GNG 1103

Engineering Design

Deliverable H

# Introduction

The reason we are doing this test is because we want to implement the suggestions made by our client, and to make a comprehensive model of how our design will work. The general objective is to gage the capabilities of the design.

# Test Objectives Description

The test objectives are to see how well the water flows through the actual system and how the estimated refill time compares to the actual time required for refills. We also want to see how we can reduce the number of leaks in the prototype.

With this prototype, we are going to see how the flow rate compares to the flow rate that we deemed to be ideal. We will also get a better idea of where leaks are most likely to occur, how much water the system can hold, and the workload the users will have to deal with when they’re operating the system.

The types of results we can obtain are either ideal, partially successful, or unacceptable. Partially successful means that the result is functional but produces a result that should be better. Having an ideal result would mean that the prototype is functional and it meets or exceeds most or all the criteria that we set. Having an unacceptable result would mean that the outcome of the prototype did not meet enough criteria to be deemed acceptable.

The results will impact aspects such as flow rate, amount of plants that can be grown, and composition of the design.

Success for the prototype means that a way to get the ideal flow rate is found, no leaks, and the ideal tap position is also found. Failure means that there is no way for the ideal flow rate to be achieved, and leaks being present in the design.

# How it’s being done

This is a comprehensive prototype. The reason for this being a comprehensive prototype is that we want to see how well the general operation of the design will work.

The testing process is as follows:

With the taps in the off position, water will be placed in the reservoirs until the water level is 5 cm from the top of the reservoir. The tester(s) will then check for leaks in the prototype.

Both taps will be switched to an on position to what looks like a steady flow rate for the user. When the bucket at the bottom of the system is filled to a satisfactory level, both taps will be switched to the off position and the contents of the bucket will be unloaded into the top reservoir.

Take note of any leaks and water levels of each reservoir.

We are measuring flow rate and time it takes for a bucket to be filled. We will measure the maximum amount of water that could be wasted if the taps are left in the on position.

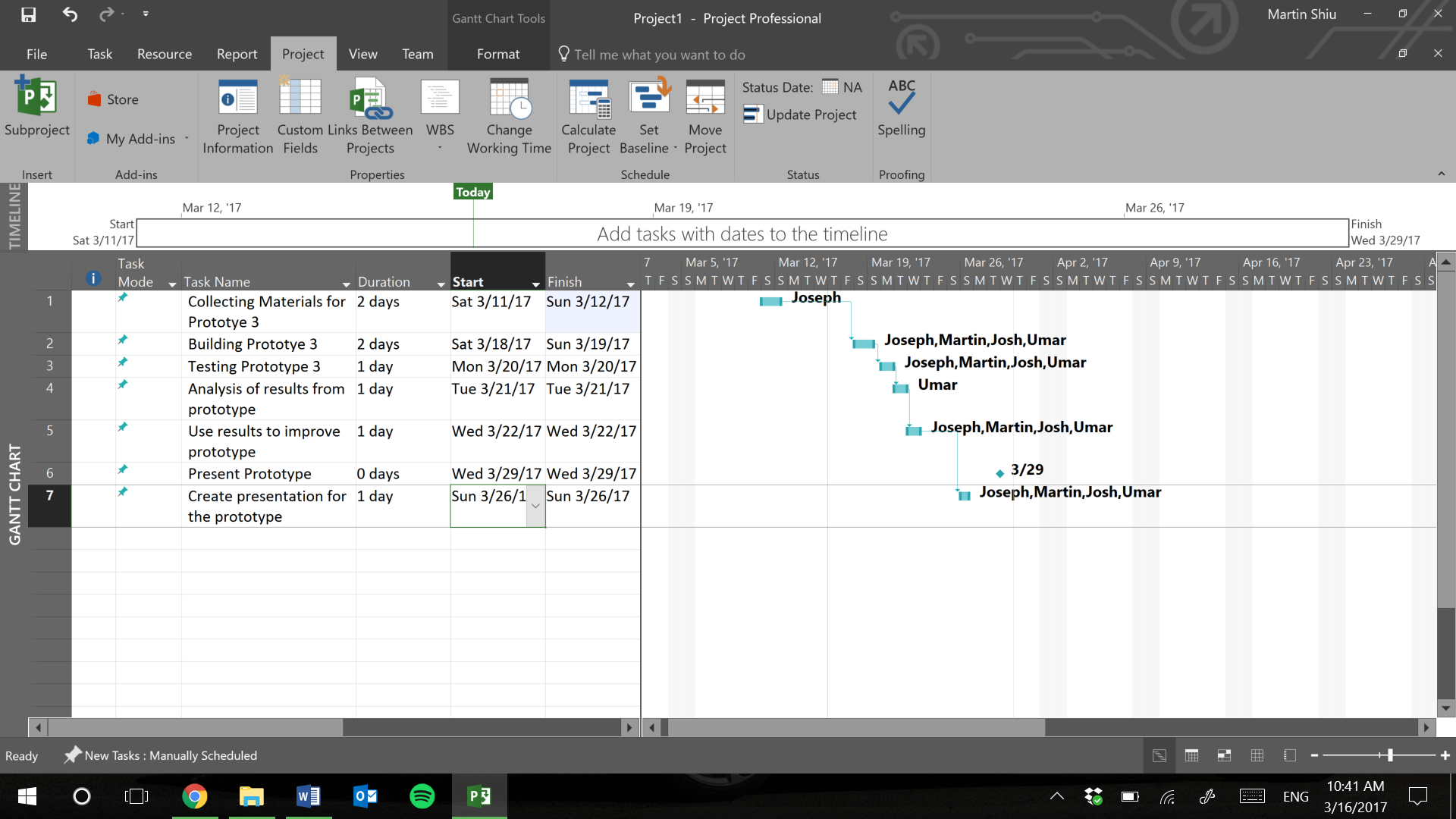
In order to measure the observations above, we have to observe them by recording the volume of water that will go into the bucket, and the time it takes to fill the bucket to that level. To get flow rate, we will divide the volume of water in the bucket by the time required to fill it. We are also going to make any observations we can on leaks by taking note of the leak’s severity and location.

The cost of our hydroponic system can be split into many sections, first of which is the cost of material and labour to manufacture it, this worked out to be about $297 CAD. $275 of that being materials purchased at wholesale pricing, and the other $22 being labour and expenses on tools. We have decided to build the hydroponic system in poland. The reason for this being that the labour rates are very competitive at $8 an hour, and we already have contacts in place to obtain a 4000 square foot building along with the materials required at the best possible price. The final sale price of the prototype would be $763 delivered to the refugees, although this number may seem high from the original cost shipping and overhead costs are taken into account at well as a $420 per unit. We also came up with a baseline requirement of an order of 300 units to go into production, any less and it is not feasible.

The comprehensive model has to be built. We also need a way to measure the amount of water in the system.

# When it is Happening

The test will take about half of a day. The test time is dependent on the comprehensive model’s availability, and how long it will take to put the appropriate amount of water in the system. However, we also must ensure that the model is structurally stable before we put the water in.



The results are needed by the 28th of March, 2017.

# Conclusion

With the completion of prototype 3 we successfully created a fully functional product with room for improvement and tweaks. Once the prototype was completed we were able to determine how far we have to turn the taps in order to create the flow rate which was determined previously. Wee visually checked the whole prototype for possible points of failure in case anything was overlooked in the previous iterations. The major concern in this step was finding a leak or a point where a leak was possible. After this check it was determined that the valves and screws were somewhat likely to leak overtime and this was solved by applying a generous amount of silicon caulking as another water barrier.

