GNG 1103 – Engineering Design Project Deliverable C

Design Criteria

Deliverable C

Group #12

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Introduction:
The hydroponic system our client requested must have a very specific design that must be catered to their needs and to do that we need a design. The way we will acquire this is by the design criteria in which the needs will be used to come up with design specifications.We will also use benchmarks for better reference. Our client emphasized on price, size, and branding. Our goal is to deliver these specifications to them and it will be done by pre planning using the design criteria below.

Importance(1-5, where 5 is most important)	**Customer Statement**	**Need**	**Design Criteria**
3	I don't want to pay too much.	The hydroponics system needs to be low cost	Use materials that are low priced with maximum efficiency.
5	I need it to fit inside an elevator	The system needs to have proper dimensions allowing it to be the right fit for the clients surroundings.(port able)	The system needs to be designed with a minimal collapsed volume ($inch^3$). To create a design with possible folding points and finding places to save space.
4	I need it to be easier to reach the higher heights of the hydroponics system	Adjustable height to allow anyone to be able to access the system	The bottom of the system needs adjustable legs to a maximum and minimum height (dependent on children heights). Also will need wheels on the legs.
5	The plants die to dehydration over a long break.	The reservoir system needs to be automated or have more capacity	The reservoir needs a higher volume to hold more cubic feet of water.
3	The plants die when the janitor suddenly shut off the hydroponics system.	The hydroponics system needs a fail-safe that can detect when it is suddenly shut off.	The system needs an alarm for when it is suddenly shut off. Or there is a backup energy source for sudden shutoffs.
5	The hydroponics system needs space	There needs to be space for	The branding area should have multiple functions to maximise

	for sponsors/branding.	branding.	efficiency. Material should not be added just to add branding space.
3	The plants had a pest infestation.	The hydroponics system needs to be easily accessible for cleaning.	The shelves of the hydroponics system needs to be easy to remove to clean the plants.
5	The hydroponics system needs a high vegetation yield.	The plant spacing could be more compact and efficient.	The design should allow a higher density for plants. To find spaces where plants could be planted.

Benchmarks

Specifications	School Ziprack system	Hydro Grow Room Deluxe Complete System	HydroCycle 4'8" Vertical Mini Aeroponic System
Company	Zipgrow	Viagrow	FarmTek 
Cost	$2,999.00	$2,193.90	$2,879.00
Size	Eight, 8 ft 5’ tall growing towers (Estimated 8 ft 5’ L x 1 ft. W) (~70.84 cubic ft.)	4 ft. L x 8 ft. W x 7 ft. H (224 cubic ft.)	8 ft. L x 2 ft. 5.5’ W x 6 ft 3’ H (122.9 cubic ft.)
Weight	349 lbs	Not specified	179.93 lbs
Plant Density	0.90 plants per cubic feet	0.14 plants per cubic feet	0.98 plants per cubic feet
Reservoir Capacity	Not specified	80 gallons	100 gallons

Portability	Ziprack is on wheels with a rack system	Immobile room but with two trolleys	Immobile pillar but could be transported with trolley

Specifications	Importance	School Ziprack system	Hydro Grow Room Deluxe Complete System	HydroCycle 4'8" Vertical Mini Aeroponic System
Company		Zipgrow	Viagrow	FarmTek 
Cost	3	1	3	2
Size	5	3	1	2
Weight	5	2	1	3
Plant Density	5	2	1	3
Reservoir Capacity	5	1	2	3
Portability	5	3	1	2
Total		58	39	71

Functional / Non Functional Requirements

Design Specifications	**Relation (<.> or =)**	**Value**	**Units**	**Verification Methods**
Functional Requirements				
Easy to take apart (clean) (min)	<	10	min	Test(time it using a stopwatch)

Wheel System(Moveable)	=	yes	N/A	Test
Correct Water Level	=	Safe Water Level	m	Test
pH level	=	Safe pH level	pH	Test
High Yield	=	Most efficient time plants takes to grow(dependent of vegetable)	days	Test
Constraints				
Cost	</=	100	$	Final Check
Branding space does not cover plants	=	yes	N/A	Visual Check
Minimum Adjustable height	=	Average height of (8-12 year old)	m	Measurement
Size	<	Elevator size	m^3	Measurement
Non-Functional Requirements				
Reliability	=	Yes	N/A	Test
Product Life	= and or >	Life of Project	Years	Test
Space for Branding	=	Size needed for branding space (0.75x0.75)	m	Test

Specification:

Cost	$100
Size	8 ft. Length x 2 ft. 5.5’ W x 6 ft 3’ H
Weight	179.93 lbs
Plant Density	0.98 plants per cubic feet
Reservoir Capacity	100 gallons
Portability	Transported with wheels on pulley

Reflection:
This design criteria was largely shaped by the meeting with client. Their three main requests were that the hydroponics system: was small and portable, had a large and automated reservoir, and that the final product has a lot of free area for branding. We heavily focused out design criteria on these three main client needs. Additionally we took into account their other, less important needs (failsafe, easily cleanable, high vegetation yield, etc.) and provided some possible solutions for those. To address the need for a reservoir we prioritized a reservoir with a large volume. To address the need for portability we made it a priority that the system has wheels, is light and is able to be disassembled. To tackle the need for branding space we focused on solutions to provide branding space without sacrificing functionality, size, or portability. Other issues were discussed and given solutions as listed in the above table.

Works Cited

"School Ziprack System." *Zipgrow*, 2018, https://shop.brightagrotech.com/school-ziprack-system/.

"Viagrow 4 Ft. L X 8 Ft. W X 7 Ft. H Hydro Grow Room Deluxe Complete System-VHH4X8 - The Home Depot." *The Home Depot*, 2018, https://www.homedepot.com/p/Viagrow-4-ft-L-x-8-ft-W-x-7-ft-H-Hydro-Grow-Room-Deluxe-Complete-System-VHH4X8/300838094.

"Hydrocycle 4'8" Vertical Mini Aeroponic System." *Farmtek*, 2018, https://www.farmtek.com/farm/supplies/prod1;ft_ag_growing_supplies-ft_hydroponic_supplies-ft_lettuce_systems;pg113700_113701.html.