Constructive and Destructive
- Sound Field
- Near Field
- Far Field
- Beam Spread
- Problems on Near Field and Beam Spread
- Principles of Piezoelectricity
- Curie Temperature
- Transducer damping
- Bandwidth
- Type of Transducers
- Contact and Immersion Transducers
- Dual Element, Delay Line, Angle Beam Transducer
- Couplant

MODULE 6: PULSER RECEIVER

- Ultrasonic Instrumentation - Analog
- Ultrasonic Instrumentation - Digital
- Time Base
- Pulse Repetition Rate
- Types of Ultrasonic Display – A, B and C Scan
- Gates
- Calibration of Ultrasonic Equipment - Time and Amplitude Linearity (Level II)

MODULE 7: ATTENUATION

- Sound Attenuation
- Causes for Attenuation
- Attenuation Measurement
- Calculation of Amplification
- Laboratory - Measurement of Attenuation

MODULE 8: THICKNESS MEASUREMENT

- Test Modes
- Thickness Measurement
- Thickness Measurement Frequency
- Screen Calibration
- Problems
- Laboratory - Thickness measurement, Corrosion Mapping

MODULE 9: IMMERSION TESTING

- Advantages and Limitations of Immersion Testing Technique
- Minimum Water Path calculation
- Types of Immersion Testing Transducers
- Bubbler/Squirter Technique
- Wheel Type Transducer

MODULE 10: FLAW DETECTION - 0 DEGREE

- Lamination, Corrosion Mapping, Base Metal defects, Bolts
- Loss of Backsurface echo technique
- Use of Flat bottom holes
- ASTM standards SA-435 and SA-578

PRACTICALS

- Thickness Measurement
- Thickness Scanning
- Loss of backsurface echo
- 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.

Birring NDE Center

515 Tristar Drive

Webster, Texas 77598

281 488 8944

www.nde.com