

MAGNETIC PARTICLE TEST

1.0 PRINCIPLES OF MAGNETIC PARTICLE TESTING:

- Introduction
- Capabilities of Magnetic Particle Testing
 - Personnel Qualifications
- Magnets and magnetic Fields
 - Magnetic Fields
- Law of Magnetism
 - Materials Influenced by Magnetic Fields
- Characteristics of Magnetic Fields

2.0 Effects of Discontinuities on Materials:

- Surface Discontinuities
- Scratches
- Subsurface Discontinuities
- Lesson 2 - Quiz
- Lesson 3 - Magnetization
 - Circular Fields
 - Contact Plates
 - Prods
 - Discontinuity Detection
 - Longitudinal Field
 - Field Direction

3.0 Magnetization Methods :

- Test Materials
 - Wet Particles
 - Dry Particle
- Longitudinal Magnetization
 - Field Strength

4.0 Principles of Demagnetization.

- Introduction
- Alternating Current Demagnetization
- Direct Current Demagnetization
- Efficiency of Demagnetization
- Reasons to Demagnetize

5.0 Equipment :

- Equipment Selection
 - Technical and Specification Requirements
 - Purpose of Test
 - Area Tested
- Mobile Equipment
- Stationary Equipment

Particles Used

6.0 Discontinuities :

Inherent Discontinuities
Processing Discontinuities
In-service Discontinuities

7.0 Principles :

Theories
Techniques
Magnetic Field Theory
 Magnetic Domains
 Magnetic Fields
 Magnetized Ring
 Bar Magnet
Effect of materials on Electromagnetic Fields
 Units of Measure for Magnetic Flux
 Magnetic hysteresis
 Magnetic Permeability

8.0 Flux Fields:

Electric Current
 Alternating Current
 Direct Current
 Half Wave Direct Current
 Full Wave Direct Current
 Three Phase Full Wave Direct Current

9.0 Magnetic Particles and Methods of Application:

Introduction
 Current Level and Particle Application
Continuous Method
 Dry Continuous Method
 Wet Continuous Method
Residual Method
 Field Direction
 Magnetic Field Measurements
Circular magnetization
 Direct Contact
 Central Conductor
 Amperage Requirements
Sensitivity Level
 Amperage
 Testing Media
 Direct Contact Circular Magnetization
 Coil Shot
 Cable Wrap

10.0 Magnetization by Means of Electric Current:

- Introduction
- Circular Magnetization
 - Circular magnetization of Solid Test Objects
 - Circular magnetization with Prods
 - Circular Magnetization with Direct Contact Head
 - Circular magnetization with Induced Current
 - Circular magnetization of Hollow Test Objects
- Longitudinal magnetization
- Coil Magnetization
- Filed Flow Magnetization
- Yoke Magnetization
 - Combined Circular and Longitudinal magnetization
 - Units of Measure and Terminology
- Types of magnetic materials
- Calculation of magnetic Force Requirements
 - Prods
 - Yokes
 - Coils
 - Air Core Coil Longitudinal magnetization
 - Fill Factor Coils
- Interpretation of Indications
 - Relevant Indications
 - Non-relevant Indications
 - False Indications

11.0[Demagnetization](#) :

- Purpose
- Principles of Operation for Demagnetization
- Reasons to Demagnetize...
- Justification for Demagnetizing
- Demagnetization Methods
 - Heating Above Curie Point
 - Electromagnetic Demagnetization
 - Alternating Current Demagnetization
 - Direct Current Magnetization
 - Yoke Demagnetization
 - Demagnetization Practices

12.0[Equipment](#) :

- Stationary Equipment
- Portable Equipment
- Dry Powder Test Equipment
 - Powder Selection
 - Powder Application.
 - Applicators

- Wet Visible Test Equipment
 - Particle Selection
 - Wet Fluorescent Method
 - Test Variables
 - Surface Preparation
 - Suspension application

- Water Problems
- Suspension Preparation
- Dry Powder Liquid Concentrate
- Paste Concentrate
- Water Baths
- Fluorescent background Check
- Oil Based Media Contamination Check
- Settling Test
- Fluorescent Test Materials
- Maintenance.
- Ultraviolet Radiation

13.0 Type of Discontinuities:

- Inherent Discontinuities
- Primary Processing Discontinuities
- Secondary Processing Discontinuities
- In-service Discontinuities

14.0 Evaluation Techniques:

- Reference Standards
- System Evaluation
 - System standardization
 - Parametric Evaluations
 - Technique Development
 - Reference Standards for System Evaluation
- Standard Tool Steel Ring
 - Ring Standard Magnetic Fields
 - Limitations of the Ring Standard
- Reference Standard Test Blocks
- Electronic Reference Standards..
 - Hall Effect Meters
 - Eddy Current Devices

15.0 Quality Control:

- Introduction
 - New Materials
 - In-Use materials
- Material Contamination
- Material Control Requirements
- Use of Settling Test
- Ultraviolet Radiation and Facilities
- Ultraviolet Radiation Intensity Requirements
 - Ambient Light Measurements
- Variables
 - Line Voltage Variations
 - Service and Aging Variations
 - Ultraviolet Lamp Hazards

16.0 Proper Procedure:

- Variation in Technique
- Selection of Current

Current Application Choices
Selection of Media
Selection of Technique
Field orientation
 Head Shot
 Central Conductor
 Longitudinal Field
Sensitivity Requirements
Conclusion
