Test 3 Reflection

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MET 330

After completing the third test I am showing that I continue to learn the concepts of Fluid Dynamics and still growing on how I can locate information that I am confused on within the provided documents/video via canvas that the professor has provided. This test allowed me to demonstrate figuring minor losses, forces on the system due to pressures inside the pipe, determining HP, Efficiency, Pump Size, and impeller size.

When comparing tests our answers were very close to each other for the most part. In section ai your answer was hA = 141.287 ft and horsepower were 90.49 HP. Our calculated values were hA = 142.02 ft and 90.96 HP. In section aii your answers were hA = 249.992 ft and horsepower 240.16 HP while ours was hA = 251.687 and 241.81 HP. In section aiii our new steel pipe size requirements were the same size. For section A our answers only differed due to rounding with every answer being within 1% of each other.

In section B for Rx, you had 2,758381 lb and we had 2380.2 lb. The most notable difference is how you found your solution and the distance you chose to use. We used 30 feet, and you chose 38 feet. In the Y direction our answers came out to be the same as 54,163.2 lb.

Looking at section C, our Ns answers were a little different. This was due to different numbers being used in the equation. You used 3600 rpms where we used 3550 rpms. Your H was also different as you used 141.29 feet, and we used 142.022 feet. The Ns answer was less than 4000 so we picked a radial pump as seen by the blue line in our chart. You picked a 7.3-inch impeller, and we chose a 7.2-inch impeller, we had an efficiency of 78% and you chose 77.7%, we chose 69 HP, and you chose 70 HP. Our pump sizes were both the same at 6x6x7.5. The differences here are due to reading the charts and assuming that are slightly different from each other. When figuring the pump weight, I forgot to add the actual pump weight to the base. Instead, I simply included the base weight. The total weight should have been 1,452 pounds. The efficiency was above the needed 60% at 78%.

1.

<u>Pipeline redesign</u>

i. Recalculate the new pump power including minor losses 1/8 out of 1/8

   a. Use Bernoulli's to get ha (ref & points in pict.) - YES
   b. Include all minor losses - YES
   c. Correct results - YES

ii. Increase of pump power with new required flow rate 3/8 out of 3/8

   a. Recalculate velocity - YES
   b. Included all minor losses? - YES
   c. Correct results - YES

iii. New pipe diameter with same original pump 4/8 out of 4/8

   a. Included all minor losses? - YES
   b. Wrote full equation with diameter as unknown - YES
   c. Iteration process - YES
   d. Correct results - YES

2. <u>Pipe-elbow forces</u>

i. Correct control volume and points - YES 1/8 out of 1/8

ii. Free body diagram and correct forces - YES 1/8 out of 1/8

iii. Force in x – solve for Rx (need to use Bernoulli's) - YES 3/8 out of 3/8

iv. Force in y (weight) – solve for Ry - YES 2/8 out of 2/8

v. Correct results – Partially .75/8 out of 1/8

3. <u>Pump preselection</u>

i. Why kinetic pump? Why radial pump? - YES 1/6 out of 1/6

ii. Use pump map? - YES 1/6 out of 1/6

iii. Draw desired operating point in pump curves - YES 1/6 out of 1/6

iv. Pump suction, discharge size, and impeller sizes - YES 1/6 out of 1/6

v. Pump power, efficiency, size, and weight - YES .75/6 out of 1/6

vi. Correct results - YES 1/6 out of 1/6

GRADE:

(90/2)*(8/8) + (90/4)*(7.75/8 + 5.75/6) = 88.73

During the test I had trouble figuring out what from test two should be used and when a lot of the times. It became confusing until an email was sent out clarifying a lot of the questions. The others I reached out to you for clarification or guidance. To complete the test, I did a lot of module review, lecture review, and reaching out for clarification. I worked separately from my partner and then we reviewed answers and talked about how/why we arrived at the answers we did and decided which to go with. I learned how to select a pump, the forces acting on a system and why it's important to know and how to account for minor losses inside the system. Engineers use these concepts when designing systems such a fire suppression system inside of a building, when pumping oil for thousands of miles up and down different types of terrain and when design a water-cooled engine. I don't think I will be using what I learned anytime soon but there is a possibility in the future should I move to the mechanical engineering industry. I was able to apply what I learned in the labs class but so far that is the only place I have used them. The most successful area I had was pump selection and the biggest improvement was with the moments and forces as that is something I have always had trouble with. Currently this course does not intersect with my career or field but who knows what the future might hold. I spent roughly 10 hours total working through it. Many breaks and lots of review to help get a better understanding of some of the topics. Time was mostly spent trying to find where sections were covered and reviewing those before attempting to solve. If issues arrived, then more review was needed. It was also sporadic as I could only sit for a couple of hours at a time due to work and kids. I'd get rid of the kids and quit work so I could focus without interruption! Just kidding of course. Maybe some better notes

with dates and times of when topics were covered so it's easier to find the topics for review.