

Advanced P.G. Diploma course in

Power Plant Design & Engineering



SmartBrains
Institute of Engineering Design & Research

COURSE OBJECTIVES:

Power Plants such as coal based and combine cycle power plants, are complex facilities consisting of equipment, piping systems, instruments, electrical systems, electronics, computers, and control systems.

The design, engineering and construction of power plants involves a multidisciplinary team effort. The goal is to design safe and dependable processing facilities in a cost effective manner. The fact is that there are very few formal training programs that focus on design and engineering of Power Plant systems. Therefore, most of the required skills are acquired while on the job, reducing productivity and efficiency.

The objective of this course is to provide the delegates the basic knowledge and skills in this discipline to facilitate faster learning curves while on the job. This course will cover the fundamental principles and concepts used in Power Plant Engineering & design. Upon completion of this course the delegates will have a clear understanding of the design and engineering principles used in Power Plants.

WHAT YOU WILL LEARN:

- Power Plant Overview and Introduction**
- Indian Energy Resources & Policy**
- Thermodynamic Principles**
- Boilers and Auxiliaries**
- Steam Turbines & Auxiliaries**
- Combustion Turbines**
- Heat Recovery Steam Generators(HRSG)**
- Power Plant Electrical Systems**
- Power Plant Instrumentation and Control**
- Balance of Plant Systems**
- Coal Handling System**
- Ash Handling System**
- Fuel Oil Systems**
- Water Treatment System**
- Cooling Water System**
- Design Management**
- Project Management**
- Risk Management**



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COURSE OUTLINE

Module - I

General Introduction:

Indian Power Scenario, Indian Electricity Act, 2003
Energy Conservation Act, 2001, Role of Electricity
Regulatory Commissions, Electricity Trading, Initiatives
of Ministry of Power, Govt of India for Power Sector
Reforms

Concept of Modern Thermal Station:

Choice of Location of Large Thermal Station,
Plant Layout, Machine arrangements, Equipment
Layouts, Switchyard and Auxiliary Arrangements

Thermodynamic Principles: Types of Energy,

Laws of Thermodynamics

First & Second Laws, T/S Diagrams

Water and Steam

Properties of Water, Steam Tables, Mollier Diagrams

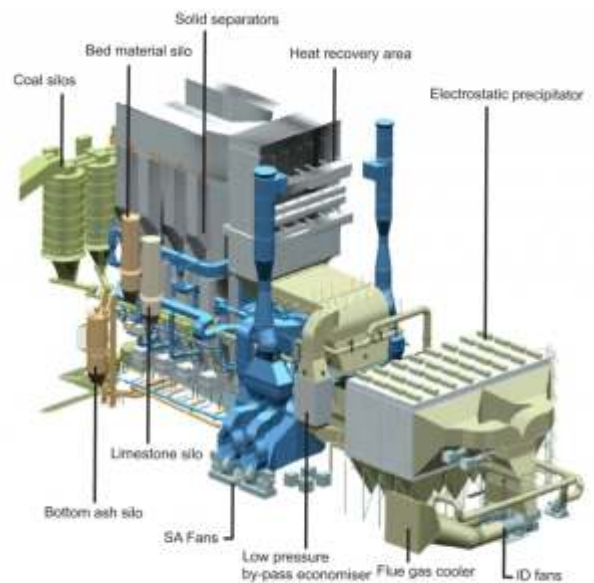
Heat Transfer

Conduction, Convection, Radiation,

Energy Balance & Heat Transfer

Combustion Theory

Principles of Combustion, Requirements for Complete
Combustion, Combustion Products, Fuel Heating Value



Module - II

Boiler & Auxiliaries:

Basic Theory- water tube and fire tube boilers- Rankine Cycle- Drum Type boilers, Drum Internals
-Drum level control issues- blow down vessels- Super critical boilers – design and operation features.
The combustion process. Emissions and its control Low Nox Burners. Burner designs.
design and construction standards- multiple fuel firing- high pressure piping
Metallurgical properties of HP piping- pipe supports- constant load supports and its maintenance
-weld joints-crack development and its monitoring- tube leaks and its control
-flue gas treatment- Fabrication and erection of Boilers. Site installation process.
Boiler operation importance of water chemistry - Boiler control. safety features- Atempersators.
Feed pumps. Different options for feed pump drives.

Steam Turbines & Auxiliaries

Turbine Principles- Nozzles, Buckets/Blades **Turbine Construction-** Turbine Casings, Stationary Blades
and Diaphragms, Turbine Seals, Turbine Rotors/Spindles, Turbine Buckets/Blades Pedestals/Standards, Bearings
Main Steam Valves, Turbine Systems- Lube Oil System, Steam/Gland Seal System, EHC Hydraulic System

Combustion Turbines & Auxiliaries:

Turbine Function, Component Description-
Turbine Flow, Air Inlet Equipment, Compressor Section
Combustion Section, Turbine Section, Exhaust Section
Bearings, Compressor Rotor, Turbine Rotor

Heat Recovery Steam Generators (HRSG)

Overview, Water and Steam Circuits- Pressure Systems,
Gas Flow Path, Major Components, Auxiliary Equipment
-Deaerator, Safety Valves, Water Gauges and Indicators
System Controls, Drum Level Controllers, Steam Temp.

Module - III

Balance of Plant Systems:

Coal Handling System, Fuel Oil Systems
Ash Handling System, Water Treatment System
Cooling Water System, Feed water System,
Circulating Water System, Compressed Air System
Condensate System, Fuel Gas Supply System

Module - IV

Power Plant Electrical Systems

Alternators- Basic generation action, D.C. and A.C. generator Principle, description, constructional details of Generators and their application in power plants

AC Motors- Classification, Principle of AC Motors, Constructional features of AC motors, its applications.

Transformers- Working Principles, Various types of transformers used in a power station, constructional features of main transformer and accessories, Bucholtz relay and main protections, types of cooling, misfire and other fire protection systems.

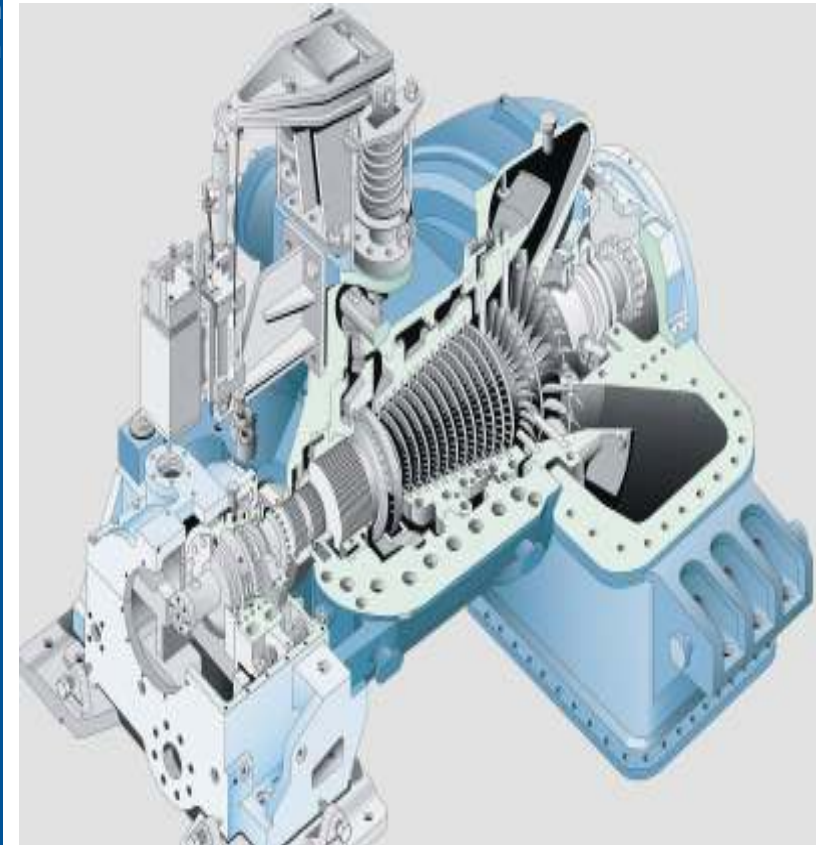
Switchyard Equipments- A typical layout of switchyard of a thermal power station, bus system, isolators, CTs, PTs, Earthing, Oil Circuit Breakers, Air Blast Circuit Breakers, SF6 Circuit Breakers, GT to feeder line arrangement, locating various transformers (GT, UAT, SAT, CTO, PTO), switchgears, isolators, earthing arrangement buses etc.

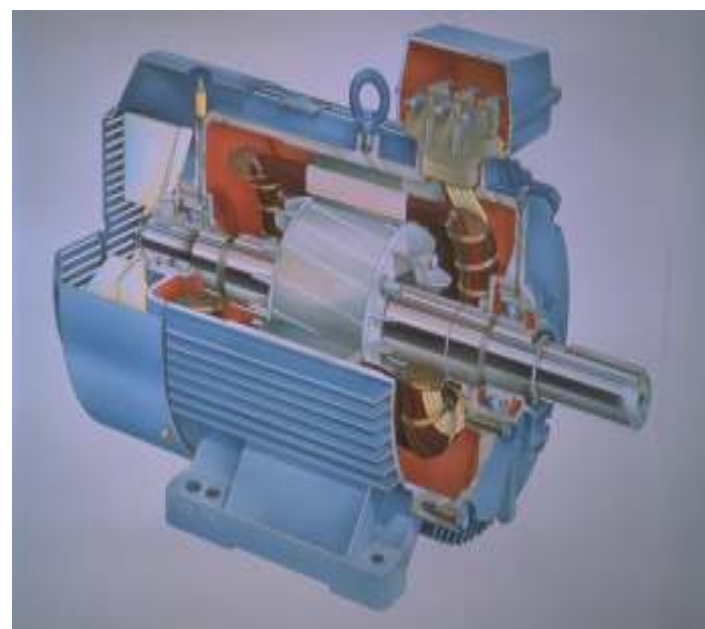
HT-LT Supply System / DC Supply System: A typical layout of 6.6 kV, 3.3 kV and 415 kV supply system in TPS, DC supply system in a TPS

Auxiliary Power Supply: 6.6 KV Schemes 420 V Schemes, arrangement of breakers, buses, DC system, battery bank arrangement.

Power Plant Instrumentation and Control

Concept and layout of Control and Instrumentation in Thermal Power Plant, Pressure Measurement and measuring instruments, Temperature measurement and measuring instruments, Flow measurement and measuring instruments, Level Measurement and measuring Instruments, Practical demonstration on pressure and flow measurements, Practical demonstration on level temperature measurements, Protection and interlocks of Boiler, Turbine and their auxiliaries, Introduction to auto control, Auto control loops used in thermal power stations, Turbovisionary instrumentation Parameters limits, Basic concepts of measuring devices, Analytical Instrumentation for boiler Water, Steam, Flue Gas, H₂/O₂/CO₂ Introduction to MAX DNA, Introduction to new / latest technology in Control and Instrumentation in modern thermal power station





Module - V

Design Management:

Fundament of process design, design process models, design organisation -structures, concurrent engineering the role of design in competitiveness, innovation, creativity, technology management. The design activity, some design process models, specification, conceptual and detail design; design complexities (e.g. relating to the people, processes, resources, product, key considerations, knowledge and information, decision making); aspects of product development (i.e. concurrent engineering, team engineering, product management, design management distributed design, decision support); design coordination; a fundamental integrating framework.

Project Management:

Understanding the key aspects of designing, planning and controlling complex projects are essential skills. This module equips students with knowledge of the techniques of project management and the responsibilities that engineers face in meeting project objectives.

Risk & Industrial Safety Management:

Fire Fighting: Fundamentals of Fire, Fire Fighting Equipments and Systems, Fire Extinguishing Methods, Demonstration of various Fires, Industrial Safety & Hazards: Industrial Hazards, Protective Clothing and Equipment, Safe Working Practices in Power Plant, Permit to work system, Safety in Movement and storage of Materials, House Keeping, Safety Rules.

Generator Constructional Details:

Basic principle of electricity generation, development of generator design, construction details of rotor, stator etc

Hydrogen Cooling System and Stator Water Cooling System:

Different types of cooling arrangements for rotor and stator, selection and properties of coolant, air cooling hydrogen cooling, stator water cooling, H₂ charging purging cycle

Hydrogen Seal Oil System:

Details of the system, function and purpose of differential pressure regulator and pressure oil regulators, types of hydrogen seals and their constructional details

Generator Excitation System and AVR:

Principles, simple arrangement of exciter and its field winding, classification of excitation system and exciter development, high frequency excitations system –their merits and demerits, automatic voltage regulator and its control. Introduction to static excitation system & description performance of static excitation system, Thyristor characteristics & its application in static excitation system, limiters in static excitation system, excitation transformer, Operational aspects of static excitation system, salient features of static excitation system

Protection of generators:

Different methods of protection

Module - VI

Plant Design Management System (PDMS)

- PDMS overview
- Various Modules

Equipment Modeling

- Creating Equipment by using primitives
- Creating Equipments by using PDMS catalogue.
- Creating Obstructions
- Manipulation of primitives & equipments
- Nozzles placements & manipulations
- Understanding parameters & attributes
- DB Utility

Pipe Design

- Pipe & Branch creations
- Pipe Routing & Slope piping
- Manipulating Piping components & Assemblies
- Checking Data consistency
- Checking & rectifying classes.
- Locating Supports & deciding Supports span
- Generating text reports like Line & Supports Lists

Draft

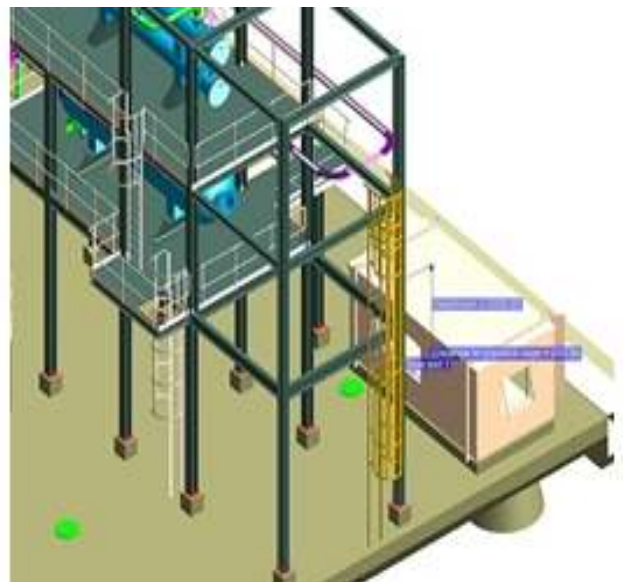
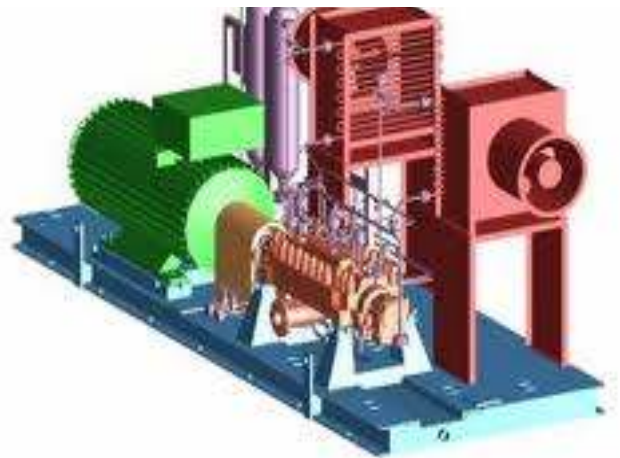
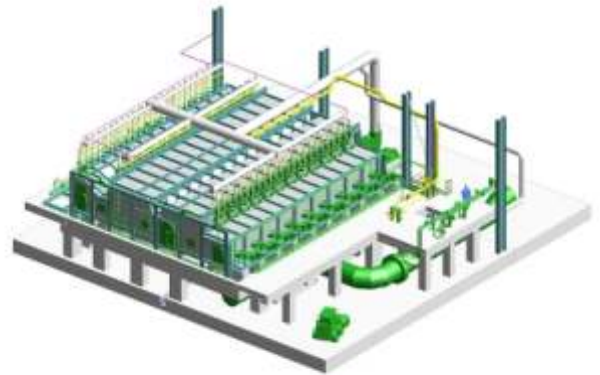
- Preparing Layouts by using Draft modules
- Creating Views
- Amotion & Dimensioning

ISO Draft

- Extracting Isometrics
- Preparing Isometrics for Fabrication & Erection

Basic Structural Modeling

- Setting-up the Database hierarchy for Structures
- Creation of Beams & Columns
- Modifying Structural Sections
- Beam & Column Utilities
- Regular Structures
- Section Fittings and Joints etc



Course Details:

Eligibility: B.E./B.Tech./Diploma in Mechanical, Electrical, Electronics, Instrumentation Engineering

Course Duration: 6 Months Full Time

Timing: Wednesday To Sunday (10 AM to 3 PM)

Course Fees: Rs. 55,000/ - (Rs. Fifty five thousand only) including all taxes

Mode of payment: Rs 20,000 as registration fees at the time of admission by Demand draft, in favour of “**Smartbrains Engineers & Technologist Pvt. Ltd**” payable at Ghaziabad. The due payment has to be cleared by course commencement date.

Training Features:

-Intensive training with extensive practical which will make person more perfect and very comfortable with industry.

-Expert faculties with 30+ years of experience which help the participants to get real

-industry tips and feedback Practical oriented Training program.

Live Engineering Project.

-Excellent training material, case studies materials.

-100 % Placement assistance to all students.

-Accommodation is available for the trainees

Placement Support:

We SmartBrains Consultants are also a leading Manpower Consultancy and we are catering to **Oil & Gas, Petrochemicals, Refineries, Process, Power, Energy, Infrastructure, Construction Engineering, Cement, Metals etc**

SmartBrains Consultants provides career Counseling and guidance, to all our students/trainee to identify their career path for achieving success in life.

Some Major Clients of Smartbrains:

? Samsung Engineering

? Valdel Engineers & Constructors Pvt. Ltd

? Cinda Engineers & Constructors Pvt. Ltd.

? Indian Oil Tanking Design & Engineering

? Lurgi India Ltd.

? Larsen & Toubro Ltd

? Doosan Babcock Engineering & Services

? ISJEC John Thompson

? Saipem Triune Engineering

? Polyplex Corporation (Hydro Power)

? UDHI India Pvt Ltd

? PL Engineering

? Tractebel Engineers & Constructors

? Worley Parsons Oman Engineering L.L.C

? Satnam Engineering

? Lahmeyer International

? WVG Engineers Consultants

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? Naftogaz India Pvt. Ltd.

? Nuberg Engineering

? Unitech Machines

? Technofab Engineering Ltd

? Enereff Engineers Pvt. Ltd.

? Driplex Water Engineering Ltd.

? Degremont

? Multitex Filtration

? MultiMax Engineers

? Advance Group of Companies

? Energo Group

? Desein Indure

? Quanta Process Solution Pvt. Ltd.

? A2Z Maintenance

? Global Economic Advantage

? Green Leaf Engineering Ltd.

? Dimension Engineering Consultants Pvt. Ltd.

Admission Procedure:

Submit Dully filled Admission Form, along with Registration Fee DD.

To,
SmartBrains Engineers & Technologist Pvt. Ltd.
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Indirapuram, Ghaziabad-201010
Email : piping@smartbrains.in
Phone +91-120-4104991/94/95

Declaration:

- This training program is on AUTONOMOUS basis conducted by SmartBrains.
- SmartBrains has right to expel any student at any time for misbehavior, poor attendance without refunding the fees.
- Certification will be issued only after completion of course, submission of all assignments and passing all the examinations.
- SmartBrains has its own rules and regulations about conducting examinations and assessment of examinations

For further information and admission, please contact

SmartBrains Engineers & Technologist Pvt. Ltd.

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