



Airside Fundamentals-II

"Airside Distribution"

1. Duct Design <12 hours>

A. Pressure Variations in a Duct System (Concepts):

- 1) Static, Velocity, Total Pressure & Losses
- 2) Takeoff Variations
- 3) Effect of Fabrication on Regain
- 4) Reducer Variations

B. Equal Friction Duct Design

- 1) Use of Air Friction Chart & Ductulator
- 2) Create your own design method
- 3) Round vs. Rectangular
- 4) Airflow Balancing

C. Static Regain Duct Design

- 1) Efficiency & inherent balance
- 2) Computerized Duct Design Analysis

D. Practical Duct Layout Guidelines

Purpose: Duct Design is intended to give the student a better understanding of what happens to air as it moves through a duct system. They will learn how certain design variables affect the overall losses. This course will help a designer know when to use one design over the other and how best to optimize each design for the particular application.

2. Fans & Fan Laws <8-10 hours>

A. Definitions

B. Concepts

- 1) Resistance vs. Velocity; Fan Testing; Fan Curves; Fan Surge; System Curve
- 2) Actual Fan Selection (analysis of various sizes that meet criteria)

C. Fan Types:

- 1) FC, BI, AF
- 2) Centrifugal, Vaneaxial, Plug/Plenum

D. Fan Laws

- 1) #1 Effect of RPM Change
- 2) #4 Density Change - Constant Volume
- 3) #6 Density Change - Constant Mass Flow Rate

E. Fan Modulation Methods

F. Application Considerations

Purpose: Fans & Fan Laws is intended to give the student a better understanding of how a fan works & which fan works best for each application. It will help a student to diagnose problem jobs as well as to increase the overall efficiency of a new design. They will learn how certain design variables such as size, RPM, type & class affect the overall efficiency and acoustical performance of a particular fan. Most importantly, they will learn how to use the fan laws to make important changes in existing fan systems.

3. Acoustics <2-4 hours>

A. Concepts:

- 1) Noise, Audiometry, Sound
- 2) Frequency, Wavelength & Amplitude
- 3) Pure Tone, Broad Band & White Noise
- 4) Sound Pressure, Power & Intensity
- 5) Octave Bands
- 6) Acoustical Sound Meters
- 7) Free Fields vs. Far Fields
- 8) Anechoic vs. Reverberation Chambers
- 9) NC vs. NR Curves

B. Acoustic Rules of Thumb

C. Effectiveness of a Sound Barrier

D. Why Humans Hear Differently Than A Microphone

E. How To Do A Sound Map

F. How To Calculate Influence of Background Noise

G. How to Calculate the Influence of Multiple Source

Purpose: Acoustics is one of the least understood aspects of HVAC design. This course lays a practical foundation that allows the student to handle a majority of acoustical problems they are likely to face. On existing problem jobs the student will learn what are the most cost effective ways to reduce sound levels. And on a new job, they will learn how best to design the proper acoustical levels up front.