Test 2 Reflection

Test 2 showed me how much I have learned about fluid mechanics and how different concepts work together to solve engineering problems. The two problems required me to use conservation of mass, Bernoulli's equation, friction losses, minor losses, pipe losses(major), and pump calculations. These topics are directly related to several course objectives, especially analyzing fluid flow in pipes, calculating energy losses, and understanding how pumps are selected for a fluid system.

While working on the test, I realized that my biggest challenge was not the calculations themselves but organizing the information correctly. In the first problem, I initially had difficulty identifying and understanding where each pressure, velocity, and elevation term belonged in the Bernoulli equation. I also spent extra time determining the correct minor-loss coefficients for the fittings and valve. After reviewing my notes and working through the problem step by step, I was able to understand how each component contributed to the total energy loss in the system.

The second problem helped me better understand how engineers design real systems. I learned how to determine the required flow rate from the desired water height, select a pipe size using a velocity criterion, calculate friction losses, and estimate pump power requirements. One mistake I made during the process was assuming values before carefully checking the problem requirements. Looking back, I should have spent more time planning my solution and identifying all assumptions before starting calculations.

If I were taking this test again, I would first create a clear diagram, identify all known and unknown variables, and list the equations I plan to use before beginning any calculations. This would help me avoid confusion and reduce errors.

I believe my work demonstrates a good understanding of the course material. My strengths were applying continuity and Bernoulli's equation, organizing calculations, and understanding the physical meaning behind the results. My weakness was occasionally overlooking small details such as fitting losses or assumptions that affected later calculations.

One of the most valuable things I learned was how energy losses affect the performance of a fluid system. Engineers use these concepts when designing water distribution systems, drainage systems, cooling systems, pumps, and industrial piping networks. Understanding these concepts is important because they help ensure systems operate safely and efficiently.

As a locomotive technician, I can relate many of these concepts to the systems I encounter at work. Locomotives use fluids for cooling, lubrication, fuel delivery, and air systems. Understanding pressure losses, flow rates, and pump performance helps me better understand how these systems function and how problems can develop. I understood the concept of fluid mechanics now better than in test 1.

I spent several hours working through the test, reviewing lecture notes, and checking my calculations. Most of my time was spent making sure I understood the problem setup rather than performing the calculations themselves. If I could do it again, I would spend more time reviewing the theory beforehand and less time troubleshooting mistakes during the test.

PROBLEM 1)

1. Correct application of 2 Bernoulli's + Conservation of mass? 3/12
2. Were all minor losses handled? 2/12
3. Have the equations worked out with numbers? 1/12
4. Was there an iterative procedure to solve system of eqs? 3/12
5. Was the velocity criterion checked? 1/12
6. Are the results correct? 0/12

TOTAL **10/12**

PROBLEM 2)

1. Used Bernoulli's to determine velocity to then compute Q? 2/12
2. Was the pipe sized using velocity criterion? 2/12
3. Was the pump head computed from Bernoulli's eq? 1/12
4. Were ALL energy losses included? 3/12
5. Was the annulus energy loss handled with hydraulic diam? 0/12
6. Was the pump power computed? 1/12
7. Are the results correct? 0/12

TOTAL **9/12**

(90/2) *(11/12 + 9/12) = 71.25

Overall, this test helped me strengthen my problem-solving skills and improve my confidence in applying fluid mechanics principles. It showed me that engineering problems often require patience, careful planning, and attention to detail. The knowledge and skills gained from this course will be useful in future engineering courses, at work, and throughout my engineering career.