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MET 330

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Exam 3 Reflection

1. The following objectives were addressed in this exam:

Objective: Explain the fluid dynamics in pipes and fittings;

Explanation: The minor and major losses of the piping system had to be determined to find the pump head in part A. The losses were used in part B to find the flow rates under different bypass valve openings.

Objective: Apply the principles of conservation of energy (Bernoulli's equation) and mass to fluid flow systems;

Explanation: Bernoulli's equation had to be used in part A and B to determine the pump head, and flow rates.

Objective: Compute friction losses in pipes for a variety of configurations (series, parallel, network, etc.);

Explanation: Part A was a series pipeline problem and part B was a parallel pipeline problem that required excel iteration.

Objective: Explain how fluid-machinery work (focused on pumps);

Explanation: The pump power equations from chapter 13 were used in part B to determine the flow rates.

2. The first difference I notice between my work and the solution is the turbulent friction factors. However, I used the formula shown in the lecture slides and the correct variables to find them. This will cause a slight difference in all the minor losses in comparison to the solution. The next difference I notice is I have all the same energy losses accounted for, but I also included entrance losses because the 4in pipe flows out of a tank. I also included reducer losses because there is a sudden change from 4in pipe to 3in pipe. Due to these small minor loss differences, I calculated a slightly larger pump HP, however, it is less than a 10% difference, and it would be better for the pump to have a little more power than not enough power. Aside from these differences I do not see any other discrepancies between my work and the solution for part A.

My mistake with part B is I assumed the flow rate at in the 3 in discharge pipe had to be the same as the flow rate at the heat exchanger pipe because of they are the same diameter. This caused me to only have 3 flow rates in my iterations rather than 4. Once again, my minor losses are slightly different because of the turbulent friction factor calculations. I also solved for entrance, reducer, and expander losses. The valve for pump power was also slightly different due to the reasons explained previously. The flow rates I calculated were only slightly different than the ones in the solutions for example, my flow rate for the bypass valve ¼ open is about 20% different than the solutions, this is due to a difference in minor loss calculations and not calculating a separate flow rate for the heat exchanger branch.

3. I would give my test a **10/10** for the rubric because based on how I did the problems I covered each section of the rubric.

Problem A: 5/5 (I do not think my friction factors are wrong because the formula I used to calculate them was shown in the lecture slides, and my variables were correct. I also think the addition of the reducer and entrance losses only make the answer more accurate.)
Problem B: 5.25/7 I am deduction a quarter of a point for only accounting for 3/4 flow rates when setting up my iterations and deduction 1 point for incorrect results.
Total: (90/2)*(5/5+5.5/7)= 80.35

- 4.
- a. One of the issues I encountered during the test was determining which Qs were the same so I could properly simplify the equations. I spent time looking at the textbook and my notes and spoke with Dr. Ayala to resolve this, however, I was still not entirely correct in my calculations. I also had an issue of not leaving Le/D separate for the bypass gate valve, Dr. Ayala helped me with this issue.
- b. I first looked through the questions and wrote down my variables and reviewed the videos for pipelines that had similar layouts. I then worked through each part based on what I said I would do in my pretest. The majority of the test was without hiccup aside for the two examples I listed in part a. In the future I would spend more time reviewing the lecture notes before the test to speed up the process.
- c. A new concept I learned from the test was how to do iteration in excel to solve for multiple unkowns.
- d. Engineers use the concepts in the fluid propulsion plants in nuclear shipbuilding applications.
- e. I currently work at the shipyard in submarine piping, these concepts could be useful to in my current work environment.
- f. These concepts will be useful to my professional career if I stay in shipbuilding or go to any other field that works with piping.
- g. If I worked in the design aspect of shipbuilding, I would use the concepts very often to design piping systems.
- h. I have not yet been able to apply these concepts outside of the classroom. One concept I learned from these types of problems that I can apply to anything is patients.
- i. I think I improved in the efficiency of eliminating parts of Bernoulli's to solve for my unknown and with solving for minor losses.
- j. These concepts are used in a lot of industries, specifically if I stay in shipbuilding and move into the design part of new construction.
- k. I spent more time on this test than the last one, somewhere between 15-20 hours, however I spilt the time up more so it didn't seem as long. My time was organized by doing the pretest Friday, then working the problems after receiving the feedback Saturday afternoon and finishing up Sunday morning by writing out my equations since I used excel to do the work. In the future I would want to be a better "Estudiante" and spend more time studying before the test.