

Ultrasonic Testing Level II Course Outline (40hrs)

Review of Ultrasonic Techniques Course

- (1) Principles of ultrasonic
- (2) Equipment
 - a. A-scan
 - b. B-scan
 - c. C-scan
 - d. Computerized systems

Testing techniques

- (1) Calibration
 - a. Straight beam
 - b. Angle beam
 - c. Resonance
 - d. Special applications

Evaluation of Base-Material Product Forms

- a. Ingots
 - (1) Process review
 - (2) Types, origin, and typical orientation of discontinuities
 - (3) Response of discontinuities to ultrasound
 - (4) Applicable codes/standards
- b. Plate and sheet
 - (1) Rolling process
 - (2) Types, origin, and typical orientation of discontinuities
 - (3) Response of discontinuities to ultrasound
 - (4) Applicable codes/standards
- c. Bar and rod
 - (1) Forming process
 - (2) Types, origin, and typical orientation of discontinuities
 - (3) Response of discontinuities to ultrasound
 - (4) Applicable codes/standards
- d. Pipe and tubular products
 - (1) Manufacturing process
 - (2) Types, origin, and typical orientation of discontinuities
 - (3) Response of discontinuities to ultrasound
 - (4) Applicable codes/standards
- e. Forgings
 - (1) Process review
 - (2) Types, origin, and typical orientation of discontinuities
 - (3) Response of discontinuities to ultrasound
 - (4) Applicable codes/standards

- a. f. Castings
 - (1) Process review
 - (2) Types, origin, and typical orientation of discontinuities
 - (3) Response of ultrasound to discontinuities
 - (4) Applicable codes/standards
- f. Composite structures
 - (1) Process review
 - (2) Types, origin, and typical orientation of discontinuities
 - (3) Response of ultrasound to discontinuities
 - (4) Applicable codes/standards
- g. Other product forms as applicable B rubber, glass, etc.

Evaluation of Weldments

- a. Welding processes
- b. Weld geometries
- c. Welding discontinuities
- d. Origin and typical orientation of discontinuities
- e. Response of discontinuities to ultrasound
- f. Applicable codes/standards

Evaluation of Bonded Structures

- a. Manufacturing processes
- b. Types of discontinuities
- c. Origin and typical orientation of discontinuities
- d. Response of discontinuities to ultrasound
- e. Applicable codes/standards

Discontinuity Detection

- a. Sensitivity to reflections
 - (1) Size, type, and location of discontinuities
 - (2) Techniques used in detection
 - (3) Wave characteristics
 - (4) Material and velocity
- b. Resolution
 - (1) Standard reference comparisons
 - (2) History of part
 - (3) Probability of type of discontinuity
 - (4) Degrees of operator discrimination
 - (5) Effects of ultrasonic frequency
 - (6) Damping effects
- c. Determination of discontinuity size
 - (1) Various monitor displays and meter indications
 - (2) Transducer movement versus display
 - (3) Two-dimensional testing techniques
 - (4) Signal patterns
- d. Location of discontinuity
 - (1) CRT display
 - (2) Amplitude and linear time
 - (3) Search technique

Evaluation

- a. Comparison procedures
 - (1) Various monitor displays
 - (2) Amplitude, area, and distance relationship
 - (3) Application of results of other NDT methods
 - b. Object appraisal
 - (1) History of part
 - (2) Intended use of part
 - (3) Existing and applicable code interpretation
- Type of discontinuity and location