

Eddy Current Level II Course Outline (40hrs)

Review of Electromagnetic Theory

- a. Eddy current theory
- b. Flux leakage theory
- c. Types of eddy current sensing probes

Factors That Affect Coil Impedance

- a. Test part
 - (1) Conductivity
 - (2) Permeability
 - (3) Size and shape
 - (4) Homogeneity
- b. Test System
 - (1) Frequency
 - (2) Coupling
 - (3) Field strength
 - (4) Test coil and shape

Factors That Affect Flux Leakage Fields

- a. Degree of magnetization
- b. Defect geometry
- c. Defect location
- d. Defect orientation
- e. Velocity factor
- f. Distance between adjacent fields

Signal-to-Noise Ratio

- a. Definition
- b. Relationship to eddy current testing
- c. Methods of improving signal-to-noise ratio
- d. Description of the theory and use of filters

Selection of Test Frequency

- a. Relationship of frequency to type of test
- b. Considerations affecting choice of test
 - (1) Signal-to-noise ratio
 - (2) Phase discrimination
 - (3) Response speed
 - (4) Skin effect
 - (5) Standard depth of penetration
 - (6) Effective depth of penetration
 - (7) Type and size of flaws sought

The Impedance plane diagram

A comprehensive explanation of its construction
Detailed explanations of how to use it to determine:

- a. Frequency
- b. Phase angle
- c. Gain (Vertical and horizontal ratios)

d. Probe choice

Coupling

- a. "Fill factor" in through-coil inspection
- b. "Lift-off" and compensation in probe coil inspection
- c. "Lift-off" in non conductive coating measurement

Field Strength and Its Selection

- a. Permeability changes
- b. Saturation
- c. Effect of AC field strength on eddy current testing
- d. Effect of field strength in flux leakage testing

Instrument Design Considerations

- a. Amplification
- b. Phase detection
- c. Differentiation of filtering

Applications

- a. Flaw detection (Surface and sub surface)
- b. Sorting for properties related to conductivity
- a. Sorting for properties related to permeability
- d. Thickness evaluation coatings
- e. Thickness evaluation metals
- f. Corrosion detection/quantification
- g. Dual frequency techniques
- h. Second layer techniques
- i. Rotary bolt hole inspection
- j. Ring probe fastener hole inspection
- k. C-scan applications

Latest developments in Eddy Current instruments

Practical demonstrations and exercises in the above techniques

Review

End of course test and review

TEST NDT does not have any pre-requisites for attending any of our courses, it is entirely up to the attendee to determine whether the course is suitable for their needs and whether they are capable of achieving the standards. Please study the applicable course outline and decide if the course is suitable for your needs before enrolling, if in doubt, please contact us to discuss. For employer funded attendees, please discuss the suitability of any of the courses with your employers responsible NDT level 3 before enrolling.