MET 330 Project

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Description:

- The system needed 3 tanks. A clean coolant tank, a reservoir tank, and a dirty coolant tank.

- It needed a pipe system to be able to transfer the coolant to each tank.

- The system as whole needed to be checked for various situations to ensure that it could withstand any problems.

Tasks I completed:

- Wall thickness of storage tanks
- Pipe wall thickness
- Open channel in case of failure
- Required instruments
- Evaluate NPSH
- Write up the report

Wall thickness of storage tanks

For this task, I had to specify the tank material and calculate the wall thickness by finding the pressure of each tank then finding the thickness by using the wall thickness equation.

Pipe wall thickness

For this task, I had to specify the thickness of the pipes in the system. I first used Bernoulli's equation to find the pressure in the pipes and calculated for the thickness of the pipes by using the wall thickness equation.

Open channel in case of failure

For this task, I took into consideration that a storage tank could fail. To prepare for the failure, an open channel was designed to be able to safely remove the coolant from the facility. I did this by using the given flow rate to calculate the necessary area of the channel, then using the area, I was able to solve for the base and height of the channel.

Required instruments

- For this task, I needed to specify what instrument we would want to use to measure the flow and calculate the drop in pressure across the instrument. I ended up choosing a flow nozzle. To calculate the change in pressure, I had to manipulate Bernoulli's equation. I calculated the necessary values such as Reynolds number, the diameter ratio, and the discharge coefficient. Once they were found I was able to calculate the drop in pressure.

Evaluate NPSH

For this task, I had to evaluate the net positive suction head available and verify the system against cavitation. I did this by manipulating Bernoulli's equation to be able to find $NPSH_A$ and then solve. I compared the $NPSH_A$ versus NPSH required and found the system did not cavitate.

Write up the report

Once all of the tasks were complete, I added and organized the report to make it clear and concise. I also wrote in any additional information that was needed.

Below is the full project report that goes into detail about how each task was done.