



Ultrasonic Testing Level II Course Outline

Introductions and Classroom Safety briefing

REVIEW OF NON-DESTRUCTIVE TESTING

Review of Non – Destructive Testing (NDT)?

REFRESHER of CERTIFICATION REQUIREMENTS

SNT-TC-1A

NAS 410

REFRESHER OF ULTRASOUND & HISTORY OF ULTRASONIC INSPECTION

Definition of ultrasound

Brief history of ultrasonic testing

Application of ultrasonic testing

BASIC MATH REFRESHER

Using a scientific calculator

Logarithms

Basic trigonometry

Algebra

Units and conversion factors

REFRESHER OF THE 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

Snell's 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
- Squitter probes
- Bubbler probes
- Wheel probes
- IRIS probes
- Multiple Element probes (mosaic)
- Crystal Materials

TESTING TECHNIQUES

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

OVERVIEW OF MANUFACTURING

Production of Raw Materials

Iron Production

Steel Making

Processing Stages

Rolling

- Rolling Discontinuities

Welding Processes

- Shielded Metal Arc Welding (SMAW)
- Gas Metal Arc Welding (GMAW)
- Flux Cored Arc Welding (FCAW)
- Submerged Arc Welding (SAW)
- Gas Tungsten Arc Welding (GTAW)
- Electroslag Welding
- Brazing and Soldering

Weldment Discontinuities

Porosity

- Uniformly Scattered Porosity
- Cluster Porosity

- Linear Porosity
- Slag Inclusions
 - Slag in the Root Area
 - Bonded – Line Slag
 - Scattered Slag
- Tungsten Inclusions
- Incomplete Fusion
- Inadequate Joint Penetration
- Undercut
- Cracks
 - Weld Metal Cracking
 - Transverse Cracks
 - Longitudinal Cracks
 - Crater Cracks
 - Base Metal Cracking
 - Transverse Cracks
 - Longitudinal Cracks
- In-Service Discontinuities
 - Corrosion
 - Erosion
 - Fatigue Cracks
 - Inter-granular Stress Corrosion (IGSCC)
 - Creep

ULTRASONIC PRACTICAL EXERCISES (PROCESS CONTROL CHECKS)

- Shear wave index point determination
- Shear wave angle determination
- Shear wave distance calibration using the IIW block
- Longitudinal wave beam profile plot
- Angle beam profile plot
- DAC curve side drilled holes (Shear wave)
- DAC curve flat bottom holes (Longitudinal wave)
- ASTM E 317 near surface resolution
- ASTM E 317 horizontal linearity
- ASTM E 317 vertical linearity
- IIW block frequency determination

Review of course material

End of course test

Appendix - Acoustic Properties for Metals in Solid Form

Course test and review of 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.

