UNIVERSITI TEKNOLOGI MARA

Gammax
Perfection of Refinishing

INDUSTRIAL TRAINING REPORT

NAME : **WAN ARISSA BT WAN ZAID**

PROGRAMME : **J4EH110 – DIPLOMA OF CHEMICAL ENGINEERING**

ID : **2018269716**

LI DURATION : **22 MARCH 2021 – 15 JULY 2021 (17 WEEKS)**

SUPERVISOR : **MR PHOONG TIENG YU**

COMPANY ADDRESS : **4, JALAN ANGGERIK MOKARA 31/63,**
KAWASAN INDUSTRI KOTA KEMUNING,
40460 SHAH ALAM, SELANGOR

VISITING LECTURER : **MADAM NOORHALIZA BINTI AZIZ**

COORDINATOR : **MS HIDAYU ABDUL RANI**

ACKNOWLEDGEMENT

Alhamdulillah, and praise be to Allah, the internship program that I have had with Gamma Coating Sdn. Bhd. has been a new life adventure and a new learning experience for me to widen my knowledge in this industry. No doubt in my mind that I can see myself developing by stages throughout the span of the internship program. Therefore, I consider myself as a lucky individual to be able to experience this industrial training, especially during this pandemic season where I can see a lot of students struggle with finding a place to undergo their internship. I am thankful and beyond grateful to have met a lot of successful people and professionals to have led me through out of my entire internship process.

First and foremost, I am using this opportunity to give my biggest gratitude and a special thanks to my training supervisors, Mr Ooi Zin Heng, Mr Phoong Tieng Yu, and Mrs. Arthi for making it possible for me to complete my internship with success despite having to have my internship alone at a place I've never been before. I want to thank them for giving me this learning opportunity, to learn to make mistakes and learn to overcome the problem at work. Alhamdulillah, with the help of them, I have been able to develop both soft and hard skills.

Next, I want to thank Mr. Tham, also known as my mentor, which has given me the spirit and the wise words to keep me going. Knowing him, I know that he has taken a good care of his workers, by the way he communicates with people. I want to thank my coordinator Miss Hidayu Abdul Rani and Mrs Siti Hajar Anaziah Muhamad for taking care of students' welfare and always there to answer every of our questions. Finally, thank you to my parents and friends for always being there for me and to support me mentally and physically throughout my internship. They all have contributed a lot throughout the period of time of my internship, and I can never thank them enough for that.

I will take these experiences, and hopefully try to adopt it in the future, to solve certain problems with the knowledge that I have. This experience has been a career developing experience for me, and I had fun during the internship. I hope that this does not end here, and will continue to achieve more until I have become the person that I wanted to be in the future.

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1.0 INTRODUCTION

1.1 GENERAL

The industrial programme has been introduced to university students to provide opportunity to the students to experience real working situation and environment in ways that student could apply and relate the theoretical knowledge that they have studied to that certain job. The objectives of an undergraduate to undergo Industrial Training are :

- Learning about safety precautions and procedures in the industry.
- Learning about the working ethics in the industry.
- Applying knowledge and skills in a problem at industrial projects.
- Making sure that the training is relevance to the current course you are currently taking and is up to date.
- Providing the opportunity for students to learn the disciplines of the industry.
- Providing the opportunity for students to get out of the comfort zone and try out the things that can determine their future.
- Students to be able to acquire practical skills and experiences from professionals in the industry.
- Providing the opportunity for students to make optimal decisions to resolve the work challenges obtained.

Gamma Coating Sdn. Bhd. understands the importance of Industrial Training programme is to adapt students to real life working situations. The internship programme that Gamma Coating Sdn. Bhd. has provided helps students to understand the actual problem in daily scope of work, and the solution options provided to overcome the current problem. This is one way to help university students to get ahead of them by gaining experiences and skills needed by the industry. Internship helps to develop a better student in the future.

1.3 ABOUT COMPANY

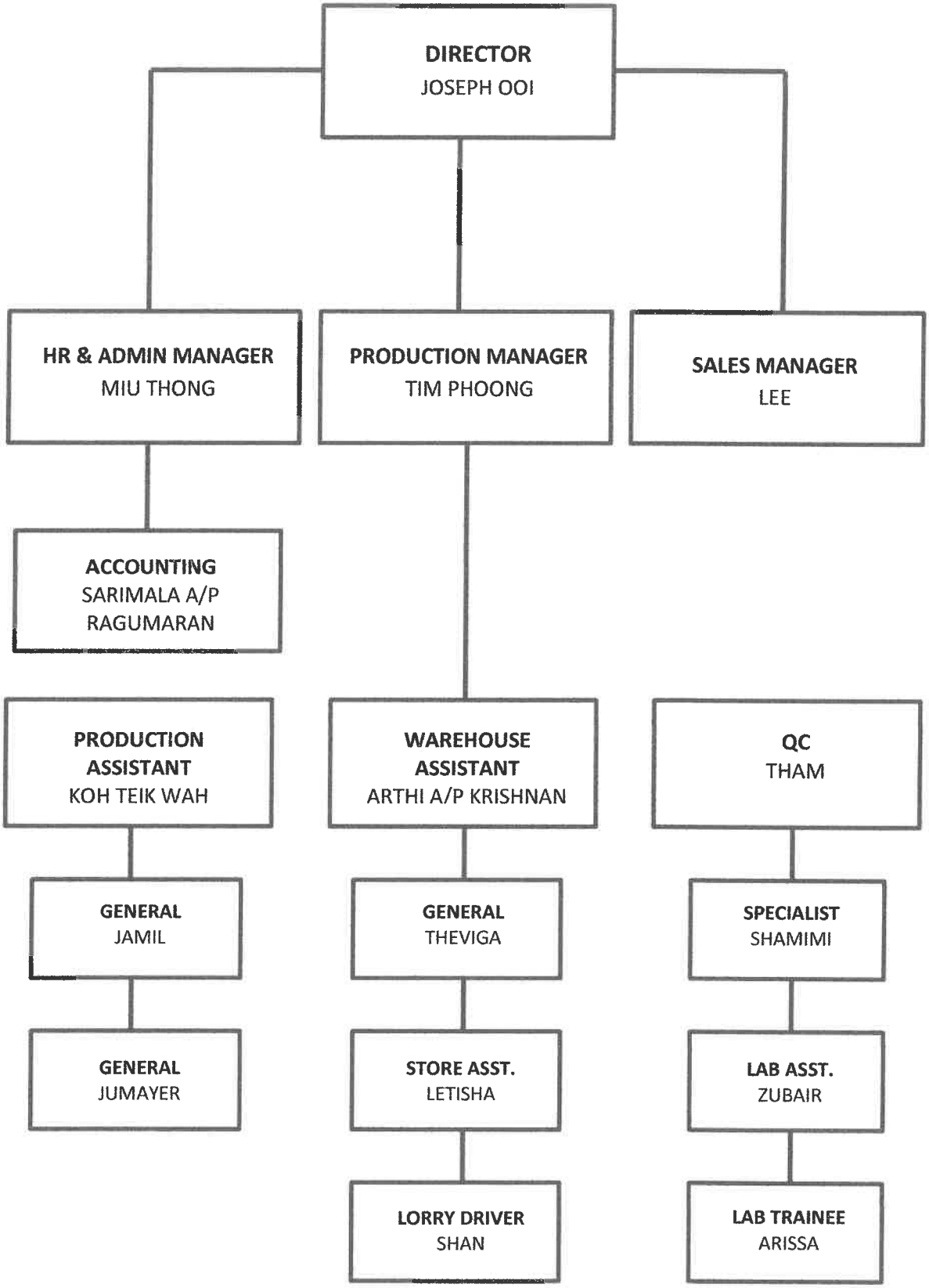
Figure 1 : Company logo.

GAMMA COATING SDN BHD, was incorporated in 2018 by an experienced personnel, specialised in automotive paint especially in the field of deep foundation such as forming of pigment, additives, resins and solvent. The company started as subordinates with cooperation of Alpha Max Sdn. Bhd. **GAMMA COATING SDN BHD,** has grown up to be one active foundation player in the local arena. Over the years, the company has acquired variety of formulas and various types of resins and paint.

GAMMA COATING SDN BHD are being back up by a group of highly qualified and experienced professionals and consultants to offer more economical alternative ways in production of wider range of ingredients and pigments. Besides, there are planning to make its own Research & Development department to widen the expertise in different materials and to study different kind of paints, and their manufacturing process.

Figure 2 : Training place

1.4 COMPANY ORGANIZATIONAL CHART



2.0 PROCESS FLOW

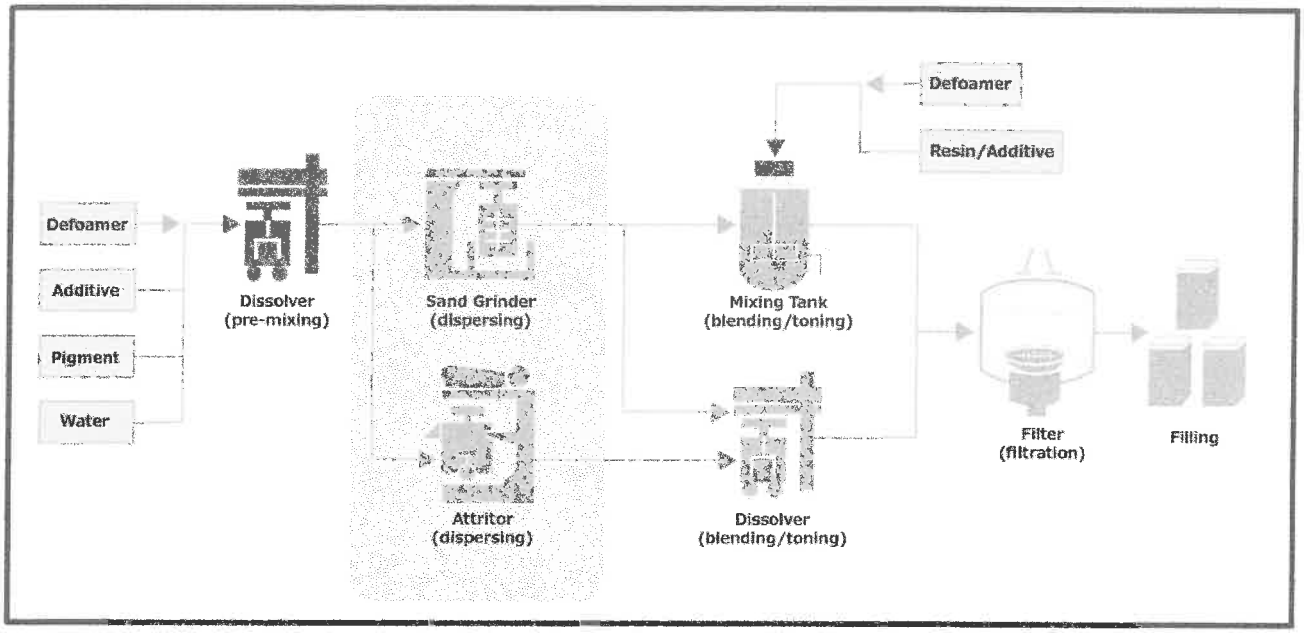


Figure 3 : Paint manufacturing process

This process has 5 steps starting with the raw materials that will be mixed and ended with filling the product. First, these raw materials must be measured using weighing scales according to the prescribed measurement report. The addition or subtraction of 5kg error usually occurs because the pigment used is in the form of a sack. Although this error does not change the pigment produced but the dosage filled must be stated in the report.

This process is usually observed by the head of the process department to observe the correct dosage filled in the pre-mixing process. Subsequently, a mixture of these materials will usually produce clumps and stick to each other. Therefore, this pre-mixing has to go through a milling process at high speed to ensure that the pigments do not coalesce and are damaged. This process is very important because the resin and additives produced must be in a very fine state so it will not damage the surface of the car. Usually the dispersion of this process takes 24-48 hours depending on the quantity and type of components produced.

The first sampling will be taken and tested with the sample that has been made. If there is a significant difference, all additions will be made in a process called let down. However, if

there are major errors, then this process should be stopped immediately. After these 3 processes have been completed, then 5g of the mixture will be taken to be tested in the laboratory process.

There are 4 tests that must be done, namely specific gravity (SG) calculation, temperature test, draw down on paint film and fineness test. The value for each test performed must be in the ideal range, and if any of the factors fails, then further processing may be required. The finished material must be put into the let-down process again to ensure that it is sufficiently mixed. The last test is applied before the filling process which is the evaluation of properties such as degree of dispersion, viscosity (consistency), density, tint strength and pigment colour, application, dry time, gloss, pigmentation and dry film appearance.

Figure 4 : Pre-mixing process

Figure 7 : Dissolved paint

Figure 8 : Filtration process

Figure 9 : Testing lab

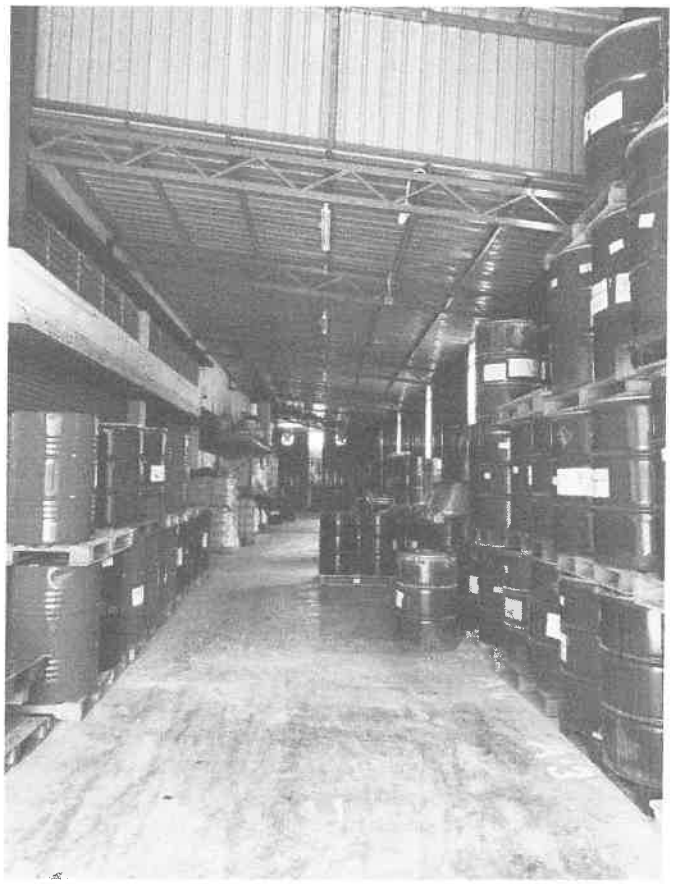


Figure 10 : Filling process

Figure 11 : Packing process

Figure 12 : Pick-up truck

3.0 BRIEF DAILY/ WEEKLY ACTIVITY

Throughout the internship period, I was assigned with conducting laboratory tests in the middle and after the let-down process. This testing process is very important and must be done accurately as it will affect all the shapes and conditions of the paint itself. In 17 weeks, this laboratory test will be done every day in addition to the other tasks according to each mixing of paint ordered. Usually, there are 5-6 code colours that require testing up to 4-6 times to produce an ideal and accurate paint film appearance. Every successful and failed testing must be recorded in a report and sample cans to be reviewed by the supervisor.

TEST 1 : Specific gravity (SG)

Specific gravity (SG) is the ratio of the density of a substance to the density of some substance (such as pure water) taken as a standard when both densities are obtained by weighing in air. Calculating specific gravity is really important as it is an important characteristic to determine the respected value of density and viscosity. There are usually specified temperature to do the testing which is between 35-37°C because the cohesiveness will affect the weight of specific gravity. In this testing, a stainless steel precision instrument which is also called as density cup to determine the specific weight of paints. This instrument is in a cylindrical shape and has a hole in the middle cup in order to exhaust any excessive paint liquid.

The formula for calculating Density and Specific Gravity are:

$$\text{Density} = \frac{\text{Weight}}{\text{Unit Volume}}$$

$$\text{Specific Gravity} = \frac{\text{Density of the Material}}{\text{Density of the Water at the Same Temperature}}$$

Note: 50cc = $50cm^3$ = Volume

100cc = $100cm^3$ = Volume

TEST 2: Temperature

The temperature must be taken at least 3 times to calculate the average measurement for each batter. This process uses a thermometer and should be between 35-37°C. In this case, it's important to observe the room temperature as it is a major effect of temperature values. Low weather will cause the paint to become too viscous and if it exceeds the maximum temperature, it will become too tedious which resulting the appearance to become uneven and thin. These measurements usually depend on room temperature and weather. Therefore, supervisors will usually look at the suitability and make a decision on timing. Latex and acrylic paint easily crack and peeled when exposed to high temperature. It is very important to analyse the chemical properties of a paint to see the principle of heat transfer in the manufacturing process. A thermometer will be clipped on the edge of the mixture to calculate the most accurate values.

Figure 15 : Paint thermometer

TEST 3: Viscosity (consistency)

Viscosity is a fluid's resistance to flow measured by time and temperature. Good paint depends on its viscosity. Paint viscosity is closely related to the thickness and adherence of the coating. It is very important in the manufacture of automotive paints because from this measurement we can measure the total life, pressure, flow rate and speed of the coating of a coating material. However, this testing should prioritize the appropriate room temperature because each viscosity test can cause significant changes in paint appearance. The warmer the room the lower the viscosity value, while the colder the room the higher the viscosity.

Normally, addition and subtraction of 5 seconds are accepted due to the pressroom temperature factor. Viscosity is directly affected by the temperature, shear rate and other possible variables different with off-line from what they are in-line. In this testing, viscosity values still measured with traditional instrumentation like flow cups and dip cups on factory floor. In this testing, a 4 cup din tool is used to measure the viscosity of paint, ink, and so on. The tool is made of aluminium with stainless steel holes. Din 4 cups will be dipped in the coating while measuring the second flow time. The normal total viscosity is between 58 seconds to 120 seconds because it is not too thick or watery.

Steps of viscosity measurement

1. Stir the coating.
2. Fully submerge the din 4 cup into the coating.
3. Start the timer as soon as the cup is out of the coating.
4. Stop the timer at the first break in the stream.

Figure 16 : Din 4 cup

Figure 17 : Coating

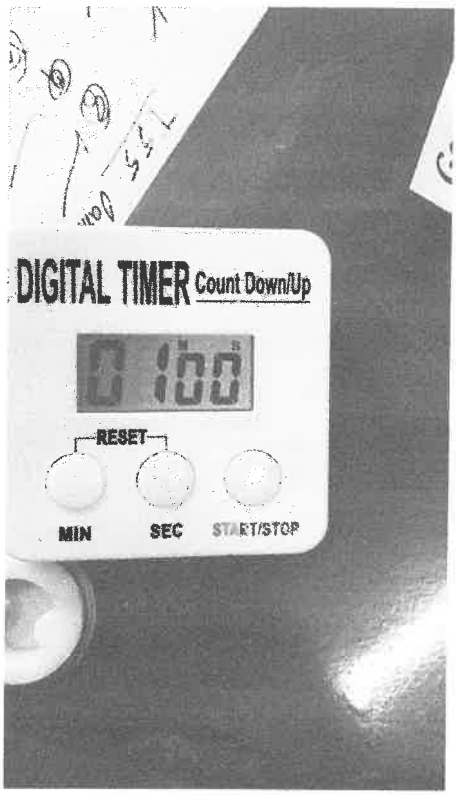


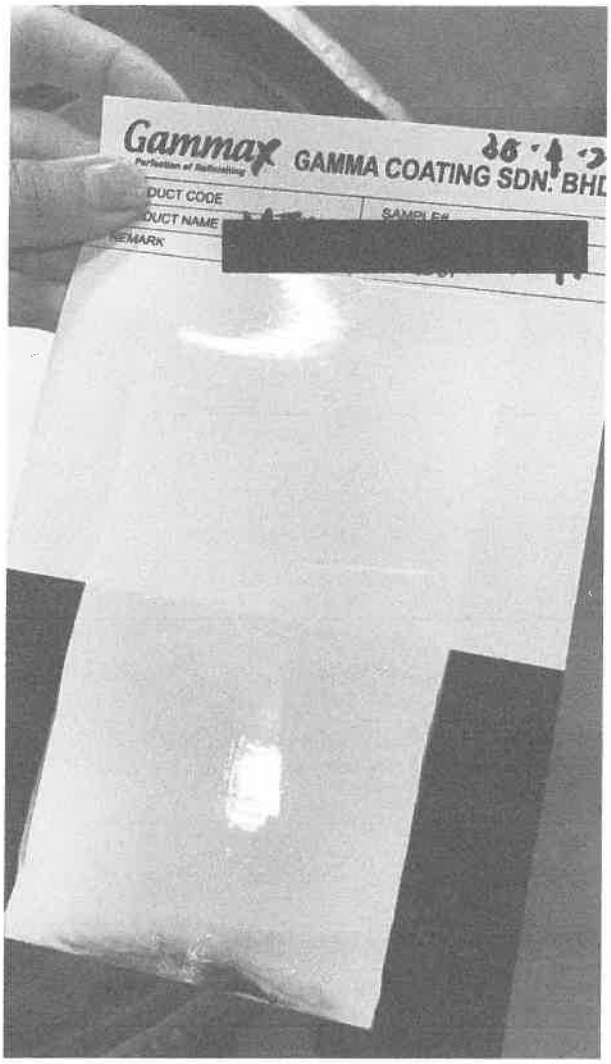
Figure 18 : Timer

TEST 4 : Dry film appearance

Drawdown cards are used for testing paints and coatings through wet film preparation. This experiment requires two equipment. The first equipment is called a black and white card. Black and white cards are used to measure both opacity and contrast ratio. By measuring reflectance values of both parts of the card one can gain a quantitative opacity value of a paint sample. Upon testing, an A4 paper must be placed underneath the card to avoid any excessive paint. Another equipment is used to refine layer thickness quickly and easily, also called as drawdown bar. This tool has 4 types of thickness, which are 30mm, 50mm, 70mm, and 100mm. Usually, a thickness of 100mm will be used to get the most exact results. These drawdown bars are best suited for use among other tools as they can be used without any change of their coating chemicals, are available at an affordable price and without time - consuming transitions.

Steps of dry film testing

1. Make sure there aren't any impurities on the testing counter.
2. Put the draw down card on the counter and A4 paper underneath the film to avoid any overflow of paint.
3. Put the draw down bar on the paint film with 50mm thickness side.
4. Drop a few drops of coating from machine on the right side and from sample on the left side.
5. Draw down the film in straight motion.
6. Let it dry 2-3 minutes and observe the dry film appearance.



4.0 MINI PROJECT

For the mini-project, the connection to the study of raw materials is connected to the detailed research on polyurethane paint due to Movement Control Order starting from 1st of June till the end of internship period. I was assigned with two mini projects. First one was to create a formulation of pigments using the existing formula/ guidelines. And for mini project 2, I was assigned to do a Research of polyurethane paint in Gamma Coating for 6 weeks starting from 1st of June until the end of my internship period.

4.1 MINI PROJECT 1

The supervisor gave instructions to create a formulation of pigments using the existing formula guide. The combination of raw materials must not be too similar or not too different from the guidelines given. This test is performed to test the level of understanding of the material used is appropriate or not for the next process. The mentor has provided a piece of sample ingredients and the mixture must be blended in a mini grinding machine. Then after the filling process in the sample can, supervisor will look at all kinds of properties and conditions of pigments and colour options to be considered for inclusion to be marketed.

Figure 21 : Raw materials

Figure 22 : Laboratory process

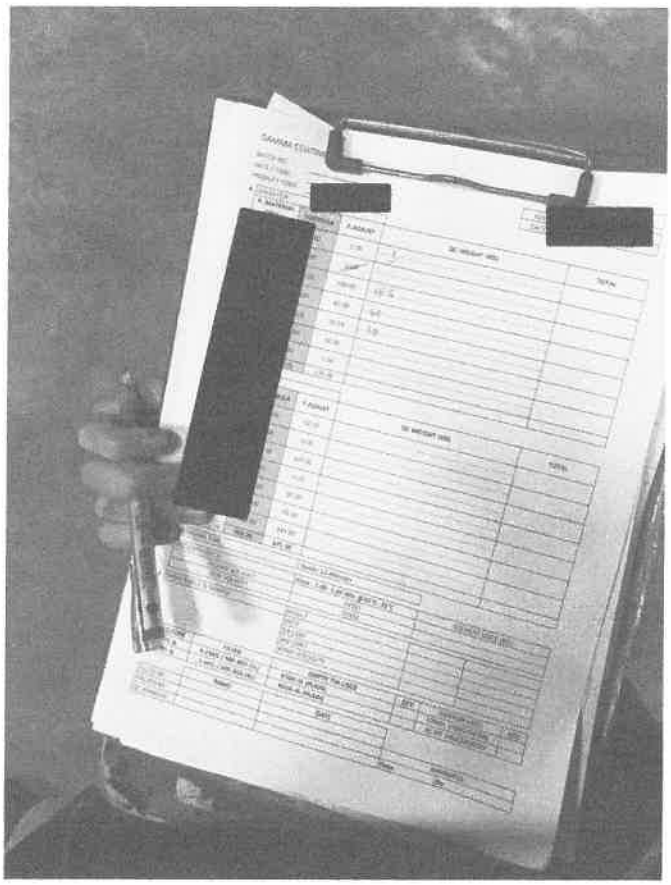


Figure 23 : Ingredient report

Figure 24 : Ingredient testing 1

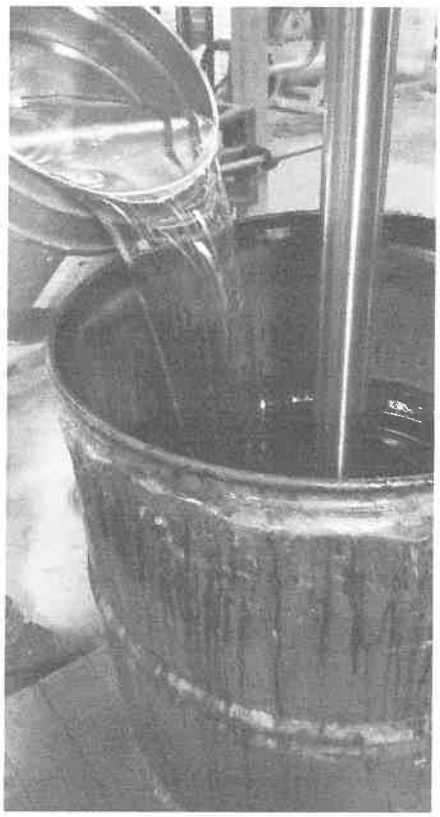


Figure 25 : Ingredient testing 2

4.2 MINI PROJECT 2

A study on polyurethane paint was conducted at home due to the announcement of the MCO effective from 1st of June until 15th of July 2021. Supervisors have assigned different tasks on a weekly basis. Each of the tasks will be given ongoing comments and feedback to be incorporated at the end of the internship period.

WEEK 1 – Research : Paint development in Malaysia.

Research : Gamma Coating to prospective client.

WEEK 2 – Research : Description of acrylic polyurethane paint in 2021 market.

WEEK 3 – Research : Chemistry part of polyurethane paint.

WEEK 4 – Assignment : Physical properties and defect of polyurethane paint.

WEEK 5 – Test : Calculations of volume between acrylic polyol and hardener.

WEEK 6 - Combination of final report.

Figure 26 : Final report

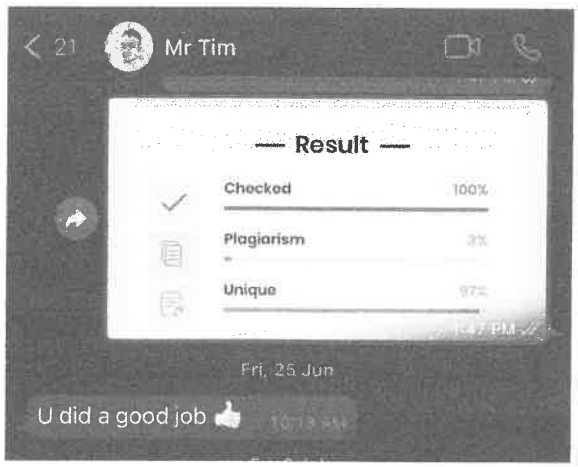


Figure 27 : Weekly feedback

5.0 CONCLUSION

5.1 CONCLUSION

To conclude the 17 weeks of my internship at Gamma Coating Sdn. Bhd. I have faced a lot of obstacles, received fresh knowledge, and gained a whole new valuable experiences in this industry. Through out the training, I was able to gain a wide range of knowledge on the process department as well as having the chance to put my own hands into work on the practical part, not just the theoretically. I have also gained much knowledge on safety precautions as to make sure those are taken seriously in matter of the task that the workers have been assigned for. Being a student is completely a different lifestyle compared to the life of an employee. The change of profession from a student to a worker has affected many changes in my life. This is because the work culture cannot be studied theoretically. It can only be understood through practise and real time experience. This internship programme has helped me to grasp with working ethics, adapting to new environment while contributing self-growth, including building self-confidence, strengthen my core skills and improving my character as a person. In conclusion, the company that I have had internship with really puts up the quality to build a better student, and a worker in the future coherent with the future demand that this industry requires.

5.2 RECOMMENDATION

As of recommendation, I think that students needs to visit their friends work place to share their experiences, and to change opinion towards the industry. I think that exchange a discussion could possibly be the source to creates different types of ideas and ways to work with a problem. Other than that, I recommend that this industry takes more seriously towards taking the initiative to develop training for young workers as the young could possibly make a change towards this industry simply by making an innovation towards the current problem that the industry is currently facing. More ideas will be generated from the youngster and become the key of painting development in Malaysia.