AATA 103B: ULTRASONIC TESTING LEVEL 2

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2025
Units:	3
Hours:	40 lecture per quarter (40 total per quarter)
Prerequisite:	This course is limited to students admitted to the Nondestructive Testing Technician Apprenticeship Program.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	None
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

Description

This course dives deeper into ultrasonic inspection, including flaw detection using angle beam inspection, application of immersion testing, weld testing, and evaluation and interpretation of codes and standards.

Course Objectives

The student will be able to:

- 1. Select equipment to conduct test
- 2. Set up test equipment
- 3. Conduct UT inspections of reference samples to find discontinuities and anomalies in materials
- 4. Create a Distant Amplitude Curve and apply to reference materials and UT inspections
- 5. Understand all applicable industry codes and standards
- 6. Interpret results with respect to applicable codes and standards
- 7. Understand limitation of the test method
- 8. Write test reports

Course Content

- 1. UT test modes
 - a. Pulse-echo mode
 - b. Pitch-catch mode
 - c. Thru-transmission mode
 - d. Scan plans and weld volume coverage
- 2. Immersion testing
 - a. Normal beamb. Angle beam
 - c. Focused immersion probes
 - d. Immersion tanks
- 3. Calibration blocks
 - a. IIW Blocks Type I and II
 - b. Miniature angle beam
 - c. DSC Block

- d. AWS Resolution Block
- e. Step wedge
- f. Area Amplitude Block
- g. Distance Amplitude Block
- 4. Angle beam inspections basics
 - a. Selection of screen range
 - b. Measurement of beam exit point
 - c. Measurement of refracted angle
 - d. Range calibration using IIW, DSC Block
 - e. Angle selection for weld inspection
 - f. Surface distance, skip distance, depth, 1/2 vee and full V path
 - g. Weld inspection and plotting discontinuities for example, crack, lack of fusion, lack of penetration, slag, porosity in welds
- 5. Angle beam inspections DAC and other issues
 - a. Sensitivity calibration: Piping and non-piping calibrations
 - b. Distance Amplitude Correction (DAC) curve
 - c. Time Corrected Gain (TCG)
 - d. Weld volume coverage and scan plan
 - e. High temp angle beam inspections
 - f. Discontinuity length sizing using 6 dB and 20 dB drop method
 - g. Worksheet: Plotting of discontinuities for butt welds
- 6. ASME V, Article 4, Writing an Ultrasonic Procedure
 - a. ASME Section V
 - b. Essential variables
 - c. Non-essential variables
- 7. ASME V codes and standards
 - a. ASME Section V, Article 4 Weld Examination
 - b. SA 388 Heavy Steel Forging
 - c. Additional codes and standards as per student's requirements, as requested at the time of registration
- 8. ASME V cladding inspection techniques
 - a. Detection of disbond and cladding flaws
 - b. Techniques: One and Two
 - c. Calibration blocks
- 9. AWS D1.1 and API RP 2X
 - a. Establishing reference level (b)
 - b. Indication rating (d), indication level (a), attenuation factor (c)

Lab Content

Not applicable.

Special Facilities and/or Equipment

 UT testing machine, transducers, test/sample pieces, couplant.
When taught via Foothill Global Access, on-going access to computer with email software and hardware; email address.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Results of written test Results of practical test

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Discussion Slideshow Video Demonstration Hands-on training

Representative Text(s) and Other Materials

American Society for Nondestructive Testing. <u>Personnel Training</u> <u>Publications: Ultrasonic Testing (UT) Classroom Training Book</u>. 2015.

This text is still widely used within the industry and is the most current text used for training.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Reading: Read Chapter 16 - ASME V Cladding Inspection Techniques

2. Writing: Complete Quiz 16 on page 102. Quiz results will be reviewed in class as a group

Discipline(s)

Industrial Maintenance