



Liquid Penetrant Testing Level I / II

Course Outline

1. Introduction

- a. Brief history of nondestructive testing and liquid penetrant testing
- b. Purpose of liquid penetrant testing
- c. Basic principles of liquid penetrant testing
- d. Types of liquid penetrants commercially available
- e. Method of personnel qualification

2. Liquid Penetrant Processing

- a. Preparation of parts
- b. Adequate lighting
- c. Application of penetrant to parts
- d. Removal of surface penetrant
- e. Developer application and drying
- f. Inspection and evaluation
- g. Post cleaning

3. Various Penetrant Testing Methods

- a. Current ASTM and ASME standard methods - ASTM E165, 1208, 1209, 1210, 1417
- b. Characteristics of each method
- c. General applications of each method

4. Liquid Penetrant Testing Equipment

- a. Liquid penetrant testing units
- b. Lighting equipment and light meters
- c. Materials for liquid penetrant testing
- d. Precautions in liquid penetrant inspection

5. Selection of the Appropriate Penetrant Testing Method

- a. Advantages of various methods
- b. Disadvantages of various methods

6. Inspection and Evaluation of Indications

- a. General
 - (1) Discontinuities inherent in various materials
 - (2) Reason for indications
 - (3) Appearance of indications
 - (4) Time for indications to appear
 - (5) Effects of temperature and lighting (white to UV)
 - (6) Effects of metal smearing operations (shot peening, machining, etc.)
 - (7) Preferred sequence for penetrant inspection
 - (8) Part preparation (precleaning, stripping, etc.)
- b. Factors affecting indications
 - (1) Penetrant used
 - (2) Prior processing
 - (3) Technique used



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- c. Indications from cracks
 - (1) Cracks occurring during solidification
 - (2) Cracks occurring during processing
 - (3) Cracks occurring during service
 - d. Indications from porosity
 - e. Indications from specific material forms
 - (1) Forgings
 - (2) Castings
 - (3) Plate
 - (4) Welds
 - (5) Extrusions
 - f. Evaluation of indications
 - (1) True indications
 - (2) False indications
 - (3) Relevant indications
 - (4) Nonrelevant indications
 - (5) Process Control
 - a. Controlling process variables
 - b. Testing and maintenance materials
- 7. Inspection Procedures and Standards**
- a. Inspection procedures (minimum requirements)
 - b. Standards/codes
 - (1) Applicable methods/processes
 - (2) Acceptance criteria