Fundamental Applications of NDE for Managers and Engineers

Computer-Based Training

Nuclear

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NRC Headquarters, Rockville, MD

NDE for Managers and Engineers

- Most popular classroom NDE training course offered by EPRI
  - Conducted ~ 5 times a year
    - EPRI – Charlotte
    - Remote
  - ~ 70 participants per year
- Converted the classroom materials to a computer-based training (CBT) course
  - A form of learning that utilizes computer technology/digital resources for delivering educational content
    - It involves interactive modules, multimedia elements, and self-paced learning
  - CBT consist of 7 modules
    - Twelve lessons
      - ~ 40 interactions (knowledge checks) and animations
      - Every module/lesson concludes with a quiz
        - ~ 6-8 multiple choice questions
  - Costs
    - Funders: $0
    - Public: $450 USD
  - Publish date: March 31, 2025

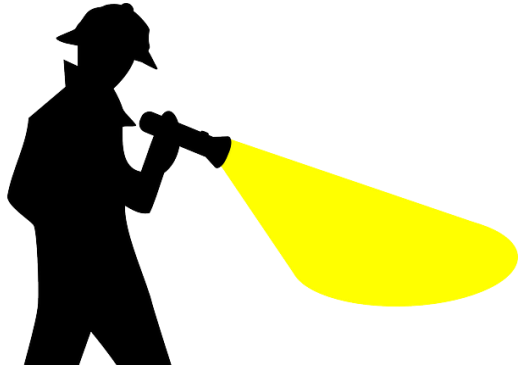
CBT can be supplemented with a Lab Session

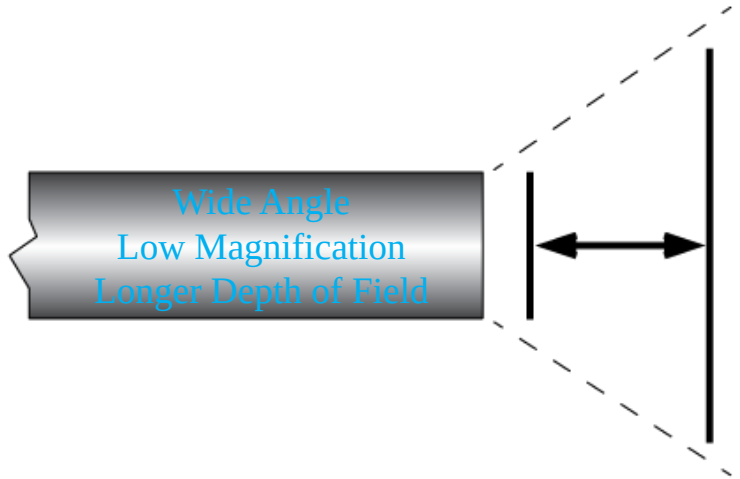
Module 1 – Introduction to NDE

- Four lessons
  - Introduction to Nondestructive Examination
    - Discontinuities
    - Engineering considerations
  - Overview of the common NDE methods
    - Factors to consider when selecting a method/technique
    - NDE's role in component design and operation
  - Overview of ASME Section XI
    - How to navigate Section XI
    - Component acceptance
    - Defining NDE terms
    - Resources for NDE
  - NDE personnel
    - Levels of qualification
      - Roles and responsibilities
    - Qualification
      - Five components
        - T^2E^3

Module 2 – Visual Examination (VT)

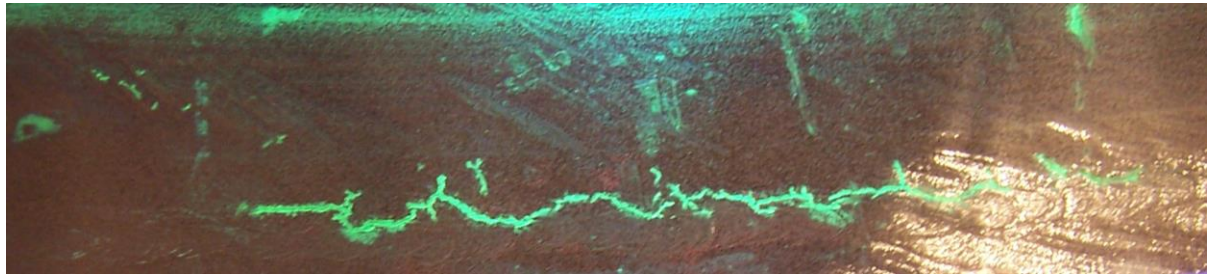
- Three Lessons
  - Lesson 1
    - Five basic elements of a visual exam
    - Types of VT and techniques
      - Applicable components
    - Advantage/Limitations
  - Lesson 2
    - Utilization of mechanical tools
  - Lesson 3
    - Utilization of optical aids
      - Fiberoptics, videoscopes



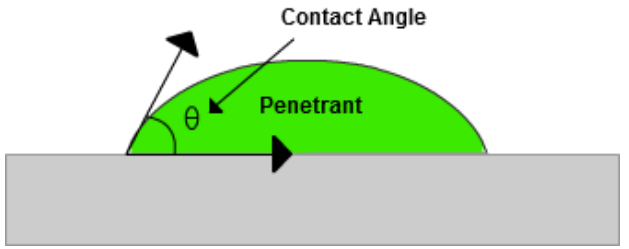


Module 3 – Penetrant Testing (PT)

- History
- Classifications
  - Types
  - Methods
    - A, B, C & D
  - Techniques
- Basic principles
  - Wettability, surface tension, cohesion, etc.
- Applications
- Procedure
  - Step-by-step tasks

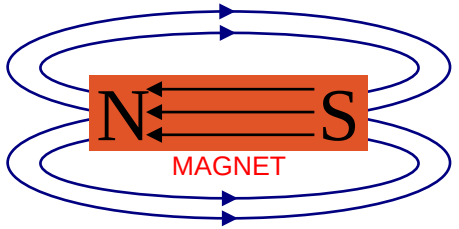


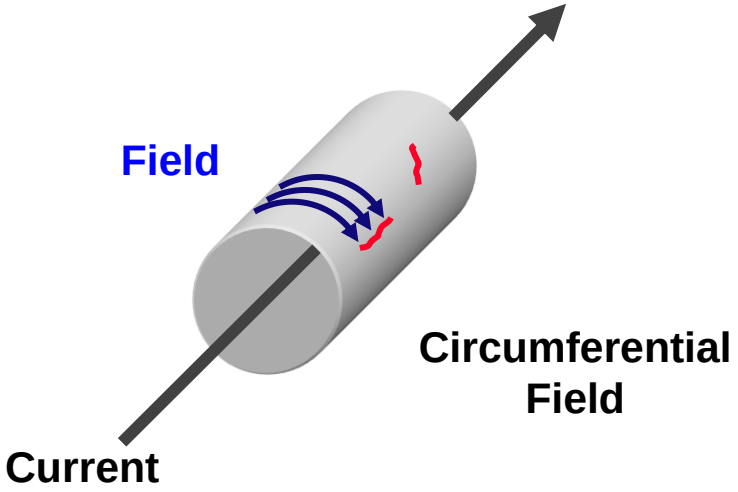
Fluorescent PT of IGSCC



Module 4 – Magnetic Particle (MT)

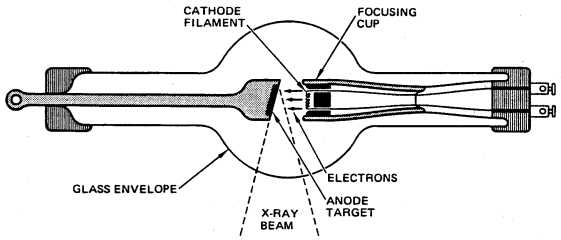
- Overview
- History
- Basic principles
- Methods and techniques
  - Circular and longitudinal fields
    - Coils, yokes, prods, etc.
  - Direct and indirect
  - AC versus DC
    - Advantages/limitations
- ASME V procedure
  - Step-by-step tasks

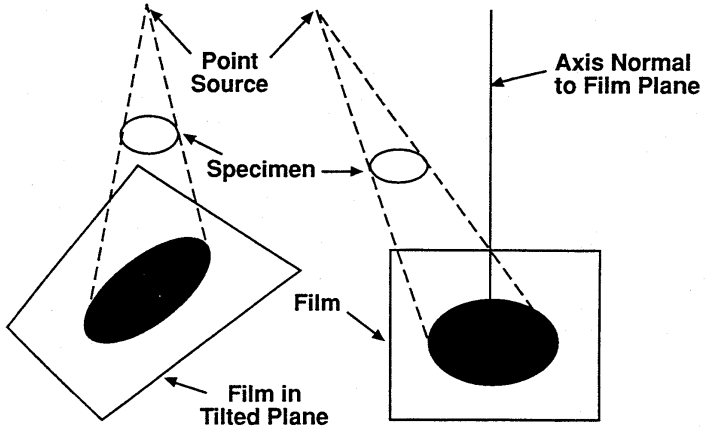




Module 5 – Radiography (RT)

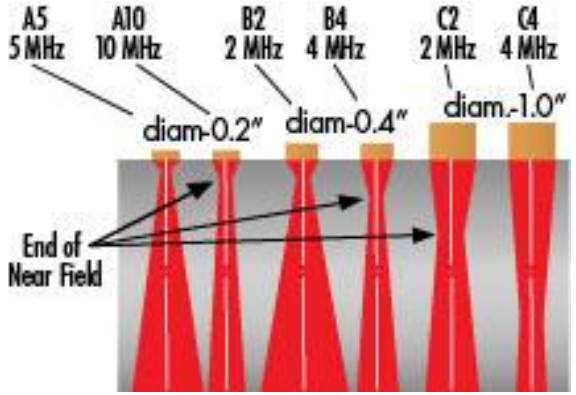
- Overview
- Fundamentals
  - Electromagnetic radiation
  - Quality versus quantity
- Techniques
  - X-rays
    - Current versus voltage
  - Gamma rays
    - Sources
      - Camera
    - Half life
- Geometric considerations
  - Distortion
- IQIs
- Film versus PSP plates

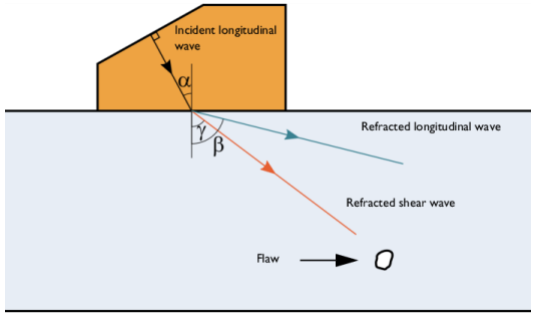




Module 6 – Ultrasonic Examination (UT)

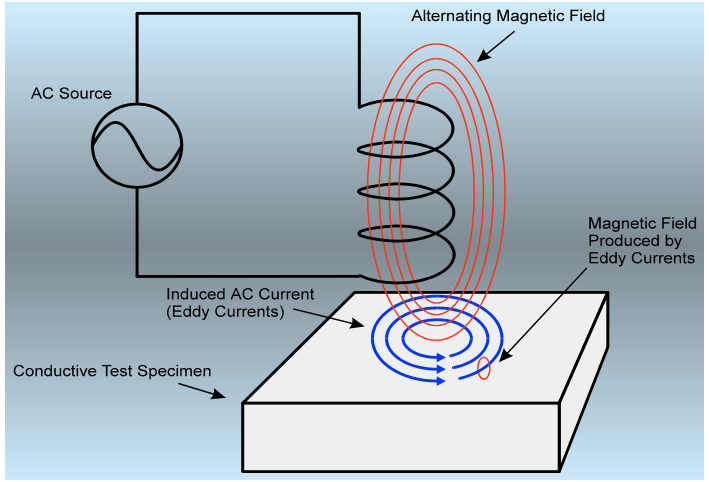
- Introduction
  - Search units
  - Waves of propagation
- Sound transmission
- Refraction
  - Critical angles
- Beam characteristics
- Techniques
  - Contact and immersion
  - Pulse echo and through transmission
  - Straight and angle beam
- Scanning
- Display modes

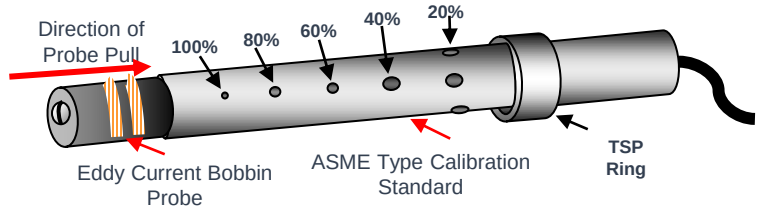




Module 7 – Eddy Current Examination (ECT)

- Basic principles
  - Electromagnetism
    - Generating eddy currents
    - Conductivity, impedance, etc.
- Applications
  - Properties
    - Path
    - Strength
    - Penetration
    - Orientation
    - Lift-off
    - Fill factor
- Equipment
  - Coils and probes
- Techniques
- Phase angle and amplitude
- Calibration standards





Questions/Comments

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