DEVELOPMENT OF STATISTICAL PROCESS CONTROL SOFTWARE FOR SMALL MEDIUM INDUSTRIES (SMI)

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Management) with Honors.

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I hereby, declared this report entitled “Development of Statistical Process Control Software for Small Medium Industries (SMI)” is the results of my own research except as cited in references.

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The title of this project is “Development of Statistical Process Control software for Small Medium Industries (SMI)”. The project discuss about the software that want to be develop in order to enhance quality control in the electronics company. The software was develop based on using Microsoft Visual Basic to control the rejection part that have increasing every day in the company. The data was collected thought factory visits, interviews and observation in order to understand the quality control that involved in the company. Data of part from the incoming supplier was gathered and was analyzed before developing the software. The software was develop is equip with the control charts for P-charts and the value of P- charts of the production to monitor and control the reject part. In addition, the software must be an easy used to the engineer and the operator to operate the software; also it must easy to understand by them for using it.
ABSTRAK

Tajuk projek ini ialah "Penghasilan perisian Kawalan Proses Statistik untuk Industri Kecil Sederhana (IKS)". Projek ini membincangkan tentang software yang ingin dihasilkan untuk meningkatkan kawalan mutu di syarikat elektronik. Perisian ini dihasilkan berdasarkan pada menggunakan Microsoft Visual Basic untuk mengawal penolakan bahagian yang mengalami kenaikan setiap hari di syarikat. Pengumpulan data kilang di ambil semasa lawatan, wawancara dan pemerhatian untuk memahami apa kawalan yang terlibat dalam syarikat. Data pada bahagian masuk alat untuk alat kelui, alat yang dihantar oleh pembekal yang rosak telah dikumpul dan dianalisis sebelum menghasilkan perisian tersebut. Perisian ini di hasilkan dilengkapi dengan carta kawalan dan hasil pengeluaran untuk mengekalkan dan mengendalikan bahagian yang rosak. Selain itu, perisian harus mudah digunakan untuk para jurutera dan operator untuk mengendalikan perisian, juga harus mudah difahami oleh para pekerja untuk menggunakankannya.
DEDICATION

I would like to dedicate this report to my parents, Ahmad Tarmidi and Latifah, my sister and my brothers.
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# TABLE OF CONTENT

Abstract i  
Abstrak ii  
Dedication iii  
Acknowledgement iv  
Table of content v  
List of table x  
List of figure xi  
List of abbreviation xiii

## 1.0 INTRODUCTION 1

1.1 Background 1  
1.2 Problem statement 2  
1.3 Objective 3  
1.4 Scope of project 3

## 2.0 LITERATURE REVIEW 4

2.1 Quality 4  
2.2 Statistical Process Control 5
2.7.2.4 u – charts
2.8 Research on Statistical Process Control
2.9 Software development
2.10 Case study 1
2.11 Case study 2
2.12 The successful stories that other companies implement SPC

3.0 METHODOLOGY
3.1 Identify the project title
3.2 Define the problem, objective and scope
3.3 Literature review
3.4 Data collection
3.5 Software development
3.5.1 To analyze the current quality control system and collect data
3.5.2 Analyze the rejection data
3.5.3 Translate the data and analyze into Microsoft Visual Basic
3.5.4 To develop a Statistical Process Control software
3.6 Final report writing and submission

4.0 COMPANY CASE STUDY
7.2 Benefit of using control charts

7.3 Future recommendation

REFERENCES

APPENDICES

A Gantt charts PSM 1
B Gantt charts PSM 2
C Summary of case study on the implementation of SPC in SMI
D AQL in the company
E Example of reject part from supplier
F Software that has been develop
LIST OF TABLE

2.1 Different situation in control charts 11
2.2 Description from other author 20
2.3 Successful stories from other company 27
5.1 Sample size, reject, and part name of one supplier. 55
6.1 Data on supplier in the month of September. 58
6.2 Data on supplier in the month of October. 59
LIST OF FIGURES

2.1  Process Flow Diagram       6
2.2  Check Sheet                  6
2.3  Histogram                    7
2.4  Pareto Diagram               8
2.5  Ishikawa Diagram             8
2.6  Scatter Diagram              9
2.7  Control charts               10
2.8  Control Charts pattern       11
2.9  Process flow of control charts 15
2.10 The flow chart of software development 23
2.11 The P-charts that was constructed 24
2.12 Recalculating the P-charts   25
3.1  Process flow chart for conducting the project 30
3.2  Phases and method that used to achieve the objective 33
3.3  Process flow chart for conducting the software 35
4.1  Process flow of RPR750       39
5.1  The 3 stages of define the software. 42
5.2  The first form               43
5.3 The form that appear after choose the supplier 43
5.4 The output of the software 50
5.5 Value from the journal 51
5.6 The result from the software first test 52
5.7 The value that has been generated from first test 52
5.8 The information from the book 53
5.9 The result from the software second test 54
5.10 The value that has been generated from second test 54
5.11 The result from the data taken. 56
6.1 P-chart in the month of September. 60
6.2 P-chart in the month of October. 60
LIST OF ABBREVIATIONS

SMI - Small Medium Industries
SPC - Statistical Process Control
FMEA - Failure Mode and Effect Analysis
CCP - Control Charts Pattern
CUSUM - Cumulative Sum
EWMA - Exponentially Weighted Moving Average
AQL - Acceptances Quality level
CHAPTER 1
INTRODUCTION

Chapter one will briefly overview the background of the Quality and Statistical Process Control, the problem that the most occur in the company, also the objectives that what to achieve in this project and the scope where there are limitations of this project were discussed.

1.1 Background

Quality is the most important thing that must have in the manufacturing company. It will make the product become more quality and in order to inspect the product and part, assemblies and final inspection before shipment. Many of the successful manufacturing company implement the quality control to ensure that the product or services are design and produce to meet with the customers’ requirements. In quality control, there are many tools and techniques that can be apply in the manufacturing company such as the Statistical Process Control.

Statistical Process Control (SPC) is one of the major techniques that can be applied in controlling the product. Since Shewhart developed the technique of using control chat and applying statistical concepts in manufacturing process. SPC is one of the techniques used in quality assurance programs and total quality management (TQM), for controlling, monitoring and managing a process either manufacturing or service through the use of statistical method. The effective implementation of SPC can be
achieved if organization or company has a good understanding of such strategy or method that will make the application successful.

However, the development of SPC in Small Medium Industries maybe not popular among the small company or organization. This maybe cause from some of the companies tends to delay installing SPC software to ‘save’ money. Generally, the SPC software and also the hardware systems can cost a lot of money not including the training cost. Basically, The SPC are subjected to a certain limitations after applying in the company when only a quality problems occurred. A corrective action has been taken by the production and engineer after the occurrence of an out of control signal.

In many cases, it is more effective to take a proactive approach to prevent the occurrence of out of control situations, allowing the process to be adjusted in preventive way so that fewer non-conforming items will be produced. It is important to note, that the ability to assess quality data processes and make instant decisions is essential in competitive manufacturing environment which are supported and provided by the SPC applications.

1.2 Problem statement

Multitone Electronics Sdn.Bhd. which produces pager as the main business has a lot of defective problems occur in the supplier side. In the company, the supplier either from local or overseas needs to pass the quality assurance department first before the part can be used in the production line. One of the main reject parts in this company is the part for pager RPR750. Based on quality assurance department, the cause for the rejection are the scratch, stain mar, white dot/stain, adhesive glue, poor coating, black dot, dirty, broken, case front problem, blurry display, and paint mark.
1.3 Objectives

Based on the titles “Development of Statistical Process Control Software for Small Medium Industries (SMI)” the objectives that achieved at the end of this thesis are;

1. To analyzed the current quality control system that used in the manufacturing company.
2. To develop a Statistical Process Control software using (Microsoft Visual Basic).

1.4 Scope of the project

This project is based on the Statistical Process Control implementation in Multitone Electronics Sdn. Bhd. emphasized on making SPC software by using the control charts for P-chart in order to monitor and control the rejection problems in the incoming quality section.
CHAPTER 2
LITERATURE REVIEW

Literature review is one of the important chapters that must be attaching in the project. The reviews are search from the variety of sources that included journals, books, report from other people experiments, internets and etc. The chapter is start with the on determination on quality and after that, this chapter will goes to the explanation on the Statistical Process Control (SPC) tools and some related information to the SPC process.

2.1 Quality

From author it says that the quality is an application used to make the organization or company establishes more efficiently and to control the product from enormous rejects and also to provide a continuous improvement to prevent waste that occur. The quality control also is a step to make the company produce better product and satisfy the customer requirement (John S. Oakland, 2008).

If all measurable quality characteristics are on target, they will certainly be within specification limits making the quality control into the manufacturing operation is almost a goal throughout industry and it is judge to be so much important that it is essentially to all industry and company. It used toll and techniques in activity to achieve, sustain and improve the quality of the product or services in the company. Quality control can be used to achieve target in production, improve quality of product, reduce cost and enhance the process in production (James .R. Evans, 2005).
There are various types of techniques and concept that can improve the product and services and to identify error such as Statistical Process Control (SPC), Zero Defects, Six Sigma, Failure Mode Effect Analysis (FMEA) and other application that include in quality (Joel E. Ross, 1999).

2.2 Statistical Process Control

Statistical process control (SPC) has been seeing to be a valuable technology or application for understanding the process behavior and also for making real-time decisions by operators and managers working in the production (Deming, 1986; Juran, 1989; Deming, 1993; Bergman and Klefsjo, 2003). The use of this system can make it possible to identify the sources of variation and also can detect the out of control situation. An effective implementation can also include removing the unusual sources of variation by taking a correct action (Montgomery, 2001). In SPC, there are seven tools and techniques that can interpret and analyze. The tools are process flow, check sheet, histogram, pareto diagram, cause and effect analysis, scatter diagram and also the control charts.

2.2.1 Process flow diagram

Process flow chart is very important process in improving the process see in figure 2.1. It is a systematic diagram that shows the process, either from the beginning till end of the process likes from the input till the output. The flow chart will make us easy to understand the procedure or step that are moves from the various processing station or operations. The diagram makes it easy to visualize the entire systems, identify potential trouble spots, and it also can locate control activities (John S. Oakland, 2008).
2.2.2 Check sheet

Check sheet is a form that will collect a data that has been recorded for process control and problem solving. The purpose of the check sheet is to make sure that the data are collected carefully and accurately. The data should be quickly generated, easy to use and analyzed and also the check sheet is individualized for each situation as shown in the figure 2.2.

Figure 2.2: Check Sheet (John S. Oakland, 2008)
2.2.3 Histogram

A Histogram is a basic graph tool that shows the frequency or occurrence of continuous data by showing which values appear most and least frequently (Dale H. Besterfield, 2001). Histogram is a set of rectangular graph show as bar that’s determines the frequency of each category as shown in the figure 2.3. It also can provide information concerning specifications, the shape of the population frequency distribution, and particular quality control problem.

![Figure 2.3: Histogram (John S. Oakland, 2008)](image)

2.2.4 Pareto diagram

From the figure 2.4 below, pareto diagram is a process data collection to determine to identify the important problem and failures, causes, types of nonconformance, and so forth. Pareto diagram can be distinguish from the histograms by the fact that the horizontal scale of Pareto is categorical and for the histogram is numerical. A Pareto diagram is a graph that ranks data classification in descending order from the left to right.