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Ruben Ghijsen's Individual Contribution Page

Fall 2013 Contributions

This semester I am working on the Ram Pump team to build a ramp pump for the water treatment plant in Honduras that can move filtered water to the chemical stock tanks at the top of the treatment plant. Our challenge is to figure out what drive is needed for this pump to be able to move the water and how we can move the water in an efficient manner. Our goal is to have the ramp pump finished before January so that it can be used right away at the treatment plant in Honduras.

Over the course of this semester, the team and I have ran numerous experiments and collected data to see which AguaClara ram pump model would achieve the highest delivery flow rate. The team and I wanted to improve upon the AguaClara model from the previous semester and optimize it to achieve the goal.

The team and I modified the design from the previous semester by changing the spring check valve to a swing check valve, adding weights and springs to the waste valve, and by increasing the diameter of the drive pipe. In order to test the delivery flow rate of the AguaClara model, I helped to design a head loss system that would, through using easy data, could create 7.0 meters of head loss and measure the vertical height that the water travelled. The system was designed out of PVC pipes and therefore the head loss could be easily varied. I also helped to create a system where the water would cycle continuously and no water would be lost during our experiment.

In order to further see how the flow rate could be improved the team and I wanted to compare our model to that of a commercial ram pump. I helped to design a system where no water would be lost from the commercial ram pump because the waste valve placed the water on the floor in its surroundings. Therefore, the team and I placed the commercial ram pump into a Sterillite bucket and drilled holes for the drive pipe, the waste water pipe, and the delivery pipe and the commercial ram pump was able to run continuously.

The team and I then took the data that was obtained from the commercial ram pump and applied that to a new AguaClara model that would resemble the commercial ram pump. The new AguaClara model was also placed into the Sterillite container and again no water was lost throughout the experiment. In creating this model, I helped to completely rearrange the order of the parts and to build a new rack that would hold the air chamber in the correct position.

After having completed the experiments, the team and I collected data and found that the first AguaClara model with the spring check valve performed better than the model with the swing check valve because a higher delivery flow rate was obtained at the same head loss value. The commercial ram pump delivered the highest delivery flow rate, but the second AguaClara model, which resembled the commercial ram pump, gave the lowest delivery flow rate and will be improved upon in the spring.

Throughout the semester I have been involved in helping build the setups of the AguaClara ram pump models, collecting data, designing new systems in order to improve the delivery flow rate. I have enjoyed working alongside my teammates and together we have come up with a design that can be used in water treatment plants in Honduras.