INDUSTRIAL TRAINING REPORT

Yap Jin Teck

Bachelor (Hons) of Mechanical Engineering

SCHOOL OF ENGINEERING

TAYLOR'S UNIVERSITY

Mohd Farid Aladdin

March 2020

CHAPTER 1 DECLARATION

I sincerely declare that:

1. I am the sole writer of this report
2. The details of training and experience contain in this report describe my involvement as a trainee in the field of **Mechanical** Engineering.
3. All the information contains in this report is certain and correct to the knowledge of the author

Signature : 

Name : Yap Jin Teck

ID No. : 0326788

Date : 23 March 2020

CHAPTER 2 ACKNOWLEDGEMENTS

I would like to express my gratitude to Taylor's University for providing an opportunity for me to undertake this industrial training placement programme as it allows to have a insight into the industry as a study for my Bachelors Honours Degree in Mechanical Enigneering.

I would also like to thank Tan Chong Motors Assemblies Sdn. Bhd. for accepting me as a intern for the 12 weeks. I would like to thank my supervisors, Mr. Muhammad Hafiz and Mr. Mohd Hafiz for guiding me throughout my industrial training placement at TCMA. I would also like to thank my colleagues for accepting me and guided me throughout my placement and allowed me to follow them as they were performing their auditing tasks in the production line. The staff and work environment at TCMA allowed for a friendly and productive work environment.

I would like to also thank my academic supervisor, Mr Farid for driving all the way to Serendah to assess me during my industrial training placement. He was really attentive and raised concerns regarding if there were any hostility in my work environment, which there were none.

CHAPTER 3 ABSTRACT

I have joined Tan Chong Motors Assemblies Sdn. Bhd. for my twelve week industrial training placement. I was assigned to the Advanced Engineering Department and was under the supervision of Mr. Muhammad Hafiz for the first month in the New Model Division and was transferred to the Production Engineering Division under the supervision of Mr. Mohd. Hafiz. TCMA is a subsidiary of Tan Chong Motors Holdings Group which is responsible for the manufacturing and assembly of Nissan vehicles in Malaysia. The aim of this industrial training is to gain insight in real world working environments and learn the working culture of a real-world working environment. During my placement under the New Model Division, I was able to help supervisor in completing flow charts, part stationing charts, order sheets, and QVCC&FF report for the new model project.

I was then transferred to the Production Engineering Division and was able to learn the audits that were conducted daily to maintain the quality and precision of the chassis manufactured. I was able to learn how to conduct sealant audits, OCPAs, Welding gun parameters and pressure audits as well as learning how to operate a CMM machine and generating QVCC and FF reports based on the data obtained form the CMM Machine. The knowledge gained from my industrial training placement helped me understand how to communicate with colleagues with different cultural backgrounds. I am happy with my work environment and was glad that I was given an opportunity to have my industrial training placement in TCMA.

CHAPTER 4 TABLE OF CONTENTS

CHAPTER 5 LIST OF FIGURES

CHAPTER 1 INTRODUCTION

1.1 Background

Tan Chong Motors Assemblies Sdn. Bhd. (TCMA) is a subsidiary of Tan Chong Motors Holdings Berhad (TCMH Group). TCMA has 3 manufacturing plants across South East Asia, two of which are in Malaysia while one is located in Vietnam.

Figure 1.1 Tan Chong Motors Assemblies Sdn. Bhd. Serendah Plant

I was able to secure my industrial training placement with TCMA Serendah, Selangor for the required 12 weeks starting from 30th December 2019 and ending on 20th March 2020. I was placed under the Advanced Engineering Department (AED) and was able to learn through the guidance of my supervisors and colleagues throughout the industrial training.

TCMH Group was incorporated in 14th October 1972 and has since been a distributor for small motor vehicles. Throughout the years it has grown and expanded to venture into various business activities such as Assembly and Manufacturing, After-Sales Services, Property Holding, Financial Services, etc. TCMH Group holds franchise rights to multiple brands such as Nissan, Renault, UD Trucks etc. Currently, TCMH Group holds the franchise rights of Nissan in Vietnam, Cambodia, Laos, Myanmar as well as Malaysia. TCMH Group operates under its core values, TCFIMPeD which are:

- Trustworthiness & Integrity
- Courage
- Frugality
- Innovation & Creativity
- 24/7 Mindset
- Perseverance
- Dilligence
-

TCMA Serendah oversees manufacturing and assembly of various Nissan models currently in the market of Malaysia, of which are:

- Nissan Almera
- Nissan X-Trail
- Nissan Serena
- Nissan NV200

1.2 Organization charts

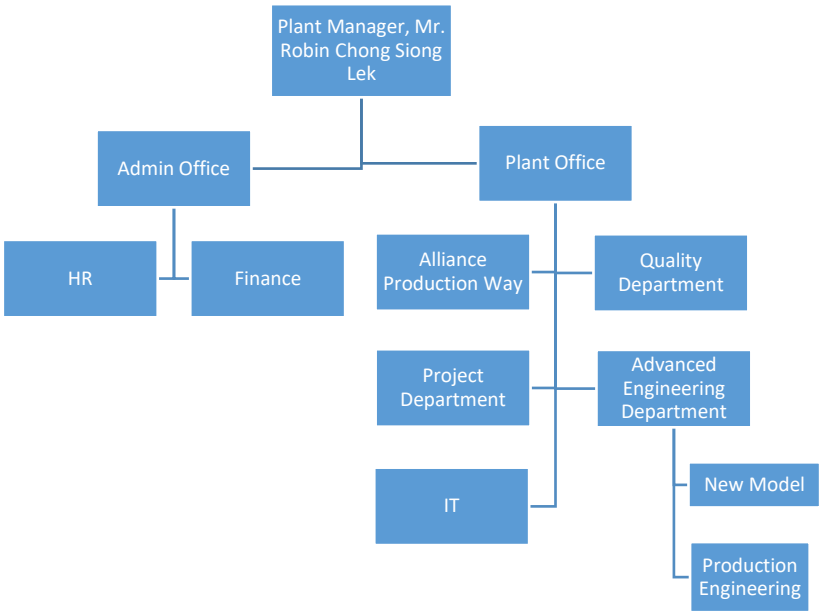

Figure 1.2 Organizational Chart of Tan Chong Motors Assemblies Sdn. Bhd. Serendah Plant.

1.3 Aims and Objectives

The aim for this industrial training is to understand and learn the challenges that are faced daily at work together with the solutions that are applied to overcome said challenges. TCMA being a manufacturing and assembly of automotive vehicles faces challenges daily to ensure that quality of their products is up to standards while maintaining maximum efficiency. The opportunity to observe and understand the solutions that are taken to maintain quality and efficiency could be beneficial in understanding the considerations that need to taken place in a working environment while understanding important decision makings in the process.

CHAPTER 2 INDUSTRIAL TRAINING ACTIVITIES

I was able to join my supervisors throughout my industrial training and was able to learn a lot from them as I was assigned to different departments over the course of my training. Throughout my industrial training placement, I was placed under the Body Shop division of AED.

The body shop is divided again into 2 subdivisions, New Model and Production Engineering (PE). The New Model division is responsible for the design and planning of the production line, workflow and the manufacturing jig of the new models.

The PE division is responsible in ensuring the production line and the workflow set by the New Model division is followed by workers through audits set up throughout the process to maintain the quality and precision of the chassis produced from the body shop.

During the first month of my industrial placement, I was placed under the New Model Division of the Body Shop. I was able to follow my supervisor in understanding the tasks and paperwork surrounding the new model project that was currently underway for the new model division. I was able to learn a lot about the responsibilities that are present in the Body Shop and the documents that record their responsibilities.

2.1 New Model Division

2.1.1 Flow Chart, Part Stationing and Order Sheet

The first assignment that was given to me by my supervisor was to help out with the part stationing chart and the flow chart for the new model project. The flow chart in this project is done to list down all the parts and hardware that are needed from various suppliers and country and list them in order with their part numbers. The parts are grouped into their own assembly, signifying the portion of the chassis it is used for. All the parts in the flow chart, if accounted for, will result in a fully assembled chassis that can be sent to the paint shop to be coated with paint before full assembly.

A part stationing chart is used here to help simplify and group the items from the flow chart. Each part stationing chart contains a subassembly that will have a list of parts with their corresponding part number. A diagram is also present at the bottom so show a visual representation of the subassembly.

Both the flow chart and the part stationing chart have to be cross referenced throughout the project to ensure that part with their corresponding part numbers are correct on both sheets as part names, numbers and sources might change throughout the project for a new model as suppliers and sometimes designs can change. I was able to finish the task in a day, but there were multiple corrections that had to be made on the flow chart and the part stationing chart as there were changes that have been made in part numbers that were not reflected in both the flow chart and the part stationing chart. I was able to hand over the work the next day on the 7th January and continued to create a order sheet based on the part stationing chart that I have made.

An order sheet is created for the parts that need to be ordered from suppliers for the project. The order sheet is categorized into the regions for clearer understanding of the origin of the parts on the chassis. All parts and part numbers are put into the order sheet and handed to my supervisor on the 7th of January.

2.1.2 Spot Welding Parameters

During my first week of industrial training, my supervisor handed me a internal manual that was used by the engineers to understand the ins and outs of Resistance Spot Welding (RSW). Resistance spot welding is used to weld body panels together to manufacture a chassis. Resistance spot welding is commonly done by having two electrodes pinching on the metal sheets that are to be welded and passing a high current through the metal sheet. The heat from the resistance of the metal sheet as current passes through heats up and melts. As current stops flowing, the metal sheets cool, creating nugget from the molten metal, fusing the two pieces together.

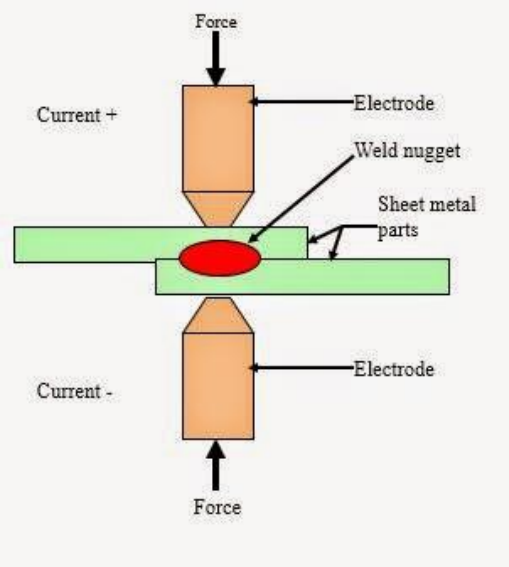

Figure 2.1 Parts Involved in Resistance Spot Welding, (Mechanical Inventions)

To get the quality and size of the nugget right, there are multiple factors that affect it. The manual details the effect of current, timing, pressure, material type and the amount of sheet metals stacking can have on the quality of the nugget. As the only independent variable in getting the perfect quality nugget is through the altering of settings on the spot welding gun, Current, timing and pressure are the variables that need to be studied here to ensure that the parameters are compatible with the controlled variables of material type and the number of sheet metals stacked. My supervisor was able to guide me in understanding important key points that was helpful in me understanding the changes that I was making in the results. I was able to translate this skill in an exercise that he set up for me.

As defects arise in production, these parameters may deviate from the theoretical optimum parameters when defects are observed when using the theoretical optimum parameters. I was able to experience this challenge during my placement with the PE division when diagnosing spot peels that are present in specific workflows in the production line.

2.1.3 Quality Variation Characteristic Control and Fit Finish (QVCC & FF)

During my time in the New Model division, my supervisor gave me a task to set up the QVCC and FF report for the new model project. This report is generated after a chassis is inspected using a Coordinate Measure Machine (CMM). A CMM is used to measure the coordinate of a designated point on that chassis and is used to compare it with the nominal data that can be interpreted from the CAD model of a specific chassis. Two CMM machines are present in TCMA as each is used to inspect one side of the chassis. A QVCC and FF report shows the deviation the chassis inspected has when compared to the nominal data. This data is important to understand adjustments that need to be made on the jig to reduce the deviation of the chassis.

2.2 Production Engineering

After the first month of industrial training in the new model division, I was placed under production engineering division. I was able to follow my colleagues into the production line and understand the tasks and audits that are performed daily to ensure the quality of the chassis that are being manufactured.

2.2.1 Auditing

Auditing is done daily to ensure that procedures are followed correctly, and quality of parts manufactured are up to standards. There are various audits that are performed by employees within the PE division.

2.2.2 Sealant Audit

Various parts of the chassis is haves sealant applied to surfaces of body panels before welding panels together. This is to ensure that a watertight seal can be achieved to prevent corrosion from within the chassis. To ensure this, the sealant must be applied correctly and sometimes evenly across the surface. The PE department is responsible in measuring and observing the application of said sealant daily to ensure that the

sealant applied is sufficient and the application of sealant is even across the surface. I was able to follow my colleague in conducting the sealant audit, understanding the importance of the audit and have a hands-on experience.

2.2.3 Overall Checksheet Parameter Audit (OCPA)

There are more than a thousand spot points that are present in a given chassis. It is important to ensure that all weld points are performed, and no defects are present when manufacturing the chassis of the car. An OCPA is conducted daily to ensure that all points are welded and defects that are observed to be recorded and fixed before sending chassis to final inspection. This is often time consuming as observation of the entire process is needed. I was able to follow my colleague in understanding what to look out for when conducting an OCPA. It is important at this stage to find any defects that are present so that it can be mended.

2.2.4 CMM Machine

One chassis of each model is required to perform a holdback to be inspected on the CMM machine. A preset nominal data is set in a program that is able to show the deviation of the chassis based on the results gathered from the CMM by measuring the coordinates of specific points of the chassis and comparing it with the nominal data. This is manually by TCMA but automated CMM is also used by companies to perform this task as it allows for the removal of human error in obtaining the data. I was able to learn procedures that are in place to obtain data from the CMM machine

Before bringing the chassis in for the CMM machine, posts for the chassis has to be calibrated to ensure that the posts are aligned and will not compromise the accuracy of the data. After the posts are aligned, the chassis is brought in to be inspected by the CMM machine. The data collected from the CMM machine is then exported to create the QVCC and FF report.

This process is very time consuming as there are more than 1000 points that are present in a given chassis to be inspected. Adding to the fact that the new model

division requires the use of the CMM machine constantly when developing the jig for the new model, this task is often times behind the quota set by my supervisors monthly. I was happy that I was able to help out my colleagues in closing in on the quota during my industrial training placement as I was able to cut the work in half.

Figure 2.2 Figure shows me operating the CMM machine

2.2.5 Spot-Welding Gun Parameter and Pressure Audit

As weld nugget quality is dictated by multiple factors including gun current and gun pressure, it is important that the parameters of the welding guns are checked regularly to ensure that the parameters do not deviate from the parameters that have been calculated during the planning of production by the new model division. Often, defect may occur in the production line in regard to welds. Spot peels are often looked in seriously as it means the quality of the nugget is not sufficient, hence being able to be peeled open by employees when testing the weld. The welding gun is then checked to ensure that the current, timing and pressure of the spot welding gun is as designated. Of there seems to be no defect on the welding gun, an investigation is conducted to understand the adjustments that need to be made to eradicate the spot peel defect that is occurring. Changes to the current and pressure are made and observed daily to ensure that the defect is not present after adjustments.

CHAPTER 3 CONCLUSION

I was able to learn a lot with the 12-week industrial training placement that I had with TCMA. I was able to learn a lot of hard skills and soft skills and was happy that I was able to contribute to my colleagues and help reduce the workload during my placement. I was able to learn the tolerances and procedures in place to maintain quality tolerances in an assembly plant. I was able to learn how to communicate with colleagues clearly to understand the process that are done daily to ensure quality of products are maintained.

Through this industrial training placement, I was able to learn the importance of recording everything down. I learned to always carry a notebook with me to note down anything of interest to be noted down in my logbook or to question my supervisors. This helps to reduce carelessness as everything is noted down in a notebook for future references. I was able to learn how to work in a multi-cultural environment through this placement. As I was the only Chinese worker in my department, I was able to learn the working culture that was present in my department and understand and tolerate the behaviors of my colleagues.

I was able to further hone my skills in Excel from this placement as there were assignments that required complicated excel codes that were not known to me prior to this industrial training placement. I am glad that I was able to learn from this placement as the additional knowledge gained was useful for me in creating cleaner spreadsheets in the future.

CHAPTER 4 RECOMMENDATIONS

There are recommendations that I wish to improve in the future. At the start of my industrial training placement, I had trouble in getting tasks from my supervisor as I was left in the office while my supervisor headed out into the body shop. As a result, I was placed under Production Engineering Division after a month as my supervisor was too busy to attend to me. I could have been more attentive and followed my supervisor even though I was told there were no tasks for me at the time.

Due to the lack of structure in my industrial training placement, productivity when I was under the new model division was low. A more defined and structured training plan would have helped in ensuring that I was busy throughout my industrial training placement. The lack of structure also made the tasks of the last few weeks repetitive and nothing new was learned.

CHAPTER 5 REFERENCES

[1] Paultan.org, *Tan Chong Motors Assemblies Sdn. Bhd. Serendah Plant*. 2012.

[2] "Brands We Represent - Tan Chong Motor Holdings Berhad", *Tan Chong Motor Holdings Berhad*. [Online]. Available: https://www.tanchonggroup.com/our-business/brand-we-represent/. [Accessed: 20- Mar- 2020].

[3] "Overseas' Ventures - Tan Chong Motor Holdings Berhad", *Tan Chong Motor Holdings Berhad*. [Online]. Available: https://www.tanchonggroup.com/about/overseas-venture/. [Accessed: 20- Mar- 2020].

[4] Mechanical Inventions, *Parts Involved in Resistance Spot Welding*.