MAESTRO CONSULTANTS

METALLURGY FOR NON-METALLURGISTS

COURSE OUTLINE 2025

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TRAINING TITLE
METALLURGY FOR NON-METALLURGISTS

VENUE
Dubai, UAE

DURATION
5 Days

DATES
17 - 21 February 2025

PRICE
$5,250 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch.

TRAINING INTRODUCTION
Although Carbon steel has been the first and widely used material in oil fields and other industry, today close to a hundred alloys and metals are used in various extracting and refining activities. Yet failures do happen, some of them leading to disastrous ends resulting in loss of assets and lives. Plant and machinery designed with carbon steel material some three decades ago are now operating in the most demanding and aggressive conditions. Therefore, Plant and machinery reliability has become a key issue in the interest of personnel safety, while total productivity and maintenance is a matter of equal importance Do metals fail due to normal out only or do they suffer from stress, fatigue and have ageing problems as humans? What are the tools available to test the reliability of old and new material? What are codes and standards for correct and economical material selection?

TRAINING OBJECTIVES
This course is designed to discuss in detail all physical and chemical properties of materials and testing methods specially of carbon steel; the benefits of heat treatment; The usage of other nonferrous and non-metallic material; and an over view of API and ASME Codes and standards.

TRAINING AUDIENCE
A condensed course on metallurgy for all plant inspectors, process engineers, and maintenance engineers who are interested in knowing why some components fail more often than expected- A Corrosion awareness- For plant operators/ engineers who are interested in learning about fitness for service of plant and equipment- For Managers interested in health safety and environment in case of unintended plant failure-for Managers interested in MRO and plant maintenance cost to know

about alternative material.

TRAINING OUTLINE

Day 1 The origin of Metallurgy

- History
- The Stone Age and the discovery of metals
- Metals and non- metals
- Ferrous and non-ferrous
- The art and science of metallurgy
- Steel making ancient and modern
- Discovery of other metals
- Periodic classification

- Physical and Chemical properties

  - Atomic model
  - Crystal structure and grain boundaries
  - Mechanical properties
  - Demerits of carbon steel
  - Discovery of stainless steel

Day 2 Carbon steel and its properties

- Fe- C diagram
  - TTT diagram of low alloy
  - Heat treatment
  - Microstructure and properties
- Heat treatment as a chemical process
  - Nitriding
  - Carbonizing
  - Flame hardening
  - Ausforming
  - Induction hardening
  - PWHT
  - Stainless steel alloying material
  - Nickel and Chromium
  - Trace elements
  - High alloys

Day 3. Corrosion Effects & Equipment used in oil and gas extraction process

- The corrosive environment
- Corrosion Properties of Metals & Alloys
- Corrosion effects in offshore environment

- Reactors and pressure vessels
- Boilers and heat exchangers
- Heaters and dryers
- Separators
- Valves and compressors
- Pipes and storage vessels

Metals and alloys used in them – failures and causes
Selection of material for Offshore Production Fields
Selection of materials in offshore environment
Selection of materials for wellheads
Monitoring of corrosion & Non- Destructive Testing of (NDT) of Offshore Equipment

Day 4. Selection of material using codes and standards

- Brief over view of ASME and API and NACE standards
  - Modern lab techniques for testing
  - Microstructure and failure analysis
  - Inspection and acceptance of new material
  - Specifications and standards

- Inspection procedures
  - Laboratory and site
  - Destructive and non destructive
  - Physical and electrochemical

Day 5.Non ferrous metals and non metals in gas and oil industry

- Properties and application of
  - Copper and alloys,
  - Titanium,
  - Aluminum,
  - Nickel and alloys

- Non- metallic's
  - Ceramics
  - Fiberglass
  - Polymers and plastics
  - And their various applications

- Design considerations
  - Welding
  - Joining

Safety, health, and environment

TRAINING CERTIFICATE

MAESTRO CONSULTANTS Certificate of Completion for delegates who attend and complete the training course

METHODOLOGY

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of "real life" issues in their organizations.
The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.