UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Faculty of Manufacturing Engineering

QUALITY ENHANCEMENT ON SAFETY PIN AT TEXTILE COMPANY USING KAIZEN APPROACH

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**A thesis submitted
in fulfillment of the requirements for the degree of Master of
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2016

DECLARATION

I declare that this theses entitled " Quality Enhancement on Safety Pin at Textile Company using Kaizen Approach" is the result of my own research except as sited in the refrences. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature   : ....

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APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Master of Manufacturing Engineering (Industrial Engineering).

Signature : ....

Supervisor Name : DR . SAIFUDIN HAFIZ YAHAYA
....

Date : 27/9/2016
....

DEDICATION

I dedicated this to my parents who always supported me and helped me during this Master project. I also dedicated this to my fellow friends that showed supports and help me in obtaining idea during the completion of this project.

ABSTRACT

Globalization inflicted on the high competition amongst the industries, especially for the manufacturing field. Manufacturing companies need the preservation of their good quality to compete in the marketplace and survive in the industry. Therefore, determining the fundamental of quality is an essential for the company to remain competitiveness in this competition. Quality issues are the major problem occurred in this field. Hence, it is a must for companies to take action to overcome this quality problem. Lean Manufacturing(LM) is well-known philosophy due to its successful implementation in reducing the waste and also improving the quality. Numerous LM methods can be used namely as 5S, Poka Yoke, and Kaizen. Kaizen is the most common method used in manufacturing company to reduce waste and improving quality due to its applicability. A textile company is one of the company that facing hardship of remaining their quality of the products. Quality issues are then identified when the specifications of the products unfulfilled by the company. Thus, the main objective of this study is to improve the quality issues in this textile industry. Classification of the quality issues is obtained through interview, observation and simulation at production line. The critical quality issue is determined through Pareto diagram analysis. Once the issue classified, root cause analysis is applied for identifying the possible root causes the occurrence of quality issues. With the reference to these root causes, improvement action is then conducted to solve the quality issues using Kaizen approach. Improvement actions are only focusing on the packaging process. Changing of the procedures is one of the suggested actions and has been implemented at the packaging machine. The changing of the weight per lot shows the better results where there are no related issues gained after implementing this action. Observation of the machine also a suggested action for new element creation and eliminating the unnecessary barriers in the machine. The improvement actions are then validated with the calculation of the total number of quality issues existed once the implementation is done. The result depicts that the quality issues have been improved significantly after applying the suggested actions. As a conclusion, the quality can be increasingly improved with the use of Kaizen approach.

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ABSTRAK

Globalisasi mengakibatkan persaingan yang sengit antara industri terutamanya didalam bidang pembuatan. Syarikat pembuatan seharusnya mengekalkan kualiti mereka agar mereka mampu bersaing di dalam pasaran dan juga bagi memastikan syarikat mampu bertahan di dalam industri ini. Justeru itu, penentuan asas adalah penting bagi syarikat untuk kekal dalam persaingan ini. Masalah kualiti adalah masalah utama di dalam bidang ini. Oleh itu, ianya adalah satu kemestian bagi syarikat untuk mengambil tindakan khusus bagi mengatasi masalah kualiti ini. Pembuatan Tangkas (LM) adalah falsafah yang amat terkenal dengan kejayaannya dalam pelaksanaan dalam mengurangkan sisa-sisa dan menambah baik kualiti. Pelbagai jenis kaedah LM yang boleh digunakan seperti 5S, Poka Yoke dan Kaizen. Kaizen adalah kaedah yang kerap digunakan di dalam syarikat pembuatan bagi mengurangi masalah ini dan juga menambah baik kualiti berdasarkan kebolehgunaannya. Syarikat tekstil adalah salah satu syarikat yang mengalami masalah dalam mengekalkan kualiti produk mereka. Masalah kualiti kemudiannya dikenalpasti apabila spesifikasi produk tidak dipenuhi oleh syarikat. Justeru itu, objektif utama kajian ini adalah untuk menambah baik masalah kualiti di dalam syarikat tekstil ini. Klasifikasi masalah kualiti diperolehi melalui temuramah, pemerhatian dan juga simulasi di bahagian pengeluaran. Masalah kritikal ini dikenalpasti melalui analisa rajah Pareto. Apabila masalah sudah dikelaskan, analisisa punca penyebab digunakan untuk mengetahui punca-punca yang mungkin menyebabkan masalah kualiti ini terjadi. Dengan merujuk kepada punca-punca tersebut, langkah penambahbaikkan dijalankan bagi menyelesaikan masalah kualiti ini dengan menggunakan pendekatan Kaizen. Langkah penambahbaikkan hanya memfokuskan kepada proses pembungkusan. Perubahan prosedur adah salah satu langkah yang dicadangkan dan dilaksanakan di mesin pembungkusan. Perubahan berat setiap lot menunjukkan keputusan yang lebih baik di mana tiada masalah berkaitan terjadi selepas pelaksanaan langkah ini selesai. Pemerhatian di mesin juga dicadangkan bagi penemuan unsur baru dan menghapuskan segala halangan yang tidak diperlukan pada mesin. Langkah penambahbaikkan kemudiannya disahkan dengan pengiraan jumlah keseluruhan masalah kualiti yang terjadi apabila pelaksanaan tersebut selesai. Keputusan menunjukkan bahawa masalah kualiti dapat ditambahbaik dengan ketara selepas melaksanakan langkah-langkah yang dicadangkan. Kesimpulannya, kualiti semakin boleh ditambahbaik dengan menggunakan pendekatan Kaizen.

ACKNOWLEDGEMENT

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LIST OF ABBREVIATIONS

LM	-	Lean Manufacturing
NVA	-	Non-Value Added
CAED	-	Cause and Effect Diagram
VSM	-	Value Stream Mapping
SOP	-	Standard of Operation

CHAPTER 1

INTRODUCTION

1.0   Motivation of Study

Judi and his co-authors (2011) defined that quality as fulfilling the specifications or any customer requirements. Generally, quality is the conformance to requirement and those requirements must be defined in measureable and clearly stated term (Marire et al., 2014). Quality is important as it conveys critical intending to makers and buyers. Thus, it is an important element in customer satisfaction. If the customer satisfied with the products, it is considered as the product is accepatable and have high quality (UNIDO, 2006).

Nowadays, in the global market, high competition can be seen between the manufacturing industries. Many organizations realize that high quality products and services can ensure their survival in the competitive business (Ashwini and Avinash, 2015). Shettar et.al (2015) also agreed with the above statement as high productivy will resulting in good quality. It shows that quality is one of the biggest factors that plays a big role in determining the successful of the company. However, it is difficult to obtain the good quality or maintaining it due to problem that always occurred during the production. Defects, malfunction, poor finishing and others are the example of poor quality where normally happened in manufacturing sectors.

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Ashwini and Avinash (2015) highlighted that excellent quality of the product can be achieved by minimizing the re-work, reducing the scrap rate and minimizing man hour on rework. However, re-work will effect the productiviy and increase the cost production. Thus, Lean Manufacturing(LM) is used in order to improve the quality. There are various LM methods that can be used for the quality improvement. For example, Kaizen is one of the approaches that can be applied to achieve excellent quality products or services. Kaizen defines as continous improvement and originates from Japanese words 'Kai' means continous while 'Zen' known as improvement (Joshi, 2013 and Singh and Singh, 2012). Shettar et.al (2015) mentioned that Kaizen philosophy has been applied in the most of organizations around the world in order to improving production values together and at same time improving employee morale and safety. The fact that Kaizen is not only understanding of what is the meaning of quality to customers segment but also including supportive culture. All highlighted descriptions above lead the organization to produce highest quality product and also excellent services. It shows that Kaizen able to help the company in remaining their quality and prevent for any problems such as incremental of production cost to be occurred.

1.1   Problem Statement

According to Malaysia External Trade Development Corporation (MATRADE), clothing accessories for textile fabrics become as a main export in 2011 with the total RM 500.2 million. Seemingly, high quality garments at low cost in shorter period will be the most challenging part for apparel manufacturers (Silva, 2012). It also happened to other company for apparel such as textile accessories according on how to meet the high quality of the product. As one of the manufacturing companies, XYZ Sdn. Bhd. also have to face

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the problem regarding the quality of the products. Quality issues are related to the production of the product. The issues namely as poor finishing, burrs and others. Chandrupatla (2009) has defined that the manufactured product quality needs to fit, finish, appearance, function, and performance. Commonly, the quality issues of the product are detected normally at the end of the manufacturing process. Thus, minimization of defects becomes an important aspect to improve or increase the quality of certain product (Uddin et al., 2014).

There are several complaints are reported to the company about the quality issues on their product such as missing cap, opening pointing, opening angle and outspec. Defects are identified to be occurred and it effected customer satisfaction. The quality is depending on the customer satisfaction. The product is classified to be in good quality if the established specification of the product is fulfilled by the company. Figures 1.1 and 1.2 show the examples of safety pin defects that occurred in textile company
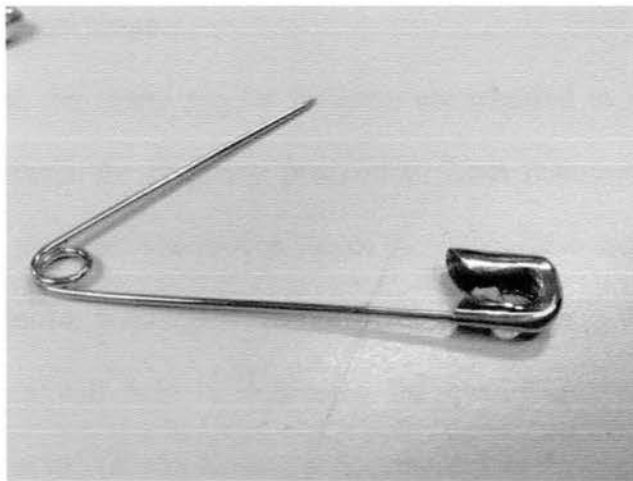

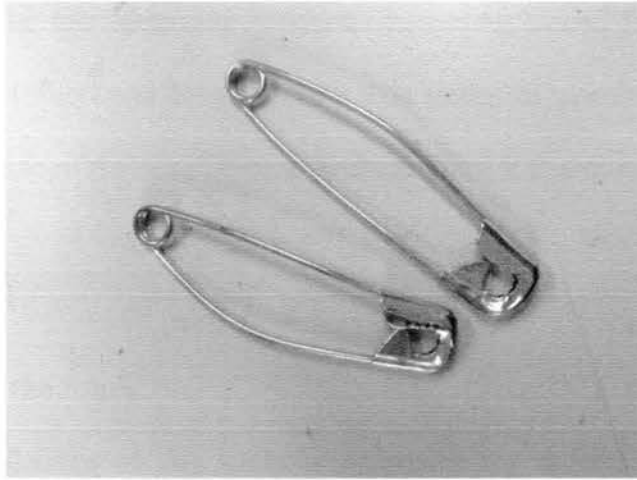Figure 1.1: Opening pin (XYZ Sdn. Bhd.)

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Figure 1.2: Outspec (XYZ Sdn. Bhd)

Figure 1.1 is the critical defect as complainted by the customer due this safety pin gives harm situation to the customer. The product is packed in poly bag and the sharp edge of the opening pin is piercing out through the bag. There are cases where customers accidently pricked their fingers with the sharp pin when holding the safety pin package. Figure 1.2 shows the poor appearance of safety pin. The appearance is more different when compared with the original shape.

On top of that, the safety pin for instance, are required to improve their quality issues in order to remain the company production. Lean manufacturing is one of the methods to solve this problem. The root causes of the defects also can be determined using lean and quality control techniques. In 2013, Wahab et al., discussed about lean manufacturing practice will help in enhancing the quality and also the productivity. According to Shettar et al., (2015), Kaizen is documented as the continuous improvement involves all persons in one organization or workplace from the top management until workers. Kaizen method also being applied in organization or in workplace due to its own nature. Thus, this method has been chosen as an improvement proposal for the case study.

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Kaizen ensure that the manufacturing processes becoming leaner, fitter and also helping for waste reduction (Singh and Singh, 2009). The issues of opening pin categorized as defect and defect is one of the seven type of wastes. Thus, it is a must to improve the issue to reduce the waste.

1.2   Objective of the Study

The main objective of this study is to reduce the defects that occurred in the production line using Kaizen approach. Besides, this study focuses on the following objectives:

a) To identify the quality issues occurred on the safety pin product through production line.

b) To analyse the root causes of safety pin quality issues in production line.

c) To propose improvement action on quality issues using Kaizen approach.

d) To implement and evaluate the improvement action taken.

1.3   Scope of the Study

This case study focuses on analysing the manufacturing processes at the industry and also identifying the quality issues occurred on the related product. The implementation of this study will be at XYZ Sdn Bhd. XYZ Sdn Bhd is a manufacturing company that manufactures and supplies such as knitting, sewing and garments accessories. There are various products that manufactured by this company namely as safety pin, ball pin, pearlised pin, and hook and eyes. Based on the customer complaints recorded, the critical product that need to be focused on is safety pin. The quality issue of the safety pin has caused incremental of cost production due to the product being send back to the company. Figure 1.3 shows the product chosen in this study.
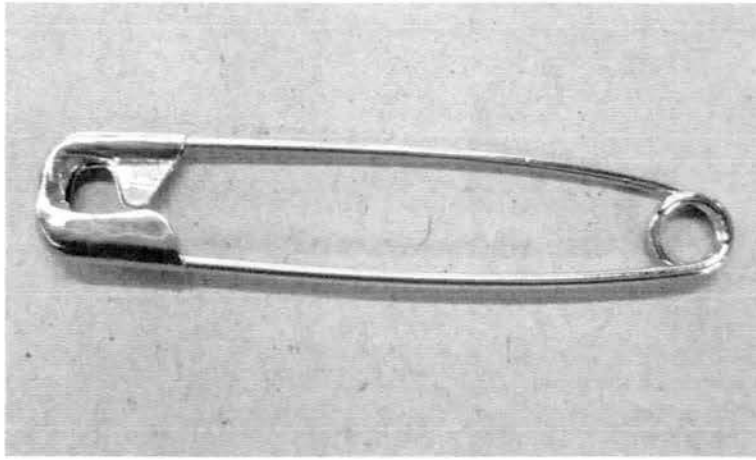
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Figure 1.3: 393HS safety pin (XYZ Sdn. Bhd)

The product chosen is safety pin with code is 393HS. The code is stand for safety pin with size of 3 and made from hard steel. This product was assembled with two parts, stem and head.

The processes that will be investigate in this case study are primary process and finishing process. Analysis will be conducted in each process to identify the root causes of the issue and to improve the quality of the product. This study will be conducted in Haberdashery Division Manufacturing which the primary production line (pointing and assembly process) is located. There are three main process that will be focused on which are assembly, plating and packaging.

The machines for assembly and plating process are fully automated meanwhile packaging processis semi-automated. The assembly machine is used to join the head and stem to become the complete product. Meanwhile, plating machine is used to coat the pins with nickel as the finishing process. Figures 1.4 and 1.5 show the assembly and plating machine.

| Figure 4: Assembly Machine | Figure 5: Plating Machine |

To improve the quality issue, Kaizen is studied and chosen as improvement method. Kaizen is one of the Lean Manufacturing methods that is successfully implemented in most of the companies especially in manufacturing companies. The continuous improvement ideas are in variety form including innovation or also small improvement action such as 5S or elimination of unnecessary process or element. Thus, Kaizen will be included as the scope for this study.

1.4 Significance of Study

Quality is a important factor that need to be preserved or improved for the company to survived in the marketplace. The study is conducted to improve the quality of the product in XYZ Sdn. Bhd. The significance of this study is the implementation of Kaizen approach as an alternative action for the company in improving their quality issues. The quality issues that are faced by the company has caused production cost to increase due to

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the poor quality. Thus, the improvement action will help in reducing the production cost by improving the quality of the product.

In addition, this study is important as there is no study are conducted at the selected type of manufacturing company. Besides, there is no study related to the selected product which is safety pin. Thus, with this study, it will give beneficial for a new findings and case study to be introduced in the manufacturing field. The type of methods used to conduct the study are commonly applied by other researchers. However, the detail of how the methods are applied during the study is different as it is referred to the selected manufacturing company and product.

CHAPTER 2

LITERATURE REVIEW

2.0   Definition of Quality

The interest of quality is so acute, especially in manufacturing industries and it becomes objective of an organization to achieve. Therefore, along these years, there are many studies conducted based on quality topic. Definition of quality also differs depending on the different purpose.

Newton (2006) stated quality as a mechanism that referring to processes of assessment, accreditation, audit, and also external examination. Quality also considered as the fitness for purpose at the most economical level and also prescribed life for the product (Vijayaram et al., 2006).

Meanwhile, Bhosale et al. (2013) discussed that quality of product is good when the product is produced within their acceptable limits. The product is determined as poor quality if the product did not meet the customer's requirement or expectation. In product aspect, the quality is different according to the product type. For example in mechanical or electrical product, quality is depending on their performance, reliability, safety and appearance. Pharmaceutical product quality can be identified from their physical and characteristics, medicinal effect, toxicity and shelf life. For food product, the quality is depending on their taste, nutritional properties and texture.

Quality also exists in education. Education quality can be refers as an input (teachers, amount of teacher training, textbooks), processes (among of direct instructional

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time, extent of active learning), outputs (graduation rates) and outcomes (performance of the teachers). In addition, quality education also can be viewed from the institution or program's reputation and also how they achieved their objectives or specified target.

The quality definition can be seen differs according to the field. Quality is considered as the importance factor to obtain objectives or targets of the fields or companies. In addition, quality also can be important benchmark for fields to refer to in order for them to become successful.

2.1   Quality in Manufacturing Industry

The globalization of markets to some manufacturers may give an opportunity for them opening up and capturing larger markets for their manufactured products. However, the competitor numbers also may be increased and the competitiveness among them will be more aggressive (Ismail, 1998). Manufacturers are competing in three main aspects which are namely as quality, cost and responsiveness (Judi et al., 2011). In manufacturing context, quality defines as a measurement of excellent performance or defect-free, deficiencies, and significant variations.

It is important for manufacturers to improve their quality in order to achieve their company objectives. In 2011, Fore highlighted in his research that improvement of quality, productivity, profitability can give positive impact to the workforce. Thus, it will give better result on improvement of the quality. Manufacturers can survive in the high competition by ensuring their processes are continuously monitored and product quality is improved (Marire et al., 2014). Quality tools and techniques can be used in order to achieve better result in the quality.

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