

**WASTE REDUCTION OF SAFETY PIN BY  
IMPLEMENTING KAIZEN ACTIVITIES IN  
TEXTILE MANUFACTURING COMPANY**

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**UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
2018**



# **WASTE REDUCTION OF SAFETY PIN BY IMPLEMENTING KAIZEN ACTIVITIES IN TEXTILE MANUFACTURING COMPANY**

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

by

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Tajuk: **WASTE REDUCTION OF SAFETY PIN BY IMPLEMENTING  
KAIZEN ACTIVITIES IN TEXTILE MANUFACTURING COMPANY**

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

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## **APPROVAL**

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

The members of the supervisory committee are as follow:

.....  
**(Associate Professor. Dr. Effendi Bin Mohamad)**

## ABSTRAK

Buangan industri perkilangan adalah salah satu isu kemampanan alam sekitar utama di Malaysia. Aktiviti 'Kaizen' (KA) adalah salah satu alat 'Lean' pembuatan digunakan secara meluas untuk menghapuskan atau mengurangkan buangan, meningkatkan kualiti dan mengurangkan kos dalam industri pembuatan. KA adalah kaedah peningkatan berterusan dipilih dalam projek ini untuk menyelesaikan masalah ketidaksempurnaan 'Safety Pin' semasa proses pemasangan dalam sebuah syarikat perkilangan tekstil yang terletak di Melaka. Pada masa ini, syarikat pembuatan tekstil menghadapi penolakan kualiti rendah 'Safety Pin' yang amat tinggi mengakibatkan kos pengisihan juga tinggi. Oleh itu, matlamat kajian ini adalah untuk mengurangkan penolakan 'Safety Pin' dengan melaksanakan KA. Terdapat banyak jenis 'Safety Pin' ketidaksempurnaan yang membawa kesan penolakan tersebut. Dengan mengikuti metodologi KA, *Top Wire Showing* adalah punca ketidaksempurnaan yang berlaku dalam proses pemasangan 'Safety Pin' dan dikenal pasti dengan menggunakan carta Pareto. Pelbagai alat statistik telah digunakan seperti Carta Pareto, *Cause-and-Effect Diagram*, *Failure Mode and Effect Analysis* (FMEA). Punca utama ketidaksempurnaan yang kritikal telah dikenalpasti dan penyelesaian untuk mengurangkannya telah disediakan. Penggunaan kitaran *Plan, Do, Check and Act* (PDCA) telah digunakan untuk menentukan mesin kesesakan dalam proses pemasangan yang mengakibatkan penolakan yang tinggi terhadap ketidaksempurnaan 'Safety Pin' pin serta memberikan tindakan pembetulan untuk mengurangkan penolakan tersebut. Hasilnya, penolakan 'Safety Pin' telah dikurangkan 32.76% dan pemisahan kos pengisihan dikurangkan 31.48% sebulan. Anggaran kos pengisihan RM13202 boleh dijimatkan pada setiap tahun selepas penambahbaikan. Untuk penambahbaikan berterusan, KA harus berterusan dilaksanakan dalam proses pemasangan untuk mencari penyelesaian yang terbaik.

## **ABSTRACT**

Wastes in manufacturing industries are one of the major environmental sustainability issues in Malaysia. Kaizen Activities (KA) is one of the Lean Manufacturing (LM) tools usually widely used to eliminate or reduce waste, improve quality and reduce cost in manufacturing industries. KA is a powerful continuous improvement method which selected in this project to solve the defect safety pin issues in the assembly process of a textile manufacturing company which is located in Malacca. Currently, the textile manufacturing company is facing high rejection of low quality safety pin which contributed to the high sorting cost. Hence, the goal of this study is to reduce the rejection of safety pin by implementing KA. There are many type of defect safety pin which contributed to rejection. By following the KA methodology, the major defects that occur in the assembly process of safety pin are identified by using Pareto diagram that is Top Wire Showing. Various statistical tools were used such as Pareto Chart, Cause-and-Effect Diagram and Failure Mode and Effect Analysis (FMEA). The root causes of the critical defect were identified and solution to reduce the defect was provided. The use of Plan, Do, Check and Act (PDCA) cycle has determine the bottleneck machine in assembly process that contributed to the high rejection of defect safety pin as well as provide correction action to reduce the rejection. Based on the results, the rejection of safety pin was reduced 32.76% and the sorting cost was reduced 31.48% per month. An estimation of RM13202 sorting cost can be saved annually after the improvement. For continuous improvement, the KA should be continuously implemented in the assembly process in order to find the best solution.



## **DEDICATION**

Only

my beloved father, Lee Kwong You

my appreciated mother, Pang Kim Fah

my adored sister and brother, Lee Sing Loo, Lee Sing Mey, Lee Sing Erl,

Lee Sing Jyy, and Lee Shao Lin

for giving me moral support, money, cooperation, encouragement and also understandings

Thank You So Much & Love You All Forever

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## LIST OF ABBREVIATIONS AND SYMBOLS

AQL	-	Acceptance Quality Level
ASP	-	Assembly Safety Pin
CL	-	Central Line
CM	-	Cellular Manufacturing
FMEA	-	Failure Mode and Effect Analysis
JIT	-	Just in Time
KA	-	Kaizen Activities
KG	-	Kilograms
LCL	-	Lower Control Limit
LM	-	Lean Manufacturing
NVA	-	Non Value Added
PDCA	-	Plan, Do, Check, Act
QC	-	Quality Control
RPN	-	Risk Priority Number
SMED	-	Single Minute Exchange Die
SOP	-	Standard Operation Procedure
SW	-	Standard Work
TPM	-	Total Productive Maintenance
TPS	-	Toyota Production System
TQC	-	Total Quality Control
UCL	-	Upper Control Limit
VA	-	Value Added
VSM	-	Value Stream Mapping
WIP	-	Work in Progress

# CHAPTER 1

## INTRODUCTION

In chapter 1, this chapter outlines the background of study. Also, the issues of textile manufacturing company will be provided in the problem statement. Next, the objectives and scope come are determined to complete in this study. In the end of this chapter describe the significance of the study and organization of report as well as summary of overall chapter.

### 1.1 Research Motivation

In this modern society, manufacturing industry had a rapid growth and become extremely competitive in the global marketplace. Because of the climate change and depletion of the mineral resources, the amounts of cost for all the resources increase gradually. Thus, the industrial company has realized that a profitable strategy and a sustainable strategy must be implemented to maintain the manufacturing industry (Kishita *et al.*, 2016). In Malaysia, the evolution of the rapid industrial development and urbanization have been increased year after year (New Straits Times, 2015). The people walk from Malaysia has been produced 33,000 tons of solid waste per year and only 10.5% of the total waste were recycle, reuse and remanufacture into the value added products (The Star Online, 2014). Hence, elimination waste should be spread widely in industrial area as toward the environmental sustainability as well as green environment. Lee *et al.* (2017) has been stated that enhancing the existing production process would imply that the new enhanced process that would expend less resources in order to produce good quality products.

The implementation strategy concentrates on waste reduction throughout the process, cost reduction through the elimination of waste, quality of product, environment, and economic policy (Bhamu and Sangwan, 2015). It is also stated that implement the Lean Manufacturing (LM) philosophy as the waste elimination method and increase the profit margin gain. By applying LM approach, it is result that the cost is saving for overall organization of the company. LM is adopted in many manufacturing industries and the effects are deliberately showing in term of optimize the production, reduce rejection of the product, profitability, elimination of waste and increase quality of product.

Sundar *et al.* (2014) suggest that one of the method in order to reduce cost, increase value added (VA) activities and reduce rejection are implementing the LM. LM include single minute exchange of dies (SMED), just in time (JIT), total productive maintenance (TPM), Kaizen, cellular manufacturing (CM) and so on which intended by the Toyota Production System (TPS). Through the implementing of the LM, waste elimination, rejection of products and cost reduction is achieved. In order to retain the company in this competitive world, all of the workers and management must in corporately make effort which will objectively improve entire performance of the company.

In recent years, the textile manufacturing industries are one of the major sectors in this fast-paced society. Especially in Malaysia, the textile manufacturing industries are developed toward the challenging worldwide marketplace. The textile manufacturing industries produce masses of product such as fabric, sewing and needle works products, as well as dyeing services. However, the key element to sustain and continuous compete toward the globalization is focus on the waste reduction and non-value added (NVA) activities. Currently, the major issue faced by the textile industrial is the high rejection over the lot size of low class products. High rejection of non-conformity product will result in sustainability issues and financial issues. Hence, this causes drive the company concentrate on the reduce rejection as to find out the root causes of the problem as well as provide solution toward the profitability and environmental sustainability company in Malaysia (Maia *et al.*, 2011).

## 1.2 Problem Statement

The waste elimination of a textile manufacturing company has played an important role for reducing the rejection of defect safety pins as to reduce sorting cost. Based on the situation as stated, one of the departments in ABC Sdn. Bhd. found that it is facing high sorting cost in the production department. With the compilation of sorting invoices 2016 and 2017, the company realized that they currently squander on sorting of the safety pins about 2 tons per annum which result in high sorting cost that is RM10000 per annum. Figure 1.1 shows the sorting cost of safety pins from January to August 2017.

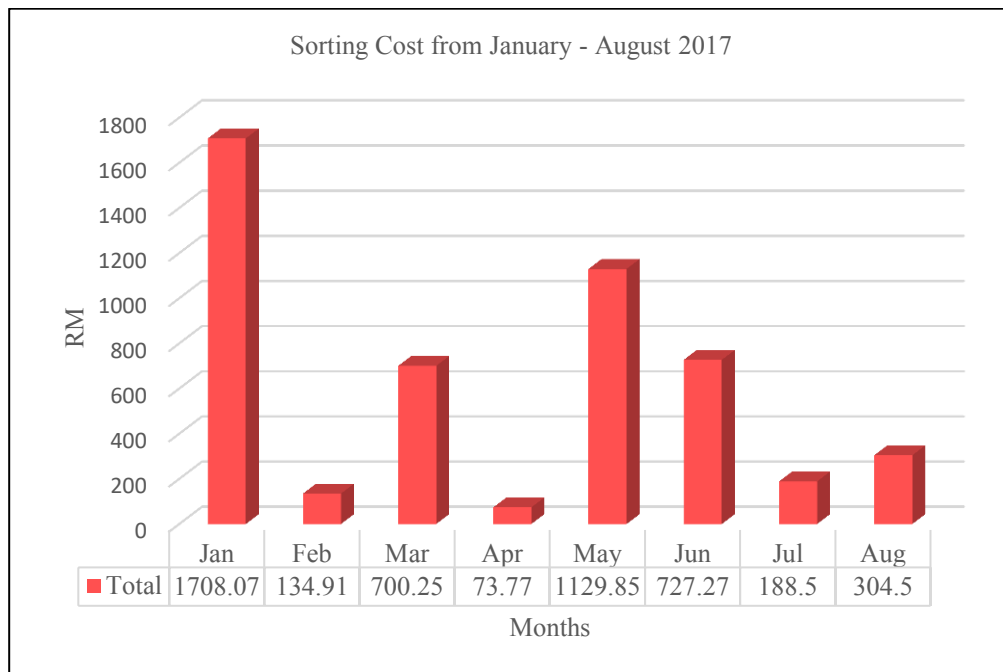


Figure 1.1: Sorting cost from January to August 2017

If without sorting the safety pins lot, all the rejected defect safety pins lot will be classified as scrap and it may cause the additional material cost to remanufacture for the safety pins. With sorting of the safety pins, all the rejected safety pins lot sent to the outsources to sort out the defective safety pins one by one and it also will cause the additional cost which is known as sorting cost. The sorting cost is the cost associated with separate non-defective products or defective products that deal with the outsource subcontractor. Nevertheless, sorting cost is lower compare to the remanufacture of safety pin as shown as Figure 1.2.

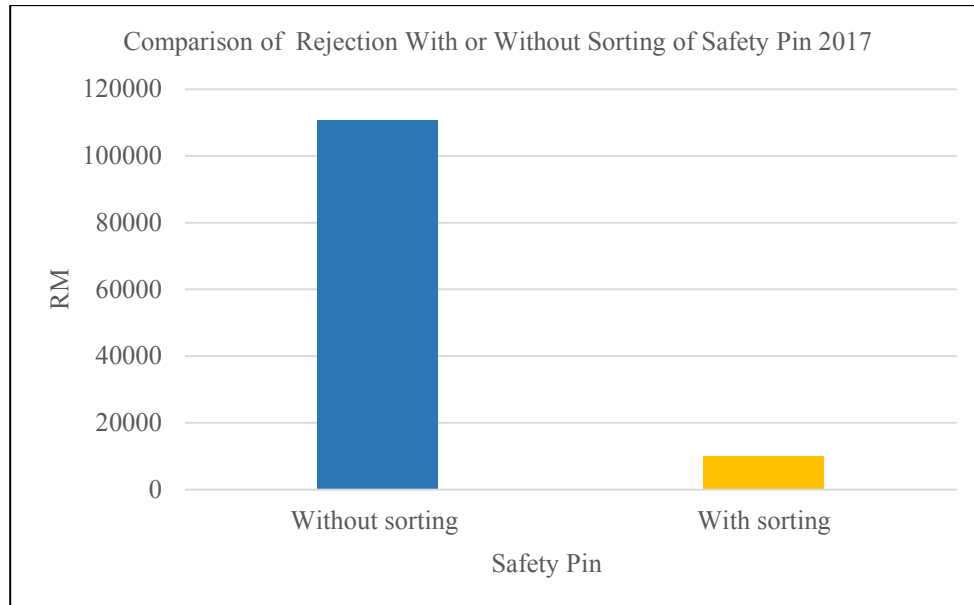


Figure 1.2: Comparison of rejection with or without sorting of safety pin

Meanwhile, the main reason that contributes to high sorting cost in production department is the high rejection of low quality safety pins. The rejection of safety pin is encountering high in the assembly line of production department. Hence, the scrap safety pin will be disposal and the defect safety pins will be sent to do sorting. It is considering as a NVA that is waste of defects. The product which contributes to the high rejection problem is safety pin as depicted in Figure 1.3. Figure 1.4 delineate that the rejection of safety pins lot after detecting the non-conformable of safety pin and needed forward to do sorting.



Figure 1.4: Safety Pins



Figure 1.3: Rejection of safety pins

Thus, to reduce the sorting cost, the rejection of low quality of safety pins must be reduced at first. The rejection of safety pins is caused by many different types of defect in assembly

process. It is desirable to determine the significant defect and the root causes of the defects using suitable approach in order to reduce the rejection of safety pin which will result in reduction of sorting cost. Thus, suitable solutions are needed to be taken to fix the issue. A profitable and sustainable for this company will be taking place.

### **1.3 Objective**

The main purpose of this study is to reduce the rejection of safety pins in term of improving the quality by reducing the defects that contributed to the sorting. The objectives that need to be achieved in this project are as follows:

- (a) To identify the critical defects that occurs in the assembly process of safety pin.
- (b) To analyze the root causes of the defects that occur in the assembly process of safety pin.
- (c) To reduce the rejection of safety pin by 30% using Kaizen activities.

### **1.4 Scope of Study**

This project is concentrate on the high rejection of low quality safety pin that will result in high sorting cost. This project is conducted in Textile Company. This project is carried out and conducted at the assembly area of safety pin that only focusing the assembly process of the safety pin. The prosecution of this study only covers on assembly machine in production line of Textile Company. The product to be chosen as sample study is safety pin only because these products have major impact and demand to the company. The product design, materials and sizes of the safety pins are not related to the methodology in this study are not included.

## **1.5 Significance of study**

The aim of the study is to reduce high rejection of safety pin by improving the quality of safety pin in order to reduce sorting cost, profitability and satisfy customer requirement. The roots causes that contribute to the high rejection of safety pin can be found out by examine the collected data. Thus, a suitable corrective action will be taken to solve the problem. Once the problem of the company is being solved, the company able to attain a betterment of quality of safety pin without any reject as well as giving a greater impact on profitability to the company in term of saving sorting cost. Hence, no sorting cost is needed for sorting the defective safety pin. Moreover, this study also helps to minimize the root causes that leading to quality issues indirectly providing solutions that able to bring potential benefits for the company.

## **1.6 Organization**

There are five chapters are often introduced in this report.

### Chapter 1: Introduction

This chapter discusses the overview of presenting the study's background and this is followed by the problem statement that facing by the case company. The objectives to be achieved throughout the study are presented. Also, the scope of the study which is concentrates and narrows down the area of the study. Finally, in this chapter also includes the significance of the study and organization of the report.

### Chapter 2: Literature Review

This chapter covers the literature review of the study which is a retrieval process on the research area. This chapter generally reviewed the past studies which consist of the basic theories of quality, lean manufacturing, seven QC tool, concept of Kaizen, qualitative and quantitative method and the summary of Kaizen techniques being used through journals, books, articles, internets and other resources.