



## DAY 1

Review of key HVAC basic summary points for advanced course

- Make Up, Recirculation air handlers. CAVs and VAV boxes.
- Overview, differences and specific utilization by system block diagram demonstration.
- ASHRAE principles of heat load calcs.
- Outdoor and space Design conditions Per ASHRAE
- Water flow calculations per ASHRAE
- Dry bulb/Wet bulb temperatures
- Mixed air calcs

## Mechanical Aspects of HVAC systems

### AHU Water side:

- Chillers and cooling towers types
- Boilers, hot water, and steam types
- Pump sizing flow, head, and bhp
- Pipe sizing calculations, velocity and pressure drop
- AHU cooling and heating coils

### AHU Air side:

- International mechanical code criteria
- Heat load calcs. air volume per ASHRAE
- Duct sizing per ASHRAE
- Duct distribution
- Fan sizing and calculation for static pressure, BHP
- International fire code criteria

### Industrial Exhaust (equipment, hoods, tools, etc.):

#### Design criteria per equipment type

- American Conference of Governmental Industrial Hygienists (ACGIH)
- International mechanical code criteria
- Duct sizing per ACGIH
- Duct distribution
- Fan sizing and calculation for static pressure, BHP per ACGIH
- International fire code criteria

### Ventilation (toilets, kitchen hoods, storage area, etc):

#### Design criteria per space type

- ASHRAE criteria
- International mechanical code criteria
- Duct sizing per ASHRAE
- Duct distribution
- Fan sizing and calculation for static pressure, BHP per ASHRAE
- International fire code criteria



## DAY 2

### Industrial & Commercial Lighting

- Load requirements & breaker design
- Incandescent, CFL & LED lighting
- In rush current, 60Hz hum, line filters etc

### Control Aspects of HVACS

#### Control Elements

- Control Valves for steam/water
- Control Damper for air
- Motor Control Centers
- Variable Frequency Drives
- Instrumentation – analog & discrete
- Control Algorithm – PID control loops

#### Control Systems

- Standalone Systems
- BAS systems
- PLC, DCS & SCADA Systems
- Interfacing between systems
- GUI/MMI software for HVAC systems
- Historical Trending & reporting

#### Industry Trends in HVAC

- Motor efficiency improvements
- LEEDs certification
- Enthalpy control
- Heat recovery techniques
- Cooling at Non peak hours
- Ice reservoirs, heat pipes and other non conventional methods

#### The big picture

- Reading & interpreting a plant drawing PFD and P&ID
- Complete plant HVAC system P&ID analysis