Team: A10
Team members: Zong Yu He, Huanyu Liu, Danny Ho
Clients: Growcer Inc.
Customers: Growcer Inc.
Users: Farmers

User Statements

1. A large amount of labor is directed to cleaning the boards after each growing cycle.
2. As the boards sit in the water algae starts to build up on the surfaces of the board, and bacteria builds on the roots if they are not properly cleaned.
3. Currently customers clean the raft by hand using scrubbing brushes and the hose.
4. 6-8 hours of the 30 hours a week is spent cleaning boards.
5. The boards weigh around 2 pounds, the size is 32 in x 24 in.
6. Important to note that boards are slippery when covered in algae.
7. There are 82 rafts in a facility, ¼ of them are cleaned every week.
8. They use drinking water mixed with pH-down and food nutrients to convince the plants that they're growing in dirt. It is also 20-21 degrees inside the unit that they are growing in.
9. Able to clean one of our multiple boards at a time automatically. Goal is to have workers start the cleaning process, then go off to do other tasks, then return when cleaning is done to restart the process.
10. Number one priority is easy use, cleanability, and 3rd is space (if you meet the space requirements, good. But if you can get a better or faster clean then that trumps it).
11. Able to clean all surfaces & contours of the board. Current degree of clean is: If you can't see any algae buildup on the boards, its clean (ie. Visual inspection).
12. Willing to increase budget and needs to be durable - 5 years for a max of boards before being replaced.
13. Wall Mounted (48 in Width x 72 inch Height) or Table top (30 in width x 96 in Length) solution given limited floor space available.
14. Unit must be Operator Safe (pinches sharp edges etc.)

Interpreted Needs

1. Reducing the amount of labor means reducing the time spent on cleaning.
2. Clean the algae on the boards properly (can't see any algae on the surfaces & contours of the board).
3. A method/machine can automatically clean the boards while workers can do other tasks.
4. Clean one or multiple boards at a time.
5. The cleaning machine/method needs to be handy in a way that it can take care of difficult situations like if the algae is slippery and/or it sticks to the board, etc.
6. Need to clean more than 20 boards a week.
7. Cleaning under a 20-21 degree environment.
8. Easy and safe to use for farmers who are not familiar with technology.
9. Better to meet the space requirement (Wall Mounted (48 in Width x 72 inch Length) or Table top (30 in width x 96 in Height)).
10. Efficiency and cleanliness outweigh the requirements for space.
11. The method/machine should be affordable, but needs to be proficient and durable.

Importance (1 to 5, 5 is the most important)

5. a. The method/machine is safe to use.

b. Cleanability - needs to get rid of all the algae on the boards as possible.

c. Reducing time spent on cleaning.

4. a. The method/machine can automatically clean the boards while workers can do other tasks.

b. The method/machine needs to be able to clean multiple boards at once.

c. The method/machine needs can handle difficult situations (algaes hard to clean).

d. The method/machine needs to clean more than 20 boards a week.

3. a. The method/machine is easy to manipulate for people who are not familiar with technology.

b. Meet the space requirement (Wall Mounted (48 in Width x 72 inch Length) or Table top (30 in width x 96 in Height))

c. Durability - should be used for at least five years before replacing.

2. a. Budget - still slightly important but cleanliness is most important

b. The method/machine works under a 20-21 degree environment.

Problem Statement

A need exists for hydroponic systems' farmers to safely and easily clean all the algaes on 21 plantable boards every week with a method/machine placed in limited space that can automatically clean multiple boards at once, handle difficult situations, and be replaced after 5 years.

Benchmark user perceptions of similar products

High-Pressure Washer

Advantages: Cheap(about $150 on Amazon), Environmental protection(Only use water), and effectively clean the algaes. Easy to use.

Disadvantages: There is a slim chance that the algae will be back. The high-pressure may cause damage to the surface of material which is not strong. Materials stay wet after the cleaning process. May need to use it manually.

Diswasher

Advantages: Can be used to the material which is not strong on its surface. Easy to use, and clean the plates automatically. Dishes are dry after the cleaning process, so they are prepared to be used immediately.

Disadvantages: Expansive (about $800 on Amazon), chemical residues may be present on the plates after wash. Not clean as the High-Pressure Washer, but still removes all the greasy dirt at most times. Take more time than the high-pressure washer.

New issues or needs

This project may require more budget. A $100 budget seems not enough. Before going to the next step the material data of the plantable board is necessary to know. Finally, the hours that the worker spends on farming is better to be told because users may not like to come back to the station repeatedly for cleaning the boards only.