Cawangan Johor
Kampus Pasir Gudang

INDUSTRIAL TRAINING FIELD REPORT

Name : Mimi Nur Farrahida Binti Ahmad Sabri
Programme : Diploma In Chemical Engineering
ID : 2018283252
LI Duration : 15th March 2021 – 8th July 2021

Supervisor : Nik Camelia Nik Omar Al-Haded
Company Address : Royal Selangor International Sdn. Bhd.,

Visiting Lecturer : Mohd Zaki Sukor

ACKNOWLEDGEMENT

In the name of Allah, the most Beneficent and most Merciful, All praises to Allah, Lord of the universe and peace be upon His messenger. I want to acknowledge Him on top of all for blessing me with patience and tenacity of mind to complete this internship report. It is undeniably a vital requirement for a certified Diploma with flying colours and I have received outstanding help from many quarters which I would like to put on record here with great pleasure and deep gratitude.

Firstly, I would like to thank the university, UiTM Johor Kampus Pasir Gudang, for giving me the opportunity to have the experience before I graduate and have a knowledge and experience of working life. Besides, I would like to thank Royal Selangor International Sdn. Bhd for accepting me as an intern student in the company, also to thank compliment my industrial training supervisor, Nik Camelia. She is a very kind person and keen enough to give me her full attention. Without her endless care and wit, I would not have made any clear progression and understand the purpose of being an intern at all. Most thanks for her support, feedback and all the worthwhile lessons. Also, I would like to thank my Head of Industrial Engineering Department, Roy Yong, Industrial Engineering Senior Executive, Izzul Fitri, Industrial Engineering Technician, Asmahaniza, Senior Intern, Nur Athirah and others who had contributed their knowledge regarding my internship.

Other than that, I would also like to express my gratitude to my dear lecturers who have guided me and other companions throughout the internship program from the very beginning till its completion. Their expert lead, suggestion and all the updating notices, had provided me with relevant information in reaching the concept and objectives of this compulsory report. Surely, without such commitment and tolerance, I may not have finished any chapter efficiently. On top of that, Madam Salmi Nur Ain as my academic supervisor and both Sir Haikal and Miss Hidayu as my industrial training coordinator, thanks for cooperating.

Last but not least, it is a special honour to be a part of the firm itself for 17 weeks, so I acknowledge Royal Selangor International Sdn. Bhd, solely for accepting me. All the sense of concern towards me is tremendous and unforgettable from the staff. It is a beautiful experience to engage with the prestige firm, therefore, the least I can hope is that my hard work and training can be a great epitome to a better application of Chemical Engineering course in near future.

ABSTRACT

Internships are intended to provide students with the chance of working in the real industry. It helps familiarizing students with the working environment in the field they currently studying. Students are also provided with real-life practice which focuses on more practical activities than theoretical in chemical engineering field. Therefore, it is compulsory for final semester students from UiTM Johor Campus Pasir Gudang in Diploma in Chemical Engineering programme to undergo industrial training at the chosen company. The purpose of industrial training is to provide the opportunity to student in applying and implementing knowledge and concepts gained during theoretical learning in classroom in the real engineering industry. On the other hand, internships train students to become independent and systematic to meet the requirement to complete the tasks given in a certain period. Most importantly, students are required to undergo industrial training in order to complete the Diploma as well as graduate from the college. Students shall be evaluated based on logbook, supervisor's evaluation, industrial training presentation to visiting lecturer and written report for their internship. The first chapter this report defines the term of industrial training and description of industrial training report. In the following chapter of this report is company profile which elaborates the company details even more. The next chapter describe the summary of the duties and various tasks in daily and weekly of industrial training activities that has been carried out. The fourth chapter explained about the details of the experienced which involve major projects that has been carried out during the training. The last chapter explains the conclusion. This chapter also included the discussion and suggestion from the overall side of evaluation during training. For duration of 4 months, which consist of 17 weeks before completing the Diploma course, industrial training at Royal Selangor International Sdn. Bhd have begun on 15th March 2021 and ended on 8th July 2021 which supervised by Miss Nik Camelia Nik Omar Al-Haded.

Table of Contents

1.0 INTRODUCTION

Basically, the Industrial Training is one of the requirements for all final semester, graduating students of UiTM Johor Campus Pasir Gudang in Diploma in Chemical Engineering programme. In this final semester, an industrial training was underwent for the duration of 4 months at Royal Selangor International Sdn. Bhd to attain the awards of Diploma. This program was introduced to increase the level of work of the graduates and give vast exposure on real challenging working life. Industrial training exposes students to the actual working environment, at the same time to gain the knowledge through hands on observation and job execution.

In light of completing this industrial training, all the possible theoretical knowledge gained during education session was completely applied and implemented in the projects given in order to contribute to the company. Despite the situation is totally different between study and work, self-discipline needed to be instilled, for example, learn from the other staff on how to deal and handle working styles and challenges so it can be utilized in the future. During the industrial training period, students can learn, and practice new things related to the course taken at UiTM Johor Campus Pasir Gudang.

Students will apply the skills that they have learned throughout their academic years and enhance their knowledge and abilities at their participate companies. Industrial training offer students with important knowledge and skills also encourage them in becoming a successful and professional employee.

Students complete their industrial training after 4 months and submit the required assessments in order to graduate. Industrial training provides the responsibility for real life work, therefore in future students would be able to choose the career options with the working environment they are compatible with.

2.0 CONTENT

2.1 ORGANIZATION CHART AND HISTORY OF THE COMPANY

2.1.1 ORGANIZATION CHART

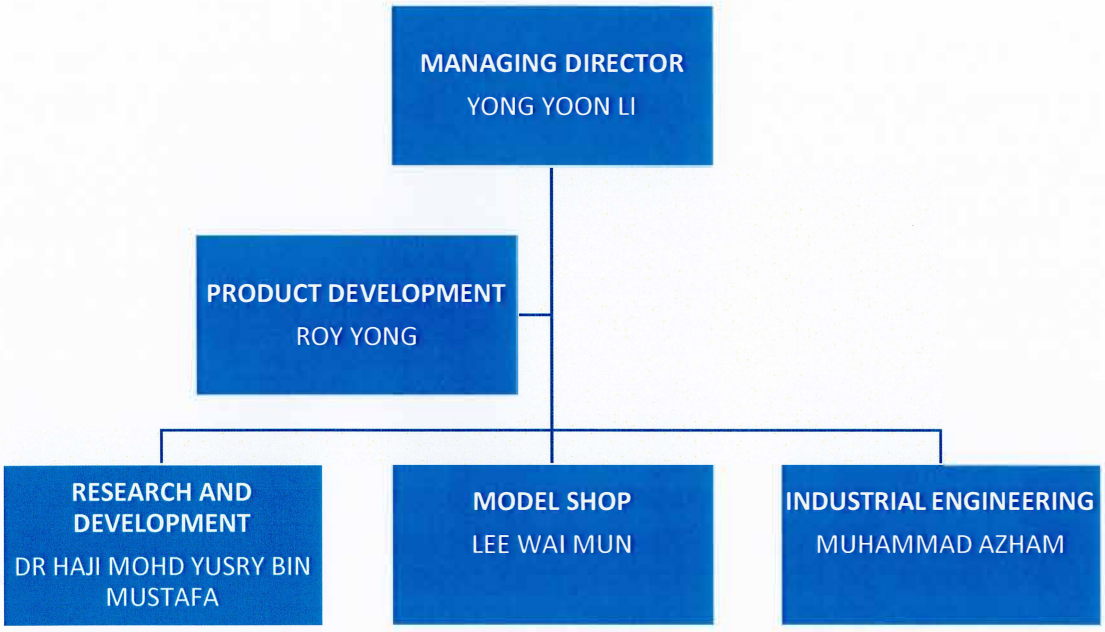

Figure 1. Organization chart of the training department

2.1.2 COMPANY HISTORY

Royal Selangor, the famous local pewter-making company. Royal Selangor is a powerhouse known throughout the world for their expertise in making quality pewters. The story of how it all started goes way back in 1885 when a young chap by the name Yong Koon Seong travelled all the way from Shantou, China to Malaya.

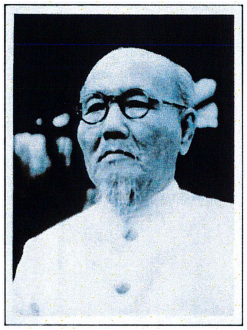

Figure 2. Yong Koon, founder of Royal Selangor

Yong Koon eventually became one of the first few pewtersmiths in Kuala Lumpur. His craft continued to develop over the years. Today, his business has grown so much since its inception. From a humble shop in Pudu Road – shop No. 219 to be exact, which was purchased with the money saved by his wife, Loh Pat, to having stores located in major cities such as Shanghai, London and Melbourne. In 1962, Selangor Pewter moves to a modern factory in Setapak with 70 employees. Selangor Pewter is renamed Royal Selangor, reflecting its status as royal pewterer. Royal Selangor acquires London silver company Comyns, including some 35000 designs covering many periods, from Roroco, Baroque to Art Nouveau. In the 1970, the company started exporting, first to Singapore and Hong Kong and then to Australia. Going through 1980, the market expanded into Europe and later in Japan. By 1992, the company changed its name to Royal Selangor to reflect its endorsement from Sultan Salahuddin, the Sultan of Selangor, dropping 'pewter' from its company name as its product range had expanded to include items from other materials. With that, in 2000, Royal Selangor introduces a new name style and corporate identity. A Royal Selangor piece exudes an elegant sculptural presence derived from the softness and versatility of pewter which is fashioned in a variety of finished – a traditional soft satin lustre, a dazzling brilliance that rivals silver or a subdued 'antique' finish. They use high quality cast pewter consists of 92% to 97% tin, with a small proportion of copper and antimony added to strengthen the alloy which is the highest international standard for pewter. A Royal Selangor offers over a thousand tableware

and gift items, from tankards and tea sets, to photo frames, desk accessories and wine accessories. The company has more than 40 shops worldwide and the base in Kuala Lumpur. It exports to more than 20 countries, with retail outlets in London, Toronto, Melbourne, Tokyo, Shanghai, Hong Kong, Sydney and Singapore. Royal Selangor is found in stores such as Harrods and John Lewis in United Kingdom, David Jones and Myer in Australia, Wako and Mitsukoshi in Japan. It represented in five continents with eight offices worldwide, it is also represented by its website. In 1989 and 1991, Royal Selangor received the Design Plus award at the Frankfurt International Gift Fair. In 1997, Royal Selangor received the Gift of the Year Award in the licensed gifts category, from the Giftware Kingdom.

Figure 3. Product from Royal Selangor (life-size Iron Man figure)

Figure 4. Pewter products from Royal Selangor

2.1.3 COMPANY OBJECTIVES

Every company has their own objectives. The world is changing all around us. To continue to thrive as a business over the next ten years and beyond they must look ahead, understand the trends and forces that will shape their business in the future and move swiftly to prepare for what is to come. They must get ready for tomorrow from today. This is their 2020/2021 vision and mission. It creates a long-term destination for their business.

2.1.4 COMPANY VISION

To be an international luxury brand that is renowned for design and craftmanship. The craftmanship with time-honoured techniques of creating handcrafted objects. They have 250 skilled craftspeople and a 40-strong in-house design team, and have expanded uses of pewter, exploring its many possibilities from children's gifts, wine accoutrements to personal accessories.

2.1.5 COMPANY MISSION

To believe in achieving excellence in design, manufacturing and marketing of high-quality home decor, gifts and jewellery. The company holds core values to set their goal and objectives which are having pioneering spirit; the criteria of design must be modern, classic and relevant, and considered world class. On the other hand, the other values they practice in their organization are to create the products with a passion for excellence, always seeking to improve ways and instil high-quality standards for excellence.

2.2 PROCESS FLOW

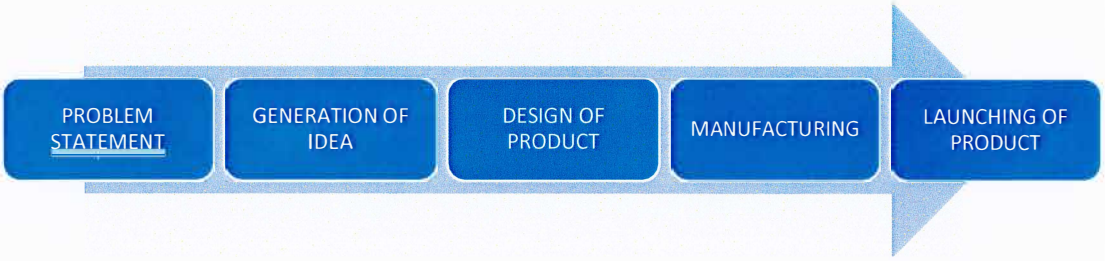

Figure 5. Process flow of the company

2.2.1 Problem Statement

The main factor that triggers problems to rise is from consumer's feedback upon their satisfaction on the product, judging the quality of the product by evaluating its ability to function flawlessly; the effectiveness of the product itself. Thus, the industrial engineers keep seeking on solvable problems emerging on the product by carrying out analysis on the features of the product that can be further improvised.

2.2.2 Generation of Idea

Ideas come forth as a result from industrial engineer's analysis, with the approval of the Head of Departments through a thorough discussion in a meeting. The idea is accepted only if all department heads have unanimously reached a consensus, considering crucial aspects for example product's safety as some substance used during manufacturing process might pose harmful effects to the environment. Then, to proceed to the next step of the process flow, which is design of product.

2.2.3 Design of Product

Starting from this stage, the design department will take over but they are still under the surveillance of industrial engineers. Using professional design software, they recreate the revised version of the product. Beginning with a sketch, until the complex figure of the product is modelled. Prior to the manufacturing process, the design would also require approval of both the Design and Industrial Engineering Departments.

2.2.4 Manufacturing

Manufacturing department, commercially recognised as the production team of the company, will take charge of the manufacturing phase. It is divided into three consecutive sections:

i. Rubber mould making

A mould made of rubber is created precisely according to the size of the product. The rubber is a two-part liquid, which requires a careful mixing of the two parts together using a specific ratio. This will create the liquid rubber that is poured into the mould.

ii. Casting

Casting process takes place when polymer resin, the commercial base material used at the company, is poured into the rubber mould. It takes about two to three hours for the product to completely take its shape inside the mould.

iii. Finishing

Using modern instruments and with the presence of high-tech machinery, the product is polished in order to smooth out any scratches, dusts or stains that seem to appear on the surface of the product.

2.2.5 Launching of Product

Prior to the launching, the product that have been examined by the Quality Engineers from top to bottom and approved will be sent to the packaging team to be packed and ready to be exported.

2.3 BRIEF DAILY/WEEKLY ACTIVITY

At Royal Selangor, an industrial engineer's job scope is resolved within the Operations Department, which comprises of three supporting departments, which are R&D (Research and Development), Manufacturing and New Product Development respectively. Industrial engineers work in a team, aimed to yield the best result possible by gathering different ideas. They look forward in improvising the quality of product in terms of effectiveness. Environment effect, type and quality of raw materials used to produce a product are some of the factors of effectiveness of a product.

As an intern in the Industrial Engineering Department, working together with other major departments like Manufacturing and R&D has been a casualty thus an excellent communication skill is required in order to ensure a systematic project and any inconvenience for instance misunderstanding of information can be avoided from occurring.

2.3.1 TECHNICAL DRAWING

Every product that is manufactured from Royal Selangor would require a technical drawing as it is an important element involved in the third stage in company's process flow. On daily basis, using appropriate design software, Rhinoceros 5.0, the details of the technical drawing such as dimensions, measurement and types of screws and bolts used for the product were updated. In some cases, for new products that have not been launched, the technical drawing would require to be constructed from scratch. The construction of technical drawing was fully under the control and guidance by personnel which expertise in creating technical drawing, engineers, designers and technicians.

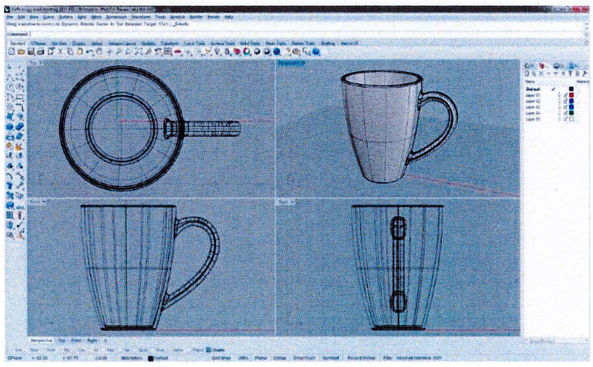

Figure 6. Technical drawing using Rhinoceros 5.0 software

This task would require knowledge from throughout study in Diploma in Chemical Engineering Programme, course code CHE211 which subject is Engineering Drawing. Throughout the execution of the task, the concept of subject was able to be applied.

2.3.2 MACHINERY SOP

An SOP (Standard Operating Procedure) is a procedure specific to the operation that describes the activities necessary to complete tasks in accordance with the standard that has been accustomed to. The purpose of a SOP is to provide detailed instructions on how to carry out a task so that any team member can carry out the task correctly every time.

Throughout the internship duration, a machinery SOP was completely made using Microsoft Excel with the assistance of technicians from Tool and Die department. The SOP was intended to teach the workers the correct and safest method to handle the machine. In order to avoid misunderstands, choice of words used are important because not all workers are highly educated. Thus, only understandable were used.

2.3.3 SOP POSTER

Cooperated with Safety Department to carry out this task. The main objective of this task was to increase awareness towards safety among workers at the factory. Since most of workers' job required them to handle heavy machineries and hazardous substances, safety is the most crucial component that needs to be paid attention to. This task was done under supervision of the safety officer. This task SOP poster also have been made using

Every day, SOP poster was checked at every working area to make sure it was updated. For working areas with outdated SOP poster would be replaced with a new one, created using online application, Canva.

2.3.4 3D SCANNING

This task would require skill of using both scanning hardware and software, which is EinScan Pro. Consist of rotating turntable, functioned as the medium to hold the product and adjustable projector to scan the product. 3D scanning was done on the products that will be sent to the archive room for future revision.

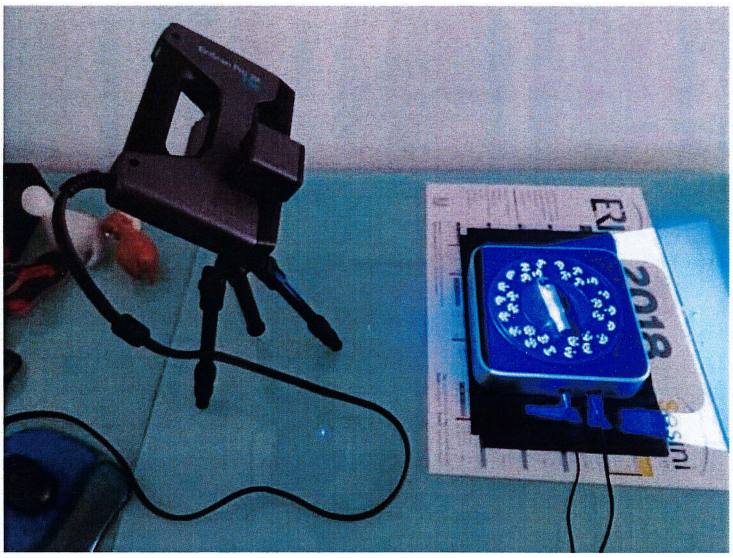

Figure 7. 3D scanning instruments

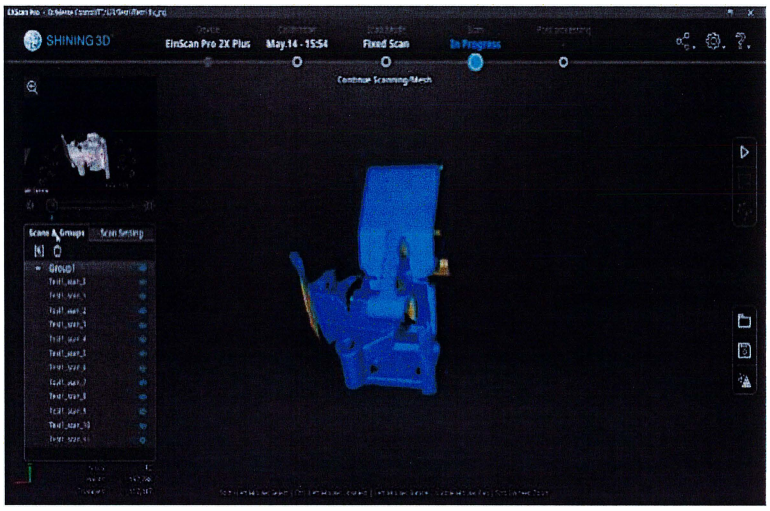

Figure 8. 3D scanning software

In order to carry out this task, the instruments must be set up beforehand, including the product which need to be properly placed on the turntable. The software needs to be opened and “scan” mode is chosen, only before setting the number of turns of the turntable. The projector would emit a blue light throughout scanning process. A successful scanning should be saved in the file appointed by the company.

2.4 DESCRIPTION OF TASK ASSIGNED

2.4.1 MINI PROJECT: REPORT ON CONVERSION FROM BONDED PORCELAIN TO POLYURETHANE

The main purpose of this project was to ensure a safer and healthier environment at workplace. Bonded porcelain tends to release particle-sized dust, carcinogenic substances which could pose danger to the lungs in case of inhalation. The other purpose was to increase production. According to the Department of Industrial Engineering Head, Roy, production rate could be increased up to 8 times when products are casted using polyurethane instead bonded porcelain. The amount of products obtained in one working day when casted using bonded porcelain and polyurethane are 4 and 48 units respectively.

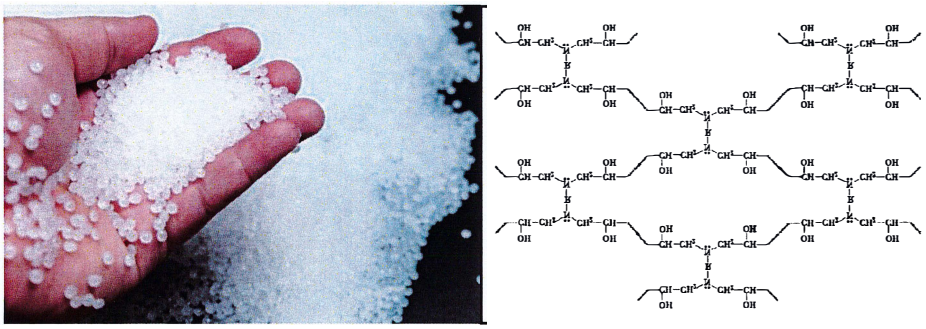

Figure 9. Polymer resin granules and its chemical structure

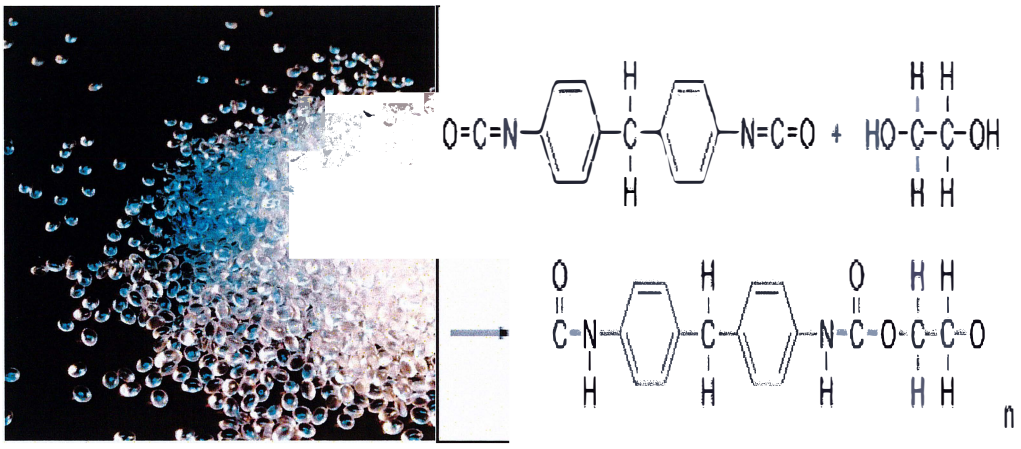

Figure 10. Polyurethane granules and its chemical structure

This project was given by the Head of R&D and Industrial Engineering Department. Bonded porcelain is the commercial base material used for casting of products. In the chemical industry, bonded porcelain is commonly known as polymer resin. Polymer resin is a

thermoplastic resin with low heat resistance and low stiffness but with good toughness. Primarily, products from Royal Selangor are made of bonded porcelain. Polyurethane is a polymer composed of organic units joined by carbamate links. In contrast to other common polymers such as polyethylene and polystyrene, polyurethane is produced from a wide range of starting materials and class of polymers.

A two-page report was written with guidance of Dr Yusry, Head of R&D. Prior to the report writing, briefing on casting process at Royal Selangor was given by the Head of Industrial Engineering, Roy Yong. A thorough research on both polymer resin and polyurethane was carried out before discussion with Dr Yusry, Head of R&D. Plenty of new knowledge was obtained from the discussion with Dr Yusry, which consequently had assisted in adding the content of the report that was later checked by the Head of Industrial Engineering.

From this project, it was realized that the awareness towards sustaining a hazard-free working environment was able to be instilled. By executing this project, the risk of being affected with a long-term disease, in this case, lung cancer could be reduced. Thus, this project applied knowledge from a subject learned in previous semester during Diploma, Occupational Safety and Health, where safety is the key of a successful organization.

2.4.2 MINI PROJECT: FINDING SUBSTITUTE FOR POLYETHYLENE BAG

The reason this project was carried out was to develop a sustainable environment, in the context of packaging disposal. At Royal Selangor, the type of packaging used for product transportation is polyethylene bag. Compared to other types of packaging, polyethylene bag takes longer time to incinerate due to the complex chemical bonds exist during its manufacturing process. Furthermore, the incineration of polyethylene bag results in harmful gas emission. Considering the usual method of disposal, the country seemed to be running out of space in landfill sites. Therefore, due to the disposal issues, a packaging replacement for polyethylene bag would be necessarily required. For the transportation of products from or within the company, including products to be exported, the type of packaging utilised was solely polyethylene bag. Thus, the company needed to find out an alternative to optimise the disposal process in terms of environmental effect, which would result in a more effective and environment friendly process.

Polyethylene bag, commercially recognised as PE bag in the industry. PE is an abbreviation for polyethylene and is a thermoplastic resin obtained by polymerizing ethylene. In the industry, it also includes copolymers of ethylene and a small amount of α-

olefins, it is a transparent plastic bag that can be used for packaging of clothing, bags, and electronic products.

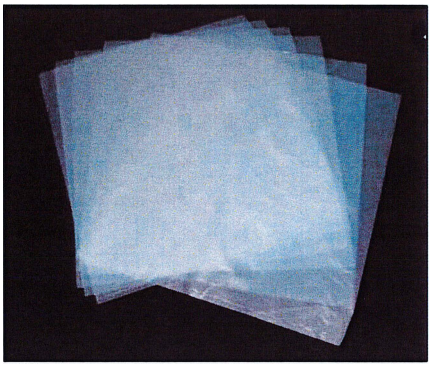

Figure 11. Polyethylene bag

In the beginning of the project, Dr Yusry, Head of R&D had briefed on the type of packaging used for the company's product transportation, which was polyethylene bag and its drawbacks. Thus, an online research was conducted to gather information on polyethylene bag and its substitutes. The substitutes found was mostly bioplastics, renewable plant-based biomass plastics. The information gathered was then discussed with Dr Yusry and came up with a choice, bag made of bamboo.

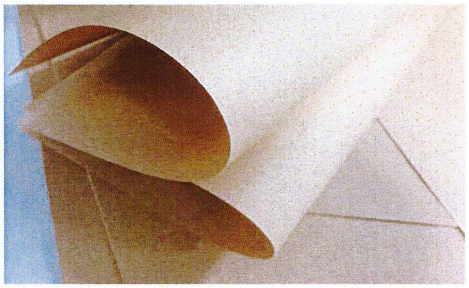

Figure 12. Paper-based bamboo

Unlike polyethylene, bamboo is a renewable source. Buying bamboo in bulk would be more cost-effective compared to polyethylene bag, with 20 percent price difference, as said by Dr Yusry. Since bamboo is a paper-based, it degrades faster which would result in easier disposal management.

From this project, concept learned from subject Environmental Engineering was successfully able to be applied and integrated. This project emphasizes on the importance of sustaining a healthy environment by ensuring every process carried out in the company is harmless in terms of environment health.

2.4.3 COMPANY PROJECT: LAYOUT PLAN OF ROYAL SELANGOR

The main purpose of this project is to optimise the economical growth of the company to ensure a sustainable working industry. The objective of this project was able to be realized by revising the labour cost of each department by measuring every working area that have been allocated for each department.

Since there had been a few renovations and change in employees count and location of working place of some department at Royal Selangor, the labour cost would require a re-evaluation.

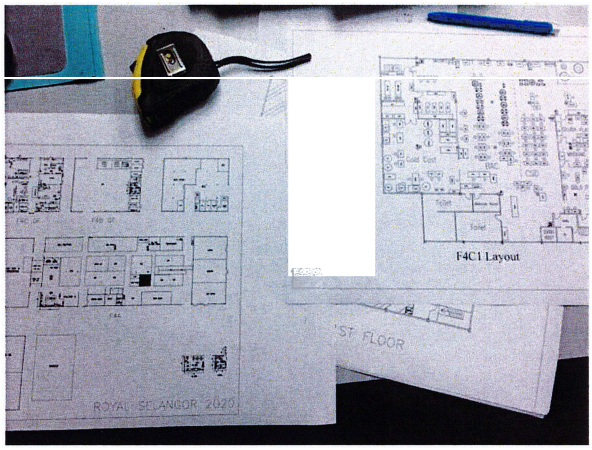

Figure 13. Layout plan of Royal Selangor

This project required to manually measure the working areas that require new updates due to renovation and changes in number of labours. The area of the working space is measured by multiplying the length and width of the room. The measurements of length and width were recorded using measuring tape. Using Microsoft Excel, the labour cost was updated by inserting particular formula and equations into the tables.

From this project, it was observed that being able to apply knowledge gained from the subject learning Plant Design in the previous semester, where the working area contribute to the salary of workers, would lead to a successful project. On the other hand, tt was learned that the importance of the economic growth plays a major role in giving birth to a successful company or industry. Not only production, but also economic growth is important.

2.4.4 MINI PROJECT: RESEARCH ON SEA WATER DESALINATION PROCESS

The objective of this project is to overcome the water scarcity issue that will occur in the future. Thus, this project emphasizes on the process flow of a complete desalination process.

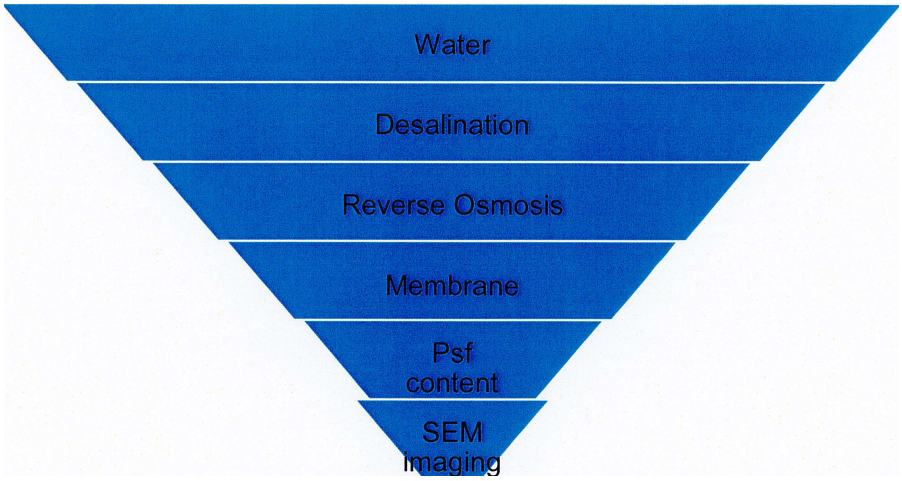

Figure 14. Flowchart of desalination process

This task was given during Work from Home period, by Sir Haikal, Industrial Training Coordinator in order to strengthen the understanding in the concepts of Chemical Engineering course. Upon completion of this project, the information on sea water desalination process was gathered, for example the factors that trigger water scarcity and the available solutions. The information was then discussed with Sir Haikal.

For the outcome of this project, the concept of the subject Environmental Engineering learned in the fifth semester was able to be applied. The concept of desalination process is somehow similar to wastewater treatment process, where impurities are removed from water

by undergoing several treatment stages. From this project, it was learned that desalination process would not only revolutionise the chemical engineering industry, but also save the future generations from water crisis.

3.0 CONCLUSION

Throughout 17 weeks of industrial training, a lot of experience and exposure in the engineering industry have been gained. The daily tasks and mini projects that had been assigned had provided an advantage to learn and gain knowledge about topics that are not familiar with. Since most of the tasks given involved with research and development, plenty of knowledge and engineering concepts obtained from 5 semesters of theory learning could be made into application. Other than communication skills, industrial training has given much experience on how the work environment would treat people and explains on their behaviour. Being an intern in the Industrial Engineering department had taught to work and succeed together in facing in any situation, even in a crisis. The Head of Industrial Engineering department had given inspiration to focus more on leadership and the importance of exhibiting professionalism in every task that has been carried out. The gist is, it is essential for every student to experience the situation of a real working environment before entering the real industry in their future. This helps them to get ready and face on what possible outcomes and challenges they might have to face in the real world.

4.0 APPENDICES

Figure 15. SOP poster created using Canva app

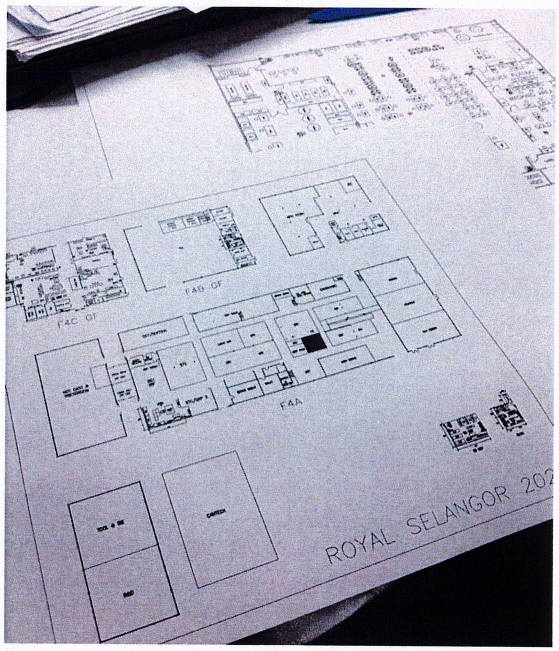

Figure 16. Layout plan of Royal Selangor

Converting the base material, polymer resin to polyurethane have been proved to save time. In manufacturing field, time is one of the most crucial aspects that needs to be taken into consideration as it influences the efficiency of the whole process. Hence, time taken to achieve completion of a unit of product is systematically divided into three, which are preparation time, run time and touch up respectively. Each time holds a significant role in product development, where the preparation time is the period which the equipment and material are set up and ready to be operated. Run time is the time taken from the beginning, where the material starts to develop until the process is finished, where final product is obtained. Run time is evaluated when the base is casted using polyurethane, where the method used is plastic injection molding. The source, polyurethane is injected into the mold through a tube. When the mold is fully filled with polyurethane, the source is detached from the tube.

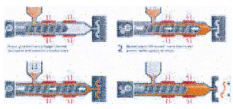

Figure 1. Simulation of plastic injection molding

Touch up time is evaluated in the event that there are any mistakes on the final product which needs to be corrected. In order to employ an efficient process, the run time must be as short as possible but the operation need to carefully carried out so that mistakes can be avoided thus touch up time will not be required.

When polyurethane is utilised, the time taken to produce a single unit of product is observed to be eight times faster than the time taken to produce the similar unit using polymer resin. Polymer resin takes 120 minutes to finish producing one product meanwhile polyurethane consume only 15 minutes to produce one product. Shorter time is more preferable.

On the other hand, converting the base material has been observed to be able to elevate production. Polymer resin can produce only four units per one working day. Polyurethane can be produced 12 times more than polymer resin, which is 48 units per one working day.

Furthermore, it is proven that the project has the capability to save energy consumption thus reduce monthly tariff of the industrial unit. Since the time operation time has decreased, the energy consumed, kW/h can also be reduced.

To sum up, in terms of a large-scale production, if we are able to save time, we can reduce the energy consumption, thus reduce the monthly tariff consequently cut the cost. Converting the base material from polymer resin to polyurethane definitely gives a great benefit not only to the manufacturers, but together with the workers.

Figure 17. Written report on Mini Project: Conversion from Bonded Porcelain to Polyurethane