Project Deliverable C: **Design Criteria and Target Specifications**

GNG 1103 – Engineering Design

Faculty of Engineering – University of Ottawa

Ibrahim Sleiman (300251255)
John Kasabri (300287984)
Max Ripperyoung (300119899)
Ryan Musa (300233935)
Ricardo Feng Peng(300196548)

-2022-

Introduction

In this deliverable we are converting the needs we have outlined in the previous deliverable into design criteria. Based on our previous work we will give more specific achievable goals with measurable metrics of success. With specific criteria it will be easier to show whether we have completed the product and if it meets all the clients needs.

Translating Needs into design Criteria

Cost efficiency	Total cost of 16 units and the system to collect them costs less than $25,000 goal
Product Safety	The product is made of food grade materials
Data Collection	Measures the specific gravity and logs the data. Bonus if it records and logs temperature
Durability	The product does not break when in use or while being cleaned
Reliability	The product will not fail while in use and will not need to be replaced often
Data visualisation	The data collected is displayed in a graph
Wireless compatibility	The product can collect the data and send it wirelessly

Physical constraints	The dimensions of the product are within the maximum and minimum dimensions of the ports on the tanks, and will not require any modification of the tanks.
Minimise waste and time spent measuring	The product wastes as little beer as possible and will take the measurements automatically
Can not be free floating	The product must be fixed to the tank.

List of Prioritised Criteria

#	Functional Requirements (Affects The solution)	Verification Method
1	Data Collection: Measures the specific gravity and logs the data.	Test it out… If it gives the same specific gravity as other methods then it works.
2	Product Safety: The product is made of food grade materials	Look at the FDA of food grade material
3	Durability: The product does not break when inside the “tank”, and has a long lasting life span.	Test it out… Make sure the battery/connection to the cloud is strong and powerful.
4	Reliability: The product will not fail while in use and will not need to be replaced often	Test it out… Material must be strong enough and the durability aspect follows within this topic.

#	Constraints (Important considerations for our design)	Verification Method
1	Minimise waste and time spent measuring: The product wastes as little beer as possible and will take the measurements automatically	Test it out… Take precautions and make adjustments that suit your desired final outcome.
2	Physical constraints of the tank	The dimensions of the product must not exceed those of the tanks ports

3	Data visualisation: The data collected is displayed in a graph.	App metric can be involved to translate into a computer graph
4	Wireless compatibility: The product can collect the data and send it wirelessly	Bluetooth to computer technology

#	Non-Functional Requirements (Does not affect the solution)	Verification Method
1	Cost efficiency: Total cost of 16 units and the system to collect them costs less than $25,000 goal	Material and all equipment costs should add up to less than the max desired cost.
2	Can not be free floating: The product must be fixed to the tank.	Not fully neseracary; however, could and most likely will allow the workers to work more efficiently.
3	App: Mobile App that reflects all solutions	App that with no bugs and is completely accurate and reliable
4	Aesthetics and design: How the final product appears.	Colourfulness and total aspect of visual appeal.

Target Specifications

Importance	Criteria	Target	Description
10	Data Collection Accuracy of Temperature	0.3°C / ±0.5°F	Accuracy is an important measurement during the bewering process of the beer. The more precise the measurement, the better the final taste of the beer will be.
10	Data Collection Accuracy of the Gravity	-/+0.002	Gravity is accurate +/- 0.002 within the range of 0.990 to 1.120. The levels in the beer are really important for its production and the more precise the measures, the better the taste of it.

3	Cost	$130<product cost<$150	The cost is not too high nor too cheap. This is an acceptable range for the product since it does not use materials that are poor in quality or toxic.
5	Weight	45g<weight<50g	The product is lightweight as the user needs to carry it on the job site to collect the data.
7	Wireless Range	Radius of 100m	The product can connect to the phone so the user does not need to go to each container to take the data.
5	Size	Size:43mm diameter by 5.4" tall	Compact size so it can be easily stored and carried on the workplace.
8	Battery life	1 year	The production of the beer takes time so it needs a long duration battery to measure the data constantly and without any interruption.
10	Temperature range	20-100 F	The temperature range would be on this range so it can gather the data more precisely. If the temperature reaches its lowest, the beer needs to be stopped and restarted since the user did not correctly control the characteristics of the beer during its fermentation process.

Changes since Deliveriable B

The deliverable B needs an introduction that captures the attention of the reader and a conclusion that states clearly the topic.

Technical Benchmarking

Rank	Reference	Technical Requirements	Similar Design
1	https://inkbird.shop/collections/bluetooth-thermo-hydrometers	• Cost: $28.99 • Wireless Range: 50 metres • Temperature Accuracy Typical: 0.3°C / ±0.5°F • Humidity Range: 0~99%RH • Weight: 20g • Warranty and Battery Life: 1 Year	• Low cost • Wireless • Accurate Temp readings • Lightweight
2&3	https://brulosophy.com/2022/01/13/product-review-tilt-wireless-hydrometer-thermometer/	• Cost: $135.00 • accurate to within +/- 0.002 SG points and +/- 1°F/0.5°C • Range Increased . • Efficiency • Battery Life 12-24 Months	• “Better reception and range, which helps to send data through larger, thicker-walled fermenters.” • “With an improved

	https://tilthydrometer.com/products/copy-of-tilt-floating-wireless-hydrometer-and-thermometer-for-brewing		temperature sensor and accelerometer, which enhances the precision of the measurements.”
4	https://tilthydrometer.com/	• Cost:$250.00 • Size: 1.7" (43mm) diameter (max) by 5.4" (140mm) tall • Weight: 5.4 ounces (153g) • Specific Range: 0.9900 - 1.1200 • Temp Range: **0°F - 140°F**	• Quality • Accurate • Lightweight •

Conclusion

The priority number one for our product is the efficacy to measure the specific gravity and temperature of the liquid while providing the user an easy access to look in the data of the product. Ther product is not only focusing on the data collection and measuring aspects but also the comfortability to transport it.
This part of the project is used to establish the objectives and limitations of the product, and it is also an important part that the deliverable D depends for its continuation.

Wrike snapshot:
https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=hG8PijkbTmDMZlgqVEvEzHGPIAL15s6D%7CIE2DSNZVHA2DELSTGIYA