Design Problem
ENVH 557, Winter 2006
Due by 3/2/06

Using your ventilation spreadsheet, specify the duct sizes and Fan requirements for the following system designs.

The hoods at A and B are to enclose two 12-inch grinding wheels producing dust mainly in the range of 5 - 20 um diameter particles. Q (design) for each hood is 300 CFM, and the entry loss is 0.65(P_V) for each hood. All elbows have a radius/duct diameter = 2.0 and the minimum transport velocity is 4500 FPM.

Part A: Assume all air volumes refer to standard conditions.
Part B: Oops! You need an air cleaner! Add a cyclone between points C and D. Choose one from the following table. (Note Dp is the particle diameter).

Type	Pressure loss @ 1000 CFM	Collection efficiency
Low contact power	6 inches of water	98% @ Dp > 10 um
Med. contact power	12 inches of water	90% @ Dp > 2um
High contact power	50 inches of water	90% @ Dp > 0.5um

Part C: Your company has another plant in Denver CO (elevation 5280 ft.). The plant has a similar process layout, except that Hood A will be attached to a milling machine. A diagram for this hood is in the vent manual plate VS-45-02. Assume an open area (with the cover up) of 4" by 36." Recalculate the duct system for this new application, including the air cleaner you selected.

(Note, the drawing is not to scale.)