

Free Air Condition and Mechanical Ventilation Class Dec 2010 at Pa Auk Meditation Center.

Conducted by Kaung Htat Nyunt

- **B.Eng (Mech)** Yangon .Institute of .Technology -1995
- **M.Sc (Mech)** NUS, Year 2000
- BCA certified **Green Mark Manager**
- **LEED** accredited professional, USA
(Leadership in Energy and Environmental Design)
- Working as Service Team Manager in Johnson Controls(York) Pte Ltd.

<http://acmv.kaung.net>

Location:

Pa Auk Meditation Centre, No. 15 Toe Kim Eng Road.

Time Table

	Day / Date	Time
1	Tue 7 th Dec 2010	7:30 PM to 9:30PM
2	Thu 9 th Dec 2010	7:30 PM to 9:30PM
3	Tue 21 st Dec 2010	7:30 PM to 9:30PM
4	Tue 28 th Dec 2010	7:30 PM to 9:30PM
5	Thu 30 th Dec 2010	7:30 PM to 9:30PM
6	Thu (Date to be confirmed)	
7	Tue (Date to be confirmed)	
8	Thu (Date to be confirmed)	
9	Tue (Date to be confirmed)	

Recommendation :

Please bring along exercise book, pencil, pen, ruler, and calculator. Lecture note will be given free of charge before class start.

MAP



Introduction of ACMV (Air Conditioning and Mechanical Ventilation) and Psychometric (2hrs)

- _ Basic concept of Air Condition
- _ Properties of Psychometric Chart
- _ How to Read Psychometric Chart and locate the point
- _ Calculation of Cooling Load by using Psychometric Chart/Software

Objective

- ❖ Introduction of ACMV and basic Thermodynamics.
- ❖ Difference between Heat and Temperature.
- ❖ What is the physical meaning of But/h, kWh, Refrigeration Ton?.
- ❖ How much do you know about Air?.
- ❖ Why do we need Psychometric chart?.
- ❖ What is the physical meaning of Dry Bulb, Web Bulb, RH, Enthalpy, etc..
- ❖ How to locate a point on Psychometric chart from given parameter?
- ❖ How to get this parameter in easy way?
- ❖ How to read the properties of Air at particular point on Chart?
- ❖ How do you understand condensation?
- ❖ How to move one point to another on Psychometric chart?.
- ❖ How do you understand the Air Flow Rate?
- ❖ What is the Formula to calculate the cooling capacity of AHU or FCU.(Air Side)?.

Air Handling Unit (Part I)- Cooling Coil (2hrs)

- _ Type of Chilled Water Cooling Coil
- _ Configuration of Chilled Water Cooling Coil
- _ Calculation of Cooling capacity and Verification of Coil Performance

Objective

- ❖ Different type of cooling coils.
- ❖ What is the characteristic of cooling coil?.
- ❖ Configuration of cooling coil.
- ❖ Understanding of cooling coil construction.
- ❖ How to connect the chilled water pipe to cooling coil correctly.
- ❖ How you determine that particular cooling coil is whether efficient or not.
- ❖ Do you really understand the physical meaning of AHU Technical data at Coil Section?
- ❖ What are the standard parameters of cooling coil? (Face velocity, Chilled water supply and return temp).
- ❖ How to verified the cooling coil capacity?.
- ❖ If you see a particular cooling coil, can you estimate the cooling coil capacity? (Reverse engineering)

Air Handling Unit (Part II) - Blower and Fan Law (2hrs)

- _ Type of Blower
- _ Fan Law
- _ VSD(Variable Speed Drive)

Objective

- ❖ Different type of blowers used in Air Handling Unit.
- ❖ What are the characteristic of blowers?
- ❖ Do you know how to read the fan curve?
- ❖ Do you know how to interpreted data on fan curve?
- ❖ Fans or blowers are connect and running in parallel / Series.
- ❖ To determine the Resultant fan curve of fans are in parallel/Series connection.
- ❖ Understanding Fan Law.
- ❖ How to applied fan law on site problems?
- ❖ How to determine fan suitable operating Point?
- ❖ How to prevent overload condition?.
- ❖ What is the variable speed drive?
- ❖ What will be the fan curve, if that fan is driven by VSD?.
- ❖ What is the benefit of VSD?.
- ❖ Fresh air requirement for AHU/ Occupant area.
- ❖ Carbon dioxide and Fresh Air Control.

Variable Air Volume System and VAV Boxes (2hrs)

- _ What is Variable Air volume System
- _ VAV Vs. CAV(Constant Air Volume System)
- _ Application of VAV Boxes and Air Balancing

Objective

- ❖ Variable Air Volume System (VAV) Vs Constant Air Volume System (CAV)
- ❖ What are the characteristic of Variable Air Volume System (VAV)?
- ❖ What are the characteristic of Constant Air Volume System (CAV)?
- ❖ How to determine the suitable application for VAV and CAV.
- ❖ What is VAV Box. (Variable Air Volume)
- ❖ Construction of VAV Boxes.
- ❖ How the VAV Boxes work.
- ❖ VAV box actuator and thermostat.
- ❖ How VAV box and VSD work?
- ❖ Do you know how to carry out correct way of Air Balancing? (CAV)
- ❖ Do you know how to carry out correct way of Air Balancing? (VAV)

Chilled Water System and Condenser water loop (2hrs)

- _ Chilled Water Pumps and Condenser Water Pumps
- _ Head loss Calculations
- _ Valves and Fitting
- _ Pipe sizing

Objective

- ❖ Fluid Flow in the pipe.
- ❖ How to size the pump and pipe.
- ❖ Primary circuit and Secondary circuit in chilled water system.
- ❖ How many type of chilled water pumps?.
- ❖ Chilled water pumps are located before chiller or after chiller in the chilled water circuit.?
- ❖ Configuration of Chilled water pump.
- ❖ Chilled water and Condenser Water Header configuration.
- ❖ Typical chilled water pump in ACMV construction drawing.
- ❖ What is the Pump head loss?
- ❖ Standard accessories for chilled water pump.

Mechanical Ventilation (MV) (2hrs)

- _ Duct Sizing
- _ Type of Fan
- _ Car Park, Staircase and Common area Ventilation

Objective

- ❖ Fluid Flow in the duct.
- ❖ Friction Loss
- ❖ Flow rate (Dynamic) and Static pressure
- ❖ Type of Fans (In line Fan, Centrifugal Fan, etc..)
- ❖ Application of Fan in MV System.
- ❖ How to design the MV Fan System
- ❖ Type of Starter for MV Fans.
- ❖ Why Fresh air fan is NOT allowed to run without running Exhaust Fan at basement car park.
- ❖ Understanding of Smoke purging System
- ❖ Understanding of Smoke extraction
- ❖ Understanding of Engineering Smoke control.
- ❖ Staircase Ventilation and Fire code requirement.
- ❖ Interlocking of Fans (EAF &FAF, MV fan to fire alarm system)
- ❖ What is the Air Change and CP 13 Standard requirement?
- ❖ Carbon monoxide Monitoring System in Basement Car park.

Indoor Air Quality (IAQ) (2hrs)

- _ What is indoor Air Quality?
- _ National Environmental Agency's 11 Parameters for IAQ
- _ Trouble Shooting about IAQ problem

Objective

- ❖ Understanding of IAQ, Trouble shooting of IAQ problem
- ❖ Temperature (Degree Celsius) 22.5 – 25.5
- ❖ Relative Humidity (%) < 70
- ❖ Air Velocity (m/s) / Air Flow <0.25
- ❖ Carbon Monoxide (ppm) 9
- ❖ Carbon Dioxide (ppm) 1000
- ❖ Ozone (ppm) 0.05
- ❖ Total Volatile Organic Compounds (ppm) 3
- ❖ Respirable Suspended Particulate ($\mu\text{g}/\text{m}^3$) 150
- ❖ Formaldehyde (ppm) 0.1
- ❖ Total Bacteria Count – TSA, 35 Degree Celsius 48 Hours (cfu/m³) 500
- ❖ Total Fungi Count – PDA, 25 Degree Celsius 5 Days (cfu/m³) 500

Basic Building Automation System and Control (2hrs)

- _ Introduction to Building Automation System
- _ Direct Digital Controller (DDC)
- _ Control Logic for ACMV Equipment

Objective

- ❖ Basic Control for ACMV Equipment
- ❖ What is automation and optimization?
- ❖ ACMV Equipment starter panel.
- ❖ What is Direct Digital control?
- ❖ PID Control Loop
- ❖ Control Signal
- ❖ Digital Output/Input
- ❖ Analog Output/Input

M&V- CP/SS(Measurement and Verification, Singapore Code of Practice/ Singapore Standard) (2hrs)

- _ Basic Tools/ Instrument
- _ Testing and Commissioning
- _ Air Conditioning and Mechanical Ventilation (SS553/Formerly CP13)
- _ Energy Efficiency Standard for Building Services and Equipment (SS530/Formerly CP 24)

Objective

- ❖ What is M&V
- ❖ Different type of tools for difference application.
- ❖ Understanding construction of individual instrument.
- ❖ How to use them correctly.
- ❖ What is the accuracy and calibration?
- ❖ Understanding of ACMV (SS553/Formerly CP13)
- ❖ Understanding of Energy Efficiency Standard (SS530/Formerly CP 24)

Others Recommend Topics Requested by Student. (2hrs)