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Reflection Test 2 MET330

After the Test 3 for the Fluid mechanics (MET 330) course, I was able to see several of the learning objectives for this course. One of them that was present in part A and B of the test was objective number 6, “Analyze, explain, and solve problems related to fluid dynamics in pipes and fittings arranged in series, focusing on energy losses and system efficiency”, by calculating the energy losses of the system; another objective present in the test was objective number 5, “Understand, explain, and apply the principles of similitude and dimensional analysis to experimental and real-world fluid mechanics scenarios”, present as well on part A; an lastly objective number 9, “Understand, explain, and assess the working principles of fluid machinery, particularly pumps, and evaluate their application in real-world scenarios.”, presented in part C when we were required to select a pump using the charts given.

After comparing my results to the solutions posted on canvas I made a couple of mistakes throughout the test, those being; when calculating the minor losses I assumed the elbows were a 90^{O} elbow and not a 90^{O} long radius elbow, so when calculating the losses for the elbows my value of K was different than in the solutions; I did not show the calculation for the not increased flow with the addition of the minor losses; when calculating the the new diameter for the pipe i used the procedure of the first exam and at the end when finding the pump power i just made the iterations, but the result was the same as the one represented; and when calculating the new pump power, the result was off due to the different minor losses from the elbows, the rest was correct and the difference of my result to the solution posted was 1.5%; for part B, i made a mistake that affected the entire question, which was the setting the directions of the R component, that caused my RY to be negative when it shouldn't and I added gravity to the calculations that wasn't needed; for the RX component, I stop the calculations before bernoulli's which also affected my final answer. Now for the C part, I did not calculate the specific speed required for the pump, and when selecting the pump, since my head size was different I got a different pipe for the system. Unlike the previous exam when I was overthinking, I was more relaxed about the exam and that made a couple of details slip out of my head, causing the loss of a couple of points.

WRITING RUBRIC

1. Pipeline redesign
    1. Recalculate the new pump power including minor losses 0.8/8
        1. Use Bernoulli's to get ha (ref & points in pict.)
        2. Include all minor losses
        3. Correct results
    2. Increase of pump power with new required flow rate 2.7/8
        1. Recalculate velocity
        2. Included all minor losses?
        3. Correct results
    3. New pipe diameter with same original pump 3.75/8
        1. Included all minor losses?
        2. Wrote full equation with diameter as unknown
        3. Iteration process
        4. Correct results

2. Pipe-elbow forces
    1. Correct control volume and points 1/8
    2. Free body diagram and correct forces 0.8/8
    3. Force in x – solve for Rx (need to use Bernoulli's) 1.5/8
    4. Force in y (weight) – solve for Ry 1.7/8
    5. Correct results 0.5/8

3. Pump preselection
    1. Why kinetic pump? Why radial pump? 0.6/6
    2. Use pump map? 1/6
    3. Draw desired operating point in pump curves 1/6
    4. Pump suction, discharge size, and impeller sizes 1/6
    5. Pump power, efficiency, size, and weight 0.9/6
    6. Correct results 0.8/6

GRADE:

(90/2)*(7.25/8) + (90/4)*(5.5/8 + 5.3/6) = 76.125

In this exam the problem I encountered was the opposite as my previous exams, not overthinking made me let small mistakes slip affecting my final grade. Overall, the procedure I had to complete this exam worked really well for me, setting more days to divide the work made me more relaxed, and not too overwhelmed at the last minute I had to work on the exam, I wasn't overloaded. The main thing for me in this exam was to finally see how an Excel spreadsheet can make our work life easier when trying to figure out no pump, powers, or new diameters for a system, and knowing how to navigate through pump maps, making the process of picking a pump easier. I think engineers can use those concepts when designing anything that requires a pump such as water, distribution machinery, houses, or anything with a hydraulic system. As mentioned before, there are a lot of scenarios where those things can be applied, and different work paths that knowledge can be used differently. I'm not sure where I will be using that but for sure at some point in my professional career that's going to be useful. Even though this is important right now for my internship, the area I want to work in I don't envision myself using these concepts a lot, maybe to a cooling process or a distribution of a fluid in a production cycle, but I can be wrong and knowing this can help me a lot in the future. I haven't had the opportunity to use any of the concepts but I am sure this class is preparing me for it in case I need it. In this exam, the most successful area was definitely not overthinking the entire exam, definitely not crying, and having confidence in what I was doing. This time the exam was spread into four days, one day for each part and one day for setting up and making the writing part of the exam and making sure all the details from my thought, processes, materials, drawings, tables, and everything required was in the PDF for the exam. Which in my opinion was the best division I've done between all the other exams.