

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

9. Ed-Lab Exercise: Full Technique Development & CR Comparison

- * 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