Airside Fundamentals-II
"Airside Distribution"

1. Duct Design <12 hours>

A. Pressure Variations in a Duct System
   1) Concepts:
      a) Static, Velocity, Total Pressure & Losses
      b) Takeoff Variations
      c) Effect of Fabrication on Regain
      d) 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.