Deliverable B – Need Identification and Problem Statement

Introduction:

The co-owner of the Beyond the Pale Brewery needs a device to automatically measure the specific gravity of the wort. Currently, they do this procedure manually and wish to automate it. This is to reduce the cost and time wasted during the expansion period of their brewery that is expected to occur over the next 2 years.

The brewing industry is an industry that has a quite expensive startup cost, and so most small breweries have to use devices that either cost a lot or are inefficient to measure the specific gravity of the wort. It is important for the brewery to measure the specific gravity of the wort as that and the temperature of the wort are the variables measured to see when the fermentation process is complete, and to maintain a consistent product. Beyond the Pale currently uses hydrometers and refractometers to measure the specific gravity, but the problem with the hydrometers is that wort has to be wasted to measure and it is a time-consuming process. The refractometers can only measure if there is no alcohol level present and do not measure very accurately.

Needs:

The product must be food grade and resistant to low concentration alkaline solutions. The total cost of installation of 16 units is preferably under 25 000$ and must be fixed or tethered. The device must measure the specific gravity of a liquid in a brewing tank at a specific time or the specific gravity of the wort flowing in a gravity-fed pipe that can give a reading every 30 seconds to a minute minimum. It needs to be convenient to access information on specific gravity and preferably information on temperature. The device cannot be free-floating in the tank. Preferably be able to log the data and store it. The client would enjoy being able to transfer the data or view it remotely without paying subscription fees to external providers. It should also be able to display said data in a graphic form allowing real-time tracking of the specific gravity changes. For the fermentation tanks, it is preferred that the device attaches to the carbonation port and is removable for cleaning.
The client also wishes to minimize the loss of wort in the process of measurement. It would also be preferable if the data from each tank was displayed in a master terminal.

Benchmarking:

Technical benchmarking:

A few products that measure specific gravity include traditional hydrometers (link), refractometers (link), float hydrometers (link).

Traditional hydrometer:

-Uses too much of the wort

-Takes too long

-Not terribly consistent

Float hydrometers:

-Limited battery usage

-Expensive

Refractometers:

-Easy to use but not very accurate

-Cheap

User benchmarking:

Traditional hydrometer:

-Fragile

-Simple to use

Float hydrometers:

-Connectivity is a hassle

-Easy to lose

-Convenient accessibility to data

Refractometers:

-Must be calibrated too often

-Easy to use

Problem Statement:

Create a device that efficiently measures the specific gravity of wort that does not require the wort to be removed, can monitor and store the data consistently, and does not freely float in the tank. It should be easy to use, maintain, monitor and cost-efficient.

Conclusion:

In conclusion, our client requires an automatic device to reduce the cost and time to monitor the gravity of the tank, which their current supporter does, but they must waste a certain amount of beer while they take a long time measuring the gravity of the beer. Firstly, we reviewed the disadvantages of the product they are using, and then we came up with options that could be optimized for a better product and a humanized proposal to complete the project.