ESTABLISHMENT OF VALUE STREAM MAPPING (VSM) OF BALLOON PRODUCTION

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

By

NAIM A'IMULLAH BIN RAMLEE
B051510095
960114-07-5595

FACULTY OF MANUFACTURING ENGINEERING

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DECLARATION

I hereby, declared this report entitled "Establishment of Value Stream Mapping (VSM) of Balloon Production" is the results of my own research except as cited in reference.

Signature   : ………………………………………

Author's Name   : NAIM A'IMULLAH BIN RAMLEE

Date   :

APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of Universiti Teknikal Malaysia Melaka as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Hons.). The members of the supervisory committee are as follow:

…………………………………

(Principal Supervisor)

ABSTRAK

Dalam industri perkilangan, pembuatan langsing menjadi semakin popular digunakan untuk mendapatkan hasil yang lebih cekap dan menguntungkan. Evert the Balloon Company adalah sebuah industri yang menghasilkan pelbagai jenis balon yang ditubuhkan di Ayer Keroh, Melaka. Berdasarkan permerhatian yang dilakukan, syarikat ini lemah dalam melaksanakan pembuatan langsing dan tidak mempunyai prosedur operasi piawai (SOP) yang baik dan Masa Kitaran yang tidak dapat dikawal (CT) dalam barisan pengeluaran mereka. Tujuan kajian ini adalah untuk meningkatkan produktiviti pembuatan dengan menggunakan teknik Peta Aliran Nilai.

ABSTRACT

In the manufacturing industry, lean manufacturing is becoming increasingly popular are use to obtain results more efficiently and profitably. Evert the Balloon Company is an industry that produced various of balloon established in Ayer Keroh, Melaka. It has been found the company weak in implementing lean manufacturing and do not have a standard operating procedure (SOP) and uncontrollable Cycle Time (CT) in their production line. The purpose of this study is to improve the manufacturing productivity by using Value Stream Mapping technique.

DEDICATION

This project is dedicated to my respected supervisor, Prof.Madya Dr. Mohd Rizal Bin
Salleh for always helping me through my project journey, my parents who always
supported & pray for me during final year project 1 and 2.

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In the name of ALLAH, the most gracious, the most merciful, with the highest praise to Allah that I manage to complete this final year project successfully without difficulty.

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LIST OF ABBREVIATIONS

TPS	-	Toyota Production System
VSM	-	Value Stream Mapping
EPE	-	Every Part Every
VA	-	Value Adding
NVA	-	Non-Value Adding
NNVA	-	Necessary but Non-Value Adding
WIP	-	Work-in-Progress
CT	-	Cycle Time
CO	-	Changeover Time
LT	-	Lead Time
TT	-	Takt Time
PSM	-	Projek Sarjana Muda
JIT	-	Just-In-Time

LIST OF SYMBOLS

%   -   Percentage

&   -   And

=   -   Equal

CHAPTER 1
INTRODUCTION

Throughout in this chapter, it comprises about the background of study, the problem statement, includes the objectives to be accomplished all through the project and the scope of the study. All through this section, it gives a structure of the report which by and large depicts about chapter division and related contents to that specific part. In generally, it condenses the advancement of the entire report, depicting how the entire project has been done.

1.1 Background

Lean manufacturing is activities that most of significant manufacturing sector in Asia, particularly in Malaysia have been attempting to embrace with it in order to stay focused in an undeniably aggressive worldwide market. Based on the study that have been done by Rahani AR and Muhammad al-Ashraf, (2012) expressed that, lean can be recognized as the focal point of the methodology is on cutting of the expense through disposing of non-value added activities included by means of utilising a management philosophy which concentrated on identifying and wiping out waste from each progression in the production line corresponding to all of energy, time, movement and resources alike all through a product's value stream. Namely, Value Stream Mapping (VSM) is a straightforward of the whole streamline work of processes. They are likewise clarified that VSM is a compelling device for the act of lean manufacturing. Likewise, gain a more profound comprehension of the stream of choices involving the whole process to change the raw materials into finished goods. VSM is known as a device for actualizing lean as business solutions with a definitive objective of eliminate the waste and will locate probably the at most common area of waste. As indicated by the associated, waste can be

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influence by many factors such as, the over-production, unnecessary inventory, exorbitant waste of time built into the process, extensive wait times and ineffective delivery of product or unnecessary movement.

When these wastes are having been recognized, a company can take an action towards the streamlining on processes in order to enhance the effectiveness and productivity of the production line. One of the crucial points is to differentiate their product in the undeniably competitive markets that there are working today. VSM can be utilized by a company that is planning on new process or to discover ways to incorporates all elements (both value and non-value added). It works by assisting the administration to depict the data and materials in the production of the finished item from beginning of stages. A similar device can be utilized to enhance the current process by making Future State Map (FSM), which envision a definitive state that the company wishes to reach inside the value stream on specific product. The hole between the Current State Map (CSM) and Future State Map (FSM) will be utilized as a base of problem statement to make an action plan for future improvements. When the improvement has been made, a new VSM can be created and new goals can be set (George, 2002). Accordingly, VSM is a basically a specialized tool, but on the other hand is also used as a vital strategic planning device and a change of management tool.

Everts, the Balloon Company, was founded in 1924 by Wilhelm Everts as a balloon printing company and distributor of novelties. In 1954 the Company started producing balls and by 1965, Everts began producing its own balloons in Datteln, Germany. Over the years further printing operations were formed in the UK and in 1987 a second manufacturing plant was established in Melaka, Malaysia. Today, Everts the Balloon Company operates from a single and modern, purpose-built plant in Melaka, Malaysia, with automated balloon production equipment, and the most recent silk screen printing technology innovation that can print five colours or all-round/worldwide prints. Their lab constantly looks for improvement, with research and development activities on new formulations, shapes and colours ensuring that they keep up today date with market needs and changes in the regulatory environment. The packing department can work with various materials and has the flexibility to pack for their own internal branded or private label, ordinarily for vast worldwide retail chains. Everts team has many years of consolidated experience and with the resources of their United Stated (US) parent company, Amscan,

they have a solid establishment whereupon to develop and consistently enhance their product range, in the meantime, staying up with the latest with the most recent technology.

1.2 Problem Statements

Nowadays, industrial sector becoming competitive market which is all companies around the globe endeavor to increase their efficiency and productivity. Evert the Balloon Company produces in high volume of balloons. Due to the high demand of the product from the customer and strive to multiply their efficiency of productivity, the company needs to reduce their current issues which is waste. Today, numerous industrial sectors confront highly critical amount of waste and because of that, they strive to minimize their waste. Waste is whatever does not give any value to the product and it affect the performance of the execution for the company operation. The presence of seven type of waste which is transportation, defect, waiting, movement over processing, unnecessary processing and inventory storage will affect the performance production operation if no action been taken. The impacts toward the quantity of operator are analysed to optimize the workstation for getting the best production line. A proper production line is analysed in order to achieve an ideal and optimum time and cost used in product assembly job and to enhance the efficiency and productivity of production line.

1.3 Objective of Study

The motivation for this investigation is to implement VSM in order to lessen the waste for improvement of production in the Everts production line. Therefore, the goals of this investigation are:

a) To identify and collect the data of current process flow of the balloon production process from the raw material until the finished goods.

b) To create and analyse the Current Value Stream Mapping (CVSM) and identify the existing wastes in the production processes.

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c) To suggest Future Value Stream Mapping (FVSM) and recommend the improvement ideas for the proposed layout.

1.4 Scope and Limitation of Study

This project emphasizes on the product that faces highly demand from customer consistently every month. The research in this project was to create the CSM according the existing process flow on production of product and identify the seven wastes that happen underway production processes. In this operation flows, the focus in this project are production process, passivation process, quality inspection, packing and palletizing. Finally, this project will be proposing the FSM for improvement to the Evert the Balloon Company.

1.5 The Report Outlines

This report is comprised of five chapters, which are:

Chapter 1: Introduction

This section gives an indication of the study. It conceals problem statements of the project, objectives, scope and limitation of the project and the outline of the report.

Chapter 2: Literature Review

This section focusses on the literature of VSM, portraying the concepts of implementation endeavors and the thoughts of academic researches. The literature review is given to help strengthen the knowledge about VSM and methodology of this project. The literature review was conduct by online search through academic journals related to VSM and other trustworthy resources.

Chapter 3: Methodology

This section converse about the methods of data that will be applied to examine the VSM. Additionally, this chapter also portrays the procedure of information gathering and unwavering quality of measures are utilized.

Chapter 4: Result and Discussion

This section introduces about the information and result acquired by calculation of the time study, including Cycle Time (C/T), Takt Time, Lead Time (L/T), etc. The information is displayed with a graph. The value mapped appears by VSM current-state and VSM future-state.

Chapter 5: Conclusion and Recommendation

This section finishes up the discoveries of the study and its importance, providing proposal to upcoming study.

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CHAPTER 2

LITERATURE REVIEW

Throughout this section, the literature on VSM is reviewed. Other than that, this part will be portraying topics that related with VSM analysis and measurement methods. Some of past research and studies were incorporated into this part to help the improvement of ideas for VSM concept and design.

2.1 History of Lean Manufacturing

After World War II, Japanese manufactures were facing with the issue of huge unavailability of material, human resources and financial. The issues that Japanese manufacturers were confronted with contrasted from those of their Western counterparts. These conditions brought about the introduction of the "lean" manufacturing idea. Toyota Motor Company, leaded by its president Toyoda perceived that American automakers of that time were out- producing of their Japanese counterparts; in the mid-1940's American companies were beating their Japanese counterpart by a factor of ten. So, as to make a move toward enhancement for their company, early Japanese pioneers such as Toyoda Kiichiro, Shigeo Shingo, and Taiichi Ohno concocted a new, process-oriented system, which is recognized as the "Toyota Production System", or "Lean Manufacturing".

2.2 Manufacturing Industrial Overview

These days, the industrial sector becoming aggressive market, all companies globally endeavour to maximize their efficiency and productivity. As stated in the Bloomberg news, BMW (Bayerische Motoren Werke) is kept up their incredible

performance spot in worldwide luxury-car sales for ninth year continuously in year 2013 even Mercedes-Benz and Audi endeavour to finish their extraordinary great performance. In the article of Christoph Rauwald (2014), to accept this challenge, Audi need to oblige in expense by around 2.5 billion per year to adjust hit spending on new technology innovation. Martin Winterkorn, Chief Officer of Audi has set out some occasion to upgrade their productivity and save their expense by 5 billion euros by 2007.

Therefore, the situation of developing industrial worldwide rivalry today makes it more intricate than earlier centuries. Each of industrial organization has being attempted to find another viable choice to endure and remain on the stream successfully. The organization need to endeavor in pursuing improvement on their streamline business operation, inventories, cycle's times, variety product offer, material and tool supplier. According to Christopsh Rauwald, (2014), the top automobile manufacturer which is Audi is an essential of Volkswagen's plan of action to take worldwide industry top automobile sales from Toyota Motor Crop. As stated by the Sean Martin, (2014), in European country the industrial output was ascend by 2.5% in August and fall by 2.6% which is that have been foresee by financial experts. Additionally, the output for the industrial sector was ascended by 0.1% which break the pattern of the last three Augusts where there was a slightly decline. In July, the growth was fall in 0.3% and they think that this fact of the few vehicle creators stops their production progress because of the extended maintenance.

Through this case, the organization need to lessen the response time towards their customer needs and fulfil their demand successfully. Present, industrial organization have diverse environment where they have issues like high uncontrolled inventory, lose the market share, uncompetitive and low satisfactory of the customer demand.

2.3 Lean Manufacturing (LM)

Numerous of the organization in manufacturing sector these days endeavor to locate any alternative route to make their performance look increasingly efficient and productive. One of the best alternative routes is by implement to pursue the stream of this ruthless worldwide market which is lean manufacturing tools and strategy. Manufacturing can be defined as operational process that made for any item by hand, agency or

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machinery. As stated by Kalpakjian, (2006), manufacturing is the processes of changing the raw material to product. According to Hall (1983) and Schonberger (1982), both of them have been exchange of views on this issue about what had been done by Japanese to expand new methodology toward the manufacturing management. By put into an action of eliminating the waste concept, as stated by Mel Duvall, (2006), Toyota Motor Corporation has taking the role as the worldwide leader in the idea of LM system. The idea of LM is presented by Womack et. al (1990) where it can be defined as elimination or lessen the non-value adding including any procedure, resources and equipment. The term of LM have been portray by Lonnie Wilson (2010), define the LM as the complete method that when combined, it will enable them to eliminate or lessen the seven wastes. This system not exclusively will make the company as the leaner yet thusly progressively adaptable and increasingly responsive by eliminating waste.

As stated by Edwards, (1996), Taiichi Ohno, father of Toyota Production System (TPS) make the Toyota evolved by taking the principle that would change on individual mind and activity that will be more standardization and included the glue of teamwork for the great measure. As claimed by Patricia Deflorin et al., (2008), throughout product for the whole value stream, lean focus on pinpoint and eliminating the waste not exclusively can be applied in company yet in addition along in company chain network. As stated by Lummus et al., (2006), by implemented on lean thinking, it will influence the process to make the profitable in development of product and process stream.

According to Hines and Rich, (1997), there are three type of operation that ought to be focal point which are the non-value added (NVA), value added (VA) and necessary but non-value added (NNVA). Non-value added is a waste and included into not necessary activity. Example of NVA is waiting time. As for NNVA, it can be wasteful, but it is necessary the fact that it is under the current procedure like bring and transfer the item from one place to others. Operation of handling the raw material using manpower can be consider as value added type. As stated by Lonnie Wilson (2010), in order to find solution for the waste issue in the production line, there have a few device and technique to be executed. Toward the finish of the outcome, the process can operate by using less material, less investment and less use of inventory space.

TPS is a manufacturing system that:

- By abolish the waste, it can bring down the cost and we need to concentrate on quality control.
- Make the solid bonding between process and product quality.

- Completely integrated.

- Ceaselessly improvement in development.

- Consistence system.

According to Womack et al. (1996), there are five key features principles of Lean Manufacturing which is value, value stream, continuous flow, pull and perfection. There is justification for five guideline of lean as below:

Figure 2. 1: Principle of Lean Manufacturing (LM)