Radiographic Training—Level 2

Course Outline

1. Introduction
   * NDT Introduction
   * Facility Tour & Method Demonstrations
   * Mathematics Review

Part 1 -- Basic Method Review

2. Radiation Origin & History
   * Basic Structure of Matter
   * Radiation Characteristics
   * Ionization/Scatter
   * Origin and Types of Radiation
   * Radiation Discovery and Historical Events
   * Industrial Radiography Beginnings

3. Radiation Safety
   * Radiation/Interactions and Origin Review
   * Units of Radiation Measurement
   * Radiological and Biological Effects
   * Exposure Reductions/ALARA
   * Requirements and Regulations
   * Emergency Response/Employee Notifications
   * Personnel Training and Qualifications/Records/Administration

4. Basic CP X-ray Systems & Subsystems
   * Tube Head
   * High Voltage Generators
   * Control Panel
   * Cooler
   * High Voltage Cables
   * Radiation Enclosures
5. Special Radiation Generating Systems
   * High Energy X-Ray (Linear Accelerators, Betatron, Van De Graaf Generators)
   * Portable X-Ray Systems
   * Mini Focus X-Ray Systems
   * Micro-Focus X-Ray Systems
   * Gamma Radiography
   * Rod Anode
   * Neutron Radiography

6. Imaging Modalities
   * Film Radiography
   * Computed Radiography (CR)
   * Digital Radiography (DR)
   * Radioscopy/Real Time Imaging
   * Computed Tomography (CT)
   * Other Imaging Methods

7. Automatic Film Processing
   * Operational Overview
   * Film Systems
   * Darkroom Operations
   * Chemistry Systems
   * Mechanical Systems
   * Controlling Factors/Common Malfunctions
   * Discharge Considerations
   * Maintenance

8. Radiographic Quality Process Variables
   * Test Specimen Coverage
   * Exposure Parameters
   * Geometric & Spatial Relationships
   * Radiographic Density
   * Image Quality
   * Scatter Control
   * Radiographic Identification
   * Radiographic Technique
   * Students Choose a Test Specimen & Fully Develop an RT Technique(s) IAW/XRI 4004 /ASTM E 1742
   * Student Will Develop “CR” Technique for Comparison of Parameters & Imaging Quality Results

10. Procedures & Specifications – History & Applications
    * ASTM E-1742 Full Review & Discussion – Open Book Quiz
    * Full Review & Discussion, Demonstrations of Process
    * Controls, Verifications & Calibrations – Review
    * Comprehensive Review Of Unique Customer Requirements

11. Material Processes Training
    * Materials & Processes – Product Forms & Applications
      o Inherent Discontinuities
        • Ingots
        • Castings
      o Processing Discontinuities
        • Primary
        • Secondary
      o In Service Discontinuities
        • Fatigue
        • Corrosion
        • Erosion

Part 2 -- Radiography for the Level 2

12. Radiographic Interpretation
    * The Radiographic Viewing Area
    * Radiographic Viewing Tools & Accessories
    * Radiographic Illuminators
    * Radiograph Indications To Discontinuity Disposition
    * Welding Radiographic Interpretation
    * Casting Radiographic Interpretation
13. Specifications Idiosyncrasy
   * A Direct Comparison & Discussion of ASTM E-1742 and the Prime Aerospace Radiographic Inspection Process Specifications & ASTM E-2104
     - GE – P3TF5
     - P&W XRM Master & Codes
     - Rolls Royce RPS 704
     - Boeing BSS 7041
     - ASTM E 2104
   * NADCAP AS7114 Review and Discussion

14. ASTM Reference Radiographs
   * A Review of Reference Radiographs: Application and Significance (Primary Focus On):
     - ASTM E-155
     - ASTM E-192
     - ASTM E-446
     - ASTM E-1320

15. Special Process Presentations
   * Titanium Radiographic Interpretation
   * Superalloy Radiographic Interpretation

16. Interpretation Exercises
   * Student Identifies Indications, Discontinuities and Gauges Radiographic Quality on Select Groups of Images
     - Titanium Casting Radiographs
     - Ferrous Casting Radiographs
     - Aluminum Casting Radiographs
     - Super Alloy Casting Radiographs
     - Aerospace Weldment Radiographs
     - Miscellaneous Weldment Radiographs
     - Miscellaneous Radiographs Package