Projacs
an egis company
بروجاكس للتدريب والتطوير
Projacs Training and Development

Advanced HVAC Design, Maintenance & Operation Techniques

تقنيات متقدمة في تصميم وتشغيل وصيانة أنظمة التكييف والتبريد

03 – 07 November 2019

Dubai

A Member of:
PROJACS ACADEMY

ProjacsAcademy.com

Introduction

HVAC is an important part of residential structures such as single family homes, apartment buildings, hotels and senior living facilities, medium to large industrial and office buildings such as skyscrapers and hospitals, vehicles such as cars, trains, airplanes, ships and submarines, and in marine environments, where safe and healthy building conditions are regulated with respect to temperature and humidity, using fresh air from outdoors.

Ventilating or ventilation (the V in HVAC) is the process of exchanging or replacing air in any space to provide high indoor air quality which involves temperature control, oxygen replenishment, and removal of moisture, odors, smoke, heat, dust, airborne bacteria, carbon dioxide, and other gases. Ventilation removes unpleasant smells and excessive moisture, introduces outside air, keeps interior building air circulating, and prevents stagnation of the interior air.

Ventilation includes both the exchange of air to the outside as well as circulation of air within the building. It is one of the most important factors for maintaining acceptable indoor air quality in buildings. Methods for ventilating a building may be divided into mechanical/forced and natural types

Objectives

This is a specialized course concentrating on two important subjects as follows:

- The details of heat load calculations, selection of appropriate equipment/system and the design of the ducts and piping networks.
- After sale service including testing, commissioning, putting into commercial operation, operation and maintenance.

To have those who attend and actively participate in the discussions and case study leave the course with enough knowledge to implement their daily assignments correctly and professionally.

Who Should Attend?

HVAC Engineers, Engineers involved in specialties such as consultants, contractors specialized engineers and end users Engineers

Course Outline

Day 1:

HVAC systems design

- **Heat load**
  - Sources of heat load
  - Using the equation of each heat load for analysis and possible reduction in the heat load.
  - Air treatment and human comfort
  - Evaluating and studying the outside and inside design conditions to meet the human comfort
  - Daily and monthly heat load profiles, how they affect the heat load

- **Selecting the type of AC system**
  - According to the size of total heat load
  - According to type of compressors
  - According to condensing method.
  - According to type of usage (Big centralized systems servicing complexes & multi buildings).
  - The C.O.P./EER with examples.

Day 2:

- **The piping system for chilled water applications**
  - Velocity/friction loss VS initial and running cost. How to decide which way to go.
  - Closed or open type systems. (Advantages and dis-advantages of each type).
  - Pressure breakers and the need for high rise buildings
  - Effect of pressure breakers on evaporating temp., chilled water temp., C.O.P., air side, initial and running cost.
  - Expansion and contracting of the piping circuits and the selection of expansion joints, pressurized expansion & make up tanks.

- **Refrigerants and their effect on AC systems selection and the environment.**

Day 3:

- **How cooling towers work for centralized water cooled systems.**
- **Thermal storage**
  - Types of thermal storage systems.
  - Air cooled systems Load shifting (partial and full), daily and weekly, case study with calculations

- and comparison of C.O.P.

- **Ventilation, infiltration, ex-filtration. How to minimize their heat loads**
- **The conclusion (Selecting the right AC system based on):**
  - Size of installation and the limitations on our choice according to job size and the readymade manufacturers equipment.
  - Initial and running cost
  - Type, size and number of compressors
  - Type of condensers. (Air, water, evaporative and radiators)
  - Evaporating temperature and the type of heat exchange in coolers and air side.
  - Evaluating the C.O.P.

Day 4:

Total system reliability

- What reliability means (Redundancy, stand by equipment/components for commercial and industrial applications)
- The difference between commercial individual systems and centralized systems.

Centralized control and management

- Definitions and the need for control narrative, BMS, SCADA and DCS systems
- How BMS, SCADA & DCS systems improve the efficiency & reliability and their effect on initial cost

District cooling

- Introduction to district cooling
- Why district cooling (For the real state developers/clients, the nation and environment).
- The choice of condensing method for district cooling systems

Day 5:

Introduction to Inlet air cooling to gas turbines

- Iso conditions for gas turbines and nominal capacity for air conditioning units.
- Gas turbines power output and the relation with ambient conditions and site elevation
- Why we need to cool the inlet air to gas turbines
- Base and peak load inlet air cooling and their economics.
- Load shifting and the need for thermal storage (Build up cycle and burn off cycle)
- Types of thermal storage for inlet air cooling

Open discussions on the HVAC design

Operation and Maintenance

- Scheduled preventive maintenance routines for DX and chilled water systems
- Daily log sheets and the items to record and monitor.
- Importance of pre-commissioning tests, cold and hot tests for proper maintenance
- Utilizing records history for improvement of systems reliability
- Hand over package and its importance for proper maintenance.
- Training of hands on staff for better understanding of the systems to reduce down time and operational cost.
- Operation and maintenance case studies
- Open discussions including any specific related cases from attendees.
- Feedback from attendees and distribution of certificates
- Continuation of open discussions on operation and maintenance

Training Method

- Pre-assessment
- Live group instruction
- Use of real-world examples, case studies and exercises
- Interactive participation and discussion
- Power point presentation, LCD and flip chart
- Group activities and tests
- Each participant receives a binder containing a copy of the presentation
- slides and handouts
- Post-assessment

Program Support

This program is supported by interactive discussions, role-play, and case studies and highlight the techniques available to the participants.

Schedule

The course agenda will be as follows:

- Technical Session 08.30-10.00 am
- Coffee Break 10.00-10.15 am

- Technical Session 10.15-12.15 noon
- Coffee Break 12.15-12.45 pm
- Technical Session 12.45-02.30 pm
- Course Ends 02.30 pm

Course Fees*

- **2,950USD**
  **VAT is Excluded If Applicable*