

**LIQUID PENETRANT TESTING  
LEVEL I  
24 hours Course**

***COURSE DESCRIPTION***

This 24 hours course is a preparatory course for personnel without prior experience in the method. The course provides a full appreciation in the techniques and method of liquid penetrant testing. A high theory and practical content is offered.

***COURSE CONTENT***

- Introduction
- Principles of Liquid Penetrant Testing
- Penetrant Inspection Equipment
- Performance checking
- Defect detection and evaluation
- Liquid Penetrant Inspection techniques
- Relevant standards

***WHO SHOULD ATTEND***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.

**LIQUID PENETRANT TESTING**  
**LEVEL II**  
**45 hours Course**

***COURSE DESCRIPTION***

This 45 hours course covers all theory aspects of the method including field aerosol and production line immersion systems as well as providing 50% practical "hands-on" workshop experience of the various techniques.

***COURSE CONTENT***

- Product Technology
- Introduction to the Liquid Penetrant Test Method
- Uses of Liquid Penetrant Testing and Penetrant Processing
- Manual (In-Field) Techniques
- Penetrant Emulsifiers, Removers and Developers
- Interpretation of Indications
- Writing of Reports and Development of Procedures
- Stationary Line Techniques
- Glossary of Terms

***LEARNING OBJECTIVES***

- 1 Basic principles and theoretical aspects of the liquid penetrant test method
- 2 Applications of the liquid penetrant test method
- 3 Types of discontinuities detected with the liquid penetrant test method
- 4 Cause and effect of various types of discontinuities
- 5 Operational steps in the liquid penetrant test and the importance of each step
- 6 Liquid penetrant examinations with both contrasting and fluorescent penetrant, following a written procedure
- 7 Interpretation and evaluation of test results with respect to the applicable standards
- 8 Test reports and written instruction (Procedure)
- 9 Location of defects in various materials, components and structures with a high probability of detection

***WHO SHOULD ATTEND***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.

**MAGNETIC PARTICLE TESTING  
LEVEL I  
24 hours Course**

***COURSE DESCRIPTION***

This 24 hours course is a preparatory course for personnel without prior experience in the method. The course provides a full appreciation in the techniques and method of magnetic particle testing. A high theory and practical content is offered.

***COURSE CONTENT***

- Introduction
- Principles of Magnetic Particle Testing
- Magnetic Particle Inspection Equipment
- Performance checking
- Defect detection and evaluation
- Magnetic Particle Inspection techniques
- Relevant standards

***WHO SHOULD ATTEND:***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.

**MAGNETIC PARTICLE TESTING  
LEVEL II  
45 hours Course**

***COURSE DESCRIPTION***

This 45 hours course covers all theory aspects of the method and provides 50% practical “hands-on” workshop experience of the various techniques.

***COURSE CONTENT***

- Product Technology
- Introduction to Magnetic Particle Test Method
- Magnetising Ferromagnetic Materials
- Method of Magnetisation
- Detecting Media
- Equipment used for Magnetic Particle Inspection
- Demagnetisation
- Practical Procedures
- Interpretation of Indications
- Assessing Amperage
- Writing of Reports and Development of Procedures

***LEARNING OBJECTIVES***

- 1 Basic principles and theoretical aspects of the magnetic particle test method
- 2 Applications of the magnetic particle test method
- 3 Types of discontinuities detected with the magnetic particle test method
- 4 Cause and effect of various types of discontinuities
- 5 Operational steps in the magnetic particle test and the importance of each step
- 6 Magnetic particle examination following a written procedure
- 7 Interpretation and evaluation of test results with respect to the applicable standards
- 8 Test reports and written instruction (Procedure)
- 9 Location of defects in various materials, components and structures with a high probability of detection

***WHO SHOULD ATTEND:***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.

**RADIOGRAPHIC TESTING  
LEVEL I  
40 hours Course**

***COURSE DESCRIPTION***

This 40 hours course is a preparatory course for personnel without prior experience in the method. The course provides a full appreciation in the techniques and method of radiographic testing. A high theory and practical content is offered.

***COURSE CONTENT***

- Introduction
- Principles of Radiographic Testing
- Radiographic Inspection Equipment
- Performance checking
- Defect detection and evaluation
- Radiographic Inspection techniques
- Relevant standards

***WHO SHOULD ATTEND:***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.

**RADIOGRAPHIC TESTING**  
**LEVEL II**  
**90 hours**

***COURSE DESCRIPTION***

This 90 hours course covers both X and Gamma Radiography with an equal balance of theory and practical sessions. As well as working through their own supervised practical exercises, students will receive full instruction on darkroom procedures and radiographic interpretation.

***COURSE CONTENT***

- Product Technology
- Introduction to Radiography
- Photographic Aspects
- Sensitometry
- Production of X-rays
- Factors Governing Exposure
- Factors Affecting Sensitivity
- Health Physics
- Gamma Rays
- Applied Radiography
- Film Interpretation
- Writing of Report and Development of Procedures
- Other Methods of RT and Latest Developments

***LEARNING OBJECTIVES***

- 1 Basic principles of the radiography test method
- 2 Applications of the radiography test method
- 3 Types of discontinuities detected with the radiography test method
- 4 Cause and effect of various types of discontinuities
- 5 Operational steps in the radiography test method and the importance of each step
- 6 Radiographic examination following a written procedure
- 7 Manually process film for high contrast and resolution
- 8 Interpretation and evaluation of test results with respect to the applicable standards
- 9 Overview of the safety precautions necessary when using ionising radiation and an overview of film interpretation
- 10 Test reports and written instruction (Procedure)
- 11 Location of defects in various materials, components and structures with a high probability of detection

***WHO SHOULD ATTEND***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.

**ULTRASONIC TESTING  
LEVEL I  
40 hours Course**

***COURSE DESCRIPTION***

This 40 hours course is a preparatory course for personnel without prior experience in the method. The course provides a full appreciation in the techniques and method of ultrasonic testing. A high theory and practical content is offered.

***COURSE CONTENT***

- Introduction
- Principles of Ultrasonic Testing
- Ultrasonic Inspection Equipment
- Performance checking
- Defect detection and evaluation
- Ultrasonic Inspection techniques
- Relevant standards

***WHO SHOULD ATTEND:***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.

**ULTRASONIC TESTING**  
**LEVEL II**  
**87 hours Course**

***COURSE DESCRIPTION***

This 87 hours course covers all the theoretical aspects of the ultrasonic method including application skills, defect sizing, immersion techniques and calibration. It is fully supported by 50% practical sessions and lectures on the latest developments.

***COURSE CONTENT***

- Product Technology
- Introduction to Ultrasonic Test Method
- Generation and Detection of Ultrasonic Energy
- Propagation of Ultrasonic Waves in Material
- Sound Distribution from Crystals
- Behaviour of Ultrasound at Materials Interfaces
- Probe Design Operating Frequency and Identification
- Ultrasonic Flaw Detector Principles
- Practical Applications
- Immersion Techniques
- Defect Sizing
- The Writing of Reports and Development of Procedures
- Calibration and Performance Checking of Equipment
- Other Ultrasonic Testing Methods and Latest Developments

***LEARNING OBJECTIVES***

- 1 Basic principles of the ultrasonic test method
- 2 Applications of the ultrasonic test method
- 3 Types of discontinuities detected with the ultrasonic test method
- 4 Cause and effect of various types of discontinuities
- 5 Operational steps in the ultrasonic test and the importance of each step
- 6 Ultrasonic examination following a written procedure
- 7 Interpretation and evaluation of test results with respect to the applicable standards
- 8 Test reports and written instruction (Procedure)
- 9 Location of defects in various materials, components and structures with a high probability of detection

***WHO SHOULD ATTEND***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.



**EDDY CURRENT TESTING  
LEVEL I  
40 hours Course**

***COURSE DESCRIPTION***

This 40 hours course is a preparatory course for personnel without prior experience in the method. The course provides a full appreciation in the techniques and method of eddy current testing. A high theory and practical content is offered.

***COURSE CONTENT***

- Introduction
- Basic Principles of Eddy Currents
- Eddy Current Inspection Equipment
- Performance checking
- Defect detection and evaluation
- Eddy Current Inspection techniques
- Relevant standards

***WHO SHOULD ATTEND***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace industry.

**EDDY CURRENT TESTING  
LEVEL II  
87 hours Course**

***COURSE DESCRIPTION***

This 87 hours course covers analogue and phase analysis principles and the detection of surface and subsurface flaws, cracks and corrosion. It is fully supported by 50% practical sessions and lectures on the latest developments.

***COURSE CONTENT***

- Product Technology
- Principles of Eddy Currents
- Factors Affecting Eddy Currents
- Coils and Probe Design
- Practical Eddy Currents
- Electrical Theory
- Basic Test Set Circuits
- Phase Analysis
- Practical Impedance Plane Analysis
- Test reports and written instruction (Procedure)
- Modulation Analysis
- Bolt and Fastener Hole Inspection using Rotating Probe Equipment
- Latest Developments in Eddy Current Technology

***LEARNING OBJECTIVES***

- 1 Basic principles of the eddy current test method
- 2 Applications of the eddy current test method
- 3 Types of discontinuities detected with the eddy current test method
- 4 Cause and effect of various types of discontinuities
- 5 Operational steps in the eddy current test and the importance of each step
- 6 Eddy current examination following a written procedure
- 7 Interpretation and evaluation of test results with respect to the applicable standards
- 8 Test reports and written instruction (Procedure)
- 9 Location of defects in various materials, components and structures with a high probability of detection

***WHO SHOULD ATTEND***

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace industry.

## **RADIOGRAPHIC INTERPRETATION**

**87 hours Course**

### ***COURSE DESCRIPTION***

This 87 hours course is aimed at providing participants with an understanding of the theoretical and practical background on interpretation of radiographs.

The course will enable students to be proficient in the use of image quality indicators to judge the quality of radiographs, understand the use of basic radiographic techniques and the factors affecting radiographic quality, interpret and evaluate radiographic images as well as the understanding of code requirements related to radiographic testing. It will enable them to identify indications on films due to faults in handling or processing the films.

It will cover all aspects of radiographic inspection relevant to film interpretation. Course participants will work through supervised practical exercises on film interpretation, including a thorough study of radiographic acceptance standards and reference radiographs for steel and aluminium welds and castings. The course ends with an assessment test.

### ***COURSE CONTENT***

- Principles of radiography
- Factors affecting radiographic quality
- Radiographic sensitivity
- Welds and weldments
- Castings
- Elements of radiographic interpretation
- Radiographic interpretation of discontinuities in welds and castings
- Faults in handling and processing of the films
- Acceptance/rejection criteria of various radiographic codes

### ***LEARNING OBJECTIVES***

- 1 Principles of radiography; effects of different sources
- 2 Radiographic techniques
- 3 Film, film selection and film processing
- 4 Image quality indicators
- 5 Factors affecting radiographic quality
- 6 Materials and their discontinuities; defects and the origin in fusion welds, forgings and castings
- 7 Elements of radiographic film interpretation; viewing conditions, identification of radiographic & spurious indications
- 8 Standards, codes and specifications in radiography
- 9 Acceptance criteria
- 10 Practical film interpretation exercise

### ***WHO SHOULD ATTEND***

This course will benefit NDT personnel, quality assurance/quality control surveillance personnel like inspectors, engineers, surveyors, technicians as well as trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore maintenance, shipbuilding, ship-repairing and building construction industries.

# **Phased Array Ultrasonic Testing Level I**

## **(40 Hours)**

### **Course Objective**

To equip NDT personnel with the knowledge in both theory and practical aspects related to Phased Array Ultrasonic Testing and to enable them to acquire the knowledge and skills required to operate the testing equipment, conduct test evaluation and preparing the test reports.

### **Course Content**

- 1) Principles of phased array probes
- 2) Principles of inspection sensitivity
- 3) Phased Array Instrument
- 4) Scanning with phased array probes
- 5) Scanning with phased array probes
- 6) Software for data collection
- 7) Software familiarity
- 8) Procedures for verification of flaw existence and position
- 9) Reporting

### **Who Should Attend**

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.

## **Phased Array Ultrasonic Testing Level II**

**(80 Hours)**

### **Course Objective**

To equip NDT personnel with the knowledge in both theory and practical aspects related to Phased Array Ultrasonic Testing and to enable them to acquire the knowledge and skills required to operate the testing equipment, conduct test evaluation and preparing the test reports.

### **Course Content**

- 1) Principles of phased array probes
- 2) Principles of inspection sensitivity
- 3) Phased Array Instrument
- 4) Scanning with phased array probes
- 5) Calibration and checks
- 6) Software for data collection and data analysis
- 7) Principles of data analysis
- 8) Software familiarity
- 9) Use of software tools for defect detection and sizing
- 10) Data analysis
- 11) Procedures for verification of flaw existence and position
- 12) Reporting

### **Who Should Attend**

This course will benefit NDT personnel, maintenance personnel, Quality Assurance / Quality Control Inspectors, engineers, surveyors, technicians, trainees in the aerospace, metal fabrication, oil refinery, petrochemical, offshore, shipbuilding, ship-repairing and building construction industries.

## **RADIATION SAFETY**

### **15 hours Course**

#### ***COURSE DESCRIPTION***

Radiographers and other radiation workers encounter in their work different situations and potential radiation hazards of varying degrees. It is essential for them to have sufficient experience and practical training to handle cases that may result in excessive radiation exposure.

This 15 hours course is tailored to provide the practical training in radiation safety to the radiographers in particular and to those who have some form of theoretical knowledge but wish to gain further training in the practical aspects of radiation control.

#### ***COURSE CONTENT***

- Units used in radiation work
- Basic principles of radiation protection
- Biological effects of ionising radiation
- Radiation safety standards
- Principles of radiation detection
- Survey instruments
- Personal monitoring instrument
- General safety requirements for industrial radiography
- Facilities and procedures for gamma radiography
- Emergency procedures
- Safety requirements for X-rays
- Radiation protection legislation in Singapore
- The radiation protection inspectorate

#### ***LEARNING OBJECTIVES***

- 1 Fundamentals of radiation and radioactivity
- 2 Radiation detection and measurement
- 3 Effects of radiation exposure on the human body
- 4 Control of radiation exposure
- 5 General concepts of the radiation protection act on the requirements of isotopes or X-ray sources
- 6 Operating procedures of industrial X-ray equipment and gamma ray exposure devices
- 7 Transportation of radioactive materials
- 8 Common faults, emergency procedures and coping with incidents

#### ***WHO SHOULD ATTEND***

Persons working or associated with the use of ionising radiations particularly industrial radiographers, safety officers in refineries, shipyards, metal fabrication workshops, etc., where radiography may be conducted, welding inspectors, surveyors and quality assurance staff whose encounters with radiation sources are more than occasional.