



اَبُو سَيِّدِي تَكْوَلُو كِي مَارَا
UNIVERSITI
TEKNOLOGI
MARA



INDUSTRIAL TRAINING FINAL REPORT

SESSION : 2022-2

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Department During Attachment : Quality Control

Duration (Date) : 20th of February – 4th of August 2022 (24 Weeks)

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Firstly, I would like to thank and compliment my industrial training supervisor, Mr. Chee Yun Fatt. He is very kind in person and keen enough to give any newbie his full attention including me. Without his endless care and wit, I wouldn't have made any clear progression and understand the purpose of being an intern at all. Most thanks for his support, feedbacks and all the worthwhile lessons. Not to forget Mrs. Zulaila Shah and Mr. Rizal for all the guidance and willingness to share information throughout the period of my Industrial Training at Polycure M Sdn. Bhd. Without their assistance, I would not be able to complete my internship along with this technical report well.

Not forgetting my sincere appreciation to my family and friends who have been providing moral support throughout the whole internship period. Even though I am hugely responsible for this report, my thanks are due to the above said names and people for their assistance, encouragement and support.

ABSTRACT

This industrial training report of Putri Nur Syakila binti Zakaria to undergo an industrial training for duration of 6 months which consist of 24 weeks before completing the Diploma courses. Starting industrial training on 20th February 2022 until 4th August 2022 at Polycure M Sdn Bhd which guided by Mr. Chee Yun Fatt.

The purpose of this program is to fulfill the course in order to complete the Diploma as well as graduate from the university. The training refers to work experience that is relevant to professional development prior to graduate. In first chapter this report is defining the term of industrial training and description on industrial training objectives. This part explains the details of objectives of industrial training report and industrial report. In second chapter of report is overview of the company and departments.

The next chapter describes the summary of the duties and various tasks in weekly of industrial training activities that carried out. The next chapter will be explained on the details of the weekly tasks and duties.

This training gives trainee a good experience in industrial world and also trainee can learn on how does the paint industries really work. Last but not least, trainee got opportunities to learn more about handling chemical in the real industry world especially by following the safety and regulations. Besides, trainee can relate to all of the experiences in the laboratory that was learned in university life. Trainee was also improved on the communicating skills while working with new people. As a result, 24 weeks of industrial training was very beneficial as it was very new-life experience and gain great knowledges.

CHAPTER 1

INTRODUCTION

1.1 Overview

Industrial Training (IT) is a compulsory requirement for students in certain programs at all levels of higher education in Institutions of Higher Learning (IHL). Industrial training programmes were established to enhance the abilities necessary to increase the degree of graduates' ability to work. Industrial Training (IT) refers to exposing students to real-world engineering experiences and involving them in Chemical Engineering projects prior to graduation. It is one of the requirements for the award of Diploma in Chemical Engineering is that the student must complete at least twenty-four (24) weeks with 12 credit hours of Industrial Training within semester six (6) or after pass all the courses taken from semester 1 to semester 5.

Industrialmanship aims to familiarise UiTM students to industrial culture and working environments while also increasing students' employability by strengthening their industrial skills. They will also go through various briefings as instruction for the learner. The duration for this internship is 24 weeks taken place starts on 24th February 2022 until 4th August 2022. The student must report to the firm at the time and date specified at the Industrial Training briefing. During the internship time, the student will be assigned to one (1) Lecturer Evaluation to evaluate their performance. The logbook and finished report are due to the college two (2) weeks after the internship ends, both online and in hardcopy.

Students are free to select government or private agencies and sectors to undergo their practical training that are suitable with their current location, financial situation and relevance to the career path. Through practical training, students are expected to expand their insight on chemical engineering related topics while also applying the knowledge gained throughout the semesters in a professional workplace. Moreover, practical training

will allow students to develop better communication, leadership, and problem-solving skills and provide them with opportunities to challenge to challenge and test their interests in a particular career before permanent commitments are made in the future. The explorations done during the internship period will increase the marketability of the students when applying for jobs and prepare necessary expectations in the field.

1.2 Objective Industrial Training

The internship's main goal is to expose to the students and develop a complete grasp of the workplace relationship, as well as to accomplish tasks and engage in real working environment. This industrial training program can help to improve my knowledge and abilities as it offers me more confidence and a sense of accomplishment that future employers would appreciate. While completing my internship, I have the chance to improve my communication, organisational, and collaboration skills, which will be beneficial for future employment. This program also gave me the opportunity to network with and engage from full-time professionals, which may contribute to career opportunities as it allows me to meet new people with a variety of abilities and experience levels who might become potential colleagues or advisors in the future.

1.3.1 Industrial Schedule

Normal working hours	9 hours
Day of working	5 days a week
Work in	8:00 am
Break hour	<ul style="list-style-type: none">• 10:00 am to 10:30 am• 1:00 pm to 2:00 pm
Work out	5:30 pm

Table 1.1: Industrial Schedule

1.3.2 Company Supervisor Information

CHAPTER 2

COMPANY PROFILE

2.1 Company Background



Figure 2.1 Polycure (M) Sdn Bhd's Logo

Polycure (M) Sdn. Bhd., a business registered with Suruhanjaya Syarikat Malaysia, was established in 1989 with a small manufacturing. It has joined the ranks of new firms attempting to establish themselves. Polycure (M) Sdn. Bhd. is a firm that produces its own product, wood coatings. They have introduced a range of wood coating types and colours. The management team swiftly converted itself from a modest player to an industry leader with its unique wood treatments. Its headquarters is in Shah Alam, Selangor.

Days	Working Time	Operating Period
Monday to Friday	8:00 a.m – 10:00 a.m	2 hours
	10:00 a.m – 10:30 a.m (tea break)	30 minutes
	10:30 a.m – 1:00 p.m	2 hours 30 minutes
	1:00 p.m – 2:00 p.m (lunch hour)	1 hour
	2:00 p.m – 5:30 p.m	3 hours 30 minutes
		Total : 9 Hours 30 Minutes
Saturday & Sunday	Weekend Holiday	

Table 2.1: Operating schedule of firm Polucure (M) Sdn Bhd

2.2 Company History



Figure 2.2 Polycure (M) Sdn Bhd's Front View

Polycure (M) Sdn Bhd was founded in 1989. Polycure (M) Sdn. Bhd. grew in size over time, and a new facility was built in the year 2000. Furthermore, in 2003, the firm achieved ISO 9001 accreditation. In just over thirty years, the firm has developed from a tiny operation to a large-scale maker of high-quality surface coatings. That is not unexpected considering all the employees' entire dedication to creating its production system in order to progress the manufacturing process.

This company's rise is also attributable to its high quality standards, which has enabled them to satisfy market needs and client satisfaction on a constant basis. Wood coating production has expanded globally. Polycure (M) Sdn. Bhd's wood treatment products are now widely recognised around the world, particularly among consumers from Asia and the Middle East. They also attempted to broaden their business to include European clients. Polycure's goods have been supplied to nations such as Bangladesh, Australia, Singapore, and Japan. This demonstrates that it has increased in size as it has broadened its target market, with an emphasis on the worldwide market.

2.3 Vision and Mission

Strive to be a leader in wood coating industry with commitment to research, development and strict quality control. Polycure undertook high standards of service on its goods to guarantee that the items it sells are the best on the market. This will ensure that their export and local consumers continue to seek to them for the best wood coating goods. Most clients

are pleased with Polycure's wood finishing solutions because they increase the value of their furniture.

2.4 Organization Chart

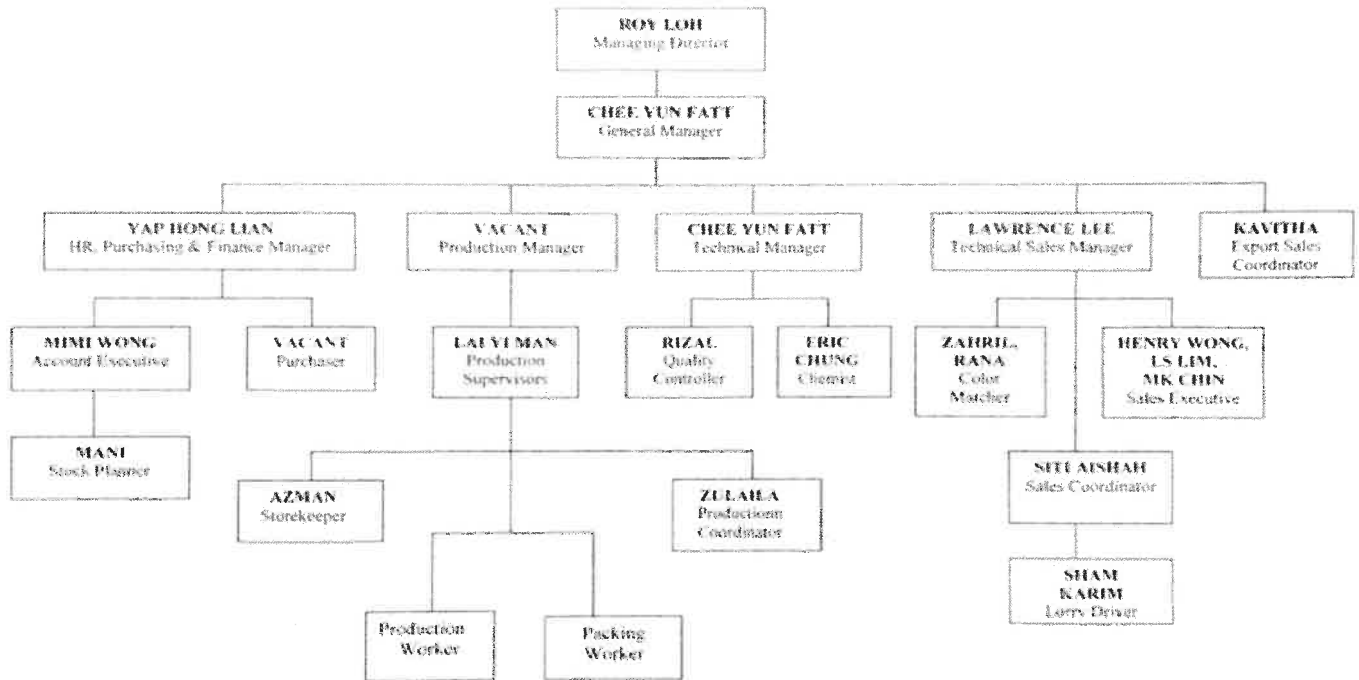


Figure 2.3 Polycure (M) Sdn Bhd Organization Chart

2.5 Main Product

➤ Polyurethane Lacquer

PU (Polyurethane) lacquer is typically hard, abrasion-resistant, and durable coatings. It can be used on doors, trim, cabinets, paneling, residential floors and furniture. Compared to simple oil or shellac varnishes, polyurethane lacquer forms a harder, decidedly tougher and more waterproof film.

➤ Pre-catalyzed Lacquer

Pre-cat (Pre-catalyzed) lacquer is fast drying, easy to use and apply with excellent flow and slip characteristics. With its excellent mar, water and general household chemical resistance, pre-cat lacquer is ideal to use for cabinets, furniture, and other interior wood finishes.

➤ Nitrocellulose Lacquer

NC (Nitrocellulose) lacquer is rapid drying solvent-based lacquers that contain nitrocellulose, a resin obtained from the nitration of cotton and other cellulosic materials, were developed in the early 1920s. These lacquers are widely used on wooden products, furniture primarily, and on musical instruments and other objects. The preferred method of applying quick-drying lacquers is by spraying. Nitrocellulose lacquers produce a hard yet flexible, durable finish that can be recoated and touch up easily.

➤ Acid Cured Lacquer

AC (Acid cured) lacquer is a two pack synthetic high quality lacquer. It's suitable for indoor wooden furniture. AC Lacquer has given the desired properties such as hard film, good thickness and excellent water & solvent resistance.

➤ Water-Based Lacquer

Water-based lacquer is considerably non-dangerous goods and environmentally friendly product. In recent years, more and more water-based lacquers are replacing solvent-based coating in woodworking and other similar industrial applications due to health risks and environmental considerations. In many cases, water-based lacquer is produce comparable results & performances compared against solvent-based coating.

➤ **1K Acrylic Lacquer**

1K Acrylic lacquer provides good gloss retention and hardens rapidly to give a very high build coating with excellent weathering resistance.



Figure 2.4 Examples of Polycure's Main Products

Color Products

➤ **Wood Stain**

Wood stain is a basic and transparent colour. It is used to unify bare wood colour.



Figure 2.5 Various Colours of Wood Stain

➤ **Pigmented Colour Stain**

Pigmented Colour Stain provides excellent hiding power with high build and high solid contents. The colours are available from matte to gloss finishes and available in any colour requests from customer.

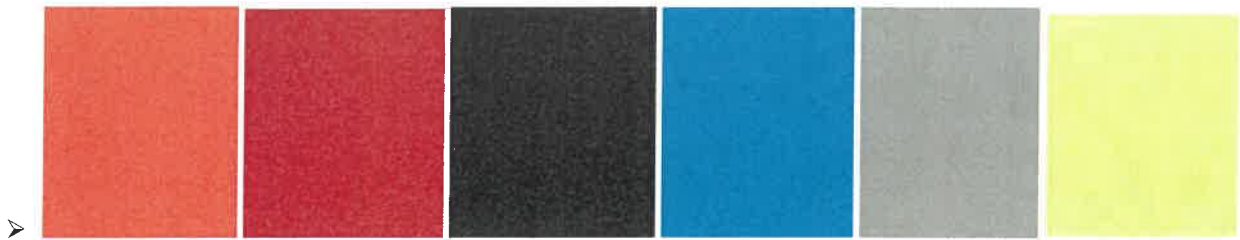


Figure 2.6 Various Colours of Pigmented Colour Stain

➤ **Glaze Stain**

Glaze Stain is oil-based colour product that is use to enhance the beauty of the natural wood grain. Glaze Stain can be applied by spray, brush and wipe.

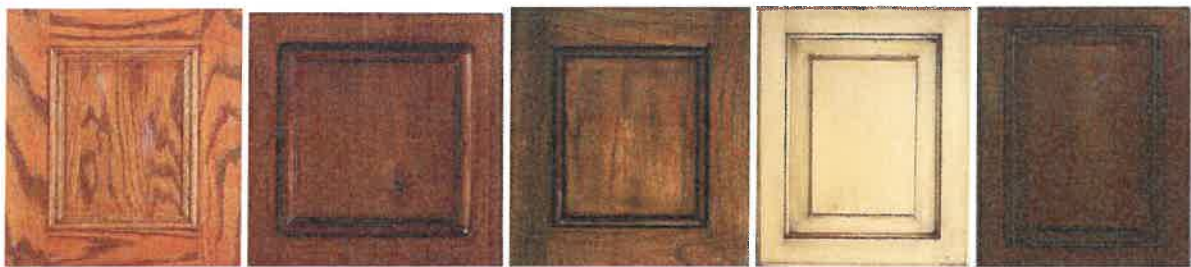


Figure 2.7 Various Colours of Glaze Stain

➤ **Special Effects**

- **Cracking Top Coat:** Cracking effect top coat. Apply on cracking and leather like finishing.
- **Texture Top Coat** : Texture Top Coat
- **Filament** : Veiling/Spider web effect.
- **Marble Stain** : Provided marble look on wood surface.
- **Metallic/Sparkle** : Provide sparking effect on high gloss finishes.
- **Granite** : Provided granite look on wood surface.



Figure 2.8 Examples of Special Effects

- **Other Products**
- **Glass Coating** : Provided excellent adhesion on glass surface. Available in various colors.
- **Decking Oil**: Urethane based outdoor oil with excellent durability.
- **Teak Oil** : Alkyd based outdoor oil. Good weathering protection.
- **Patina** : Powdery glaze stain to given the antique effect.
- **Skin Coating** : Strippable & flexible coating for spray booth protection.
- **Bleaching Agent** : Lighten the natural dark color of wood, or remove discolorations of wood due to aging or contamination.

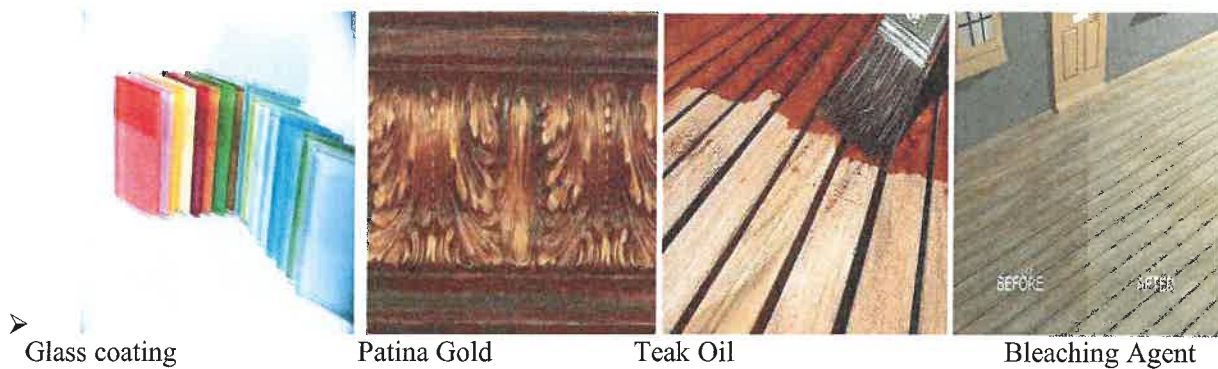


Figure 2.9 Examples of Other Products

CHAPTER 3

OVERVIEW OF THE TRAINING

3.1 Introduction

Throughout 24 weeks of the training, there were a lot of different tasks that were assigned to me accordingly. The first week of the internship was spent learning about the company's products, manufacturing, and safety precautions. Mr. Chee assigned me my first tasks over the following several weeks, which were to learn step by step how to do Quality Control (QC) on various products. QC Test is the procedure to control the quality of the product. Each product has a different set of standard control procedures. There are solids test, specific gravity test, viscosity test, tough dry test, hardness test and gloss test.

3.2 Summary Of The Training And Experience Gained

These are the main duties and tasks that were conducted during the industrial training.

Task 1: Identify the type of sample

This manufacturing company offers a wide range of products, including:

- PU
- NC
- AC
- Solvent Stains (SS)
- Glaze Stain

- Teak oil
- Wood-Fillers
- Water-based Paints (WB) & others

Task 2: Standard Test Method

Begin performing QC Test on the provided sample product using the standard test technique for each product category.

Task 3: Sanding wood panel using sandpaper

To achieve a nice smooth finish, it's essential to sand to help prepare the area for painting application, by sanding you are removing imperfections (also known as pimples), creating a nice smooth finish while at the same time adding adhesion by developing small, rough ridges for the paint to stick to.

Task 4: Spray the sample test on a wood panel

To check that the sample has the correct colour and finish, it must be sprayed on a small wood panel.

Task 5: Gloss

Each sample has its own gloss range that was first specified by the consumer. As a result, when the sprayed-on panel has dried, we must use a gloss metre to evaluate the gloss of the panel.

The details of the task will be explained in Chapter 4

3.2.1 Weekly Activity (summary of each week)

Week 1: Briefing with supervisor regarding job scope that was assigned and greeted new colleagues, especially Mr. Rizal and Ms. Hannah who were working with me in QC Lab. Mr Chee also gave an overview regarding wood coatings, and safety and health policies. Mr He also provided the required PPE before handling the chemicals in QC Lab.

Week 2: Learned basic knowledge of Nitrocellulose as it is the most common in wood paintings. Some of the basic knowledge is it is also called cellulose nitrate which is a mixture of nitric esters of cellulose and it is a highly flammable compound.

Week 3: Learned a new task which was arranging the samples of paints in small cans to put in different boxes. The samples of cans were specifically parted by the types of coating to ensure it will be easier to find in the future.

Week 4: Learned how to QC a Hardener. Firstly, the density needed to be measured. Secondly, the NK² needed to be checked on and must be on range 8-11 depends on the types of hardeners. As the wet sample is ready, it must be sprayed on a panel to ensure the hardener is good to go right after it dried.

Week 5: Learned the characteristics of Nitrocellulose (NC), Acid-Cured (AC) and Polyurethane (PU).

Week 6: As the office was short-handed, I was assigned a new responsibility. The tasks were to print formulations for orders or stocks to provide production department so they do the paints following the exact procedures from the formulations.

Week 7: Understanding Solvents Part I such as Petroleum Distillates and Turpentine, and Toluene and Xylene.

Week 8: Understanding Solvents Part II which there are five solvents families used in finishes such as Petroleum Distillates, Alcohols, Ketones, Esters and Glycol Esters.

Week 9: Understanding Solvents Part III which was about Lacquer Thinner. Lacquer Thinner is

the solvent and thinner used with all types of lacquer, including NC, acrylic and catalyzed.

Week 10: Learned some product's information in company such as Sealers, Top Coat, Hardener and Thinner.

Week 11: Learned the knowledge of Dyes such as they are soluble the lightfastness of lower dyes are very much vulnerable. Lights destroy colored objects by breaking open electronic bonding within the molecule.

Week 12: Learned the knowledge of Pigments such as they are colourants that are insoluble in water and most solvents. Pigments' lightfastness have been found to be more lightfast than dyes.

Week 13: Learned Sandpaper Grit Classification because sandpaper has many types of grits. Polycure mainly use very fine grade for woodworking.

Week 14: Learning details of organic and inorganic in pigments and dyes such as inorganic characteristics are dull in colour and opaque opacity. Meanwhile, organic molecules characteristics are bright in colour and transparent opacity.

Week 15 – Week 18: Understanding Safety Data Sheets (SDS) which learning the SDS includes information such as the properties of each chemical, the physical health, and environment health hazards.

Week 19: Learned the Common Wood Finishing Problems such as the following factors may be impact the end of result of finishing operation such as type of surface, type and brand of washcoat and sealer, percentage of material reduction for each coat and others.

Week 20: Learned the Wood Finishing Problems and Remedy such as brown spots may cause from oil coming through “separator” of supply line. Hence, the remedy is lower the temperature and use flow additive. The air pressure must increase and use smaller gun tip to improve atomization.

Week 21 – Week 22 : Learned the Coating Failures and Detects such as Adhesion Failure's probable causes are surface contamination or condensation. Hence, must ensure that the surface is clean, dry and free from any contamination and that the surface has been suitably prepared.

Week 23 – Week 24: Learned the Classification of Dangerous Goods such as the classifications of SDS are provided by the supplier and written in official language.

CHAPTER 4

DETAILS OF EXPERIENCES

4.1 Introduction

During the period of internship, the trainee was required to comprehensively understand the manufacturing rules and regulations, and the basic components paints. There were also a lot of information that was shared by Mr. Chee. Firstly, paint has been defined as a pigmented coating material in either a liquid or powder form that when applied in a thin film and cured will protect and/or decorate a surface. Unpigmented paints that result in a transparent nearly colorless film are sometimes called understanding of the 5 basic ingredients and how they are mixed to form a can of paint. There are:

Binder/Resin

The binder is the main film former that remains when all solvents or water have evaporated leaving a continuous film which adheres to the substrate and protects against climatic conditions, mechanical and chemical damage. Binders may be oil, a resin, or a combination of oils and resins. They may also contain pigments to achieve a variety of colors. Clear finishes have no pigment content and may be gloss-adjusted.

Binder materials may be classified as:

a) Thermoplastic Binders (Pre-Cured)

Binders, which, when dry, will dissolve in the solvents or thinners used in their preparation such as Polyurethane, Polyester, Alkyd and many resins.

Pigments

Paint pigments are finely ground solids added to the paint to provide the film with certain properties. Pigments fulfill one or more of three possible functions:

a) Optical Function

Color, opacity, gloss

b) Protective Function

Weather stability, surface hardness, flexibility and adhesion

c) Reinforcing Function

Increases the binder's cohesiveness, elasticity, hardness and abrasion resistance

Some typical pigments are white Lead, Zinc Oxide, Titanium Dioxide, and others. However, most reputable paint manufacturers only use Lead free pigment especially for paint to be used for toys and furniture.

Extender Pigments/Filler

These pigments are general regarded as non-hiding, as they do not impart opacity or color to a large degree. They give paint "body", lower cost of paint and affect final resistance properties. Some examples are Calcium Carbonate, Talc, China Clay and others.

Solvents/Volatiles

These are volatile liquids that lower the viscosity of paint to render it usable during manufacture and application. A blend of solvents is called Thinners or Reducer. The blend of solvents is crucial to the drying, film formation and stability of paint.

Additives

Though they represent only a small part of the total coating ingredients (1-2%) additives may have a significant influence on the overall physical and/or chemical properties of the coating. The additives may:

- a) Provide assistance on actual production such as wetting, anti-skinning, flooring, floating, foaming and viscosity agents.
- b) Prevent deterioration during storage such as anti-settling agents, preservatives, and others.
- c) Promote ease of application such as bodying or thickening agents and anti-sag agents.

4.2 Details of experience gained

4.2.1 Task 1: Identify the type of sample

This manufacturing company offers a wide range of products, including:

- PU
- NC
- AC
- Solvent Stains (SS)
- Glaze Stain
- Teak oil
- Wood-Fillers
- Water-based Paints (WB) & others

Below is the table to show the difference between NC, PU and AC.

Table 4.2 Difference between NC, AC and PU

	NITROCELLULOSE (NC)	ACID-CURED (AC)	POLYURETHANE (PU)
TYPE	1 component - Single pack	2 component - lacquer + hardener	2 component - lacquer + hardener
FINISH	Glossy, Satin and matt	Glossy, Satin and matt	Very High Gloss, Satin, matt
APPLICATIONS	Interior & Exterior	Interior	Interior & Exterior
DRYING TIME	fast - quick drying	Moderate	slow - long drying time
SCRATCH RESISTANCE	Low	High	High to very high
HOW TO APPLY	Spray	Spray	Spray
ADVANTAGES	Quick drying & hardening time, Short recoating time, relatively low cost, easy to apply, easy to repair, recoat & touch up. Available in variety of colors, good clarity, long pot life, water resistant, easy to strip.	High solids - so film build is good, very good stain, water & chemical resistance. Excellent adhesion, high stain, scratch/abrasion resistance, good resistance against heat/hot water.	Best in class - High solids, provides excellent flexibility. Variety of finishes can be achieved from dead matt to very high gloss smooth finish, Protection against Ultraviolet (UV) rays & weathering. Very good mechanical properties, hardness & abrasion/scratch resistance. Excellent water & chemical resistance.
DISADVANTAGES	Less resistant to heat - prone to hot water marks. Low resistance to solvents, low scratch resistance. Very high gloss finishes cannot be achieved.	Cannot be used in exteriors. Emits formaldehyde. Short pot life after adding hardener (8 hours), difficult to repair & strip.	High cost, short pot life after adding hardener (up to 4 hours). Lot of qualities are available for various surfaces - so choosing the right product is critical. Needs dust free environment, skilled applicator is essential for desired results. Contains Isocyanate, sensitive to environmental changes primarily temperature & humidity. Slow drying requires dust proof environment.
RECOMMENDATION	NC paints are not suited for heavy applications requiring extreme resistance properties but they are ideal for light duty applications with moderate durability on automobiles, metals, wood based products & furniture & Industrial Items.	AC coating are suitable for heavy duty interior applications on all wood based products & furniture including table tops due to very good resistance against acids, tea, coffee, alcohol, stain mark etc. AC is not recommended for exterior application.	PU coating is a heavy duty full package product which offers complete protection for your surface whether interior or exterior with maximum durability. Due to its versatility, it's popularly used in automobiles, metals, wood based products & furniture, plastics, glass, floorings.

4.2.2 Task 2: Standard Test Method

Begin performing QC Test on the provided sample product using the standard test technique for each product category.

Below are the Standard Test Methods for:

- Adhesion Test

Standard Test Method

ADHESION TEST

Materials needed : Sample panel

Cross Hatch Cutter (6 blades – 2 and 3 mm gap)

Cellophane Tape (minimum 1 inch width)

Procedure:

1. Get the sample for testing.
2. Spray it on test panel (see lab procedure for spray-out).
3. Leave the panel to dry overnight. Do the test the following day.
4. Make one sharp cutting with cross hatch cutter on the test panel. Make a second cutting at the same area of the test panel perpendicular to the previous cutting, thereby making square boxes.
5. Unroll and discard two rounds of tape lengths to expose fresh adhesive.
6. Place cellophane tape on the test panel covering all the square boxes.
7. Apply pressure to the tape using the flat side of the fingernail to make sure it adheres to the test panel.
8. Hold the other end of the tape and remove in a swift motion 45° away from the test panel.
9. Check panel for peel-off.
10. Record reading as percent of number of square boxes peeled-off over total number of square boxes.

NOTE : Use cross hatch cutter 1.0 mm gap for 25 micron and below DFT (on metal substrate) ;
2.0 mm gap for 50 microns DFT; and 3.0 mm gap for >75 micron DFT.

- Density

Standard Test Method

DENSITY

Materials needed :

Sheen Density Cup – 100 ml capacity
Weighing scale (digital or mechanical)
Thermometer (digital or analog)

Procedure :

1. Get enough samples for testing. Remove skin or dried film on top of the sample and stir it vigorously.
2. Adjust sample temperature to 25° C accordingly.
3. Place empty density cup and cover on scale and tare zero the reading.
4. Pour in the sample into the density cup until it reaches the upper level indicator of the cup. Press the lid slowly until it snugly fit. (*Excess material in the cup will be released from the hole on the lid.*) Clean off the excess material.
5. Weigh the cup with material.
6. Divide the reading by “10” to convert value in kilogram per liter.

7. Report density in “kg/lt”.

- pH

Standard Test Method

pH

Materials needed :

pH Meter (model : Hanna pH meter 210)

Buffer solutions pH – 7.01, pH - 4.01 and pH – 10.01

Note :

The instrument should be calibrated:

- a) Whenever the pH electrode is replaced.
- b) At least once a week.
- c) After testing aggressive chemicals.
- d) After pressing RESET.

If you are measuring in the **acid range**, use **pH4.01** as second buffer; if you are measuring in the **alkaline range**, use **pH10.01** as second buffer.

Procedure :

Two-point calibration

It is recommended that pH7.01 is chosen as first calibration point and pH4.01 (acidic) or pH10.01 (alkaline) as second point.

1. Immerse the pH electrode approximately into a buffer solution (pH7.01) and stir gently.
2. Press **CAL**. The “**CAL**” and “**BUF1**” indicator and “**7.01**” buffer will be displayed on the LCD.
3. If necessary, press “ °C ” or “ °C ” to select different buffer value.

4. When the reading is stable, “**READY**” and “**CFM**” will blind. Press the **CFM** to confirm the calibration. The “**BUF2**” indicator will be displayed on the LCD.
5. After the first calibration point is confirmed, wash the pH electrode with distilled water and wipe it dry. Then, immerse the pH electrode in the second buffer solution and stir gently.
6. If necessary, press “ □°C ” or “□°C ” to select different buffer value.
7. When the reading is stable, “**READY**” and “**CFM**” will blind. Press the **CFM** to confirm the calibration.
8. After the second calibration point is confirmed, wash the pH electrode with distilled water and wipe it dry.
9. Press **CAL** to quit calibration. The meter will return to normal operation.

- Viscosity using Iwata@NK² Cup)

Standard Test Method

VISCOSITY (IWATA@NK2 CUP)

Materials needed :

- Iwata@NK2 Cup
- Stainless Steel Spoon
- Thermometer (Digital or analog)

Plastic Cup

Stopwatch or Timer

Procedure :

1. Get sample for testing. Remove skin or dried film on top of the sample and stir it vigorously.
2. Adjust sample temperature to 25° C accordingly.
3. Hang the Iwata cup in a position that the bottom or orifice of the cup is about 4 – 5 inches above the sample. Zero reading the stopwatch or timer.
4. Cover the orifice (bottom) hole with the middle or ring finger of your left hand.
5. Pour in the sample into the cup until it is full. Place emptied cup 4 – 5 inches under the Iwata cup.
6. Simultaneously remove finger from the hole and start the stopwatch. Get the time elapsed until the liquid inside the cup all flow out or until the first breakage of the flowing liquid is observed.
7. Record result in time units (minutes or seconds).
8. Clean Iwata cup with appropriate solvent or thinner.

Note : Iwata Cup NK2 is advisable and accurate to use for viscosities of 45 seconds and below. Beyond this reading, Ford Cup #4 is more suitable.

- Viscosity using Viscometer with Spindle

Standard Test Method

VISCOSITY

(Viscometer with Spindle)

Materials needed :

Rion Visco Tester VT-06
150ml Beaker
Thermometer (Digital or analog)
Spindle #1, #2, #3

Procedure :

1. Transfer approximately 150ml of sample into beaker and adjust sample to the required measurement temperature to 25° C accordingly.
2. Insert spindle in the test material until the fluid's level is at the immersion groove cut in the spindle's shaft.
3. Position the sample so that the spindle is centered in the test sample container.
4. Take a reading when the pointer or the digital display is stable.
5. If the viscosity measurement is off-scale high, go to the next higher spindle number. If the viscosity measurement is off-scale low, go to the next lower spindle number.
6. Record result in units - Poise.



Figure 4.2.1



Figure 4.2.2

Figure 4.2.1 and Figure 4.2.2 Using Spindle to Check Viscosity



Figure 4.2.3



Figure 4.2.4

Figure 4.2.3 and Figure 4.2.4 Equipments and Tasks in Qc Lab

4.2.3 Task 3: Sanding wood panel using sandpaper

To achieve a nice smooth finish, it's essential to sand to help prepare the area for painting application, by sanding you are removing imperfections (also known as pimples), creating a nice smooth finish while at the same time adding adhesion by developing small, rough ridges for the paint to stick to.

Using the right sandpaper can make all the difference in a woodworking, painting, or finishing project.

A sandpaper's grit refers to the size of the abrasive materials on the paper. There are various standards that exist for ascertaining, but common standards include the Coated Abrasive Manufacturers Institute (CAMI) and the Federation of European Producers of Abrasives (FEPA). Regardless of which standard is used to measure, a general rule is that the lower the number of the sandpaper grit, the coarser the grit grade will be.

Sandpaper contains numerous sharp edges that cut away at wood or metal. The abrasive edges are glued onto backing material such as Kraft paper with a bonding agent. Different grades of sandpaper represent the difference in quality of the abrasives, the backing material and the bonding agents. Industrial-grade sandpaper uses higher quality materials than commercial grade but is only available in specific stores. In addition, sandpaper is measured by its grit size, or number of sharp particles per square inch of sandpaper. The larger the grit size, the more edges there are and the smoother the sandpaper. The density of the grit is important, too. Open-coated sandpaper has gaps between the grits, allowing sawdust to gather so it doesn't interfere with the sanding, whereas closed-coated sandpaper doesn't have those open spaces.

There are many types of sandpaper grits such as Macro Grits, Extra Coarse, Coarse, Medium, Fine, Very Fine, Micro Grits, Very Fine, Extra Fine, Super Fine and Ultra Fine. As for Polycure's woodworking, their standard is Very Fine grade.

4.2.4 Task 4: Spray the sample test on a wood panel

To check that the sample has the correct color and finish, it must be sprayed on a small wood panel. Paint finishes are extremely complex chemical formulations. They include both solvent and waterborne types. Some may require the addition of solvents to form the proper spraying viscosity. Others may simply require the addition of a second component at a prescribed ratio to obtain sprayable consistency. Many of them also have hardeners or other chemicals, added to them to ensure correct color match, gloss, hardness, drying time, or other characteristics necessary to produce a first-class finish. It must be ensured to be familiar with the specific finish material data sheets accompanying each material. Materials from various manufacturers cannot be mixed. Directions must be read and followed carefully. All finish materials must also be supplied with a Material Safety Data Sheet (MSDS). This data provides information on the proper handling and disposal of materials. Many states require that MSDS be kept on file by the user. The first step is knowing the type and color of paint the project requires. With this determined, follow the manufacturer's instructions for preparing it exactly.



Figure 4.2.5 Spray Panel Using Spray Gun

4.2.4 Task 5: Gloss

Each sample has its own gloss range that was first specified by the consumer. As a result, when the sprayed-on panel has dried, we must use a gloss meter to evaluate the gloss of the panel. Gloss is associated with the capacity of a surface to reflect more light in some directions than in others. The directions associated with mirror (or specular) reflections normally have the highest reflectance. Measurements by this test method correlate with visual observation of surface shininess made at roughly the corresponding angles. Measured gloss rating by this test method is obtained by comparing the specular reflectance from the specimen to that from a black glass standard. Since specular reflectance depends also on the surface refractive of the specimen, the measured gloss rating change as the surface refractive index changes. In obtaining the visual gloss ratings, however, it is customary to compare the specular reflectance of two specimens having similar surface refractive indices. Since the instrumental ratings are affected more than the visual ratings by changes in the surface refractive index, non-agreement between Visual and instrumental gloss ratings can occur when high gloss specimen surfaces differing in refractive index are compared.

- a) Position each specimen in turn beneath the gloss meter. For specimens with brush marks or similar texture effects, place them in such a way that the directions of the marks are parallel to the plane of the axes of the incident and reflected beams.
- b) Take at least three reading on a 3 by 6-in. area of the specimen. Of the range is greater than two gloss units, take additional reading and calculate the mean after discarding divergent results as in the section on Test for Outliers of Practice D3980. For larger Specimens, take a proportionately greater number of readings.



Figure 4.2.6 Gloss Meter to Measure Gloss

4.2.3 Report On Personal Project for Industrial Training

Throughout 24 weeks of internship, supervisor, Mr. Chee has assigned trainee to do the Special Effect of Cracking Top Coat since it is different and unique. Firstly, for the colour of Cracking Topcoat Antique White, PC-09 which is a cracking mix needed to add to clean the drum. Next, to adjust the colours to match, CP-10.11 which is White Paste, CP-13 which is Yellow Iron Oxide Paste, CP-22(A) which is Black Paste, and CP-34 which is Red Paste needed to add following the guidelines from the formulations. The paint is then mixed until ready to be sprayed. Before spray, plank wood needs to be sanded using the sandpaper to ensure it has nice smooth finish. Next, the plank is then coated with white sealer. The plank is then coated with NC topcoat with any colour desired as long as it is contrast with the Cracking Topcoat colour. Lastly, spray the Cracking Topcoat onto the wood plank and let it dry under the sun to see the outcome.



Figure 4.2.7 Result of Cracking Top Coat Panel

4.3 Problem Encountered and Approach Adopted for Solving Problem

One of the difficulties was remembering all of the processes and test methodologies for each sort of sample that was delivered from the production painting during my early weeks. As a result, taking notes every day and obtaining advice from Mr. Rizal and Ms. Hannah was really beneficial in getting hands on things effectively. Because Mr. Rizal and Ms. Hannah are both so professional, it was very inspirational to be like them and eventually manage on my own.

Secondly, handling the spray gun was not as simple as it appears. The spray gun has several nozzles, each with its own function. As a fresh trainee, have got to admit that all the nozzles seemed the same. The aftermath of the confusions, the sample was either flooded/center-heavy spray pattern or overly dry, resembling orange skin. However, the basic considerations that Mr. Rizal taught in selecting the nozzle combination are the type and viscosity of the material being sprayed, the physical size of the object being finished, the desired speed, the gun model being used, and the available air volume and pressure from the compressor. After weeks of practicing, the spray gun technique has become pretty good on hands all thanks to Mr. Rizal and Ms. Hannah.

4.4 Professional and Ethical Issues

Professional ethics are important in the workplace since they define their own personality while working, particularly devotion, honesty, and duty to an organisation. By adding great ethics, it is possible to boost overall worker morale and increase organisational effectiveness in accomplishing their goals. The ethical issues that will be addressed as below:

While completing industrial training, several tasks were assigned as an internship student. Being accountable and devoted to every tasks and duties assigned as internship students is critical while working in the real world. As a result, using phone must be less while working, as this appears to be immoral in the workplace. This is because it may appear that the attitude is uncommitted and reckless in work. Too much conversing may cause us to get disinterested in work hence should be discussed on work matters mostly. As a result, as internship students, students must be more devoted to completing the tasks assigned throughout the internship term.

It is also critical to be on time at all costs. because timeliness implies responsibility and discipline. A person who consistently fails to manage their time is always perceived as irresponsible. Besides handing work on time, arrive work on time is also as important. As a result, timeliness is critical throughout this internship period, as the organisation has already established a working schedule for all employees. By practising timeliness, students may get an understanding of the necessity of managing time properly and become more aware of time management in daily lives.

4.5 Health, Environment and Sustainable Aspect

The Sustainable Development Goals (SDGs), also known as the Worldwide Goals, were recognized by the United Nations in 2015 as a global call to action to eradicate poverty, protect the environment, and ensure that everyone enjoys peace and prosperity by 2030. People, corporations, governments, institutions, and nations from all around the world must work together to achieve these common goals. As a result, Polycure (M) Sdn. Bhd. also considered health, the environment, and sustainability.

Polycure (M) Sdn. Bhd. addressed their employees' health as well, notably during the Covid-19 epidemic. This is due to the requirement to do a Covid test once a week to guarantee that all employees are clear of the Covid-19 virus. Furthermore, if any worker becomes sick, the entire organisation will perform the Covid test and supply us with the test kit.

Polycure has supplied their employees with complete Personal Protective Equipment (PPE) when handling the chemical. Polycure also requires all employees to observe safety requirements while handling chemicals. This is due to the fact that some hazardous raw materials are included in their paints. Following that, employees in the manufacturing department must refer to the safety data sheets for each raw material. This will enable them to be more cautious when handling dangerous compounds. Wearing a mask and glove in the laboratory before performing QC test techniques on the product is another PPE control precaution. Aside from that, the chemicals waste generated during production was carefully disposed of by segregating the trash based on its level of hazard. As a result, this element follows SDG 3 since effective chemical handling has been shown to be crucial in ensuring worker safety while also conserving environment.

Aside from that, recycling is essential for maintaining a sustainable ecosystem. This is because it has the potential to lower the quantity of garbage disposed of by the firm. Polycure (M) Sdn. Bhd. constantly recycles the aluminium barrels used to store their material. As a result, there is no waste of drums because they recycled all of the drums that they did not utilise. As a result of this technique, we may avoid climate change and pollution from occurring because the garbage has been disposed of appropriately, keeping our environment cleaner.

CHAPTER 5

CONCLUSIONS

5.1 Conclusions

In conclusion, I can admit that this 24 months of industrial training programme has been one of a ride for me. Not only have I managed to gain a lot of new experiences and improve my skills for better usage, I have also had the opportunity to work with amazing people as well as those in high rank position. The Quality Control Department is knowledgeable in the paint industry. I was able to obtain experience in the chemical engineering industry while working in the Quality Control Department. Also learned several test methods to be used on paint goods to assure item quality. Lastly, I could also conclude that the softskills and experiences that I have gained throughout this programme will surely increase the quality of the future employee I will become in the near future. This could also be concluded that through the whole internship programme, the participation and involvement of my work journey has definitely helped in building my skills as well as improving my character development which will benefit me in my next employment.

5.2 Recommendations

The employer should assign the student more projects related to the field of Chemical Engineering. This is to assist students who completed an internship there in gaining real-world experience working as a Chemical Engineer or in other jobs related to chemical engineering. Other than that, the respective authorities have done an excellent job in assisting the students with their placement and other matters that arise along the span of industrial training.