Training Title

METALLURGY FOR NON - METALLURGISTS

Training Duration

5 days

Training Date

REF WC040	Metallurgy for Non - Metallurgists	5	07-11 Feb 2021	$4,500	Dubai, UAE

In any of the 5 star hotels. The exact venue will be informed once finalized.

Training Fees

- **4,500 US$ per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch**

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

Language: English

TRAINING OVERVIEW

TRAINING INTRODUCTION & DESCRIPTION

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 OBJECTIVE

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 non ferrous and non metallic material; and an over view of API and ASME Codes and standards

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TRAINING METHODOLOGY

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course. All presentations are made in excellent colorful power point. Very useful Course Materials will be given.

- **30% Lectures**
- **30% Workshops and work presentation**
- **20% Group Work& Practical Exercises**
- **20% Videos& General Discussions**

WHO SHOULD ATTEND

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.

DAILY COURSE 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**

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- 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

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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.**

NOTE:
Pre & Post Tests will be conducted
Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.

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