SmartBrains
Institute of Oil and Energy

Oil & Energy

Static Equipment Design & Engineering for Process Industry



What You Will Learn...

- Introduction to Oil& Gas, Refinery, Petrochemical industries
- Introduction to Projects, Engineering, Commissioning, Operations etc
- Introduction to Pre-FEED, FEED and Detailed Engineering
- Design Basis development
- Preparation of G.A. / Fabrication Drawings of Process Equipments
- Relevant standards and Codes, their importance and applications
- Material selection
- Material selection for process equipment
- Commonly used materials, Painting and coating for corrosion protection
- Pressure Vessel Design (ASME Section VIII Division 1)
- Heat Exchanger Design
- Storage tank Design (API 650)

SmartBrains Oil and Energy Institute provides premium training courses for energy industry executives and fresh engineering graduates. Our success and distinguished reputation is thanks to our commitment to provide first-class programmes to our clients. Combining leading professionals from across the industry as lecturers and an interactive, practical format, the lessons learnt in a SmartBrains for Energy course are directly transferable back to the work place.

Our Strategic Objectives

To be recognized by industry and employers as a highly reputable training organization. Provide dynamic leadership, sound management and excellence in training. Continue to improve our services through quality management processes. Invest in and value our people through professional development activities. Grow our business through innovation and to continue to be financially secure. Be influential in the economic development of the industries we serve nation wise

Our Mission

"To provide quality training and assessment services and to prepare our students for a fulfilling professional career in their chosen industry. We are committed to upholding our values of providing excellence in training"

Course STRUCTURE

"Smartbrains made my journey easy to reach where I wanted. I got placed in Samsung first and now I am working with GE. All thanks to Smartbrains Professionals"

Aabhishek Pathak
GE, Noida

Introduction

- Introduction about process Industry and EPC (Engineering , Procurement, Construction) industry.
- List of Equipments used in Industries, their introduction, applications.
- Relevant Codes and Standards used in Industry

Material Technology related to Pressure Vessel Design and Engineering

- Basics on Material Technology related to Pressure Vessel Design
- Stress strain Diagrams, Types of Materials, Commonly used carbon steels, Stainless steels, Low and High alloy steels, ASME Code properties for different materials and Engineering properties related to materials.
- Factors governing choice of materials, criteria for material selection for process equipment
- Materials for Different temperature requirements (High and Low Temperature), NACE requirements, Hydrogen Requirements, Petrochemical Requirements, Sour gas service requirements, cryogenic services.
- Types of Gaskets , Gasket material selection , Role of gaskets in Pressure Vessel Design

Mechanical Design of Pressure Vessels

- Design and Analysis of Pressure Vessels & Component & Coded Design of Pressure Vessels (ASME Section VIII Division 1)
- Internal and External Pressure Design , Design of cylindrical vessels, various types of dished heads, flat heads
- Design of Jacketed vessels, Limpet Coils, Horizontal equipments with saddle support.
- Various Types of Supports & Attachments
- Leg, Skirt, Bracket Supports
- Lifting attachments, Design of Anchor Bolts, Safe Loads for Ropes and Chains.
- Nozzle openings and reinforcements, Nozzle Local Load Analysis
- Welded joints, Butt welded joints of unequal Thicknesses, Application of Welding Symbols.
- Role of MAP, MAWP, Design Pressure, Design Temperatures, Allowable Stresses, Corrosion Allowance and Loadings as per ASME in Pressure Vessel Design.
- Impact Testing, PWHT along with heating rates and cooling rates, Hydro test pressure, Stamping of Vessels

Pressure Vessel/Column/Reactor Design Calculation: (ASME SEC VIII, DIV.1)

- Maximum Allowable Stress Values (UG-23)
- Shell Design for Internal Pressure (UG-16, UG 27,Appendix 1- 2)
- Dished End Design For Internal Pressure (UG-32)
- Shell Design for External Pressure (UG-28, UG-29, UG-30)
- Dished End Design For External Pressure (UG-33)
- Hydro test Pressure/Pneumatic Test (UG-99,UG-100)
- Wind Load (IS-875, Pt-3)
- Seismic Load (IS-1893, Pt-1 & 4)
- Combined Loading Effect
- Conical & Toriconical Section Analysis (UG-32,33, Appendix 1-5 & 1-8)
- Weight Calculation
- Opening (Nozzles) (UG-36 ~ UG-45)
- Local Load (WRC 107 & 297)
- MDMT & Impact Test Enigma (UCS-66)
- Lifting & Tailing Lug analysis
- Support Analysis (Skirt, Leg, Saddle ,Lug) & Anchor Bolt Design
- Joint Efficiency, MAWP, MAP, SR of DE for Forming Operation
- PWHT (UCS-56)
- Types of Gaskets, Gasket material selection, Role of gaskets in Pressure Vessel Design
- Mechanical Design of Non Standard Flanges as per Appendix 2
- Mechanical Design of Jacketed Vessels and Limpet Coils

Fabrication of Pressure Vessels

- Plate rolling, Plate Bending, Welding methodologies (STAW, GTAW, GMAW, SMAW) , welding symbols , fabrication sequences , fabrication schedules, plate forming, cutting etc.
- Hydro testing of pressure vessels, pneumatic testing of pressure vessels
- Painting and coating for corrosion protection, surface preparation, pickling & passivation of process equipments

Column & Tower Internals

- Types of Internals
- Functions of Internals
- Process aspect of these internals
- Specialized manufacturers of internals.
- Scope and design of the internals

Design & Analysis of Heat Exchangers

- Heat Exchanger Types , Classifications , TEMA types, classifications,
- Design of Shell, Channel, Shell Bonnet, Channel Cover, Selection of Girth Flanges.
- Limitations in the use of heat exchangers.
- Components of Heat Exchangers
- Design aspects in the design of Heat Exchangers .
- Tube sheet Design: Fixed Tube sheet , Floating Tube sheet , U – Tube sheet
- Design of tube sheet as per TEMA as per Bending and Shear Loading.
- Limiting cases in the design of heat exchangers.
- Testing of Heat Exchangers
- Introduction to the following types of heat exchangers :
- Condensers
- Evaporators
- Reboilers
- Plate Heat Exchangers

Storage Systems

- **Introduction to Storage Systems Review of Tanks Codes Fixed/Floating Roof Tanks Design**
  - Basic Design
  - Leak Prevention
  - Leak Detection
  - Secondary Containment

  Tank Corrosion Mitigation
  - Causes of Corrosion
  - Tank Floor Corrosion
  - Lining Systems
  - Sulphur Corrosion

  Storage Tank Maintenance Guidelines
  - Planning
  - Inspection
  - Managing
  - Repair Guidelines
  - Storage tanks Safety

Detail Engineering Aspects of Process Equipments

- Understanding the BASIC ENGINEERING PACKAGE, Tender requirements of Clients, Engineering Design Basis , Understanding the Client and Project requirements , Issues co agreed between client and the Consultant
- Preparation of Technical Specifications: Process Data Sheets and Mechanical Data Sheets
- Information flow between Process and Mechanical and other relevant data required to prepare the Technical Specification
- Understanding the scope of supply between mechanical, civil & process
- Enquiry Stage design, drawings and other relevant calculations
- Preparation of General Arrangement Drawings & Fabrication Drawings of Process Equipments
- Evaluation of Vendor Offers, Preparation of Technical Queries, Technical Bid Evaluation, Technical Recommendation to be given to the Client

Why
SmartBrains?

SmartBrains is the ultimate choice for all the working & non working engineer's in energy Sector training requirements. Our extensive portfolio of energy training courses are:

- 100% focused on the Oil and energy industry.
- Guided by the industry's renowned professionals with unprecedented knowledge of the Oil and energy industry.
- Highly interactive program with practical and relevant case studies.
- Training by extensively researched self developed cutting edge techniques.
- Skill development techniques with comprehensive set of documentation, practical skills and tools used in the Industry.
- The perfect opportunity to develop network and experiences with knowledge sharing.
- Internationally acclaimed engineering qualification.
- Designed for both Fresh engineers and working professionals to attain growth in oil and energy industry.
- One of the finest international faculty.
- Interactive, interesting and motivational training sessions.
- Access to enormous reference books and research materials.

Oil & Energy

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