



## **Ultrasonic Testing Level II**

### **Course Outline**

- 1. Review of Ultrasonic Techniques**
  - a. Principles of ultrasonics
  - b. Equipment
    - (1) A-Scan
    - (2) B-Scan
    - (3) C-Scan
    - (4) Computerized systems
  - c. Testing techniques
  - d. Calibration
    - (1) Straight-beam
    - (2) Angle-beam
    - (3) Resonance
    - (4) Special applications
  
- 2. 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
  - f. Castings
    - (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 – rubber, glass, etc.



## Plumstead Quality and Training Services

### Radiation Safety - Training and Level III Consulting for Nondestructive Testing

#### 3. 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

#### 4. 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
  - (5) Discontinuity
- 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 vs. display
  - (3) Two-dimensional testing techniques
  - (4) Signal patterns
- d. Location of discontinuity
  - (1) Various monitor displays
  - (2) Amplitude and linear time
  - (3) Search technique

#### 5. Evaluation

- a. Comparison procedures
  - (1) Standards and references
  - (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
  - (4) Type of discontinuity and location