Team A22

Deliverable C - Design Criteria and Target Specifications

Engineering Design - GNG1103

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ABSTRACT

This report's objective was to establish design criteria for the clients requirements covered in deliverable B. The criteria will be split into three parts: functional criteria, non-functional criteria, as well as constraints. Furthermore, benchmarking will be performed on similar cleaning products to define target expectations. It was determined that the basis of a dishwasher held closest to the design criteria, and thus will be utilized as the main inspiration during the development of our cleaning method.

1. Introduction

In the previous deliverable, it was stated that Greener Hydroponics requires a method of efficiently cleaning their polyurethane trays. The objective of this deliverable is to define the design criteria of our cleaning method, utilizing the previously discussed needs of the client from the last deliverable. The design criteria is split into functional, non-functional, and design constraints. Following that, the criteria will then be applied to similar cleaning products to define target specifications.

The table shown below (Table 1) is a summary of the client's requirements rated by their overall importance shown off in deliverable B.

Number	Needs of client	Level of Importance
1	Time Efficient for Staff	★★★★★
2	Ease of Use	★★★★★
3	Cleaning Effectiveness	★★★★
4	Cost	★★★
5	Space Taken	★★
6	Time Efficient Process	★★

Table 1. Table of Clients Needs

2. Design Criteria

During the meeting with Greener's representative, they outlined several important elements that should be included in the design of the solution to their algae growth problem. Detailed in the table below are some of the most important factors that are going to be considered in the development of the product for Greener Hydroponics. As previously mentioned in Deliverable B, key areas of focus are reducing the time burden on staff, making the process more automated, keeping the size of the product relatively compact, & ensuring that the product is simple to operate.

Number	Needs of Client	Design Criteria
1	Time Efficient for Staff	Reduces manual labor time for cleaning boards from 6-8 hours to 3-4
2	Ease of Use	Limited training(less than 1 hour), Low complexity while operating, Quick set up time (Less than 10 minutes)
3	Cleaning Effectiveness	Can remove algae growth so that build up is not visible
4	Cost	Ideally a low cost, however time saved is worth more than the cost of the product
5	Space Taken	Fits in given wall mount or table mount area (48"x 72" for table & 36" x 24 for Wall) allotment
6	Time Efficient Process	Cleaning process is automated or semi automated to reduce human involvement

Table 2. Interpretation of Client Needs as Design Criteria

3. Benchmarking

While looking into comparable products to our solution, we found three products that could also be used to clean the polyurethane boards. We ended up choosing these three products based on the variety in their methods. The three chosen items were a pressure washer, a dishwasher, and a manual brush. After benchmarking all options, we have concluded that the dishwasher should be our main inspiration in designing our method. Because of this, we will mainly be comparing our method to dishwashers, and furthermore use the design criteria of the other options to build our solution to the problem.

	Devices of Comparison		
Design Specifications	**Pressure Washer**	**Dishwasher**	**Manual Brushing**
Automation	No	Yes	No
Manual Time Required / Automation	High	Very Low (Automated)	High
Cleaning Effectiveness	High	Very High	Very Low
Cost	$$$	$$$$$	$
Space Taken	Medium	Large	Minimal
Ease of Use	High	Very High	High

Table 4. Benchmarking Perceived Value of Design Criteria for Comparable Products

	Devices of Comparison			
Design Specifications	**Importance**	**Pressure Washer**	**Dishwasher**	**Manual Brushing**
Time Efficient Process	2	2	3	1
Manual Time Required / Automation	5	3	5	1
Cleaning Effectiveness	3	4	4	5
Cost	3	3	1	5
Space Taken	2	4	3	5
Ease of Use	5	3	5	1
Total Score		**63**	**77**	**52**

Table 5. Comparative Product Evaluation Using Design Criteria

4. Conclusion

Through benchmarking, we have determined that the device best suited for cleaning algae off of the polyurethane boards would be most similar to a dishwasher. The dishwasher scored a total of 77 points, and thus will be the main inspiration used in the development of our cleaning method.

5. References

Dishwashers:

- https://www.homehardware.ca/en/24-stainless-steel-built-in-dishwasher/p/3719059#ccode=7924
- https://www.samsung.com/ca/dishwashers/all-dishwashers/?linear-wash

Washing Machines

- https://www.bestbuy.ca/en-ca/product/samsung-5-2-cu-ft-high-efficiency-front-load-washer-wf45r6100ap-us-platinum/14400383?source=category&asSlot=1
- https://www.bestbuy.ca/en-ca/product/samsung-5-3-cu-ft-high-efficiency-front-load-steam-washer-wf46bg6500avus-black-stainless-steel/16250757

Pressure washers

- https://www.lowes.ca/product/electric-pressure-washers/bosch-electric-high-pressure-washer-154-gpm-green-330658625
- https://www.lowes.ca/product/electric-pressure-washers/kobalt-1700-psi-pressure-washer1704-1-1065809