

## **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