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UNIVERSITI  
TEKNOLOGI  
MARA



## **INDUSTRIAL TRAINING FIELD REPORT (CHE 353)**

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Diploma in Chemical Engineering (EH110)

2018243858

22<sup>nd</sup> MARCH 2021 – 30<sup>th</sup> JULY 2021

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## **1.0 INTRODUCTION**

Industrial training is a program that offers good practical training students before their graduation in a particular time frame. The students will be exposed to professional skills and good experiences in real industrial engineering. Besides, industrial training also helps to motivate the students to become a successful engineer in the future.

There is several importance of industrial training to students including mastering their skills. Usually, some students are not aware with the technology and concepts used in the real industry. So, industrial training will help them to catch up with the latest advancements. Besides, industrial training is a comprehensive training platform for students to improve their employability skills, management skills and social skills. The reason is student will be prepared and build up their confidence to face the real nature of work.

For my internship, the company name is Bechem Technologies Sdn. Bhd. which is located at Shah Alam, Selangor. The duration of my internship is about 17 weeks which started on 22<sup>nd</sup> March 2021 and ended on 16<sup>th</sup> July 2021. Due to pandemic Covid-19, I had to extend my internship until 30<sup>th</sup> July 2021. I was placed in the technical department in the company and I did a lot of technical works such as maintenance, service and many more. I was supervised by Ir. Dr. Beh Chin Lai where he is a managing director of the company. He taught me a lot of knowledge during the internship and motivate me to become a successful engineer in the future.



**Figure 2: Location plan of Bechem Technologies in satellite view**

Mission and Vision of this company is:

**Mission**

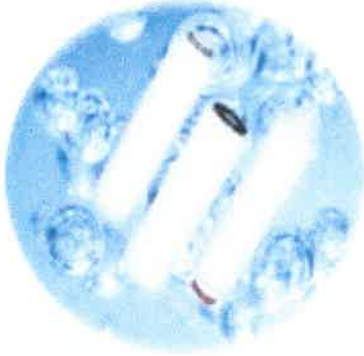
“To be the leader and customer-driven service & products provider that will contribute to the industrial, environmental as well as human’s need & enhancement.”

**Vision**

“To be recognized as world-class organization of industrial & environmental excellence.”

## Filtration products

### 1. Filter cartridge



BCT-P Series

PP Pleated Filter Cartridge

- Uses the latest gradient density micro fibre media technology.
- Special combination of polypropylene media with variation in the fibre diameter.
- All components used in manufacturing process are safe, chemically inert and meet Good Manufacturing Practice (GMP) standard and other internationally quality requirements.
- It is suitable for many applications because the polypropylene offers an extremely broad chemical compatibility.



BCT-M Series

High Performance Melt Brown  
Cartridges

- 100% of polypropylene construction provides great chemical resistance to bases, acids, salts and many organic solvents in a broad range of applications.
- All components used Food and Drug Administration (FDA) listed materials of construction to ensure they are safe for food and beverage contact.
- Highly automated manufacturing process assure consistent filter performance and repeatable result over time.
- Continuous length cartridges available up to 40 inches to prevent fluid from bypass and enhance the fluid flow properties.



BCT-S Series

Precision Wound Cartridge

## 2. Filter Bag & Housing



**Figure 3**

Bag Filter Housing



**Figure 4**

Multi Pocket Filter



**Figure 5**

Bag Filter

### **Industrial Degreasing Material & Machine**

Bechem's use their industrial cleaning products that replaced toxic chemicals such as Tri-Chloro Ethylene (TCE), PerChloro Ethylene (PCE) and Methylene Chloride (MC) that is harmful to human health and environment.

Bechem's industrial cleaning products are:

- i. Hydrocarbon cleaner/solvent and machine
- ii. Aqueous cleaner and machine
- iii. Isopropyl Alcohol (IPA) cleaner
- iv. Solvent recycling/recovery system



**Figure 6**

## Water Treatment & Services

Bechem specialize in design and built turkey system which offer a wide selection of chemicals, equipments and system for water treatment.

These are projects for water treatment:

### 1) Raw Water and Ultra Pure Water System

- Iron Removal System
- Ion Exchange System
- Media Filtration System
- Membrane System



Figure 7

### 2) Waste & Recycle Water System

- Chemical Treatment System
- Non-chemical Treatment System
- Biological Treatment System



Figure 8

### 3) Cooling Water System

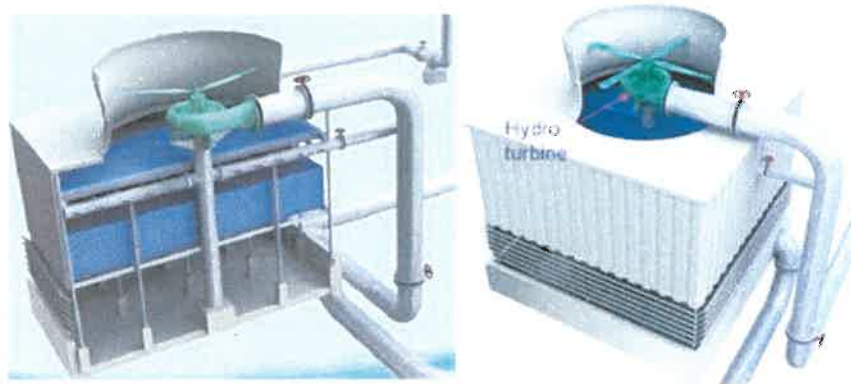


Figure 9

### Water Treatment Chemicals

Coagulants, flocculants (polymer), corrosion inhibitor, Biocides, ion-exchange resin, softener resin, etc.

- Sand filter, Carbon filter, Multimedia filter, Membrane (RO, UF, MF) filter & Filter Press.
- Portable DI Column Regeneration
- Range of pumps, blowers, nozzles, mixer, oil skimmer etc for chemicals and water.

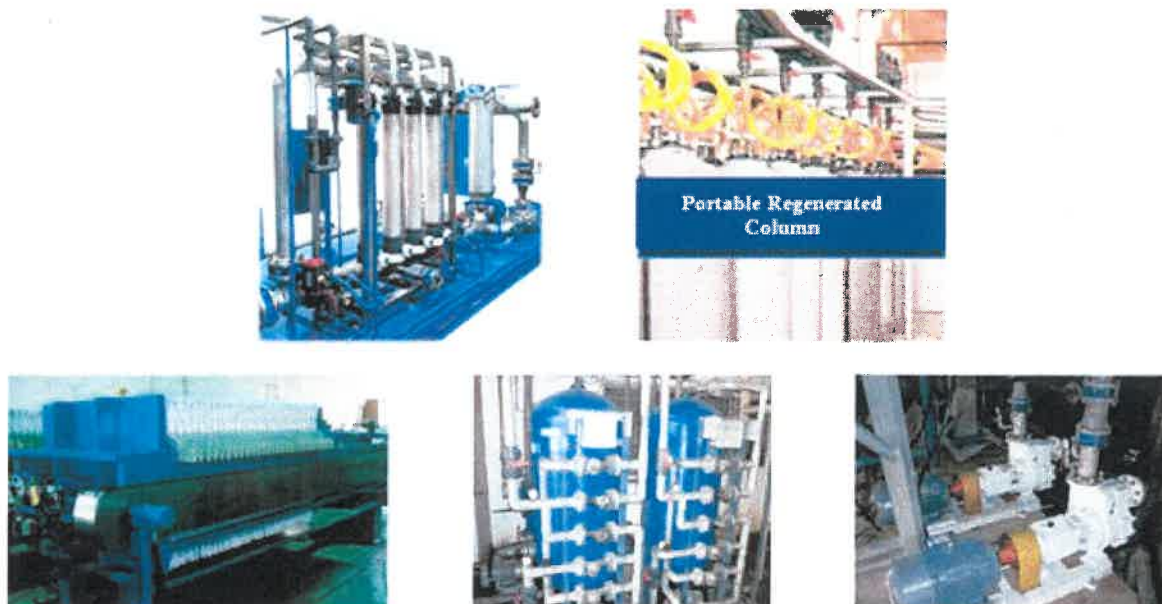


Figure 10



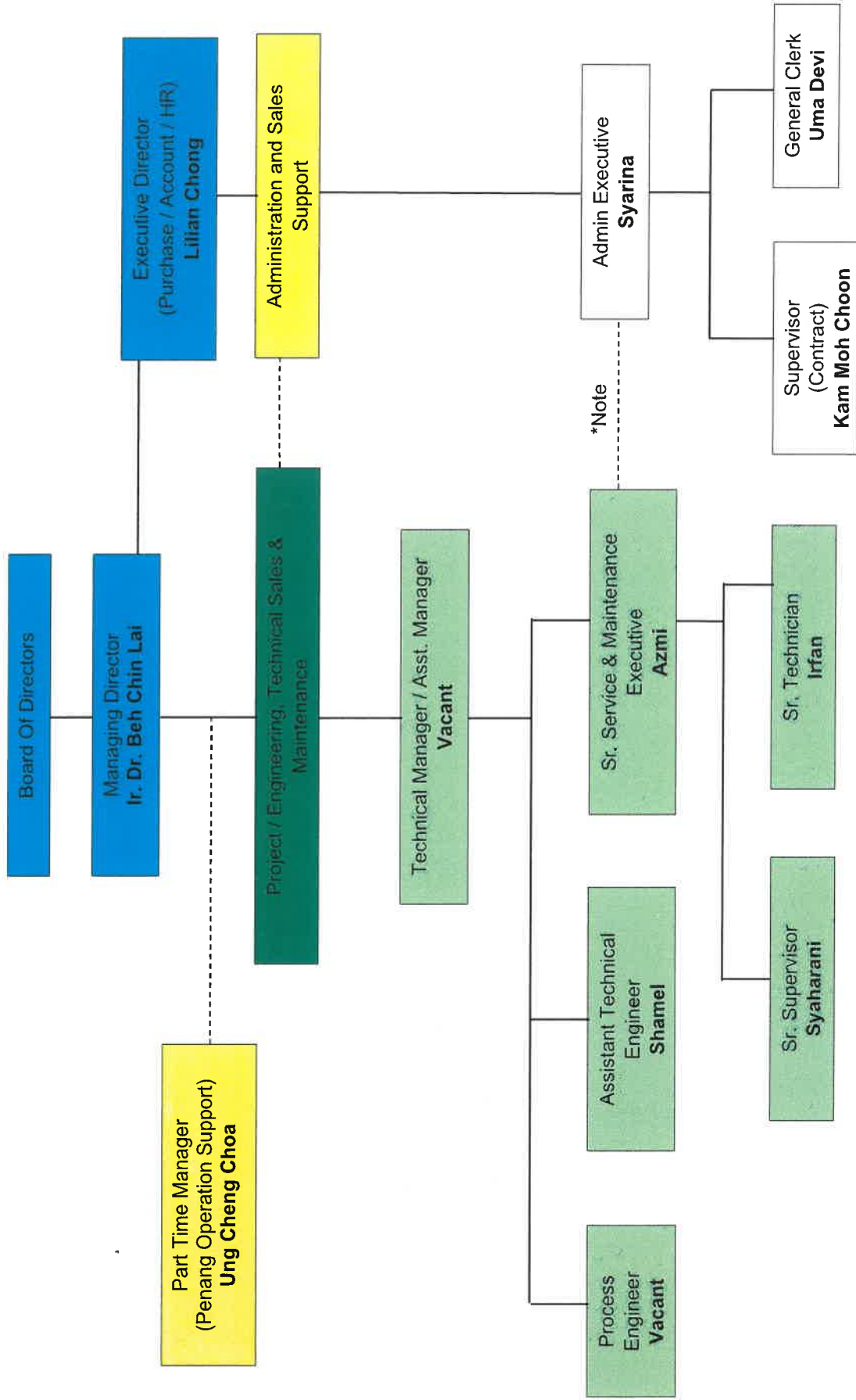
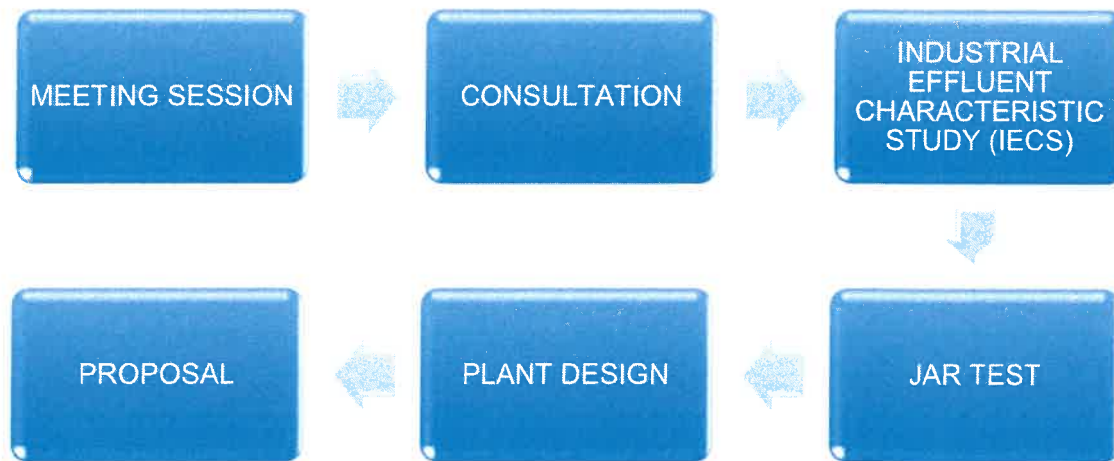


Figure 14: Organization chart of Bechem

## 2.2 PROCESS FLOW



**Figure 15: Process Flow**

### **Meeting session**

- Bechem will have a meeting with client to discuss about water treatment plant that was proposed by the client.

### **Consultation**

- Bechem will consult with the client by giving the best option to meet the client's requirement.

### **Industrial Effluent Characteristic Study (IECS)**

- Engineer from Bechem will make IECS study by identifying the type of chemicals, dosage of chemicals and chemical process to make the water treatment plant successful.

### **Jar Test**

- The engineer will perform a jar test to study the properties of chemical used in water treatment.

### **Plant Design**

- The engineer will make a design for the water treatment plant according to the client's desire.

### **Proposal**

- After finish designing, Bechem will propose the final idea to the client.

## 2.3 BRIEF DAILY/WEEKLY ACTIVITY

WEEK	ACTIVITIES
<p><b>WEEK 1</b></p>	<p>In the first week, I had a meeting session with my supervisor, Dr. Beh and co-supervisor, Mrs. Lillian about the company and had an ice breaking session to know the staffs at the company. I was given a task to handle which is a project for Atlas Industries Sdn. Bhd. and I have been taught by senior internship on how to do jar test to complete the project. I learned how to do jar test for Kozato project and COD test for Atlas project to identify the chemical oxygen demand (COD) value for the wastewater. Besides, I was asked by my supervisor to visit Matrix Flavours &amp; Fragrances Sdn. Bhd. to study their temporary wastewater treatment plant (TWWTP). With the help of the operator at Matrix, I studied the process from the first process until the end of the process including the quantity and type chemicals used and the products. Then, I have been given a task which is to write a report based on the procedure of wastewater treatment plant at Matrix.</p>
<p><b>WEEK 2</b></p>	<p>In the second week, I continued completing the report for Matrix wastewater treatment plant by studied the lab test that was made by my company and explained the result in industrial effluent characteristic study (IECS) report. Then, I submit the report to my supervisor to be evaluate. Besides, I went to matrix with my senior technician and learned to do maintenance there. My senior technician taught me how to service filtration equipment which is activated carbon filter (ACF). I need to replace the activated carbon with the new one by using a host. I took out the old carbon by using gravity concept that was taught by my technician. After finished servicing, I need to test the operation to ensure the operation went well. I also need to do a slide about the procedure for Matrix's wastewater treatment plant. My senior technician also taught me and explained about the operation of vacuum evaporator at the warehouse. I also learned about wiring for the filter press from my senior technician and how to check the condition of the filter press. To check the condition of filter press, I need to take the average time of working time for filter press. Other than that, I did some cleaning on the filter press because it will be used for Matrix's wastewater treatment plant.</p>

<p><b>WEEK 3</b></p>	<p>In the third week, I completed my slide about Matrix's wastewater treatment plant procedure and submit it to my supervisor. My technician also asked me to paint the filter press that was placed in my company's warehouse. This week is a hectic week because I often went to Matrix to do a few tasks given by my supervisor. Firstly, me and my friends did some cleaning on some equipment for wastewater treatment plant such as filter press, activated carbon filter (ACF) tank, ultrafiltration (UF) tank and holding tank. Secondly, I did some inspection on the operator to ensure they follow the standard operating procedure (SOP) of the wastewater treatment plant that was provided by my company. Lastly, I took a few samples from different discharge point from the wastewater treatment plant to make a COD test using photometer and the result obtained was quite not good.</p>
<p><b>WEEK 4</b></p>	<p>Due to the bad result obtained last week, I have been asked by my supervisor to revise back the standard operating procedure (SOP). I work together with intern members to identify which part of the procedure should be changed to achieve a good result. Then, me and my friends performed a COD test for Monday sample because my senior technician did some improvement by adjusting new membrane for reverse osmosis (RO) system. From that, we managed to get a good result where the cod value is less than 100 mg/L which pass the Department of Environment (DOE) standard. We repeated the test by tested another 3 samples and also managed to achieve a good result. We need to revise more about the procedure to replace the old SOP. So, I went again to Matrix with process engineer, Mr. Harinesh and senior technician, Mr. Irfan to do some maintenance and observed the process flow of the wastewater treatment plant. After observed the process flow, I had a discussion with my supervisor and we found that the method of inserting the chemicals into the reaction tank was not correct.</p>

<p><b>WEEK 5</b></p>	<p>Since we found the reason why the result was not good, I have been instructed by my supervisor to go to Matrix with senior technician, Mr Irfan. There, I had to make a new SOP by observing which method of inserting the chemicals is the most suitable whether by one shot or every 5 minutes. Based on my observation, one shot method is suitable because there is a little unsettled sludge floating in the reaction tank after the mixing of chemicals which is good for water treatment. Besides, I studied a chemical process called Fenton reaction which used solution of hydrogen peroxide and iron (II) sulfate to oxidize the wastewater. Furthermore, in this week, I spent a lot of time doing work for Matrix wastewater treatment plant. Among the activities I did were modifying pipeline for treatment plant, sketching reverse osmosis (RO) membrane and labelling every valve on RO membrane to ensure that the operator not confuse which valve need to be open or close. At the office, I was asked by my supervisor to calibrate turbidity meter that has not been used for a long time and help the technician deliver DI columns to Kohoku Electronics (M) Sdn. Bhd.</p>
<p><b>WEEK 6</b></p>	<p>In the next week, I had a meeting with my supervisor and other staffs and my supervisor succeed to propose a solution to encounter the problem at Matrix. Then, I was asked to join the technicians to settle the problem by using solution that my supervisor had proposed. At Matrix, I learned the technique to do piping installation and I also helped Mr. Irfan to buy some parts from hardware. We then had to service the activated carbon filter (ACF) again using the same method as before. After managed to settle the problem at Matrix, me and my friends, Syaraf and Imran has been given a new task which is to study an experiment which called resin trial method. For this task, we need to rewrite the procedure and list out the equipment used in the experiment.</p>

<b>WEEK 7</b>	<p>In this week, I submitted the procedure for the resin trial method to my supervisor. My co-supervisor asked me and my friends to find the equipment through online and setup the apparatus that she bought for the resin experiment. Furthermore, I also help my technician to repair the leaking roof at the office and deliver computers to Klang to be repaired.</p>
<b>WEEK 8</b>	<p>I helped the technician to put DI columns in the truck and deliver them to Eratreat Engineering Sdn. Bhd. which is located at Puchong. Ther, we replaced the existing DI columns with the new one that we brought. My supervisor also taught me about the resin trial method and explained the right procedure for the experiment. Then, me and my friend worked together in group understand the procedure that has been taught by my supervisor.</p>

<p><b>WEEK 9</b></p>	<p>In the next week, I helped my senior technician, Mr. Syaharani to deliver new DI columns to Sangsin Enerotech Sdn. Bhd. and took the old one. We cleared the water inside the DI columns by using a pump connected with a tube to pump the water out. Furthermore, I also helped the technicians for Kohoku's project. For this project, I helped the technicians to do face piping and I learned some basics in drilling and welding from Mr. Irfan and Mr. Syaharani. In the last day of this week, me and my friends had to stay at home due to Pandemic Covid-19 and obey the Movement Control Order (MCO). So, we need to work from home by doing the task given by the supervisor which is to make a research and write a report on Matrix's TWWTP improvisation.</p>
<p><b>WEEK 10, 11 &amp; 12</b></p>	<p>During these three weeks, I discussed and did the task together with my friends. I made some research for Matrix's TWWTP by identifying which type of chemical and the details of the out spec parameters. I also learned on how to improve the existing setup at Matrix. I completed this task by the help of Mr. Syamel where he is the technical engineer in the company. After finalized the report with my friend, we submitted the report to Dr. Beh and Dr. Mohsin through email.</p>
<p><b>WEEK 13</b></p>	<p>In the next week, I need to come to office to helped Mr. Syamel to do jar test for Vnotion Materials Sdn. Bhd. For this test, I need to identify the best chemicals and chemical dosage treat the wastewater. For the chemicals, we tried a few chemicals such as ferric chloride, hydrogen peroxide, alum and polyaluminium chloride (PAC). We use different dosage for every test which is 200ppm, 400ppm, 600ppm, 800ppm, 1000ppm and 1200ppm. Then, I did a report based on the result obtained from the jar test. From the result, it can be concluded that ferric chloride is the best chemical wastewater treatment and I submitted the report to my supervisor.</p>

<p><b>WEEK 14 &amp; 15</b></p>	<p>In the next week, I continued work from home by doing the last task given by my supervisor which is to research and write a report about resin regeneration including the mechanism, type of resin regeneration, technical data and schematic design. Me and my friends split every part to each other to do the task easier. During these two weeks, I completed my part which is providing technical data on how to regenerate resin. There are two methods of resin regeneration which is co flow regeneration and reverse flow regeneration. The best method is reverse flow regeneration due to high purity, lower leakage and less regenerant required. Then, I compile the report with my friends and submit the first draft to Dr. Beh and Dr. Mohsin through email. After being checked by the, we had to do some correction on the report.</p>
<p><b>WEEK 16 &amp; 17</b></p>	<p>In the last two weeks, I continued to do my next part which is to identify resin regeneration based on single column, quantity of resin and chemicals used in resin regeneration. There are many designs of column such as co flow regenerated vessels, reverse flow regenerated vessels, stratabed columns and Amberpack packed bed system. After completed my part, I had a discussion with my friends to ensure all the information is correct. Then, we finalized the report and submitted the final report to Dr. Beh and Dr. Mohsin.</p>



## 2.4 DESCRIPTION OF TASK ASSIGNED (MINI PROJECT)

For my mini project, it was located at an oleochemical company called Matrix Flavours & Fragrances in Telok Panglima Garang, Selangor. Since I have been a trainee at Bechem, I spent most of my time being here to do many kinds of work.

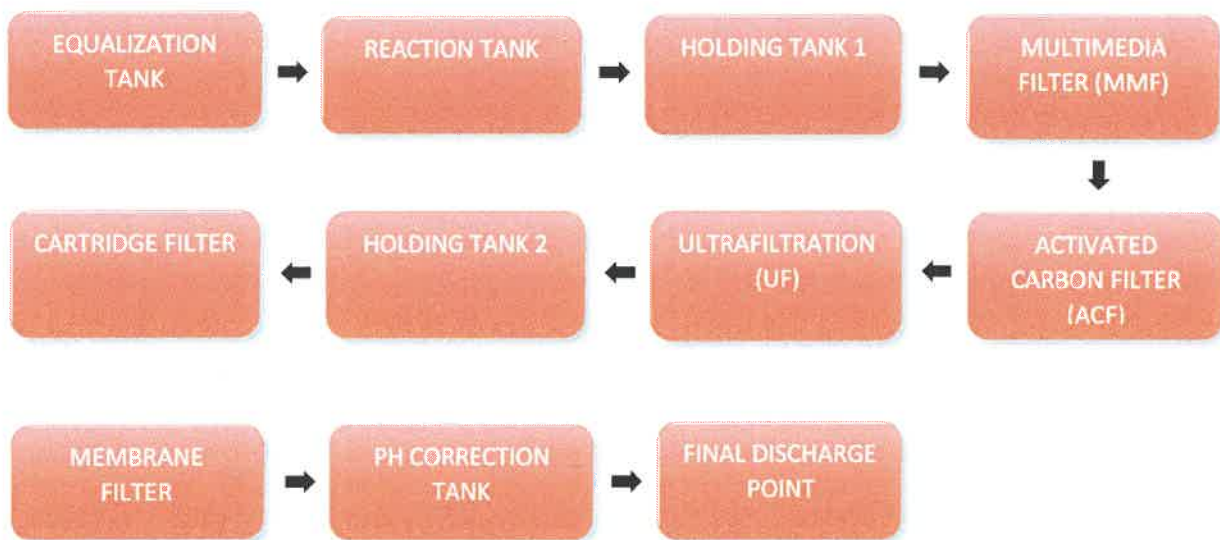


Figure 16: Matrix's Logo



Figure 17: Location plan of Matrix in satellite view

On that day, I went to matrix along with my friends and technicians from Bechem early in the morning. As soon as I get there, I was asked to study the process operating flow for the temporary wastewater treatment plant. By the help of the operator there, me and my friends had understood the process flow form the early stage to the final stage. This treatment plant is for temporary because the actual wastewater treatment plant for matrix is under construction.



**Figure 18: Process Operating Flow of the Wastewater Treatment**

Figure shows the process operating flow of Matrix’s temporary wastewater treatment plant. The process started when the wastewater flows into the equalization (EQ) tank. This EQ tank helps to provide storage for the wastewater to convert the unsteady flow into steady flow. So, once the flow is steady, the wastewater will go into a reaction tank. A chemical process called Fenton reaction occurred in reaction tank when Befes-2P and Beper-205 inserted to treat the wastewater. Then, Bebuff-201 is inserted to adjust the pH of the wastewater to neutral and BCT-RM10 also inserted as separating agent to separate the treated wastewater with the sludge. This chemical is mixed by a mixer that attached to the reaction tank and it took 3 hours for the wastewater to settle down. Then, the treated wastewater will flow into a holding tank to lower the temperature of the wastewater and continue to flow through the first part of filtration. First part of filtration consists of three filtration equipment which is multimedia filter (MMF), activated carbon filter (ACF) and ultrafiltration (UF). MMF helps to remove particles in the wastewater and ACF helps to remove the odour and colour of the wastewater. Then, the treated wastewater will flow into holding tank and then will be pumped into the second part of filtration which is cartridge filter and membrane filter. These two filters also known as reverse

osmosis (RO) system. This RO system helps to remove any residue of particles and chemicals in the treated wastewater. Before being discharge to the sewer, the treated wastewater will flow into a pH correction tank to ensure the pH value is neutral. Lastly, the treated wastewater will be discharged to the sewer.



**Figure 19: Matrix's Temporary Wastewater Treatment Plant**

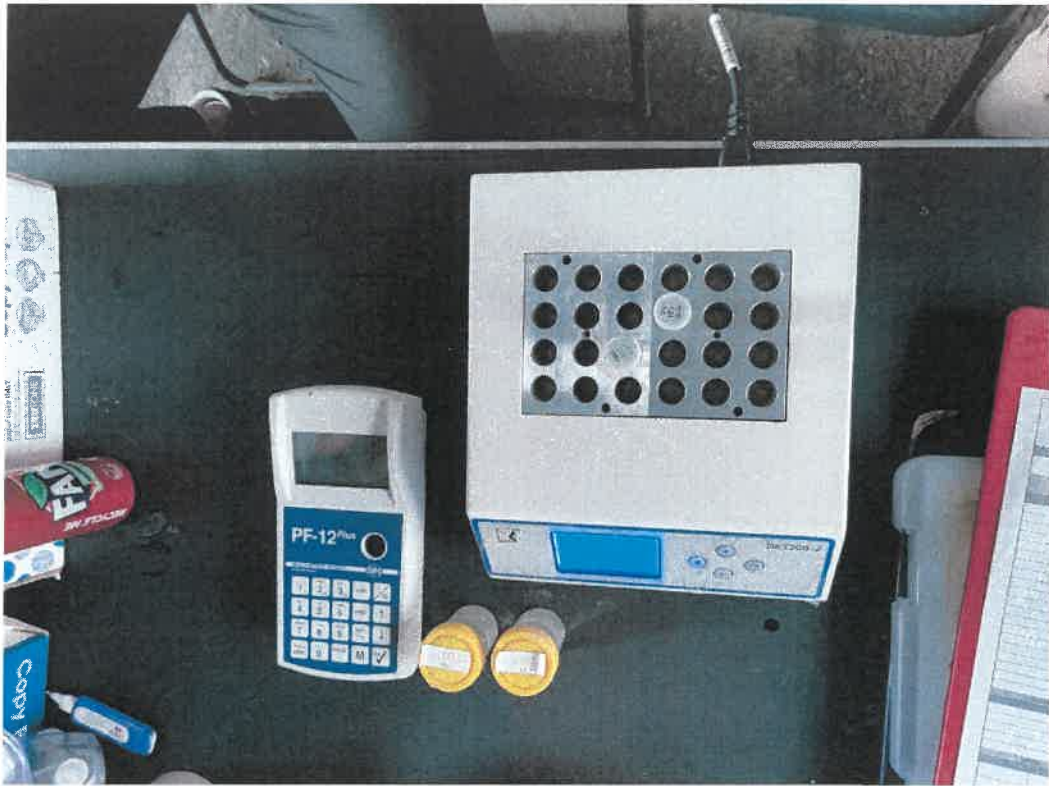


**Figure 20: Servicing the activated carbon filter (ACF)**



**Figure 21: Cleaning the block of the filter press**

Besides, I also worked together with my friends and staffs to clean some of the equipment at the treatment plant. We managed to clean the activated carbon filter (ACF), holding tank, reaction tank and the filter press. I also serviced the activated carbon filter (ACF) by replacing the old carbon inside the tank with the new carbon. The method used to remove take out the carbon from the tank is gravity concept that was taught by my supervisor. I used a water tube that is connected with a pipe to suck the carbon out from the tank. Furthermore, my supervisor asked me and my intern members to perform a chemical oxygen demand (COD) test. We measure the COD value of the treated wastewater from different discharge point to ensure COD value pass the department of environment (DOE) standard. We started the test by mixing the treated wastewater with a reagent in a vile and heat it for 30 minutes by using a heating block. After 30 minutes, we let it cool for a few minutes and measure the COD value using a photometer. Unfortunately, the COD value is high and we need to study how to solve this problem. In the next week, my supervisor succeeds to solve the problem which is the new membrane filter need to be adjusted. After adjusting the new membrane filter, we performed three COD tests and managed to get a good result which is less than 100 mg/L.



**Figure 22: Performing COD test for the treated wastewater**

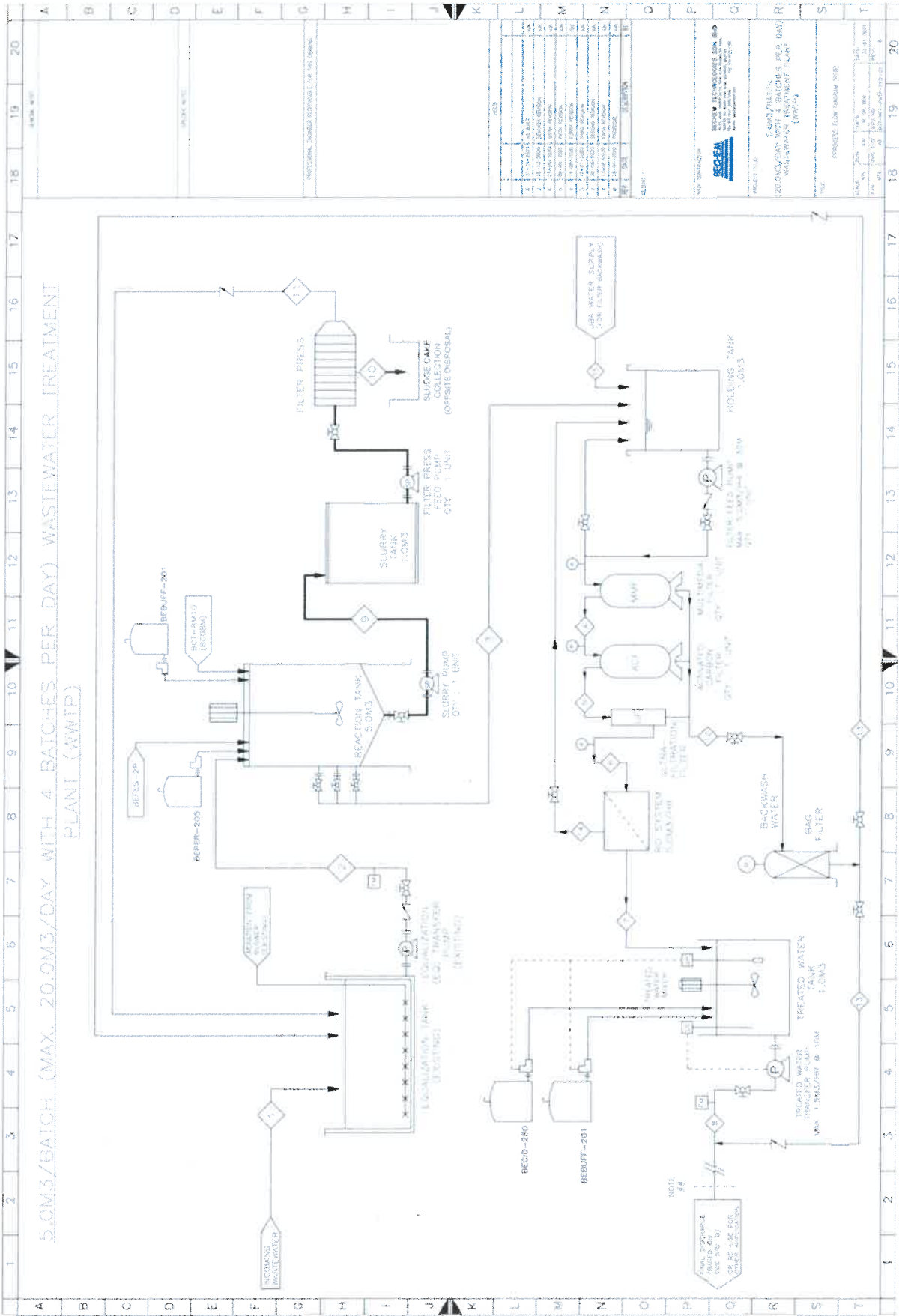


Figure 23: Matrix's wastewater treatment plant schematic diagram

### **3.0 CONCLUSION & RECOMMENDATIONS**

In conclusion, Bechem has taught me many new things that will help me to be a successful engineer in the future. For these 17 weeks, I have gained a lot of knowledge in water treatment including the process flow, equipment used and chemical test. As a trainee at Bechem, I able to improve my time management skills because this company taught to be punctual in everything. My supervisor also helped me a lot to complete my internship such as performing jar test, writing IECS report and many more. I hope that working at Bechem will give me experience so that I can continue working at any industry.

For recommendation, I think Bechem should involve the trainee more in the company's project to give more experience to the trainee. Bechem also should improve their working system because sometimes I had nothing to do in the office. So, I think Bechem should give more task to trainee to help them improve their employability skills and become a successful engineer.

## 4.0 APPENDICES



**Figure 24: Painting filter press**



**Figure 25: Learn about wiring for filter press**



**Figure 26: Drilling for Kohoku's project**



**Figure 27: Face piping for Kohoku's project**





**Figure 28: Briefing about Kohoku's project by my senior technician**



**Figure 29: Delivering DI columns to Sangsin Enertech Sdn. Bhd.**



**Figure 30: Performing jar test for Vnotion's project**