

**DEVELOPMENT OF NEW STANDARD OPERATION  
PROCEDURE CONFIGURATION FOR  
DISASSEMBLY WORK**

**BOO JIA MIN  
B051410122**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
2018**



# **DEVELOPMENT OF NEW STANDARD OPERATION PROCEDURE CONFIGURATION FOR DISASSEMBLY WORK**

Submitted in accordance with the requirement of the University Teknikal Malaysia Melaka  
(UTeM) for the Bachelor Degree of Manufacturing Engineering (Hons.)

by

**BOO JIA MIN**

**B051410122**

**940501-06-5460**

FACULTY OF MANUFACTURING ENGINEERING

2018

**BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA**

Tajuk: **DEVELOPMENT OF NEW STANDARD OPERATION PROCEDURE CONFIGURATION FOR DISASSEMBLY WORK**

Sesi Pengajian: **2017/2018 Semester 2**

Saya **BOO JIA MIN (940501-06-5460)**

mengaku membenarkan Laporan Projek Sarjana Muda (PSM) ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. \*Sila tandakan (√)

- SULIT** (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysiasebagaimana yang termaktub dalam AKTA RAHSIA RASMI)
- TERHAD** (Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/ badan di mana penyelidikan dijalankan)
- TIDAK TERHAD**

Disahkan oleh:

\_\_\_\_\_  
Alamat Tetap:

\_\_\_\_\_  
Cop Rasmi:

\_\_\_\_\_  
Tarikh: \_\_\_\_\_

\_\_\_\_\_  
Tarikh: \_\_\_\_\_

\*Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

## **DECLARATION**

I hereby, declared this report entitled “Development of New Standard Operation Procedure Configuration for Disassembly Work” is the results of my own research expect as cited in reference.

Signature : .....

Author's Name : BOO JIA MIN

Date : 11 June 2018

## **APPROVAL**

This report is submitted to the Faculty of Manufacturing Engineering of Universiti Teknikal Malaysia Melaka as a partial fulfilment of the requirements for the degree of Bachelor of Manufacturing Engineering (Hons.).

The member of the supervisory committee is as follow:

.....

**(Dr Fairul Azni Bin Jafar)**

## **ABSTRAK**

Prosedur Operasi Standard (SOP) adalah satu komponen penting dalam mana-mana sistem operasi yang berkualiti. Bertulis kepada proses yang seragam memberi panduan untuk memastikan bahawa aktiviti yang dijalankan dalam cara yang konsisten, dengan itu membawa kepada produk yang boleh dipercayai dan kualiti perkhidmatan. SOP yang dibentuk perlu mematuhi sepenuhnya garis panduan sesuatu amalan organisasi. SOP dalam bentuk kertas bercetak adalah manual sepenuhnya dan ianya yang boleh menyampaikan beberapa kelemahan dan batasan terhadap pengguna. Oleh itu, tujuan projek ini dibuat adalah untuk membangunkan SOP separa automatik berkonsepkan digital untuk menggantikan SOP tradisional. Ini bertujuan bagi mengatasi kelemahan SOP berasaskan kertas cetak. Laporan ini juga mengambil kira teknik yang diperlukan untuk mencapai matlamat projek ini. Terdapat dua produk dipilih sebagai model iaitu lanjutan soket dan telefon talian untuk kerja-kerja pemasangan, kemudian menyediakan SOP berasaskan kertas yang dicetak sekali mengetahui urutan pemasangan dan komponen yang mengandungi dalam produk. Selain itu, langkah-langkah pemasangan akan dilaksanakan di SOP berdasarkan digital dicadangkan yang dibangunkan dengan menggunakan Microsoft Power Point kerana kos dan faktor mudah. Selepas mencadangkan konfigurasi SOP baru, koleksi data akan dijalankan oleh tiga puluh peserta untuk melaksanakan kerja-kerja pemasangan dan analisis akan dijalankan untuk menganalisis prestasi. Prestasi tersebut adalah menganalisis dengan menggunakan masa yang diambil untuk menyiapkan kerja pemasangan. Oleh itu, hasilnya pada dasarnya menunjukkan perbandingan mengenai prestasi pemasangan antara SOP kertas yang dicetak berasaskan dan cadangan SOP digital berasaskan. Dalam tambahan, hasilnya juga menganalisis pencapaian kerja pemasangan dengan menggunakan peralatan tangan yang berbeza yang pemutar skru manual dan separa automatik pemutar skru. Pendek kata hasilnya menunjukkan bahawa SOP berdasarkan digital yang dapat membantu dalam kerja-kerja pemasangan dengan mengurangkan masa keseluruhan sebanyak 15% untuk lanjutan soket dan 26% untuk telefon talian.

## **ABSTRACT**

Standard Operating Procedure (SOPs) is a vital component in any quality operation system. Written instructions on standardized processes provide guidance to ensure that activities are conducted in a proper way, hence leading to reliable product and service quality. SOPs should be prepared in full compliance with guidelines and regulations as well as must upload current organizational practices. However, traditional printed paper based SOP is a fully manual in application in which it can deliver some disadvantages and limitations to users. Therefore, the purpose to come out with this project is to develop semi-automated SOP that is in digital based to replace traditional SOP which to eliminate the limitations of printed paper based SOP. This report also included the technique that required to approach the aim of this project. There have two product are chosen as the model for disassembly work which are extension trailing socket and landline telephone, then prepare the printed paper based SOP once know the disassembly sequences and the components that contain in the products. Moreover, the disassembly steps will be perform in proposed digital based SOP which developed by using Microsoft Power Point due to cost and convenient factor. After propose a new SOP configuration, a series of data collection are conducted with thirty participants to perform the disassembly work and analyses are conducted to analyse it performance. The performance is analyse by using the time taken to complete the disassembly work. Thus, the result basically shows the comparison about the performance of disassembly between the printed paper based SOP and proposed digital based SOP. In additional, the result also analyse the achievement of disassembly work by using different hand tools which are manual screwdriver and semi-automated screwdriver. In short the result shows that the digital based SOP able to help in disassembly work by reduce the overall time required by 15% for extension trailing socket and 26% for landline telephone.

## **DEDICATION**

This report is dedicated  
to my beloved parents,  
who educated me and enabled me  
to reach at this level.



## **ACKNOWLEDGEMENT**

I have taken efforts in this projects. However, it would not have been possible without the kind support and help of many individuals. I would like to extend my sincere thanks to all of them.

I would like to express my deepest appreciation to all those who provided me the possibility to complete this report. A special gratitude I give to my final year project supervisor, Dr Fairul Azni Bin Jafar, whose contribution in stimulating suggestions and encouragement, helped me to coordinate my project especially in writing this report.

Furthermore, I would also like to acknowledge with much appreciation the crucial role of the staff of Mechatronic Lab, who gave the permission to use all required equipment. I have appreciate the guidance given by all panels especially in presentation project as well as thanks to their comment and advices.

Finally, I would like to thank everybody who was important to this FYP report, as well as expressing my apology that I could not mention personally each one of you.

# TABLE OF CONTENT

ABSTRAK	i
ABSTRACT	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENT	v
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xiii
LIST OF SYMBOLS	xiv

## CHAPTER 1: INTRODUCTION

1.1	Chapter Overview	1
1.2	Background of Study	1
1.3	Research Motivation	2
1.4	Problem Statement	3
1.5	Objective	4
1.6	Scope of Study	4
1.7	Report Structure	5

## CHAPTER 2: LITERATURE REVIEW

2.1	Overview	6
2.2	Introduction of Standard Operating Procedure	6
2.3	Benefit of Standard Operating Procedure	8
2.4	General SOP Component	11
2.5	Type of SOP	17
2.6	Review and Approve of Standard Operating Procedure	20
2.7	Common Problems in Implementing Standard Operating Procedure	21
2.8	Software to Develop Standard Operating Procedure	22

2.9	Power Point Based Standard Operating Procedure	25
2.10	The Effect of Standard Operating Procedure on Disassembly Work	25
2.11	Summary	27

### **CHAPTER 3: METHODOLOGY**

3.1	Overview	28
3.2	Overall Methodology	29
3.3	Literature Review	30
3.4	Disassembly Modelling	31
	3.4.1 Disassembly Extension Trailing Socket	32
	3.4.2 Disassembly Landline Telephone	35
3.5	Preparing Standard Operating Procedure	39
3.6	Develop Proposed Standard Operating Procedure	40
3.7	Data Collection & Analysis	42
	3.7.1 Experimental Platform	43
	3.7.2 Experimental Setup	45
	3.7.3 Experimental Procedure	46
3.8	Summary	47

### **CHAPTER 4: RESULT AND DISCUSSION**

4.1	Overview	48
4.2	Printed Paper Based SOP	48
4.3	Proposed Digital Based SOP	49
4.4	Background Data of Participants	50
4.5	Disassembly Work for Extension Trailing Socket	52
	4.5.1 Analyzing Time Taken in Disassembly Work with Printed Paper Based SOP (Group A)	52
	4.5.2 Analyzing Time Taken in Disassembly Work with Proposed Digital Based SOP (Group B)	54
	4.5.3 Comparison of Time Taken for Critical Stage by Using Both Types of SOP with Manual Screwdriver	56
	4.5.4 The Average Time Taken for Disassembly Work by Using Both Types of SOP with Manual Screwdriver	57

4.5.5	Disassembly Work by Using Semi-automated Screwdriver with Printed Paper Based SOP (Group C)	58
4.5.6	Disassembly Work by Using Semi-automated Screwdriver with Proposed Digital Based SOP (Group D)	59
4.5.7	Comparison between Disassembly Using Manual Screwdriver and Semi-automated Screwdriver	60
4.6	Disassembly Work for Landline Telephone	62
4.6.1	Analyzing Time Taken in Disassembly Work with Printed Paper Based SOP (Group B)	62
4.6.2	Analyzing Time Taken in Disassembly Work with Proposed Digital Based SOP (Group A)	64
4.6.3	Comparison of Time Taken for Critical Stage by Using Both Types of SOP	66
4.6.4	The Average Time Taken for Disassembly Work by Using Both Types of SOP	67
4.6.5	Disassembly Work by Using Semi-automated Screwdriver with Printed Paper Based SOP (Group D)	68
4.6.6	Disassembly Work by Using Semi-automated Screwdriver with Proposed Digital Based SOP (Group C)	69
4.6.7	Comparison between Disassembly Using Manual Screwdriver and Semi-automated Screwdriver	70
4.7	Data Analysis of Feedback from Participants	72
4.8	Summary	73

## **CHAPTER 5: CONCLUSION**

5.1	Conclusion	74
5.2	Recommendation for Future Work	75

## **REFERENCES**

## **APPENDICES**

A	Example of SOP for Assembly Work	81
B	Example of SOP for Laboratory	89

C	Questionnaire	94
D	Printed Paper Based SOP (Extension Trailing Socket)	95
E	Printed Paper Based SOP (Landline Telephone)	100
F	Proposed Digital Based SOP (Extension Trailing Socket)	103
G	Proposed Digital Based SOP (Landline Telephone)	106
H	Gantt Chart for FYP 1	108
I	Gantt Chart for FYP 2	109

## LIST OF TABLES

2.1	Benefits of SOPs with Explanation	10
3.1	Bill of Material (BOM) of Extension Trailing Socket	34
3.2	Bill of Material (BOM) of Landline Telephone	38
4.1	Participant Group with Work Package	50
4.2	Number of Participant and Races in Each Group	51
4.3	Data Collected of Disassembly Extension Trailing Socket Based on Printed Paper Based SOP (Group A)	52
4.4	Data Collected of Disassembly Extension Trailing Socket Refer to Proposed Digital Based SOP (Group B)	54
4.5	Disassembly Extension Trailing Socket by Using Semi-automated Screwdriver with Printed Paper Based SOP (Group C)	58
4.6	Disassembly Extension Trailing Socket by Using Semi-automated Screwdriver with Proposed Digital Based SOP (Group D)	59
4.7	Average Time Taken in Disassembly Work by Using Manual and Semi-automated Screwdriver	61
4.8	Data Collected of Disassembly Landline Telephone Based on Printed Paper Based SOP (Group B)	62
4.9	Data Collected of Disassembly Landline Telephone Refer to Proposed Digital Based SOP by Using Manual Screwdriver (Group A)	64
4.10	Disassembly Landline Telephone by Using Semi-automated Screwdriver with Printed Paper Based SOP (Group D)	68
4.11	Disassembly Landline Telephone by Using Semi-automated Screwdriver with Proposed Digital Based SOP (Group C)	69
4.12	Average Time Taken in Disassembly Work by Using Manual and Semi-automated Screwdriver	71

## LIST OF FIGURES

2.1	Example of Title Page in SOP	12
2.2	Example of Table of Content in SOP	13
2.3	Example of Procedure in SOP	15
2.4	Example of Reference in SOP	16
2.5	Example of Technical SOP	18
2.6	Example of Administrative SOP	19
2.7	Outlook of SweetProcess Software	23
2.8	General Work of EtQ Software	23
2.9	Zavanta Software Logo	24
2.10	Disassembly Methods Based on Fastener Type	26
2.11	Assembly Outline (Left), Connection Diagram (Right)	27
2.12	State Diagram Based on Connection Diagram (Left), Based on Assembly Outline (Right)	27
3.1	Process Flow for Overall Methodology	29
3.2	Process Flow for Literature Review	30
3.3	Manual Screwdriver Set (Left) and Semi-automated Screwdriver Set (Right)	31
3.4	Outer Appearance with Front View (Left) and Rear View (Right)	32
3.5	Inner View of Extension Trailing Socket	32
3.6	Each Component from Extension Trailing Socket	33
3.7	Disassembly Sequence for Extension Trailing Socket	33
3.8	Outer Appearance with Front View (Left) and Rear View (Right)	36
3.9	Inner View of Landline Telephone	36
3.10	Each Component from Landline Telephone	37
3.11	Disassembly Sequence for Landline Telephone	37
3.12	Process Flow for Preparing SOP	40
3.13	Process Flow for Develop Proposed SOP	41
3.14	Process Flow for Analysis	43

3.15	Workstation that Used for Experiment	44
3.16	Detail Specification for Mini Desktop	44
3.17	Specification for Touch Screen Panel	45
3.18	Extension Trailing Socket	46
3.19	Landline Telephone	46
4.1	Example of Printed Paper Based SOP	49
4.2	Example of Proposed Digital Based SOP	49
4.3	Analysis of Number of Participant against Races for Each Group	51
4.4	Time Consuming of Disassembly Extension Trailing Socket by Using Manual SOP with Manual Screwdriver (Group A)	53
4.5	Time Consuming of Disassembly Extension Trailing Socket by Using Proposed SOP with Manual Screwdriver (Group B)	55
4.6	Comparison of Time Consuming for Critical Stage in Disassembly Extension Trailing Socket	56
4.7	Average Time Consuming For Disassembly Extension Trailing Socket	57
4.8	Time Consuming of Disassembly Extension Trailing Socket by Using Traditional SOP with Semi-automated Screwdriver (Group C)	58
4.9	Time Consuming of Disassembly Extension Trailing Socket by Using Proposed SOP with Semi-automated Screwdriver (Group D)	59
4.10	Comparison between Manual and Semi-automated Screwdriver in Disassembly Work	61
4.11	Time Consuming of Disassembly Landline Telephone by Using Manual Screwdriver and Manual SOP (Group B)	63
4.12	Time Consuming of Disassembly Landline Telephone by Using Proposed SOP (Group A)	65
4.13	Comparison of Time Consuming for Critical Stage in Disassembly Landline Telephone	66
4.14	Average Time Consuming For Disassembly Landline Telephone	67
4.15	Time Consuming of Disassembly Landline Telephone by Using Traditional SOP with Semi-automated Screwdriver (Group D)	68
4.16	Time Consuming of Disassembly Landline Telephone by Using Proposed SOP with Semi-automated Screwdriver (Group C)	69



4.17	Comparison between Manual and Semi-automated Screwdriver in Disassembly Work	71
4.18	Comparison of Feedback Data for Printed Paper Based SOP and Proposed Digital Based SOP	72

## LIST OF ABBREVIATIONS

BOM	-	Bill of material
EPA	-	Environmental protection agency
HACCP	-	Hazard analysis critical control point
ID	-	Identification
OSHA	-	Occupational safety and health administration
QA	-	Quality Assurance
ROI	-	Return on investment
SOP	-	Standard operation procedure
USB	-	Universal series bus

## LIST OF SYMBOLS

%	-	Percent
min	-	Minute
sec	-	Second

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Chapter Overview**

This chapter discusses about the introduction and idea to develop new Standard Operation Procedure (SOP) configuration which is in semi-automated form for disassembly work. This chapter includes background of study, research motivation, problem statement, objective, scope, and report structure of this study. The basic fundamental of the relationship between assembly and disassembly work, and SOP will be discussed in background of the study. Meanwhile research motivation will describe about why this research work or study is needed. Problem statement is a part of summarized to propose a solution to the problem. The objectives and scope of study will give details about what this study focus on. The last subtopic of this chapter is report structure that will describe the overall sequence or arrangement of the report for this research.

### **1.2 Background of Study**

SOP is a step by step activities to a certain operation that defines the activities necessary to complete tasks in accordance with industry regulations, common laws or even the standard for maintaining own business. SOP as a set of documents describe about practices and the need to be followed in word and soul by all worker entirely. Industrial, laboratories, business associations and government organizations also have their own arrangement of SOP which are depend on the agency or company vision, mission and requirements, but all of them have one normal or essential objective, which is to give the most ideal administration or product to customers as far as quality. In manufacturing

environment, the most evident case of a SOP is the step by step production line procedures used to make products as well as train staff or worker. Besides that, SOP is also one of the communication tools between the peoples who are responsibility or take part in that task.

SOP is needed in assembly or disassembly work since SOP is able to provide a more safety working environment. SOP write in clearly condition alongside appropriate training that able to lessen the chances of mischances or injury since tasks are written and also may diminish legitimate risk should an accident happen. SOP also able to increase productivity and efficiency on assembly or disassembly work due to the leader can save time retraining or reminding the workers what should be done once a day. These will make the job finished with more profitable and more prone to accomplish crest execution. Well written SOPs not only can provide clearly outline and direction of how the procedure or each steps of assembly or disassembly work need to do but also can convey sound reasons of why the activity ought to perform positively.

Other than that, SOP also common used in business area due to SOP is important to the growth or development of a business. SOP able to create benchmarks for the quality of output for every staff and helps to make sure that every team member knows exactly what are the expected outcomes. If a business fail to create or having an SOP that could cause the company lose profit and even clients as well as the quality of work. SOP act as a checklist of sorts for staffs to follow in order to do well on their tasks that may cause employees will be more productive and inspired to work. Hence, SOP is essential for business environment rather than only for manufacturing industry.

### **1.3 Research Motivation**

In general, most of the agency or industry is using printed paper type of SOP for their daily task. However, there are some disadvantages or limitations on printed paper based SOP. Manual SOP files require a lot of physical storage space and typically need to be stored close to hand so that the users can be accessed as quickly as possible. If the SOP files located not around the workstation area may cause severe productivity losses when retrieving the SOP documents. Besides that, SOP developed in paper form is prone to damage, such as in industry, documents can be damaged from the wear and tear of regular handling. Thus, the

SOP documents need to change or renew in uniformly duration which will affect the cost and the time factor for doing the changing or renew SOP job. The limitation of manual SOP also included the editing problems for SOP, when the SOP need to be updated or revise for the new information purpose, editing becomes a messy and time consuming process.

Moreover, paper based SOP also is a burden for our environment and nowadays most of the industries are operating with prioritize sustainability and consider environmentally friendly. Hence, the existence of semi-automated SOP can make sure that the amount of paper use can be minimized. The SOP developed in digital based can deliver the benefit of ease of retrieval and access. Unlike paper based SOP that must be searched manually, the proposed SOP can be retrieved using keywords included in either the file name or the content no matter where the document is located (Breuel, 2006). Therefore, the limitation of the printed paper based SOP motivates the idea to come out with a digital based SOP to overcome those limitations.

#### **1.4 Problem Statement**

This research is to develop a new configuration of standard operating procedure (SOP) which is SOP in semi-automated form to replace the previous manual SOP during disassembly work. Product assembly and disassembly work are the most crucial operation in a product lifecycle. Assembly is the process of constructing a product from its component parts while disassembly is the reverse of assembly and adapt some of the basic principles of assembly to the disassembly process. Hence, an optimisation of SOP of assembly and disassembly work is vital as it has important significant on productivity, product quality and efficiency (Veerakamolmal and Gupta, 1998). The manual SOP will influences the result of assembly and disassembly work perform in inconsistency quality, efficiency as well as time consuming, whereby it is believed that those limitation can be overcome by a semi-automated SOP. Due to maximizing the efficiency of SOP on performing work, analysis work need to be done to identify the optimum SOP for either manual SOP or semi-automated SOP.

Numerous studies have described various softwares in market that are available to be used to prepare the semi-automated SOP for performing work. Subsequently, the SOP

need to be designed in user friendly for performance of work can be improved concerning an objective, which can be operating time or cost. Effective methodologies are to find an optimal software with low cost to prepare the semi-automated SOP for performing work and this is one of the purpose of this research. Currently, this project will not involve any software due to consideration on cost factor, however the semi-automated SOP for this project will be done by using Microsoft Power Point which is much cheaper than any SOP development software but it still able to help user achieve good quality of work. Microsoft Power Point also have an advantage to be used in this project that it is easy to use compared with any software therefore able to eliminate the training time to learn the other SOP software.

## **1.5 Objective**

The objectives of this research are listed as follows:

- i. To develop a formation of digital standard operating procedure (SOP) by using Microsoft Power Point displayed on touch screen panel.
- ii. To analyze performance work between the proposed digital based standard operating procedure (SOP) with the traditional printed paper based standard operating procedure (SOP).

## **1.6 Scope of Study**

This project will cover several scope of development that are:

- i. Although the new SOP configuration is relevant to be used for job such as assembly work, disassembly work, and repairing job, but for this project, the new SOP configuration is developed with regards to disassembly work only.
- ii. The SOP developed without using any software due to factor of cost and convenient to use.
- iii. The respondents selected to perform the disassembly work for the analysis purpose are coming from engineering field, female and height in range of 155cm to 165cm.

- iv. As this project is still in the preliminary stage, no collaboration with any manufacturing industry is carry out. Anyway, there is a possibility that this project might be introduce to real manufacturing industry upon the success of this project.
- v. The disassembly sequence based on reverse assembly.
- vi. The entire disassembly work is using basic hand tools.
- vii. Electrical components as the model in disassembly work.
- viii. No specific environmental features are controlled in the experiment lab.

## **1.7 Report Structure**

This project report is organized into six chapters. This report will divide into 2 parts which are Final Year Project 1 and Final Year Project 2. Final Year Project 1 including Chapter 1 (Introduction), Chapter 2 (Literature Review), and Chapter 3 (Methodology). While Final Year Project 2 consists of Chapter 4 (Result and Discussion) and Chapter 5 (Conclusion).

Chapter 1 (Introduction) describe the idea and motivation to develop semi-automated SOP. This chapter also includes its problem background, research motivation, problem statement, objectives, and project scope. A problem statement is summarized to propose a solution to the problem. The solution is stated as the objectives of developing this project. Thus, the scope is covered the functionalities provided by this project.

In Chapter 2 (Literature Review) is reviewing researches done previously, facts and existing system that are related to the project. The resources are taken from books, journals and internet. Then, Chapter 3 (Methodology) is explaining all the steps and approaches that are used in this research. It starts with the chapter overview, overall methodology, literature review, disassembly modelling, prepare standard operating procedure, upload and show standard operating procedure on workstation as well as analysis.

The developed SOP will be presented in Chapter 4 (Result and Discussion) and also included the analysis and discussion of result, while Chapter 5 (Conclusion) will discuss about the conclusion of this project in the form of whether the objectives are achieve or not and in addition of future suggestion in order to improve this research work.