



M2110

MAGNETIC PARTICLE INSPECTION

LEVEL I & II

24-Hours (3 days)

ASNT SNT-TC-1A Recommended Qualification Hours for Training and Experience			
Training	Level I: 12-hrs	Level II: 8-hrs	Total: 20-hrs
Time in Method	Level I: 70-hrs	Level II: 210-hrs	Total: 280-hrs

PREREQUISITES

This course requires no prior training or experience by the candidate in this method of NDT. The material is presented in a manner that promotes understanding and the ability to make immediate application. This is an excellent course for NDT trainees who must have Level I and II training in order to qualify for certification as well as facility personnel who are responsible for or oversee the application of Testing or Quality Control/Quality Assurance.

COURSE CONTENT

Fundamental Level I and II material is presented, starting with the basic theory of magnetism, going through its many applications for the testing of ferrous materials plus hands-on lab exercises. The curriculum exceeds the coverage for Level I / II training recommended by The American Society for Nondestructive Testing for Level I and II studies. Lesson-by-lesson quizzes monitor progress and complete Level II General, Specific and Practical tests are administered by a qualified ASNT ACCP Level III. A Visual Acuity Test is included if required. M2110 provides accurate, current and thorough training that lays a solid foundation for the student to perform valid Magnetic Particle Testing.

ALTERNATIVE COURSE OPTIONS

Besides a classroom-only venue, a web-based distance-learning course is also available, M2111-WB. This course is ideally suited for Level II technicians that are in need of refresher training. Distance learning courses include recommended "body of knowledge" course content plus the General Test. An additional four hours classroom training and evaluation is required that concludes with the Specific and Practical Tests as well as a Vision Acuity Test. All tests are administered by a certified ACCP Level III. Ask for "on-site" options if travel to our facility presents a problem.

COST

Classroom Venue - M2110.....	\$ 950.00
Web Based Class - M2111-WB	\$ 495.00
Qualification Examinations: General.....	\$ 100.00
Specific.....	\$ 100.00
Practical	\$ 200.00

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COURSE OUTLINE

Day One

LESSON 1 – Introduction to the Method

- Course Objectives
- Capabilities and Limitations of the Method
- Objectives of Testing
- The Magnetic Particle Testing Process

LESSON 2 – Basic Principles of Magnets and Magnetic Fields

- Historical Overview
- Basic Principles of Magnetism
- Origin of Magnetic Force
- Dipoles, Atoms and Domains
- Magnetic Behaviors: Diamagnetism, Paramagnetism, and Ferromagnetism
- Magnetic Sources
- Characteristics of Magnetic Flux Fields
- Section Quiz

LESSON 3 – Magnetic Properties – the Hysteresis Loop

- Permeability
- Reluctance
- Residual Magnetism
- Retentivity
- Coercive Force
- Relationship of Magnetic Properties
- The Hysteresis Loop
- Section Quiz

Day Two

LESSON 4 – Effects of Discontinuities on Magnetic Fields

- Detecting Discontinuities: Surface and Subsurface
- Discontinuities and Magnetic Field Distortion
- Relevant Discontinuities
- Non-relevant Discontinuities
- False Indications
- Section Quiz

LESSON 5 – Using Magnetic Fields

- Direct and Indirect Magnetic Induction
- Magnetic Field Patterns
- Circular Magnetic Fields
- Longitudinal Magnetic Fields
- Choosing the Appropriate Technique
- Test Materials: Magnetic Particle Media
 - Dry Method
 - Wet Method
 - Plotting Sensitivity
- Section Quiz

LESSON 6 – Types of Currents for Producing Magnetic Fields

- Direct Current
- Alternating Current
- Rectified Current (HWDC and FWDC)
- Computing Current Requirements for Circular and Longitudinal Fields
- Section Quiz

LESSON 7 – Principles of Demagnetization

- Principles of Demagnetization
- AC Demag Techniques
- DC Demag Techniques
- Reasons to Demag
- Section Quiz

Day Three

LESSON 8 – Equipment

- Equipment Selection Criteria
- Stationary Equipment and Accessories
- Mobile Equipment and Accessories
- Portable Equipment and Accessories
- Section Quiz

LESSON 9 – The Nature and Origin of Discontinuities

- Sources of Discontinuities
 - Inherent Discontinuities
 - Processing Discontinuities
 - Inservice Discontinuities
- Section Quiz

EXAMINATIONS:

- **General Exam** – covers the basic principles (Body of Knowledge) of Magnetic Particle Testing.
- **Specific Exam** – tests ability to read, interpret and apply specific procedure material for the method.
- **Practical Exam** – hands-on demonstration of the ability to operate test equipment, perform specific calibrations and tests in order to find and report flaws of sample materials according to appropriate specifications.

