



Energizing Engineering - Empowering Engineers



ISO 9001 : 2008

Institute of Piping Engineering & Building Services

CERTIFICATE ONLINE TRAINING COURSE



PRESSURE VESSEL & PROCESS EQUIPMENT DESIGN & ENGINEERING

Course Speaker:

Mr. V. H. Ashok
B. E. (Mechanical)
International Course Speaker

ABOUT TRAINING PROGRAM

This course broadly covers design & construction including fabrication / testing of pressure vessels & other process equipments like heat exchangers, reactors & columns. The course is designed to give complete understanding of ASME Codes used in design of pressure vessels.

The **Online Training Course** is developed by the faculty of **IPEBS**, who are International Course Speakers and have more than 20 years work & training experience individually.

PROGRAM FEATURES

- ✓ In-depth course content for easy understanding.
- ✓ Blended Learning: Online contact with faculty.
- ✓ Accessibility to Course Faculty & Counseling Services.
- ✓ Job oriented training program.
- ✓ Student will be job ready, after the course.
- ✓ Student will acquire skills and knowledge similar to working professional.

WHAT YOU WILL LEARN

Upon completion of course the attendees will be able to

- ✓ Understand different types of Static Process Equipments.
- ✓ Pressure Vessel Design, Supports & Attachments.
- ✓ Prepare and develop pressure vessel & process equipment data sheet, sizing of process equipments, design them as per relevant codes, prepare fabrication details and specifications, estimation and quality assurance during fabrication and assembly.
- ✓ Mechanical design of pressure vessels, heat exchangers - TEMA & columns.

- ✓ The course also covers training on **PVELITE** (DEMO version) software which is a highly useful tool and gives u an upper edge as a design engineer in the process equipment design field.
- ✓ Understand how to use ASME Codes related to pressure vessel design, materials, fabrication & pressure testing.
- ✓ Detail engineering aspects of process equipments
- ✓ Preparation of G. A. / fabrication drawings of process equipments.

WHO SHOULD ATTEND

• Graduating College Students in the following disciplines

- ✓ Mechanical Engineers
- ✓ Chemical Engineers
- ✓ Petroleum Engineers
- ✓ Production / Industrial Engineers
- ✓ Diploma / ITI

• Working Professionals

- ✓ Piping Design / Layout Engineers
- ✓ Piping 3D Cad Engineers
- ✓ Mechanical Engineers
- ✓ Chemical Engineers
- ✓ Static Equipment Design Engineer
- ✓ Process Engineers
- ✓ Fabrication Engineers
- ✓ Inspection Engineers
- ✓ Piping QA / QC Engineers

- **Corporate / Organizations**

- ✓ EPC Companies
- ✓ Piping Equipment Manufacturing Companies
- ✓ Piping Consultants
- ✓ Piping Contractors
- ✓ Thermal Power Plants Industry
- ✓ Ship Building / Marine Industry

COURSE MODULES:

- ✓ **Introduction**
- ✓ **Material Technology related to Pressure Vessel Design and Engineering**
- ✓ **ASME Codes and its relation to Pressure Vessel Design**
- ✓ **Mechanical Design of Pressure Vessels**
- ✓ **Pressure Vessel/Column/Reactor Design Calculation: (ASME SEC VIII, DIV.1)**
- ✓ **Fabrication of Pressure Vessels**
- ✓ **Column & Tower Internals**
- ✓ **Design & Analysis of Heat Exchangers**
- ✓ **Detail Engineering Aspects of Process Equipments**

Detailed Course Modules:

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

ASME Codes and its relation to Pressure Vessel Design

- Introduction of Various Standards of Different Consulting and Engineering Companies.
- Codes related to Pressure Vessels & Process Equipments, (ASME Sec VIII Div.1-Latest issue, ASME Sec II, TEMA and API 650 etc.)
- Code philosophy understanding requirements of codes. - ie conditions/clauses governing Pressure Vessel Design under ASME Sec VIII Div 1.
- Pressure vessel categories & code rules for design of 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

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.

Course Fee Details:

Course Title	Fee for Indian Participants	Fee for International Participants
Pressure Vessel & Process Equipment Design Engineering – Online Training Course	INR 30,000/-	USD 800/-

For making e – payment for the course fee please find **IPEBS** Bank account details below.

Account Name	IPEBS
Account Number	03182020005287
Bank Name	HDFC
Branch	ABIDS
RTGS / NEFT / IFSC Code	HDFC0004125
SWIFT Code	HDFCINBB

IPEBS Corporate Training Clients:

Company Name	Location	Company Name	Location
Intergraph Consultants	India	SPPC	Sudan
Port of Sohar	Oman	CFPE Technology Solutions	Malaysia
Uhambiso Consultant	South Africa	Qatar Petroleum Technical Center	Qatar
Newtech Consulting Group	Sudan	Petro Vietnam Marine Shipyard	Vietnam
Yashada Consultant	India	Locus Technologies	India
Telstar Life Science Pvt Ltd	India	RasGas	Qatar
BHEL	India	ICB Technimont	India & Italy
IDC Training House SDN BHD	Malaysia	LG-Digitech	Sudan
Sakhlain Energy	Russia	Infotech Enterprises	India
Aveon Offshore	Nigeria	Petroleum Operating Company	Sudan
BPCL	Bhutan	Dr. Reddy's Labs	India
Saitech Engineers	India	Vasavi Power Services	India
Riyan Architects	Maldives	Siddhi Consulting	India
Oryx GTL	Qatar	Qatar Petroleum	Qatar
WNPOC	Sudan	Centroid Technical Services	Sudan
GNPOC	Sudan	MG – Vowgas Group	Nigeria
Fleming gulf	UAE	DAL Group	Sudan

Terms & conditions:

CANCELLATIONS: IPEBS does not provide refunds for Cancellations done after registration & fee payment. However, credit maybe granted to a later program. This credit will be available for up to one year from the date of issuance.

COURSE MATERIAL AGREEMENT: It is the intention of **IPEBS** that the course text and materials supplied to participants at **IPEBS** courses are prepared and issued for the participants' sole use. Codes and standards constantly change and interpretations are issued by the publishing societies. Information contained in **IPEBS** course materials is based on the best available data obtained by **IPEBS** at the time of publication. **IPEBS** is in no way responsible for subsequent use regardless of intention.

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COURSE CANCELLATION BY IPEBS: IPEBS reserves the right to cancel any course due to circumstances beyond our control. All tuition fees will be refunded in the event of cancellation. **IPEBS** liability is limited to only those tuition fees paid in advance.

FORCE MAJEURE: Except for the obligations to make money payments as outlined hereunder, neither party shall be responsible to the other for delay or failure to perform any of the terms and conditions, or other activities, of this agreement if such delay or failure is caused by strike, war, act of God, or force majeure.

Frequently Asked Questions – FAQ's

Duration of the Course?

Ans: Course Duration is 01 month.

Daily Class Duration?

Ans: Daily class will be for up to 02 Hours.

Requirement for the Course?

Ans: Computer / Laptop with good internet connection, Camera and Mic.

Support from IPEBS?

Ans: Faculty assigned to all registered participant of the course. Faculty not only helps to clear the participant's queries while doing the course but also monitors the progress of the participant to help in successful completion of the course.

Mode of Payment?

Ans: You can make the payment through electronic transfer or at **IPEBS** office.

Issue of Certificate?

E - Certificate will be issued by **IPEBS** only on successful completion of the course & will be sent via email to the participant.

Training Methodology?

Ans: Online streaming of lectures, contact with faculty by email or chat groups.

Training Material?

Ans: Printed Material – Course / Class handouts will be provided in printed format and shipped (within India) to the participants.

Soft Copy Material - Data tables, charts, Nomographs, drawings, concept theory, design calculations and practice exercise's will be provided in soft copy.

Demonstration software's and excel spread sheets will be provided.

**** International Shipping charges of printed material - course / class handouts to be borne by participants.**