Today, we will:

- Complete the hood/exhaust fan example problem from last time
- Go over Exam 2
- ~~Discuss **Computational Fluid Dynamics** in **Chapter 10**~~ NO TIME - WILL DO ON WED.

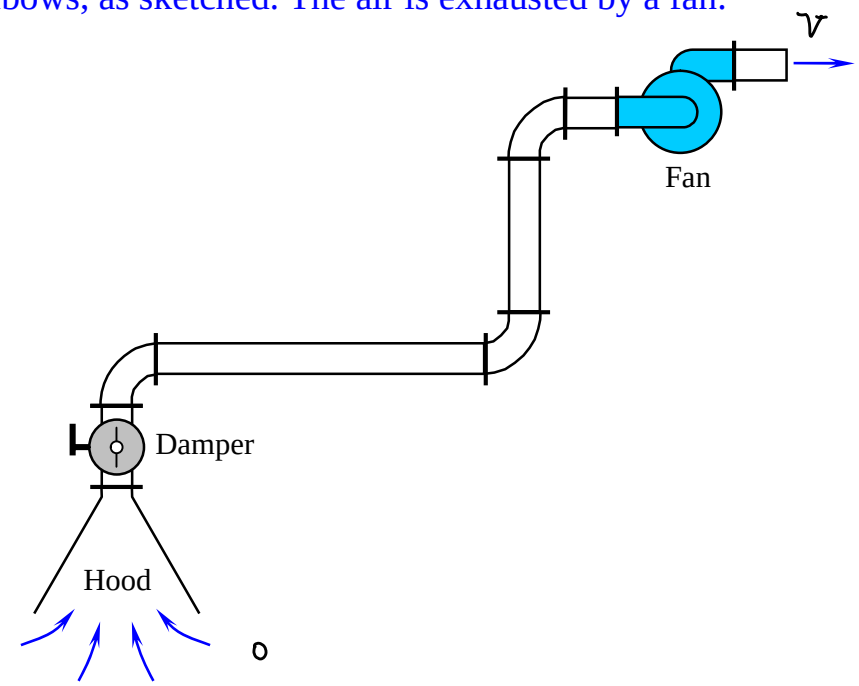
Results of Exam 2:

- ***Mean***: 72.7
- ***Lowest***: 54
- ***Highest***: 99
- ***St. Dev***: 11.6
- ***Median***: 69
- ***Mode***: 69

Example (continued from last time)

Given: Air is drawn into a 45° tapered hood, and then goes through a damper, several long sections of pipe, and three elbows, as sketched. The air is exhausted by a fan.

- duct length = 100 ft
- duct dia. = 6 in
- duct roughness = 0.006 in
- $C_{o,\,hood} = 0.15$
- $C_{o,\,damper} = 0.50$ when fully open
- elbows are 5-gore, 90° CD3-9 with $R/D = 1.5$
- $\rho_{air} = 1.2\ kg/m^3$
- $\nu_{air} = 1.5 \times 10^{-5}\ m^2/s$
- $Q = 1200$ CFM



(a) To do: Calculate the required pressure rise across the fan.

Solution:

Last time, we analyzed all the major and minor losses through the duct, and determined the following:

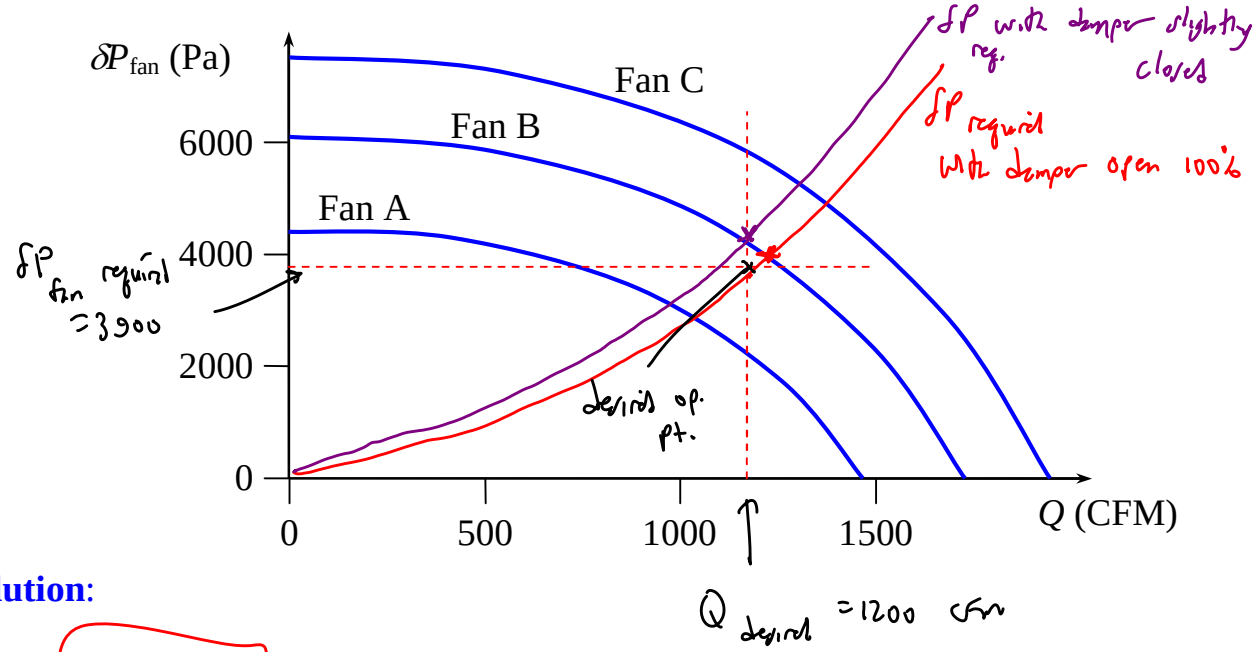
$$\left(\delta P_{fan}\right)_{required} = \alpha_2 \left(VP\right)_2 + \Delta P_{major\ losses} + \Delta P_{minor\ losses}$$

$$= 1.05\left(583.8\ Pa\right) + 2413.0\ Pa + 869.8\ Pa$$

$$= 3896\ Pa \approx 3900\ Pa = \delta P_{fan}\ \text{required to get}\ Q = 1200\ CFM$$

(b) To do: Select an appropriate fan from a family of available fans.

(see fan choices on the next page)



Solution:

Pick Fan B → will operate at slightly higher Q

→ OR, Adjust damper to get Q = 1200 cfm