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MET 330

July 5th, 2023

Test – 2 Reflection

For test number 2 we were required to demonstrate our knowledge and ability to calculate the flow of a parallel system, ensure that the applicable velocity criteria was not violated, and then determine the pressure at the exit of the conjoining tee. For the following problem we needed to be able to interpret the drawing as well as the given data to calculate the correct pipe size for the water fountain and then the pump power requirements. Both problems required us to implement our knowledge of losses to ensure accurate results. Through the performance of these problems, we accomplished five of the course objectives outlined in the syllabus.

In reviewing my exam compared to the provided solutions one of the first things that stuck out was how the difference in rounding can change the value of the various volumetric flow rates when working with such large values. Digging deeper into the first problem all the correct values for the equivalent lengths were implemented and used as well as all the correct equations for the various losses. All equations were correctly used with the only difference being the values used based upon rounding that was used when implementing the calculations. The result was correctly correlating values for all the volumetric flow rates, their velocities, and the pressure at the exit of the pipe tee. This problem was easier for me to work through as it made more sense logically and once all the known information was laid out it made sense as to which step to perform next.

For the exam's second question this proved to be more difficult for me to work through and where I made an error that resulted in the following equations answers being off due to the error being carried forward numerically. The point that was wrong was I incorrectly used what I assumed was needed as the velocity through the entirety of the annulus, 1.8m, as well as the 1m spray height for a total of 2.8m. This resulted in my volumetric flow rate being slightly skewed, however, since the difference was minimal the flow rate still correctly correlated to the same size diameter pipe as correctly determined on the exam. Moving through the end of the question I was already to the point where I was mentally drained from attempting and reattempting to solve portions of the problem and determine how to work through it that when I got to the point where I was to calculate the power of the pump, I put together what I assumed was the information requested.

In reviewing the grading criteria for the first question, I feel like the following would accurately represent the work displayed on the test. Correct application of 2 Bernoulli's + conservation of mass 3/12, were all minor losses handled 2/12, have the equations worked out with numbers 1/12, was there an iterative process to solve system of eqs 3/12, was the velocity criterion checked 1/12, are the results correct 2/12, for a total of 12/12 on the first equation based on the written work and the provided excel spreadsheet. For the second question I feel like the following would have been earned. Used Bernoulli's to determine velocity to then compute Q 2/12, was the pipe sized using the velocity criterion 2/12, was

the pump head computed from the Bernoulli's eq. 0/12, were all energy losses included 3/12, was the annulus energy loss handled with hydraulic diam. 1/12, was the pump power computer 0/12, are the results correct 1/12, for a total of 9/12. Using the equation supplied (90/2)*(12/12+9/12) for a total of 78.75.

While performing the test one of the main issues I encountered was just life and timing. Working excessively long hours at work while attempting to still be somewhat present in my family's life led me to have minimal time to take the test. This caused a compounding issue as it was mentally exhausting to work through and I was already burnt out. How I worked my way through it was multiple small breaks to try and regain focus when I came back and step away from the problem to allow myself to clear my mind instead of getting frustrated. When that was not a possibility I would deep dive back through the notes and text to try and find what piece of the puzzle I was missing. In conjunction with that for completing the whole test I would ideally only have to do school and nothing else allowing myself to solely focus on just the tasks at hand or place myself in a career that was not as intensive as my current one that allowed for more time to study and do schoolwork. The entire group of chapters that were taught this section were all new concepts that I learned. These concepts would be something that the engineers that design the fluid systems used in the nuclear reactors I currently oversee would have to know and use so that all the losses within the system are known, the pump requirements to determine the amount of flow through the system are known, and just how much room we must operate on either side should a failure occur. For my current career path, the knowledge of what all is occurring will help me in the fact that it will provide me with a better understanding of how the system works internally. I could implement this knowledge when we do flow rate verifications to determine if the installed orifices and all other piping performs as it does in the ideal computer program used to design all of the systems. With where we are currently in construction I am unable to apply any of the current knowledge to anything that we are actively performing. I see this course's content intersecting with my career in that it will allow me to understand what the engineers under me are doing for each piece of the puzzle they are working on. For the exam I spent a total of 10 hours on the exam. This time was spent coming back and forth to the exam due to family needs and just due to mental exhaustion. As previously spoke upon I would allow myself the opportunity to not have any other responsibilities if I was to go through college again.