UNIVERSITI TEKNOLOGI MARA

Delima Oil Products Sdn. Bhd.

# CHE 353
# INDUSTRIAL TRAINING REPORT
# Universiti Teknologi Mara (UiTM)


**NABILAH SYAHIRAH BINTI SULAIMAN**

Diploma in Chemical Engineering (EH110)

2017628504


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# 1.0 INTRODUCTION

## 1.1 INTRODUCTION TO INDUSTRIAL TRAINING CHE353

Industrial Training CHE353 is one of the course in Diploma of Chemical Engineering at Universiti Teknologi MARA (UiTM). This industrial course is mandatory for 6th semester students, in order to complete diploma studies. Before entering into real working life, students are required to seek and apply for an internship in any company related to the field of chemical engineering.

The aim of this course program is to give students an opportunity to embark on real-world work experience. This course is also useful to them as they can expand their knowledge and learn more about the current chemical industries, and apply the theories they learned during their diploma in real world scenarios.

Students are required to undergo this industrial training program for a minimum of 16 weeks to meet seven credit hours. This 16-week industrial internship is mandatory, as it fulfils the requirements of the Malaysian Engineers Board (BEM) of the Engineering Technology Accreditation Council (ETAC) for undergraduate student

### 1.2 JOB SCOPE OF INDUSTRIAL TRAINING

During this internship program, I was assign in the Packing Product Department of Delima Oil Product Sdn Bhd. The scope of my training was production's line project and measure manufacturing productivity. Under the great supervision and guidance of Encik Muhammad Amir Qayyum Bin Abdul Rahman, I has successfully completed 16 weeks of industrial training despite the outbreak of the novel coronavirus COVID-19.

I felt very fortunate that I had the opportunity to work with great mentors alongside the experienced staff and workers. Every day at work is a learning process for me and I am grateful that I can applied some of the theories I learned during my diploma and learned new things along the way.

## 2.0 CONTENT

### 2.1 HISTORY OF THE COMPANY

Delima Oil Product Sdn Bhd was established in 1975 and began as a Fast Moving Consumer Good (FMCG) sector in 2000 as a subsidiary of FGV Holdings Berhad. There are three core areas of operation for Delima Oil Product Sdn Bhd which are palm oil refining, manufacturing of processed palm oil products and distribution of industrial and consumer products. Delima Oil Products Sdn Bhd strictly conform to the code of practice for Processing and Refining of Edible Palm Oil, as well as the Malaysia Food Act and Regulations 1983.

There are other certificate obtained by Delima Oil Product Sdn Bhd which are Halal Certification by the Islamic Development Department of Malaysia (JAKIM), HACCP and GMP Certification of Ministry of Health Malaysia, KOSHER certified by London Beth Din Kashrut Division and MeSTI certification from Ministry of Health Malaysia.

## 2.2 PRODUCT OF COMPANY

| Consumer products | Industrial Pack Products |
|---|---|
| • **SAJI** – Cooking Oil<br>• **ADELA** – Soft Oil (Canola, Sunflower, Adela Blended<br>• **Seri Pelangi** – Margarine<br>• **Tiga Udang** – Cooking Oil | • **SAJI** – Cooking Oil (17kg)<br>• **ADELA** – Shortening, Dough Fat, Margerine, Pastry Margerine, Cake Margerine, Cream Margerine, Vegetable Ghee. |
| **International** | **Bulk Palm Oil Trading** |
| • **SAJI** – Cooking Oil<br>• **TIARA** – Cooking Oil<br>• **ADELA** – Vegetable Shortening, Cake Margerine, Margerine<br>• **MARINA** – General Purpose Margerine | • **RBD Palm Oil**<br>• **RBD Palm Olein CP10**<br>• **RBD Palm Olein CP8**<br>• **RBD Palm Oil CP6**<br>• **RBD Palm Stearin**<br>• **Palm Fatty Acid Distillate** |


**Figure 1:** Local Products of Delima Oil Product Sdn Bhd

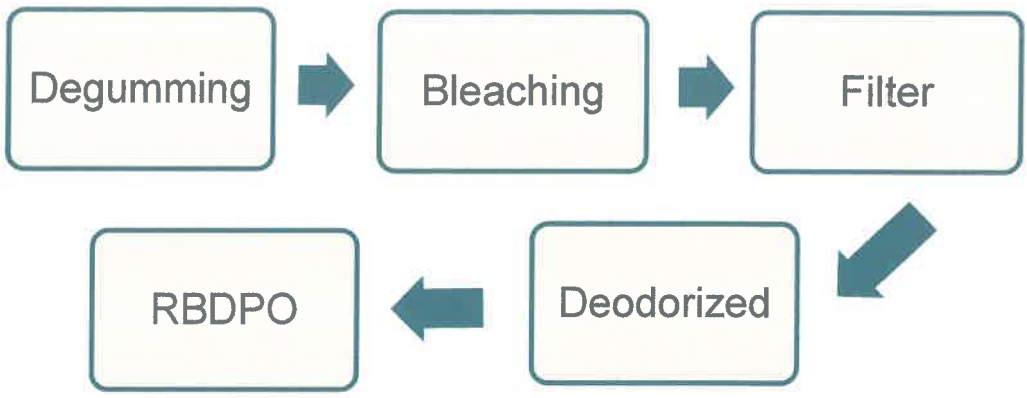


**Figure 3:** Process Flow in Refinery Plant

First process is degumming, where phosphoric acid as the raw material are going to be introduced inside the reactor to coagulate with the gums (phosphatides) to get rid of it from the oil. Second, after the oil has been degummed, bleaching earth will enter the tank to soak up colour pigment like chlorophyll and carotenes inside the oil.

After the bleaching process, the bleached palm oil will then go for filtration process by using Niagara Filter in order to get rid of the spent earth and any solid forms contained within the bleached palm oil. Then, the oil will go for the last process in refinery, which is deodorization process. This process used steam-distillation method to remove any voltile component and fatty acid from the palm oil and leave as palm fatty acid distillate (PFAD). This process operate at high temperature in order to evaporate the fatty acid component in the palm oil.

There are some differences between the two refineries plant, Oiltek and AlfaLaval, that brings different result to the refined palm oil. First difference is that Oiltek refinery plant use two Niagara filter meanwhile AlfaLaval has three. This will affect the quality of refined oil as AlfaLaval will remove the amount of impurities higher compared to Oiltek. Second, Oiltek refinery plant consist of one deodorizer unit meanwhile AlfaLaval consist of two deodorizers unit. This will make the refined palm oil from AlfaLaval refinery plant has low colour (1.5).

### 2.3.4 Fractionation Process

The RBD palm oil will the go for further process in fractionation plants. There are three fractionation plants in Delima Oil Products Sdn Bhd, which are Oiltek, JJLurgi and Tertiaux. There are two main process included in fractionation plant, which are crystallization process and filtration process.

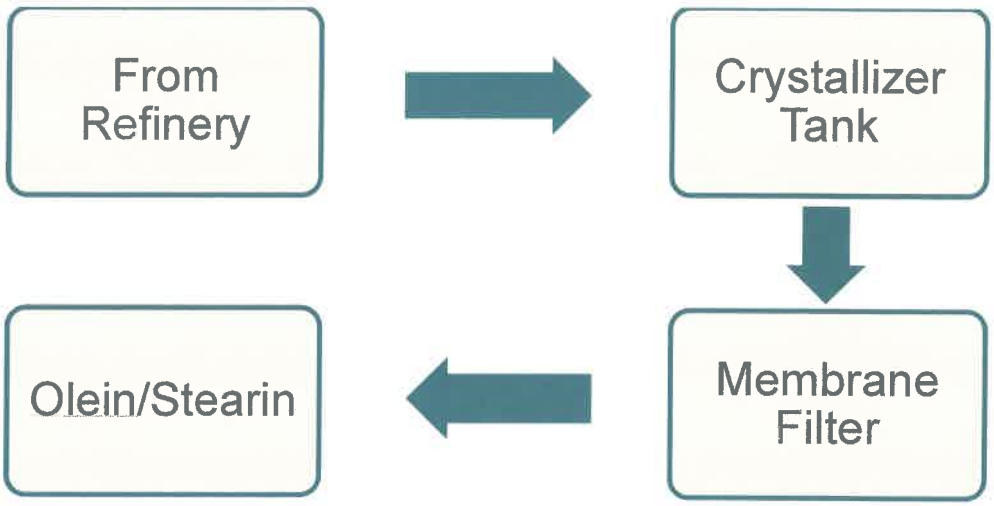


**Figure 4:** Process Flow in Fractionation Plant

For crystallization process, the oil are going to be stirred around 6 to 15hours in the crystallizer tank, at certain temperature for its to be cooled down and form a slurry. There are two steps in the cooling process of the RBD palm oil, which are the first step is fast cooling and the second step is slow cooling process.

In order to produce palm olein with different cloud point (CP) different temperature and duration is required. For the production of olein with CP6, the temperature for the process is 17.5 ºC for the duration of 15-16 hours of crystallization process. Meanwhile for the production of olein with CP8, the temperature required is 22 ºC and the duration is 8-9 hours of crystallization. Lastly for the productionof olein with CP10, the temperature of cooling is 25 ºC and the duration is 6-7 hours of crystallization.

To obtain the olein and stearin separately, we will filter the slurry by using membrane filter. Membrane filter are run by batch process. This is where we separate the stearin by pressing it on the membrane filter and let the olein flow passes through it. Different cloud point will gives a differents yield percentage of olein and stearin. Yield percentage for CP6 is 56% of olein and 44% of stearin, for CP8 is 76% of olein and 24% of stearin and lastly for CP10 is 80% of olein and 20% of stearin.

### 2.3.5 Chemical/QC Lab 1

A sample of RBD Palm oil, olein and stearin will then be send to QA lab for quality checking whether it meets the preferences for its standard. Few parameters that need to be observe are Cloud Point, DOBI, Peroxide value and Iodine value.

### 2.3.6 Cooking Oil/Fats Production

There are two areas in the cooking oil production line, which are Incoming Oil and Oil Filling area. Incoming Oil is where the RBD olein is transferred into the blending tank for further blending process.

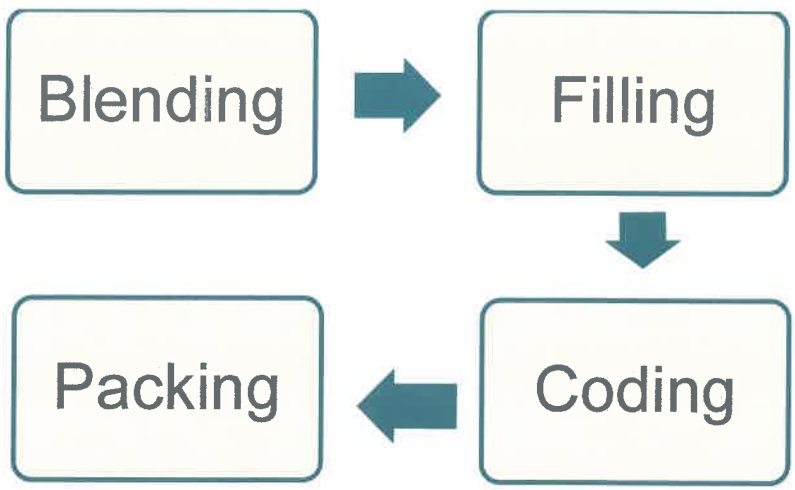


**Figure 5:** Process Flow in Cooking Oil Production Line

For blending, olein will enter the blending tank followed by the emulsifier such as anti-oxidant and anti-crystal. Blending tank for CP6 are T03, T04, T05 and T06 while blending tank for CP8 are T01, T02, T07 and T08 and the time required for blending process is approximately two hours. Anti-oxidant used is BHT (12kg) and rikemal SV-65 L (50kg).

For filling process, the oil from the blending tank will then be transferred into subtank for each production line. CP6 olein for 5kg will flow into subtank at Line 1 and Line 2. For CP6 olein of 1,2 and 3kg will flow into sub tank Line 3 and Line 5. Lastly for CP8 olein will flow into sub tank at Line 7.


**Figure 6:** Cooking Oil Production Line

Next, after the filling process, all the PET bottle or pouch bag will be proceed for coding. The production date and expired date will be print out on the bottle and then will be packed into boxes to send it to the warehouse.

Fats production line is where the stearin will be used to produce other food products such as Margerine, Shortening and Vegetable Ghee. Fats production line used both stearin and olein for the food processing and for certain recipe they also might use palm oil, palm kernel oil, hydrogenated palm oil and hydrogenated palm kernel oil.

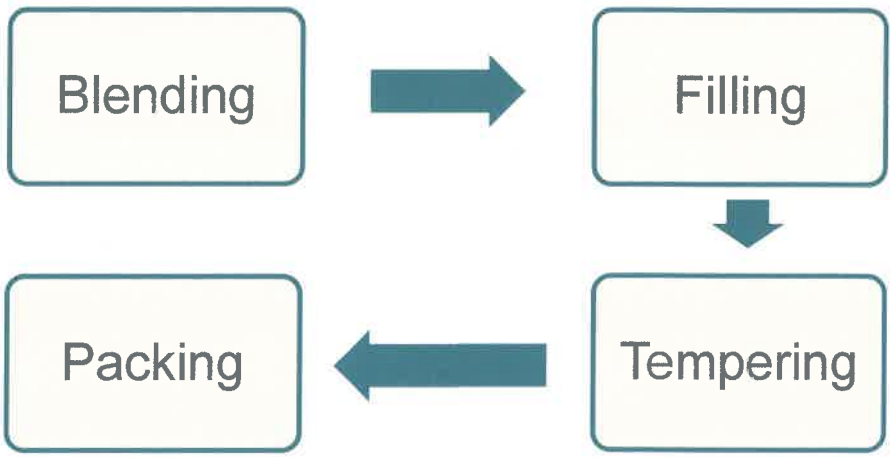


**Figure 7:** Fats Production Line

For blending, emulsifier such as anti-oxidant was added along with olein, stearin and other types of oil depending on its recipe. For the filling process, margarine from the chemetator will be transferred to the production Line 2, Line 3 and Line 4 meanwhile for shortening will be transferred to production Line 1 and Line 5.



**Figure 8:** Fats Production Line

### 2.3.7 Chemical/QC Lab 2

This is where the final product will be tested for their quality in order to ensure the products are in best condition and followed the standard required. Other than that, olein and stearin that are used for processing food products will also be tested first, to ensure it is good to use for the process. Some of the test are Slip Melting Point, Solid Fat Content and standard test like IV value and Cloud Point.

### 2.3.8 Packaging Product

All the products will be packed according to their standard, there are few packaging of products in Delima Oil Products Sdn Bhd such as PolyEthylene Bottle (PET), pouch bag, tin and boxes. All the finished good will be stored in the warehouse for further distribution to the customers.

## 2.4 DESCRIPTION OF TASK ASSIGNED (MINI PROJECT)

As an intern in the Packaging Product department, I was assign to the task related to the production line. There are three task that has been assign for me, which are drawing a P&ID for the production line, generate a Pictorial Work Instruction (PWI) for the production line and provide the Overall Equipment Effectiveness (OEE). All the task were assign under the supervision of En. Muhammad Amir Qayyum.

### 2.4.1 P&ID for Production Line

For the P&ID drawing task, I were assign to draw the proess flow for the fats production line (L1,2,3,4,5), ammonia refrigerant system and hot water system. The task duration was about two month starting from 17 May 2021. The task started off with a discussion with En Qayyum on the existing P&ID of the company which is old and inaccurate as there are many changes has been made throughout the production plant site.

Initially, the P&ID were drawn on paper by sketch, I trace the flow of the pipeline starting from the beginning of the process until the end, including all the main equipment and instrumentation. Then, the sketch will be reviewed second time along with the supervisor in charge in the area, and confirmation from En Qayyum. The steps are the same for all needed area and the sketch will be redraw into Autocad drawing.

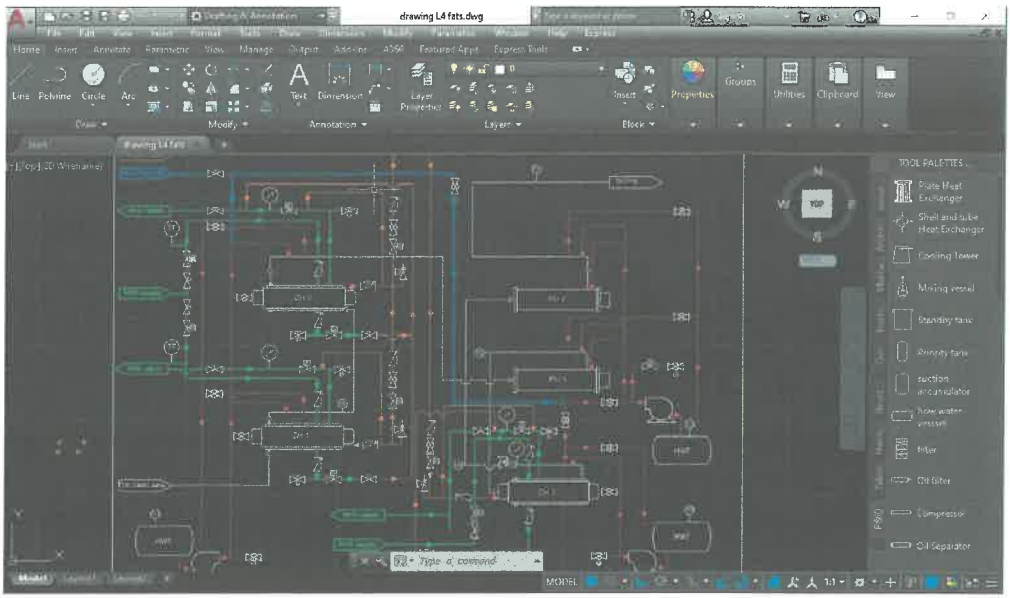


**Figure 9:** P&ID for Fats Production Line 4

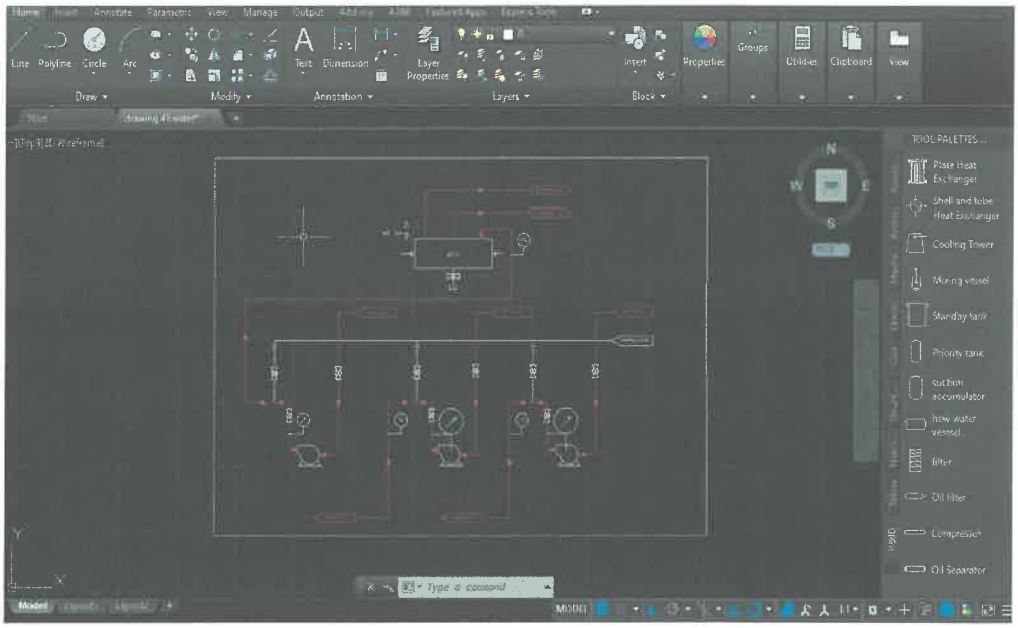


**Figure 9a:** P&ID for Hot Water System

There are many benefits and outcomes that I gained from completing this task, where I can improve my understanding for process flow diagram. I have learn about P&ID drawing in my semester 2 and from this task given, I can apply all the knowledge I have to complete the task and at the same time, I learn many new things in laying out a drawing. I have also learnt the function of few equipment used in the chemical manufacturing process such as combinator, refrigerant system and chemetator.

There are variety types of symbol for instrumentation in P&ID, where some of it I have seen throughout my diploma study meanwhile, other new instrumentation symbol that I have learnt is from this task itself. Besides, from this task I can improve my skill in using Autocad software. There are many new function that I discovered from Autocad such as how to create our own equipment and instrumentation symbol and how to save them in the "Tool Palletes". I am glad to have assign for this task as it gives me a lot of knowledge and improvement for my skill in drawing.

### 2.4.2 Pictorial Work Instruction (PWI)

For the second task, I was assign to provide a pictorial work instruction for the cooking oil and fats production line. A meeting was held as En Qayyum explained what is the uses of PWI and ways to construct it. From the discussion, En Qayyum state that any improvement or idea for the PWI can be made in order for the PWI to be efficient for the operator to use. The purpose is to make sure that the PWI are complete with all the procedure but in a simpler language.

The duration for the task to be completed is two weeks starting from 1 May 2021. An example of PWI constructed by En Qayyum has been made as a reference for me to do for the rest of cooking oil and fats production line. Firstly, I ask the supervisor in charge to explain the overall procedure of the production line from the start up until the end of the process. The explaination of the procedure from the operator/supervisor might be difference from the manual handbook, so I need to re-confirm with En. Qayyum whether it is acceptable or not and decide which one we need to follow.

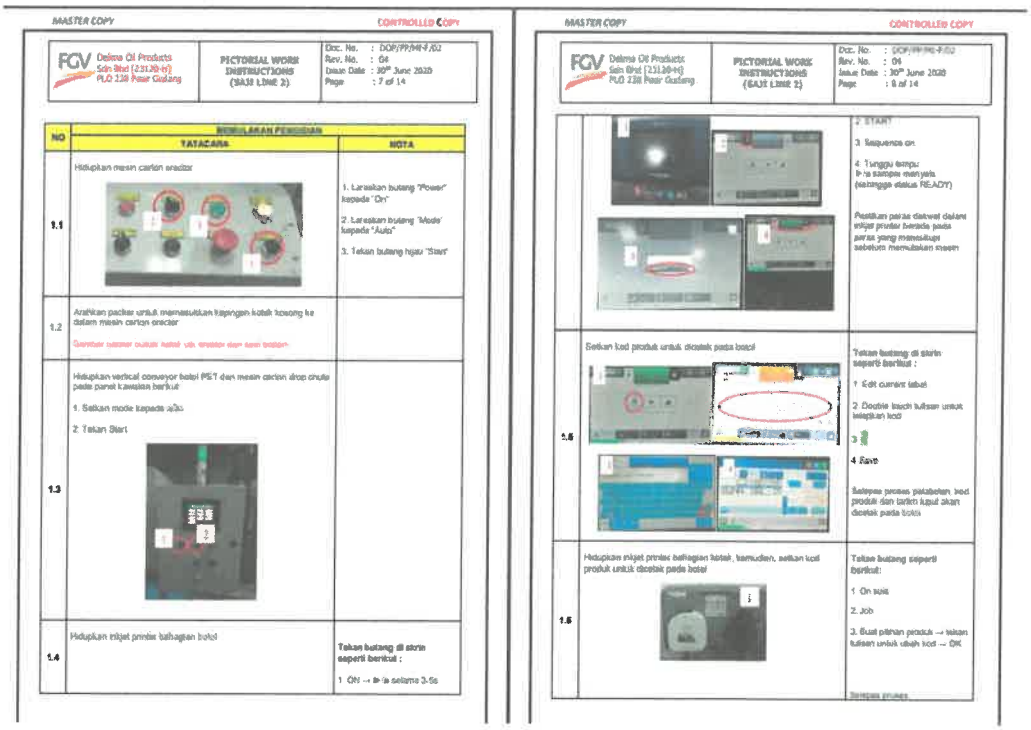


**Figure 10:** PWI for Cooking Oil Production Line 3

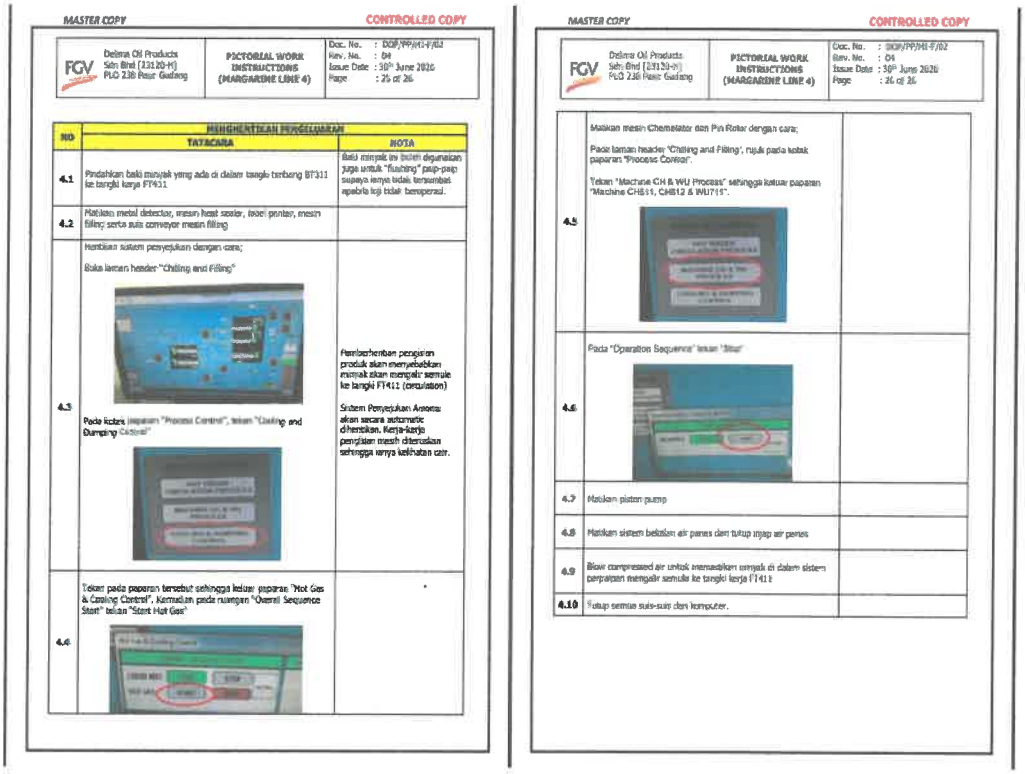


**Figure 10a:** PWI for Fats Production Line 4

### 2.4.3 Overall Equipment Effectiveness (OEE)

Next, overall equipment effectiveness is one of the tools for any company to measure their manufacturing productivity. A discussion with En Qayyum was held for him to explain about the OEE and how to use it to calculate the productivity effectiveness of Delima Oil Product Sdn Bhd.

The duration for the task is two weeks starting from 14 April 2021. Basically, the task required me to key-in all the data required such as, type of product produce according to their production line, the quantity produced, the planned and unplanned down-time for the production line and state if there is any issue occurred throughout the production. All the data was insert by day and the OEE are calculated per month.

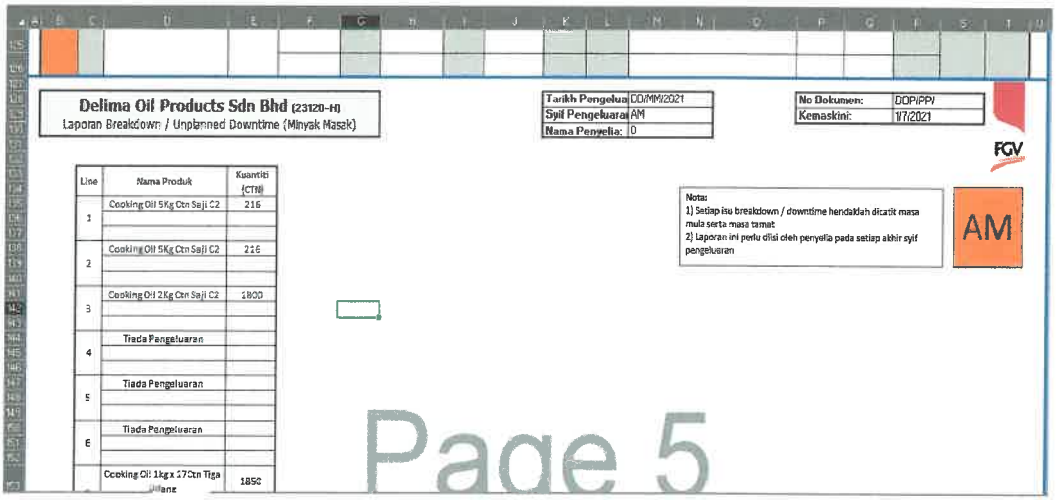


**Figure 11:** OEE data entry for Cooking Oil Production

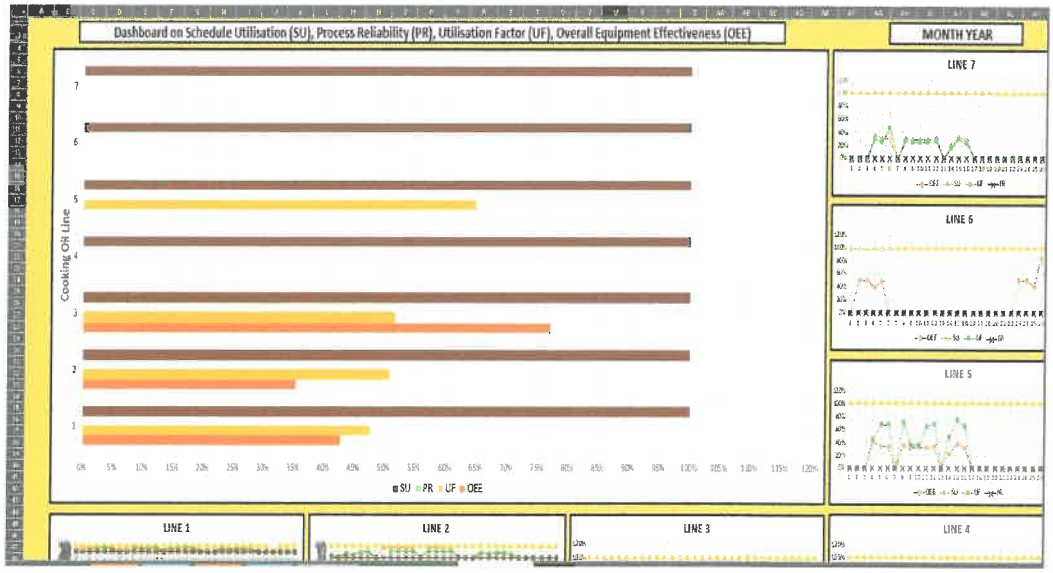


**Figure 11a:** Dashboard reading for percentage of OEE obtained

## 3.0 CONCLUSION

Universiti Teknologi MARA (UiTM) has always aspired to produce well-rounded students with strong academic accomplishments, leadership abilities, and improved communication skills that will help them succeed in their future endeavours. The students' participation in this industrial training has provided them with the chance to develop real-world experience and expertise.

This industrial training has been one of a kind experience for me as I learned a lot from the guidance of En Qayyum and all the staff. Being in the Packaging Department and through all the task given, I have a chance to understand the real working scope that related to the field of chemical engineering. Nonetheless, I am truly grateful to be surrounded by the great people in this company, all the staffs who are very helpful to share their knowledge and the time they had given upon me despite their busy working scheduled. I had also like to express my gratitude to my industrial training coordinators, Miss Hidayu binti Abdul Rani, Sir Mohd Haikal bin Mustafa, my academic advisor Madam Nurul Hazwani binti Sabri and my family for all the cooperation, guidance and support given to make my internship a successful journey.

Finally, I am grateful that, despite the pandemic of COVID-19, I was able to complete my industrial training in 16 weeks. I had want to extend my gratitude to En Muhammad Amir Qayyum bin Abdul Rahman of Delima Oil Product Sdn Bhd as well for accepting my internship, providing me with unwavering support and most importantly for all the useful advice and sharing.