Deliverable G

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Abstract

The following deliverable covers and interprets client, user, and TA feedback on the previously established Prototype I. This report then delves into the team's current plan and progress towards its Prototype II. Finally, the team updates the overall prototyping plan and updates the reader on the next step in the design process.

Client Meeting III Feedback

Following the third client meeting, the team presented its first prototype along with the beginnings of the second prototype to received feedback. The client expressed understanding of the team's approach but asked about idea to track conveyor data continuously using a sensor system. Tracking data online was not a client need outlined in the project description, nor did the client express any interest in these functionalities in the previous two meetings, so the team expressed that an online sensory system along with the current expectations is outside the scope of this project and product. In addition, the team had no reason to assume this functionality was needed due to the client providing us with obtained data, which implies they have the current ability to obtain process speeds. The team will continue to work on the current interface and database systems as there is insufficient time to add a mechanical component to the project.

User Feedback on Prototype I

In addition to client feedback, the team requested feedback on the interface's aesthetic from students across the University of Ottawa, as advised by the TAs. After asking several students for artistic feedback, the team gathered the following results: Please note that student names are to be kept anonymous for student privacy reasons.

Student Number	**Rating out of 10**
Student #1	7/10
Student #2	8/10
Student #3	7/10
Student #4	6/10
Student #5	9/10
Student #6	7/10
Student #7	7/10

Table 1: Student Feedback on User-Interface

From the table, the team gathers that the average ranking of the display is 7.3/10, which the team finds acceptable with room for improvement.

In addition to random student feedback, the team took feedback from the TAs to add a login username and password feature to the interface, which the team has started programming.

The following pictures display an updated prototype for the interface; more changes will be added to this system in the final comprehensive prototype, outlined to begin on March 15th.

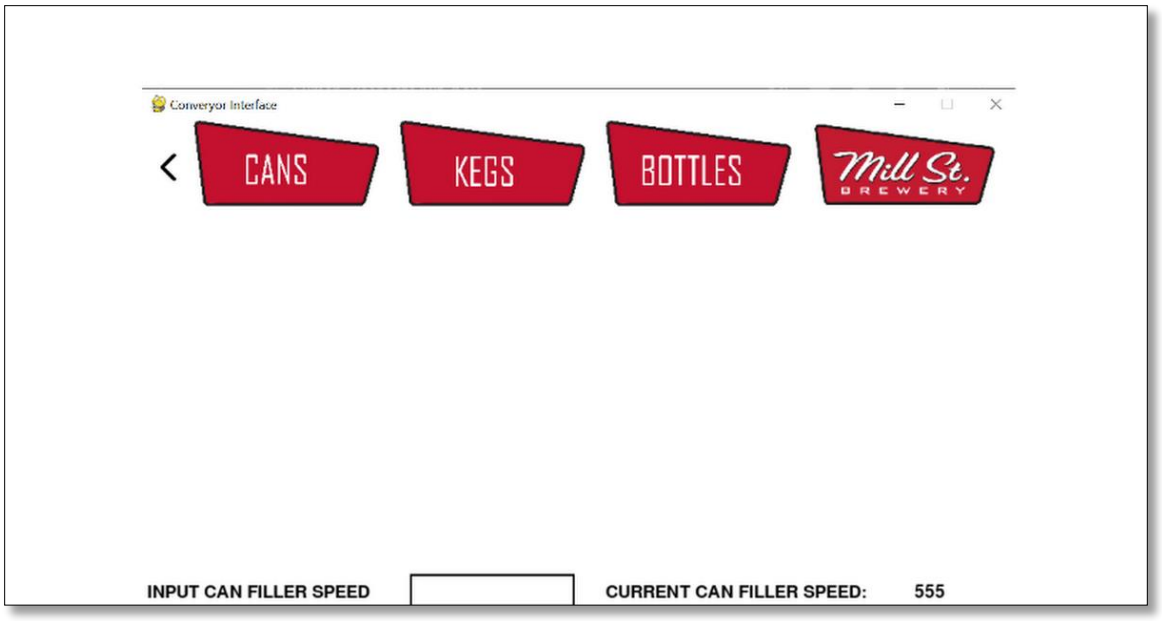

Figure 1: Updated User-Interface System Visual

Description of Prototype II

For the second prototype, the team investigates the development of a data-storage and calculation system. The system should be able to perform all efficiency calculation required by the client, determine points of interest so the client can improve his system and create a 2% increase in OEE, and have a graphical component for visual display. The following images below display the team's current version of the second protype.

	Filler Trial Speed	175	200	--	--	--	V-Curve x Width	Percent Error	POI	OEE
2	**Can Depallietizer**	**759.02064**	**1004.0352**				**3360**	77.41%	Can Depallietizer	88.50%
3	Conveyor Post Dep 1	290.346	339.42384				840	65.44%	Conveyor Post Dep 1	Intrest Threshold
4	Conveyor Post Dep 2	245.8575	290.8143				630	60.98%	Conveyor Post Dep 2	50.00%
5	Conveyor Post Dep 3	227.5938	272.5506				630	63.87%	Conveyor Post Dep 3	Insert Filler
6	Conveyor Post Dep 4	456.5925	531.0522				630	27.53%	0	175
7	Conveyor Post Dep 5	204.6471	225.7206				210	2.55%	0	
8	Conveyor Post Dep 6	288.0045	319.8489				210	37.15%	0	
9	**Can Rinser**	**288.0045**	**319.8489**				**192.5**	49.61%	0	
10	Conveyor Pre Fill	299.712	482.349				175	71.26%	Conveyor Pre Fill	
11	**Can Filler & Seamer**	**175**	**200**				**175**	0.00%	0	
12	Converyor Post Fill 1	721.182	739.4457				175	312.10%	Converyor Post Fill 1	
13	Converyor Post Fill 2	828.891	843.4083				175	373.65%	Converyor Post Fill 2	
14	Converyor Post Fill 3	515.13	509.5104				175	194.36%	Converyor Post Fill 3	
15	Converyor Post Fill 4	255.6918	258.0333				175	46.11%	0	
16	Conveyor Pre Past 1	426.153	417.2553				192.5	121.38%	Conveyor Pre Past 1	
17	Conveyor Pre Past 2	421.0017	420.5334				192.5	118.70%	Conveyor Pre Past 2	
18	Conveyor Pre Past 3	203.2422	203.2422				192.5	5.58%	0	
19	Conveyor Pre Past 4	494.5248	494.5248				770	35.78%	0	
20	**Can Pasteurizer**	**352.1616**	**352.1616**				**9047.5**	96.11%	Can Pasteurizer	
21	Conveyor Post Past 1	324.0636	324.0636				770	57.91%	Conveyor Post Past 1	
22	Conveyor Post Past 2	653.7468	464.5536				770	15.10%	0	
23	Conveyor Post Past 3	535.7352	320.3172				770	30.42%	0	
24	Conveyor Post Past 4	279.5751	244.4526				577.5	51.59%	Conveyor Post Past 4	
25	Conveyor Post Past 5	984.8349	910.3752				577.5	70.53%	Conveyor Post Past 5	
26	Conveyor Post Past 6	451.4412	446.2899				192.5	134.51%	Conveyor Post Past 6	
27	Conveyor Post Past 7	508.5738	506.2323				192.5	164.19%	Conveyor Post Past 7	
28	Conveyor Post Past 8	644.3808	650.4687				192.5	234.74%	Conveyor Post Past 8	
29	Conveyor Post Past 9	606.9168	603.6387				192.5	215.28%	Conveyor Post Past 9	
30	Conveyor Post Past 10	606.9168	603.6387				192.5	215.28%	Conveyor Post Past 10	
31	Conveyor Pre Mead 1	643.9125	393.372				1050	38.68%	0	
32	Conveyor Pre Mead 2	412.104	301.5852				420	1.88%	0	
33	Conveyor Pre Mead 3	412.104	300.6486				420	1.88%	0	
34	**Mead Packer**	**360**	**360**				**840**	57.14%	Mead Packer	
35	Conveyor Post Mead 1	575.0724	573.38652				840	31.54%	0	
36	Conveyor Post Mead 2	2275.938	2270.13108				840	170.95%	Conveyor Post Mead 2	
37	Conveyor Pre Duo 1	850.4328	706.1964				840	1.24%	0	

Figure 2: Excel Database Overview

Machine	Order in Line	Client Data	V-Curve x Width
Depallietizer	1	759.02064	3360
Rinser	2	288.0045	192.5
Filler/Seamer	3	175	175
Pasturizer	4	352.1616	9047.5
Mead Packer	5	360	840
Duo Packer	5	899.136	1260

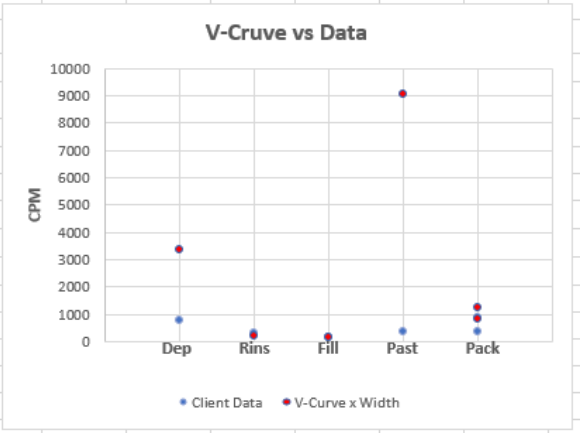

Figure 3: Graphical Visual Excel System

The first image shown displays the overall database for the product. The product contains various columns, each with a defined purpose. The first column displays the type of machine the numerical row values correspond to. The second through sixth columns are meant for data storage; only the first two columns are occupied due to the client only giving us two data sets, but the team has provided flexibility by allowing the user to store up to five complete datasets at a given time. The seventh column displays the ideal v-curve data corresponding to an inputted filler speed, which is highlighted in yellow. The eight columns take the inputted filler, track the corresponding provided dataset, and compare it with the ideas v-curve valued to output percent error calculations. The calculation can be provided using the formula below.

$$\%\ error = \frac{Data\ value - ideal\ value}{ideal\ value} \times 100\%$$

If the percent error is above a certain threshold, then the point is called a "point of interest." POI machines will then be separated from the rest of the system, as shown in column nine, and then outputted along with their errors for the client to see and make the necessary changes. The final calculation in the system, OEE, is determined to be one minus the overall percent error of the system, shown using the question below.

$$OEE = 1 - \frac{\sum cpm\ data - \sum cpm\ vcurve}{\sum cpm\ vcurve} \times 100\%$$

The second image shown displays graphical visuals of a data set's speed relative to its corresponding v-curve ideal speed. The graph is automated to change with the entry of a new filler into the yellow-highlighted box.

Prototyping Test Plan

Since the last deliverable, the team has completed the design of the second prototype. The main functional component of the prototype, the Excel spreadsheet, has been completed and integrated into the user interface. With this prototype, the user is able to input a specific filler

speed, and all of the corresponding optimal speed data, efficiency readings, and suggestions are computed through Excel and then outputted into the user interface.

Test ID	Test Objective	Description of Prototype used and of Basic Test Method	Description of Results to be Recorded and how these results will be used	Estimated Test duration and planned start date
1	Create a simple main menu with all the different lines	To test the interface, we will make sure all the menus are working, and seeing if there are any errors in the code	Checking any errors and comparing test results to theoretical results to determine whether it is good enough to be used	Testing already complete
2	Create an interface with no main menu and instead have always one of the lines showing, and being able to change between them	Testing will be very similar for all prototypes. It will involve using the interface and testing all possible scenarios to try and find bugs in the code.	Depending on how the interface performs relative to the other prototypes, the best aspects of it will be recorded (in terms of code).	Test already complete
3	Create a graphical program than can plot system speeds according to V-curve theory	Prototype will be made using excel, test will have user unput filler speed, with a resulting output of all ideal system speeds plotted on a dot chart	Result will be recorded when test successfully outputs desired values. These results will then be recoded for python and used in the final product	Test already complete
4	Create a comprehensive prototype the encompasses all	Prototype will be made using python and tested for errors	Results will be used to make any final adjustments to the final product	Test duration: 1 hour Planned start date: March 15th

	aspects of the final product	in code and calculations		

Table 2: Overall Prototyping Test Plan

The team is currently working on developing an encryption system in the form of a passcode. This prototype will enable the user to input a specific passcode into the interface, where the passcode will be verified and retrieved using an Excel spreadsheet. If the password is found, the program will run, and the user will be directed to the main menu. If the password is not found, the user will not be able to access the program. The team is working on ensuring the prototype contains a functional automated locking system, in which when the program has not been interacted with for 5 minutes, it will automatically lock, restricting access to the program until a verified password is inputted into the interface.

Lastly, the team will begin working on the final prototype, which will be the comprehensive product. The comprehensive product will consist of the user interface, which contains the interactive main menu and allows the client to view all current filler speeds for the can, bottle, and keg lines. Furthermore, the user interface will allow users to transition from the main menu to a specific line page, namely the can bottle or keg lines, which will allow the user to input a specific fill speed at which all speed and efficiency data for the system will be output. The comprehensive product will also consist of a functional Excel spreadsheet, which will be used to compute all V-curve theory and efficiency-based data correlating to raw client data. This data will be retrieved and output by the interface. Lastly, the comprehensive product will consist of the encryption system, which will negate all unauthorized access. The team will be focused on compiling existing prototypes to create a comprehensive product and regularly testing code and general functionality to mitigate errors.