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University of Ottawa

GNG 1103: Engineering Design

Project Deliverable B: Needs Identification and Problem Statement

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Currently, smaller breweries are wasting time using manual means to measure the specific gravity of their wort. The amount of time it takes for bigger companies to measure the specific gravity of their wort is much shorter than smaller breweries. This is due to the large cost of technology that larger breweries can afford but smaller ones cannot. In order to help smaller breweries, keep up with the larger ones, our solution will hopefully improve the efficiency of the specific gravity measuring process for smaller breweries such as Beyond The Pale (BTP). Our aim is to design a solution that is easy to use, budget friendly, records data and incorporates food safe materials to adhere to proper food safe practices.

The first important need of the client is a product that is purposefully designed. The product will be used within a tank and cannot be free-floating for easy capture. Therefore, it will be mounted securely inside to prevent it from getting lost in the tank. However, the client expressed concerns about hardware maintenance, so even though the device is mounted it should still be easy to remove and re-attach whenever necessary. It also must withstand the pressure of an 80% filled tank while mounted inside because the tank must be tightly closed at all times to prevent liquid loss or outside interference. Seeing that we are dealing with a food related industry, the product is required to be food grade, in other words produced from a non-toxic and safe material, to ensure it can interact with fermented liquid in a safe way. The device will be connected to an outlet outside of the tank as a power supply. However, to ensure all bases are covered in case of a power loss, a back-up battery system will be implemented for measurements to continue in case the device is cut off from the power supply.

One of the most important client’s needs for this product is the process of collecting specific gravity measurements and the ability to store this data. This includes but is not limited to the client's improving the current way of taking and logging the specific gravity of beer during the brewing process within a respective tank. This device needs to be able to decrease the amount of time spent taking samples to be used for the measurement of specific gravity. The client currently loses time and product taking samples to be measured about 10 times per day. The product needs to reduce the amount of time it takes to measure the specific gravity while in the tank to avoid product loss. With the samples no longer taken by hand and the waiting time reduced, the data will be more efficient and exact by eliminating human error. The second was to improve the input of the specific gravity data by keeping all recorded data in house or local. It is important that all the data is easily readable, accessible and can be saved forever. The data must be stored so that others can use it to recreate the same result as previous outcomes. Therefore, the inputting of the data, both collecting and logging are crucial to limiting time and product loss for the company.

For this design project, the budget provided is $25,000 for installation and the purchasing of the device which will measure the specific gravity in all 16 tanks. If we split the total budget by the number of tanks in which the device will be needed, that makes it approximately $1,500 per device for each tank. This budget range is reasonable for our project, and we should be able to supply and accommodate the product within the given price range. However, if we go an acceptable amount over budget ($5,000 - $10,000) and our product is interesting enough for our client, they are flexible and are willing to pay more to purchase it because it is still a profitable investment for them long term. For the actual tracking of the system, monetary wise, the client does not want to pay a subscription to use the service, instead would prefer an upfront cost. Our client explained how they do not like subscriptions for services they use and would prefer an upfront cost for unlimited usage of the service for an unlimited period of time. There is also a data storing reason related to the subscription thing which will be further elaborated on in the other paragraphs.

The device's primary function is checking for the beer's specific gravity during fermentation. In addition, the client wants the device to keep the beer in a closed system, so the device will be inserted into one of the ports to keep the system closed. According to the user, natural yeast and bacteria in the air would ruin the beer. So instead of wasting liters of beer every day to keep checking the specific gravity of the beer, the device would help reduce waste and give them accurate measurements of the beer. The data would then be transferred to them for utilization by the user; this data could then be transferred into a graph for comprehension reasons. The data transfer could be done in two separate ways, either through Bluetooth or Wi-Fi. The user does not mind which one is used as Wi-Fi is available to all silos, and Bluetooth would allow the device to be battery-powered.

In conclusion, smaller breweries such as BTP, need access to cheaper and more affordable solutions to measure the specific gravity of their wort. Smaller breweries need a solution that is simple and easy to use for the user, budget friendly and affordable for smaller breweries, records data for future use and record keeping and utilizes food safe materials that follows brewery safety guidelines.