

***Deliverable F***  
***Dream Team***  
***(Group 8)***  
***GNG 1103 deliverable***

**Prototype 1 and Feedback**

**Abstract**

The goal of this prototype is to create a small scale concept of what the final prototype is going to look like and how it is going to function. The prototype is also going to be used to determine if the slurry mixture will circulate properly with the impeller or if modifications are needed to make it circulate properly. Additionally, the splash zone and other areas where water can leak as well as other factors like impeller being too fast and pushing all the water away and water pressure on the walls will be tested to find and fix those flaws for prototype 2.

**Basic concept**

Prototype 1 is designed to represent how the overall impeller system is going to function. Due to the time constraint and lack of resources, the prototype is very bare bones and is meant to only give a rough visual image. The tupperware container is representing the container that the prototype is going to be measured in. It will be filled with water, a slurry mixture consisting of water and sand, and salt water to measure corrosion as well as erosion on metal components. The fidget spinner represents the impeller which is the sample and also used to circulate the water and slurry mixture. Since we could not get access to a motor, prototype 1 is hand powered and a pen is attached to the fidget spinner to represent the motor and a metal rod spinning the impeller. Other aspects like the thermometer and scale were not included due to the budget and time constraint.

**Prototype pictures**







## **Feedback**

Due to the time constraint, we could not get in contact with actual users for feedback that would be using the erosion test system. The feedback that we got is through friends that have or are taking the course and parents that are in a field which works with the actual users who have a general idea of how the system should work.

### **Feedback 1:**

A lid can be added to prevent water from spilling. It would also be better if the container is narrower and deeper.

### **Feedback 2:**

Using a propeller and a stick instead of a pen and fidget spinner would be better. A Dollarama motor would also give a better vision of the concept and be useful for other aspects such as rpm.

### **Feedback 3:**

Make sure that the size of the tank is not too large for the load of the propeller, keeping the system small and efficient will maximize your results.

### **Feedback 4:**

The idea is great and conservative for a first prototype as it portrays the use and how the device would be used. One thing is to make sure the spinner spins enough to showcase the work as it would be hand powered. A cover with a hole for the pen to pass through would also be great as that would keep the fidget spinner in place and protect from splashes.

## **Updated BOM**

### **[Prototype 1.xlsx](#)**

Due to the parts chosen being sold out and/or no longer available as well as the time constraint, prototype 1 had to undergo drastic changes and was constructed using materials found around the house and the focus was shifted to measure the overall design as well as providing a visual concept of what the final prototype is going to function like.

## **Test Plan**

Test ID	Objective	Description	Results	When
1	Test the ability of a propeller underwater	This test will involve testing a fan system in a low-fidelity model of our system.	A propeller would be very useful underwater but for it to be functional, the container needs to be narrow and tall and the propeller	March 1st, 2024

			needs to be closer to the bottom	
2	Look for Flaws	This test is simple, we will be looking for any holes in our early design and will be making sure the system is feasible with our given materials.	Having a lid and higher walls would keep the water splashes from coming out. Having tape and glue to keep the edges airtight is also crucial to keep all the water inside the container.	March 1st, 2024

## What to modify for next prototype

- Adding a lid
- Container should be smaller for better circulation
- Deeper container to keep water splashing low
- Propeller near the bottom rather than the top

## Next Prototype

As laid out in Deliverable E, the second prototype will be a medium fidelity model that will require the following materials,

Prototype 2:

- Bucket
- Arduino Motor
- ~5cm diameter 3d printed impeller
- Arduino UNO board
- Arduino software
- Thermometer
- Filtration System
- Salt
- Sand
- Water
- Laptop
- Duct tape
- Glue
- Breadboard

This will let the group commence the following plans,

Test ID	Objective	Description	Results	When
1	Continued testing of the	This test will be to make	N/A	March 8th,

	propeller and motor	sure the propeller system established in the first prototype continues to work in the higher-fidelity system		2024
2	Water Testing	This test will help the group decide what type of water to use in the final system. With that being a slurry mix, saltwater, or mineral water	N/A	March 8th, 2024
3	Secondary Testing	This will be testing done on the smaller aspects of the design. Testing aspects like the thermometer, the filter, and the scale.	N/A	March 8th, 2024
4	Look for Flaws	This will just simply be looking for any flaws in the system, and making an effort to revert these flaws.	N/A	March 8th, 2024