MET 330 – Fluid Mechanics Post-Test #2 Reflection Joey Cantrell

1. The test required us to work with fluid dynamics within pipes and fittings of this system. Bernoulli's equation was used during the test to reinforce our need to utilize this key principle throughout fluid mechanics. We also had to compute friction losses and other energy losses using equivalent length and the K values for various valves, elbows, and a heat exchanger. All of these items are listed on the syllabus as vital course objectives that will be covered in the material.

2. Each section listed below:
    a. The final values that I obtained differed from the solution provided due to the mis-application of the K-factor equation. I mistakenly used the $f_T$ values in the equation causing my equivalent length values to be too large. This was a confusion with the equation provided in the book and its application.
    b. I recognize that I did not apply the equivalent length correctly by multiplying all terms by the friction factor, which caused my numbers to be extremely large. Based on the additional guidance that was provided, I was confused how some of the energy losses were not incorporated. Where is the entrance, elevation, and elbows from the suction pipe? The instructions made it seem that everything needed to be accounted for and this does not appear to be the case based on the solution. This was not covered in class to provide significant guidance in solving these types of problems
    c. Once that I messed up on part b, this part was destined for failure. I did set up the spreadsheet to calculate the new values of the flow rate correctly (similar to examples in course notes). My final answer is different due to the starting value not being accurate.

3. Writing Rubric:
   Purpose – 0.5/10; Drawings & Diagrams – 1.0/10; Sources – 1.0/10; Design Considerations – 1.0/10; Data & Variables – 0.5/10; Procedure – 2.0/10; Calculations – 1.2/10; Summary – 0.5/10; Materials – 0.5/10; Analysis – 0.8/10; Total – 9.0/10

   Problem Scoring:
   1. a. 1/9
      b. 1/9
      c. 5.0/9
      d. 0.5/9
   2. a. 1/5
      b. 1.4/5
      c. 1/5
      d. 0.5/5
   3. a. 2/5
      b. 2/5
      c. 0.7/5

   Final Grade – 9.0 + (80/3) * (7.5/9 + 3.9/5 + 4.7/5) = 77 based on the mis-application of $f_T$ and the equivalent length issues. I think that my writing and communication would have enabled another engineer to see my flaws and we would have been able to work through the issues easily.

4. Each section listed below:
    a. The biggest issue I encountered was the understanding of equivalent length and the appropriate use of the friction factors. This caused me some issues making my calculations to be too high and making the overall system solution incorrect.
    b. The way the test was laid out, you had to complete each section in order because they fed into each other.
    c. Through the reflection, I have learned the appropriate use of K and the friction factors so that going forward I will be able to correctly design a system.
    d. Engineers use these concepts in any pressurized piping system or heat exchangers for power or heating purposes.
    e. Similarly, the company I work for deals with these pressurized systems.
    f. Yes, I have already been able to more easily converse with colleagues at work and more easily understand the problems in order to work to a resolution.
    g. As I stated in the previous answer, I deal with engineers on these systems now, so this will become another tool in the toolbox as I further my career within the company.
    h. See previous answer.
    i. I was most successful with setting up the spreadsheets to complete the calculations. I have a mathematical mindset making this part of the test the easiest for me.
    j. As I get further integrated into the engineering aspects of my job, this course will prove beneficial to providing a knowledge base that allows me to solve problems and converse in a more educated manner.
    k. I spent approximately 10 hours on the test over the course of several days. The first part was spent setting the problems with the pre-test and the rest on performing the calculations. I would definitely communicate more with the professor to ensure that I was at least on the right track relative to some of the more confusing problems.

When I started the test, I felt that it was going to be simple but very time consuming due to all of the set up work for the spreadsheets and iterations. I was correct about the spreadsheets taking some time, but then the calculations were just a matter of copying and pasting to compute the iterations. I knew exactly which concepts to apply in each of the parts, which led me to believe it would be easy. However, I was not familiar with the correct application of the K values and friction factors in the calculations causing me to miss some of the parts. After studying the solutions provided, I now feel that I would be able to ace a similar problem based on my knowledge of the material and the additional insight into the K values and friction factors that were not discussed prevalently in class lectures.