

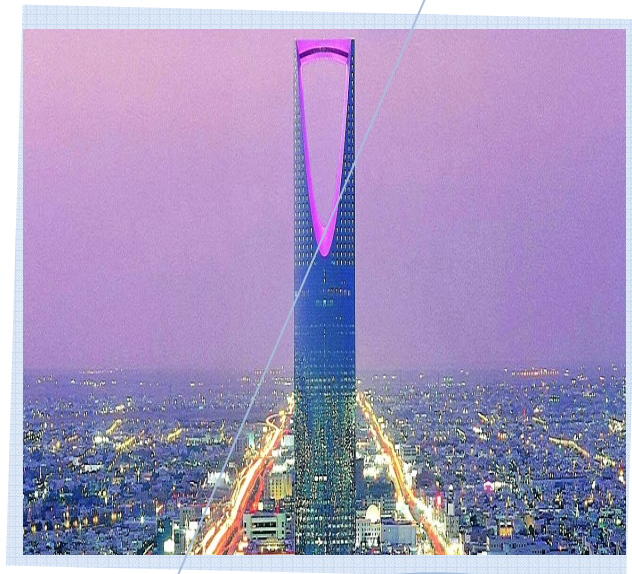
Training Course :

Metallurgy for Non-Specialists

Training Course For One Week In

Saudi Arabia , Riyadh , Al Faisaliah
Hotel

Which Be Held As Under Details :



Abar Solutions Petroleum Consultancy Invite Your Employee To Participate With Us In Special Training Course As Under Details :

Course Name		Metallurgy for Non-Specialists			
Code	Period	Language	Start	End	Location
WE 117	5 Days	Bilingual (Arabic & English)	06/09/2015	10/09/2015	Saudi Arabia , Riyadh , Al Faisaliah Hotel
			04/10/2015	08/10/2015	
			08/11/2015	12/11/2015	
			06/12/2015	10/12/2015	
			10/01/2016	14/01/2016	
			14/02/2016	18/02/2016	
			20/03/2016	24/03/2016	
			17/04/2016	21/04/2016	
			22/05/2016	26/05/2016	
			19/06/2016	23/06/2016	
			17/07/2016	21/07/2016	
			21/08/2016	25/08/2016	
<p>** The Fees Includes : Lecturer , Training Material , Training Room With One Coffee Break Daily , Certificate Of Attendance In Last Day Training Course **</p>					

Course Description

⇒ This course will deal with the basic structure and properties of many commercially important metals and alloys, principals of alloying and heat treating, and methods of fabrication, joining and finishing.

Course Objectives

⇒ Upon completion of this course, participants will have gained an understanding of the important principals of metallurgical engineering involving properties and characteristics of metals and alloys, including fabrication and heat treatment of commercial steels and

non-ferrous alloys. Participants will acquire sufficient knowledge and skills to independently evaluate possible metallurgical solutions, to recognize crucial metallurgical selection/design/treatment and intelligently discuss their metal problems with metallurgists.

Course Content & Outlines

⇒ **DAY 1**

⇒ **MECHANICAL PROPERTIES AND STRUCTURE OF METALS**

⇒ **Survey of Metallurgy**

- Introduction

⇒ **Strength and Deformation**

- Stress-Strain Behavior of Engineering Alloys; Stiffness and Ductility.
- Impact tests.
- Hardness tests.

⇒ **Metallography**

- Sample Preparation, Interpretation of Optical and Electron Micrographs.

⇒ **Nature and Properties of Pure Metals**

- Atomic and Grain Structure; Solidification of pure metals.

⇒ **Basic Metal Strengthening Mechanisms**

- Crystal Imperfections and the concept of Edge and Screw Dislocations.
- Strength and Micro structural Aspects of Strain Hardening; Grain Size and Solid Solution Strengthening.
- Cold and Hot Working (Recovery, Re-crystallization and Grain Growth).

⇒ **DAY 2**

⇒ **PHASE DIAGRAMS AND HEAT TREATMENT OF METALS**

⇒ **Principals of Alloying**

- Basics of Metal Phase Diagrams; Industrially Important Alloy Diagrams, Deviation from Equilibrium.

- Precipitation, Dispersion, Order and Diffusion; Multiphase Strengthening.
- Iron Carbon Systems.

⇒ **Understanding Commercial Steel Heat Treatments**

- Commercial Steel Alloy Designations; Practical Heat Treatments Procedures for the Control of Steel Alloy Properties; Stress Relief, Spheroidised and full Annealing; Normalising; Tempering; Temper Designations.
- Understanding Transformations using Continuous Cooling Transformation Concepts; Austempering.
- Controlling Surface Properties by Local Heating, Carburising and Nitriding.
- Residual Stresses.

⇒ **DAY 3**

⇒ **FURTHER ALLOYS AND HEAT TREATMENT**

⇒ **Steel Alloys, Cast Irons**

- Classification of alloy Steels; Stainless Steels; Ferritic, Martensitic and Austenitic.
- Cast Irons; Gray, White, Malleable, Ductile and Compacted.
- additional alloying Elements and Practical Control of Alloy Properties.

⇒ **Non Ferrous Alloys**

- Aluminum Alloys; Designation; Wrought; Cast; Heat Treatable, Age Hardening.
- Copper and its alloys.
- Super Alloys; Nickel Based; Iron-Nickel Based; Cobalt Based.
- Titanium Alloys.
- Refractory Metals.

⇒ **Behavior Modification Using Coatings**

- Altering Behavior by use of an organic, metallic or ceramic coating.

⇒ **DAY 4**

⇒ **ANALYSIS AND PREVENTION OF MECHANICAL FAILURE**

⇒ **Toughness and Catastrophic Fracture**

- Stress Raisers; Stress Concentration Factors; Design Criteria.
- Fracture Toughness, K_{Ic} , Defects and their Relationship to Fracture, toughness Testing, Failure Prevention.

⇒ **Long-Term Service Under Load**

- Repeated Loading, Fatigue testing and mechanisms; Fatigue Curves (S-N Curves); Fatigue-Resistant.
- High Temperature Performance, Creep testing; Applications of Creep curves; Creep-Resistant Alloys and creep Minimisation.

⇒ **Non-Destructive Testing and Evaluation of Metals**

- Flaw and Crack Detection; Liquid Penetration; Ultrasonic and Electromagnetic; x-rays and g -rays Methods: Eddy Current Method.

⇒ **Corrosion Control**

- Chemical Corrosion; Electrochemical Cell; Types and Mechanisms of Electrochemical Cells.
- Design, Selection and Treatment of Corrosion Resistant Alloys; Cathodic and Anodic Protection; Inhibitors; Stress-Corrosion Cracking Minimisation.

⇒ **DAY 5**

⇒ **MANUFACTURING METHODS AND MATERIALS SELECTION**

⇒ **Casting**

- Methods of Casting, Cast Metal Structure and Properties.

⇒ **Mechanical Forming**

- Hot and Cold Forming; Effects on Structure and Service Properties; Metals Fabrication Methods; Forging, Rolling and Extrusion.

⇒ **Welding and Joining**

- Welding, HAZ, Weld Failures, Brazing, Soldering.

⇒ **Other Manufacturing Methods**

- Powder Metallurgy; Metal Machining.
- Properties and Design Criteria, Specifications, Designations and Control of Properties.