Ultrasonic Testing Level I Course Outline

Introductions and Classroom Safety briefing

OVERVIEW OF NON-DESTRUCTIVE TESTING

- What is Non – Destructive Testing (NDT)?
- Comparison of major methods, advantages and disadvantages
  - Penetrant Testing (PT)
  - Magnetic Particle Testing (MT)
  - Eddy Current Testing (ET)
  - Radiographic Testing (RT)
  - Ultrasonic Testing (UT)

CERTIFICATION REQUIREMENTS

- SNT-TC-1A
- NAS 410

OVERVIEW OF ULTRASOUND & HISTORY OF ULTRASONIC INSPECTION

- Definition of ultrasound
- Brief history of ultrasonic testing
- Application of ultrasonic testing

BASIC MATH REVIEW

- Using a scientific calculator
- Logarithms
- Basic trigonometry
- Algebra
- Units and conversion factors

THEORY AND APPLICATIONS OF ULTRASONIC INSPECTION

- Nature of Sound Waves
- Modes of Sound Wave Propagation
- Modes
  - Compression waves
  - Shear waves
  - Surface Waves
  - Plate waves
- The relationship between velocity, frequency and wavelength
  - Wavelength
  - Frequency
  - Velocity
- Attenuation
  - Scatter
  - Characteristic Acoustic Impedance
  - Beam Spread
- The near field
- Sound reflection properties at an interface
- Sound reflection/refraction at interfaces
- Snells Law
- Mode conversion

First and second critical angles

EQUIPMENT

Information display types
- "A" scan
- "B" scan
- "C" scan

Basic flaw detector circuits
- Power supply
- Timer (clock)
- Pulser
- Receiver/Amplifier
- Reject
- Calibrated gain control
- Video processing
- Filters
- Gates
- Timebase
- Display

PROBES

Contact, single crystal, longitudinal wave probe
Contact, single crystal, shear wave probe
Contact, single crystal, surface wave probe
Contact, single crystal, "Delay tip" longitudinal wave probe
Contact, single crystal, longitudinal wave probe
Immersion probes
Immersion tank probes
Squirter probes
Bubbler probes
Wheel probes
Multiple Element probes (mosaic)
Crystal Materials

TESTING TECHNIQUES

Angle beam shear wave inspection
Surface wave testing
Plate (lamb) wave testing
Immersion tank inspection

MANUFACTURING TECHNOLOGY OF PRODUCT FORMS

Steel alloys
Product forms
Discontinuity cause and appearance

ULTRASONIC PRACTICAL EXERCISES

Time base calibration, longitudinal wave probe, 10"
Time base calibration, longitudinal wave probe, 1"
Longitudinal probe resolution check using IIW block
Dual crystal 2" time base calibration

Dual crystal 1” time base calibration
Plotting laminar flaws using the 6dB drop technique
Near surface resolution check using ASTM E 317 block
Shear wave index point
Shear wave angle determination using mini angle block
Shear wave 10” distance calibration using IIW block
DAC curve flat bottom holes (Longitudinal wave)

HOMEWORK QUIZZES

ULTRASONIC FORMULA SHEET

ACCOUSTIC PROPERTIES FOR METALS IN SOLID FORM

Review of course material

End of course test

Review of course test results

TEST NDT does not have any pre-requisites for attending any of our courses, it is entirely up to the attendee to determine whether the course is suitable for their needs and whether they are capable of achieving the standards. Please study the applicable course outline and decide if the course is suitable for your needs before enrolling, if in doubt, please contact us to discuss. For employer funded attendees, please discuss the suitability of any of the courses with your employers responsible NDT level 3 before enrolling.