Deliverable F- Prototype I and Customer Feedback

GNG 1103 - Engineering Design

Faculty of Engineering – University of Ottawa

Team 7 Puwen Yang (7663593) Herb Chao (7764038) Evan Chan (8263808) Sara Godon (300086897) Jason Sanghun Lee (300035841) Zhaoqi Gu (300065341)

Introduction

Our team has been tasked to design and develop a greenhouse to grow vegetables year round for an aboriginal community in Le Domaine off of Barriere Lake. We have defined the problem and have made a design that is ready to be constructed. However we must first construct a prototype as a proof of concept for the greenhouse. A low cost Prototype 1 has been constructed to test if the general design is adequate and if improvements are needed. Explanation below details the steps and measure we have take to ensure proper testing was conducted on a smaller scale of our actual greenhouse.

Prototype 1

Prototype 1 is designed from popsicle sticks to construct the general design of the greenhouse. The pieces were broken down on a smaller scale in order to represent the actual design as much as possible. The structure is held together by glue. Additionally, the blocks on four of the corners were used by paper box and the roof is covered with thin layer of plastic.



Prototype Test Plan

What:

In order to test our design and establish further confirmation on the overall structure, we have constructed a Prototype 1 using popsicle sticks bought from the dollar store and put together by glue. This prototype is on a much smaller scale than our final product and we want to construct this miniature house in order help us better visualize and get a rough idea what the structure would look like. This is the first step of building after we drawed up our rough sketch on the tablet and we were very pleased with the way it turned out.



Why:

One of the most important features we want to test was the slanted roof design. The slanted roof design is to ensure snow slide off the roof instead of staying and covering the ceiling. During construction, we did an angle equation with respect to the frame of the structure to make sure the angle was properly calculated. To ensure that the angle of the roof is sloped far enough, we simulated it with water as well as some ice that builds up in our kitchen fridge.

They were then dropped on the slanted roof to test if the angle of the roof was effective. Our result validates the angle of the greenhouse roof to be adequate to be resistant to snow accumulating on the roof.





When:

This initial prototype was built just before we physically started building our actual structure in the structure lab. The timing is perfect since we now have a general idea of what the overall physical structure looks like before actually starting to construct the greenhouse on a bigger scale.

Stopping Criteria:

To be fully satisfied with the results and make sure the slanted roof fully functions to the best of its capabilities, we simultaneously started by testing the ice and water at different angle on the structure. Once we have visually seen that the liquid flows easily down the angled roof, we can conclude on testing was successful and note down the angles and glue the roof permanent with the rest of the greenhouse.

Feedback

From the last customer feedback, we were able to show Monique the design on the tablet and ask for her opinion. Her constructive feedback guided us to make further adjustment to our roof and the overall structure by adding in vents as well as other smaller components. Due to the time frame of this deliverable, and the difficulty to reach out to her in the reserves, we turned to our TAs during the lab session to get a feedback on the popsicle stick prototype. Both the TAs were very happy with our first prototype and they give a very positive feedback telling us it was very creative and done very similarly to the drawing we had on our tablet. Furthermore, when we brought up the testing method to use liquid in order to test the roof, they approve of the testing method.

Conclusion

Overall, we were very pleased and happy with the mini greenhouse prototype and all the positive feedback we have received from our team members as well the TAs. By following the steps and method learned in class, we have followed a constructive plan to initiate this design and transferring it into an actual physical prototype. Using the prototype testing method helped validate our questions and confirm our measurements. Initiating a stopping criteria helped us to save time and know when to stop when our target was reached. The whole team feels more confident with this design and is excited to move into the building the larger scale of the greenhouse.