Project Deliverable G:
Prototype II and Customer Feedback

GNG 1103 - Engineering Design

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Faculty of Engineering
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Why are we doing this test?

*This is an introduction. Capture the reasons for the test, giving enough background information to justify doing **any** prototyping at all. Is the **general** objective one of: learning, communication, de-risking, etc.*

Similar to the first prototype in Deliverable F, the second prototype is made to validate our hydroponics system, but this time, the design is closer to the final product. While the first prototype is more of a small scale model, the second prototype will represent parts of the actual system, including, but not limited to: the water piping, the frame, the water pump.

Test Objectives Description

*What are the **specific** test objectives?*

The objective of this next test is to determine if the water pump system works well with our design. We want to find out if the water pressure is sufficient and if the splitter works properly. Since from the last prototype we learned that our design is sufficient we can now get more specific with the subsystems.

*What **exactly** is being learned or communicated with the prototype?*

If the pump can efficiently deliver water the proper distance that we need. We also would like to know if the splitter will work or if a second pump is needed in order to get water to both sides of the system. From the last deliverable we learned that the clients liked our design and believed that it could meet their needs.

What are the possible types of result?

One possible result that is the one we are hoping for is that the single water pump delivers enough water through the tubes and the splitter works properly without leaking. Another result is that the pump does not have sufficient flow through the tubes and not enough water would get up to the plants. Also, the splitter for the tubes may not work or even leak. Our last prototype determined that our design did not need to change very much and is possible to implement by the final deadline.

How will these results be used to make decisions or select concepts?

These results may tell us that our current system works well and that nothing needs to be changed. We may also need to find a new splitter or maybe buy smaller tubes to increase the flow. Our last option which is not desirable is that a second pump must be bought.

What are the criteria for test success or failure?

The criteria for success is that the pump can run for 30-60 minutes without leaking while still delivering enough water through the splitter and out the tubes. Criteria for failure is that the pump/tubes leak at some point or the pump is unable to flow enough water out the tubes.

What is going on and how is it being done?

*Describe the prototype **type** (e.g. focused or comprehensive) and the reason for the selection of this type of prototype.*

This prototype is a working model, it is focused. The focus is on the water circulation system for our hydroponics system. It was decided that without this system working properly, the rest of the model would be pointless, this is why it was chosen to be designed.

Describe the testing process in enough detail to allow someone else to build and test the prototype instead of you.

For the building of this prototype, you would need 20 feet of clear half inch diameter tubing, 2 brass T-splitters to split the tubing, and a water pump. Cut the tubing into a 4½ foot length, as well as 2 smaller 3 feet sections. Connect the 4½ foot section to the pump and the T-splitter, and connect the 2, 3 foot tubes to either side of the T-splitter. Fully submerge the pump under water and plug it in.

*What information is being **measured**?*

We are measuring the water pump and its ability to pump water 4 feet high, as well as provide water to the system.

*What is being observed and how is it being **recorded**?*

The pumps ability to pump water to the required height of 4 feet, while pumping a great enough volume, as well as doing it with minimal leakage of water to the surrounding areas.

What materials are required and what is the approximate estimated cost?

A 20 foot, clear, half-inch tubing, a water pump, 2 T-Splitters. Approximate estimated cost $40

What work (e.g. test software or construction or modeling work or research) needs to be done?

Assembly of these pieces will be required, the lengths of tubing must be cut properly and attached in the required layout.

When is it happening?

*How long will the test take and what are the **dependencies** (i.e. what needs to happen before the testing can occur)?*

The length of testing will all depend on the amount of water being pumped, and the settings of the pump (ie… if it is on high/low flow). On max flow, the pump can pump 400 gallons of water per hour.

When are the results required (i.e. what depends on the results of this test in the project plan)?

These results will be needed before we can go on with the creation of the rest of the project. This is because if this critical system doesn't work, we will have to find some sort of alternative for the project, rendering all other steps pointless.