Level I - Ultrasonic Testing

Course: A 40 hour course intended to address the body of knowledge outlined in ASNT CP-105.

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REFERENCE & TRAINING MATERIAL:

1. ASNT UT Level I/II Powerpoint Presentation
4. AWS D1.5 Part C. Ultrasonic Testing of Groove Welds
5. ASTM E 114 (2005)

UT Level I Lesson Plan Outline

Day 1

Introduction: Brief History of Ultrasonic Testing
Classroom Rules
Basic Math for Ultrasound
Reading Assignments

Lesson 1 Qualification and Certification

A. Industry Standards
B. Written Practice
C. Qualification Requirements
D. Quiz
Lesson 2  Basic Principles of Acoustics

A. Sound and Ultrasound
B. The Generation of Ultrasound
C. Wavelength, Material Velocity and Frequency
D. Wave Modes
E. Quiz (UT Lesson 2)
F. Math Work Sheets
   1) Metric Conversions
   2) Wave Length
   3) Snell’s Law
   4) Acoustic Impedance

Reading Assignment: Chapters 1, 2, and 3 of The Ultrasonic Training Classroom Training Book

Day 2

Lesson 3  Ultrasonic Equipment

A. Ultrasonic Instrument Circuitry and Controls
B. Instrument Calibration
C. Instrument Standardizing
D. Reference Standards
E. Digital Thickness Gages
F. Cables
G. Quiz (UT Lesson 3)
H. Lab Exercise 1 (UT Lesson 3)
I. Lab Exercise 2 (UT Lesson 3)

Reading Assignment: Chapter 4 of The Ultrasonic Training Classroom Training Book

Day 3

Lesson 4  Transducers

A. Operation and Theory
B. Piezoelectric Principle
C. Transducer Elements  
D. Near and Far Fields  
E. Beam Spread  
F. Types of Transducers  
G. Sensitivity, Resolution and Damping  
H. Couplants  
I. Quiz (Lesson 4) Lab Exercise 3 (UT Lesson 4)  
J. Lab Exercise 4 (UT Lesson 4)  
K. Lab Exercise 5 (UT Lesson 4)  
L. Math Work Sheets  
1) Beam Divergence  
2) Near Field Measurement

**Reading Assignment:** Chapter 5 of *The Ultrasonic Training Classroom Training Book*

**Day 4**

**Lesson 5 Basic Ultrasonic Testing Methods**

A. Contact Testing  
B. Pulse-Echo Techniques  
C. Through Transmission  
D. Angle Beam Technique  
E. Surface Wave Technique  
F. Lamb Wave Technique  
G. Immersion Testing  
H. Non-Contacting Ultrasonic Techniques  
I. Quiz (UT Lesson 5)  
J. Lab Exercise (UT Lesson 5)

**Day 5**

**Review of Level I Ultrasonic Testing**

A. Lab Exercise  
B. Review of Level I Ultrasonic Testing  
C. Final Examination