AATA 103B: ULTRASONIC TESTING LEVEL 2

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2023
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:	Pass/No Pass 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:

a. Select equipment to conduct test
b. Set up test equipment
c. Conduct UT inspections of reference samples to find discontinuities and anomalies in materials
d. Create a Distant Amplitude Curve and apply to reference materials and UT inspections
e. Understand all applicable industry codes and standards
f. Interpret results with respect to applicable codes and standards
g. Understand limitation of the test method
h. Write test reports

Course Content

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

Lab Content

Not applicable.

Special Facilities and/or Equipment

1. UT testing machine, transducers, test/sample pieces, couplant.
2. 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. Personnel Training Publications: Ultrasonic Testing (UT) Classroom Training Book. 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

a. Reading: Read Chapter 16 - ASME V Cladding Inspection Techniques
b. Writing: Complete Quiz 16 on page 102. Quiz results will be reviewed in class as a group

Discipline(s)

Industrial Maintenance