Best Technology Soultions **(BTS)**

Training Program

Fundamentals, Sizing, Selection & Operation Of HVAC Systems

Training Program

Introduction:

Mastering fundamentals, sizing, selection, & operation is a must for designers & operators of HVAC systems. This course covers the fundamentals of HVAC systems starting from Psychrometry & representation & calculations of air conditioning processes & cycles. Cooling & heating load calculations, design of air distribution systems, HVAC equipment & system selection, controls, energy conservation & economics of HVAC systems are all covered. The use of Carrier's Hourly Analysis Program (HAP) in the design & sizing of HVAC Systems is demonstrated. Many useful rules of thumb to aid the beginning individual in the design & sizing of HVAC systems will be provided. The experienced individual will find them useful for a quick design & operation check. The course will feature:

- Psychrometry
- Air conditioning cycles
- Space conditions – comfort
- Cooling/heating load calculations
- Design of air distribution system (duct design)
- HVAC equipment and system selection
- Rules of thumb (ROTs)
- Controls, energy and costs
- Design of water distribution systems

Who Should Attend?

Mechanical Engineers, General Supervisors, Consulting Engineers, Design Engineers, Foremen, Supervisors, Technicians, Maintenance Personnel, Engineers of all disciplines, Supervisors, Team Leaders and Professionals in Maintenance, Engineering and Production Managers, Maintenance Personnel, Heads of Maintenance and Operation, Chemical Engineers, Equipment Specialists, Technical Engineers, Operation Engineers, Planning Engineers, Process Engineers, Reliability Specialists, Boiler Plant Construction Managers, Consulting Engineers, Design Engineers, Insurance Company Inspectors, Operation, Maintenance, Inspection and Repair Managers, Supervisors and Engineers, Plant Engineers, Senior Boiler Plant Operators, Repairers and Installers, Project Engineers and Technologists, Facility Engineers, Consultants, Mechanical Engineers and Technologists, Maintenance and Operation Personnel and other technical personnel who need to upgrade/refresh their current knowledge of HVAC systems

Course Objectives:

By the end of this course, delegates will be able to:

- Apply key fundamentals in the design and operation of HVAC systems
- Perform air conditioning cycle, load, duct and hydronic piping design calculations
- Select procedures for efficient operation of various HVAC equipment and systems
- Recognize energy saving opportunities in HVAC systems into energy cost saving opportunities
- Design efficient controls for your HVAC systems

Course Outline:

Introduction & Psychrometry

- Moist air properties
- The psychrometric chart
- Moist air processes

Air Conditioning Cycles

- Bypassed, return and outdoor air
- Capacity of refrigerating plant
- Effect of heat gains in ductwork

Space Conditions: Comfort

- Comfort-physiological considerations
- Environmental comfort indices
- Comfort conditions

Cooling & Heating Load Calculations

- Design temperature differences
- Quantity of heat to be removed
- Conduction heat gains
- People load
- Loads due to lights and equipment
- Infiltration load
- Ventilation load
- Radiant and solar heat gains

Design of Air Distribution System (Duct Design)

- Total, static and velocity pressures
- Changes in pressure in a duct
- Loss in static pressure due to friction
- Fan laws and fan performance curves
- System characteristic curves
- Fan selection

- Duct design

HVAC Equipment and System Selection

- Unitary equipment
- Heat pumps
- Chilled water systems
- Selection procedure for chilled water coils, air conditioners and heat pumps
- Selection procedures for unitary heat pumps and furnaces
- Cooling towers
- Economizers

Rules of Thumb (ROTs)

- Cooling and heating load ROTs
- Infiltration and ventilation ROTs
- Humidification ROTs
- Occupancy ROTs
- Lighting ROTs
- Equipment and appliances ROTs

Controls

- HVAC control component and circuits
- Unitary controls and circuits
- Central HVAC system controls

Energy and Costs

- HVAC system demand calculations
- Energy consumption and cost calculations
- Maintenance and replacement and system installation costs

- Energy conservation opportunities (ECOs) in HVAC systems

Design of Water Distribution Systems

- Piping loop systems
- Head loss characteristics
- Design methods
- Piping layout and sizing
- System head and pump selection

Demonstration of the Use of Carrier's Hourly Analysis Program (HAP)

- Basic HAP program concepts
- Step-by-step instructions for using the program to design HVAC systems
- Example problems illustrating how the software is used to design an HVAC system