



uOttawa

**University of Ottawa**

**GNG 1103-B00: Engineering Design**

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

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## 1. Introduction

In this deliverable, we will discuss features of our future product and order them in levels of importance. We will list which function is more important and what should be added to our final product. This list will help us decide what to build in the future and to better satisfy our client. Although the list won't be fixed. There is a chance for us to make some features more or less important later.

## 2. Needs and Design Criteria

Table 1.0: Needs Statement, Design Criterion, Functional/Non-functional needs

Priority (1-5)(5>1)	Need	Design Criteria	Functional / Non-Functional
5	Able to measure the specific gravity	Divides the density of the beer by the density of water	Functional
4	Measure Temperature	Having a thermometer within the product	Functional
4	Measure Pressure	Using a measure meter to measure differential pressure	Functional
5	Must work as part of a closed system	Enclosed in a tank during its functionality period	Non-Functional
5	Log and record data at least every hour and create a fermentation curve	Coding software that will log the data and create a line graph	Functional
5	Mounted so not lost	Stays in the same position	Non-Functional
5	Alkali resistant	Keeps the product safe during cleaning	Non-Functional
3	Withstand temperatures up to 25°C	The tank will not exceed 25°C	Non-Functional

		during fermentation	
4	Data must be permanently stored	Used to look back and take proper measurements based on past data.	Functional
3	Easily cleaned	User friendliness	Non-Functional
3	Easily installed and removed	User friendliness	Non-Functional
4	Works with different sized tanks	Usable in all 16 tanks	Non-Functional
3	Hard-wired	Aesthetics/ User-friendly	Non-Functional

### 3. Benchmarking

Table 2.0: Benchmarking Properties.

No.	Metric	Tilt™	VEE GEE	Thomas Scientific	EasyDens
1	Measure specific gravity	Yes	Yes	Yes	Yes
2	Measure Temperature	Yes	Yes	No	Yes
3	Measure Pressure	No	No	No	No
4	Operate in a closed system	Yes	No	No	No
5	Plot fermentation curve	No	No	No	No
6	Mounted device	Free floating	Used on small samples	Used on small samples	Used on small samples
7	Alkali resistant	Yes	Yes	Yes	Yes
8	High-temperature resistance	Yes	Yes	Yes	Yes
9	Permanently store data	Yes, as it is app operated	No	No	Yes, as it is app operated
10	Easy cleaning	Yes	Yes	Yes	Yes

11	Easy setup	Free floating	Not mounted	Not mounted	Not mounted
12	Easy adaptability	Yes	Used on small samples	Used on small samples	Used on small samples
13	Hard-wired	No (Batteries)	Manual	Manual	No (Batteries)
14	Cost	Tilt - \$135 Tilt pro - \$250 Tilt float - \$145	\$51.95	\$35.59	\$539

Table2.1: Comparison of Importance

N o.	Metric	Our device (5>1)	Tilt™ (5>1)	VEE GEE (5>1)	Thomas Scientific (5>1)	EasyDens (5>1)
1	Measure specific gravity	5	5	5	5	5
2	Measure Temperature	4	4	4	1	4
3	Measure Pressure	4	1	1	1	1
4	Operate in a closed system	5	3	1	1	1
5	Plot fermentation curve	5	1	1	1	1
6	Mounted device	5	1	1	1	1
7	Alkali resistant	5	5	5	5	5
8	High-temperature resistance	3	3	3	3	3
9	Permanently store data	4	4	1	1	4
10	Easy cleaning	3	4	3	3	3
11	Easy setup	3	4	2	2	2
12	Easy adaptability	4	4	1	1	1
13	Hard-wired	3	2	1	1	2
14	Cost	4	3	4	4	3
<b>Total</b>		57	44	33	30	36

### 3.1 Definitions

**Specific gravity:** Gravity is used to describe the density of liquid in brewing. In brewing beer, these data are usually used to measure the amount of sugar in beer. It is very important to beer producers because this number will decide how the beer tastes.

**Closed system:** This means nothing goes in or out during the process of fermentation, and there will be no open ventilation or air within the tanks. Our project needs to be linked with the beer tank.

**Fermentation curve:** It is a curve that is plotted with data that is recorded by our device. All those values together will form a curve that describes the fermentation process of beer. The curve at which the specific gravity stops increasing and starts decreasing is the curve called “The fermentation Curve”

**Alkali resistant:** It means that the product won’t react with alcohol or alkali products which will most likely be used during the cleaning process.

**Easy cleaning:** Must be easy to clean the equipment in a short period of time.

**Easy setup:** The equipment should be able to be set up within the tank or safely removed from the tank with no hassle.

**Easy adaptability:** Can be used in different-sized tanks

**Hard-wired:** The product is wired up and plugged into an outlet rather than powered through a battery source.

## 4. Target Specifications

Table 3.0: Functional Requirements

No.	Design Specification	Relation	Value	Units	Importance 1(less) to 5(more)	Verification
1	Measure specific gravity	=	Yes	-	5	Testing
2	Measure Temperature	=	Yes	°C or °F	4	Testing
3	Measure Pressure	=	Yes	Atm or kPa	4	Testing
4	Plot fermentation curve	=	Yes	-	5	Testing
5	Permanently store data	=	Yes	-	5	Testing

Table 3.1: Constraints

No.	Design Specification	Relation	Value	Units	Importance 1(less) to 5(more)	Verification
1	Cost	=	150	\$	4	Estimating
2	Alkali resistant	=	Yes	-	5	Testing
3	High-temperature resistance	=	Yes	-	3	Testing
4	Operate in a closed system	=	Yes	-	5	Testing
5	Mounted device	=	Yes	-	5	Testing

Table 3.2: Non-Functional Requirements

No.	Design Specification	Relation	Value	Units	Importance 1(less) to 5(more)	Verification
1	Easy cleaning	=	Yes	-	3	Testing
2	Easy setup	=	Yes	-	3	Testing
3	Easy adaptability	=	Yes	-	4	Testing
4	Hard-wired	=	Yes	-	3	Testing

## 5. Reflection

The client meeting played an essential role in how we created the product because speaking to the user and identifying the user's needs is important when designing the product, as displayed in the empathize stage of the design thinking criteria. This also allows us to easier identify what the client prioritizes more in the product. For example, he told us that he would prefer that the product can not only measure specific gravity but should also be able to measure the temperature and pressure of the beer as well. This opened our ideas to more options of what to add to our product and how to design something better suited for this specific user. The information given by the client also allowed us to further our research on how to create the product and how similar our product will be to other similar products that are attempting to do the same thing. While creating the benchmarking of this deliverable, we realized that our main goal for this product is creating something that can simultaneously measure specific gravity, temperature, and pressure, all while graphing and logging the data. Furthermore, the research and benchmarking helped us better understand how similar products were created and their strengths and weaknesses. Therefore, through this deliverable, we learned that technical benchmarking was not only able to help us better organize our work, but it was also able to give us a deeper understanding of what we are up against and how to go about developing our product.

## **6. Conclusion**

In conclusion, this deliverable helped us analyze the user needs of our client that we learned during our client meeting and properly organize them into their respective places. We managed to demonstrate the basics of how our product will be created; we also displayed what we will use in our product and the objectives that the product will be able to accomplish. To further extrapolate, our product will be hard-wired and mounted in a closed system of filtration tanks with the ability to measure specific gravity, temperature, and pressure. These three points will also be stored using code we created and sent to a computer system that the user can view. Furthermore, the specific gravity data will be inputted to create a line graph that can document the curve at which the data starts decreasing and notify the user during the decrease of the fermentation curve. Our research during Deliverable C also gave us an estimate of prices other companies use for their products that can measure the same sorts of data. Finally, we understand the constraints put upon us for this project, and we can begin our design concepts to formulate some products.

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## **9. Wrike Link**

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