



**REDESIGN WORK SYSTEM FOR PRODUCTIVITY
IMPROVEMENT: A CASE STUDY**

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

by

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DECLARATION

I hereby, declared this report entitled “Redesign Work System for Productivity Improvement:
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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 Degree of Manufacturing Engineering (Manufacturing Management) (Hons). The member of the supervisory committee are as follow:

.....
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ABSTRAK

Kajian kes ini tentang pada mengenal pasti, menganalisis dan mencadangkan penyelesaian bagi topik terpilih dan industri yang terlibat. Projek ini telah dijalankan di salah sebuah syarikat pembuatan belon yang terletak di Melaka, Malaysia. Terdapat isu-isu yang mempunyai masalah perniagaan iaitu jabatan pembungkusan tidak boleh mencapai sasaran bulanan mereka dan melambatkan penghantaran kepada pelanggan. Ini berkaitan dengan proses pembungkusan belon sehingga proses penghantaran. Kajian kes ini adalah memberi tumpuan kepada proses pembungkusan dan menyelesaikan masalah ini dengan kajian masa jam randik dan kaedah garis keseimbangan. Kajian masa jam randik digunakan untuk menentukan aliran proses pembungkusan dan masa yang standard pada setiap proses. Untuk talian kaedah pengimbangan digunakan untuk memberi semula beban kerja di kalangan pengendali, mengurangkan masa terbiar dan mengimbangi kesesakan pada baris bungkusan. Oleh kerana pelbagai produk dalam syarikat pembuatan belon, fokus kajian kes ini ke atas dua jenis utama produk yang nama sebagai produk A dan produk B. Produk adalah warna tunggal dan produk B adalah campuran warna dalam satu paket. Selepas kajian masa jam randik, produk A masa standard 1669.88 sec / kadbod, manakala produk B masa standard 2606.43 sec / kadbod. Dengan menggunakan kaedah garis pengimbangan kecekapan barisan pembungkusan semasa dikirakan. Barisan produk kecekapan A ialah 53% dan produk B adalah 64%. Baris semasa cekap tidak mencukupi, masa standard melebihi masa takt. Produk ini tidak menghasilkan bawah masa takt, dengan itu tidak memenuhi permintaan pelanggan. Selepas menyerahkan semula beban kerja di kalangan pengendali, isu-isu kesesakan menyelesaikan selaras bungkusan. Kedua-dua produk barisan peningkatan kecekapan 89% bagi product A dan 93% bagi produk B. Berdasarkan proses pembungkusan semasa, terdapat beberapa cadangan dibuat untuk meningkatkan kecekapan barisan pembungkusan.

ABSTRACT

This case study was concerning on identify, analyze and propose solution for the selected topics and industry that involved. This project was done at one of the balloon manufacturing company at Malacca, Malaysia. There are issues that having problem on the business which is the packaging department cannot reach their monthly target and delay the shipment to customer. This related to the packaging process of the balloon until the shipping process. This case study was focus on the packaging process and solving this problem by stopwatch time study and line balancing method. Stopwatch time study used to determine the packaging process flow and the standard time on each process. For line balancing method is used to reassign the workload among the operator, minimize idle time and balance bottlenecks on the packaging line. Due to the variety of the product in the balloon manufacturing company, this case study focus on two main type of product which name as product A and product B. Product A is single colour and Product B is mix colour in one packet. After the stopwatch time study, the product A standard time is 1669.88 sec/carton, while product B standard time is 2606.43 sec/carton. By using line balancing method the current packaging line efficiency is determined. Line efficiency for product A is 53% and product B is 64%. The current line efficient is not sufficient, the standard time is beyond the takt time. The product do not produce under the takt time, thus do not meet the customer demand. After reassign the workload among the operator, bottlenecks issues solve in the packaging line. Both product line efficiency increases to 89% for product A and 93% for product B. Based on the current packaging process, there are a few recommendation made in order to improve the efficiency of the packaging line.

DEDICATION

My Only
beloved father,
appreciated mother,
for giving me moral support, money, cooperation, encouragement and also understandings
Thank You So Much
&
I Love You All Forever

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LIST OF ABBREVIATIONS

ALB	-	Assembly line balancing
ALBP	-	Assembly Line Balancing Problem
ILO	-	International Labor Organization
JIT	-	Just In Time
LB	-	Line Balancing
LOB	-	Line of Balancing
OP	-	Oriented Polypropylene
OR	-	Operation Research
PE	-	Polyethylene
PP	-	Polypropylene
PR	-	Performance Ranting
PSM	-	Project Saujana Muda
SALBP	-	Simple Assembly Line Balancing Problem
SLP	-	Systematic Layout Planning
SMED	-	Single Minute Exchange of Die
SOP	-	Standard Operation Procedures

LIST OF SYMBOLS

%	-	Percent
ft.	-	Feet
min	-	Minute
RM	-	Ringgit Malaysia
sec	-	Second

CHAPTER 1

INTRODUCTION

This chapter explain the background of the study and explain about the current background of the packaging department in the company. The problem statement explain briefly about the packaging problem having in the industry. Objective and scope of this report also emphasize in this chapter. This case study was conduct at Everts (M) Sdn.Bhd, one of the famous balloon manufacturing company located at Melaka. Focusing on improving productivity on their packaging department using stopwatch time study and line balancing method.

1.1 Background of the Study

In this era globalization, engineering is getting more famous and popular among a large population of all professions. This is also due to the higher requirement from manufacturing industry which needed more professional engineering. In manufacturing industry, higher productivity and effectiveness is critical for them to compete other competitor at market. The manufacturing industry always compete on effectiveness, efficiency and productivity in order to produce a low cost and quality product. Productivity is reduction resources and material such as manpower, time, machine, space and etc. The productivity is act as the measurement of the performance, it is describes how well the industry use the resources and material to produce the output (Reid & Sanders, 2011). To improve the productivity, the industry must redesign the process, layout, use standards operation procedure to satisfy the customer need with optimum resources. There are many techniques/strategies and tools use for improving productivity for

example: Five Ss' of Housekeeping, Muda elimination, Poka-Yoke, Single Minute Exchange of Die(SMED), Standardize work, Time study, Just In Time(JIT), Kanban, Kaizen and etc.

This study focus on improving productivity of a packaging department of a balloon manufacturing company. Packaging is a necessary process in industry which coordinated with shipping process and warehouse. The purpose of packaging is to protect the balloon from compression, temperature and also avoid contaminate. Packaging also used graphic and physical design to attract the potential buyer to purchase the item. The case study was conducted at rubber and plastic balloon manufacturing company in Melaka, Everts (M) Sdn.Bhd. This study evaluate the packaging system and propose an alternative system that can increase the productivity of the company.

At Everts (M) Sdn.Bhd, the packaging process consists of automatic and manual packing system. In automatic packing system, two types of plastic bag are used: oriented polypropylene (OPP)/polypropylene (PP) and header card shows in Figure 1.1. The figure also shows the type and the sizes of plastic bag available for the customers. The manual packing system will be used for the amount of balloon does not exceed 100 pieces per bag. The amount of the balloons per plastic bag can vary according to customer needs and is usually in small amount such as 15, 25, 30 and 50 pieces. When the amount of the balloons per plastic bag is more than 15 pieces, the packaging line will involve weighing process. Figure 1.2 shows the variety of the plastic bags used in the manual packing system. In the manual packing system, the types of the plastic used are printed polypropylene (PP) and polyethylene (PE).



Figure 1.1: The automatic packing bag

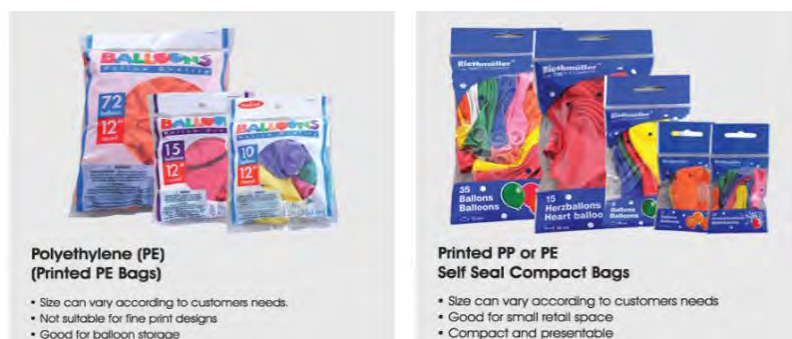


Figure 1.2: The hand/manual packing bag

There are three type of packaging in Everts which is primary, secondary and tertiary. Primary packaging is the plastic bag that first envelops the balloon as shows in Figure 1.3. Secondary packaging box is outside the primary packaging which show on Figure 1.4, it's used to prevent pilferage and group the primary packages together. For the tertiary box packaging is used for warehouse storage and shipping transport shown in Figure 1.5.



Figure 1.3: The primary packaging



Figure 1.4: Secondary packaging box



Figure 1.5: Tertiary packaging box

1.2 Problem Statement

Bottleneck on packaging line cause a significant loss on productivity not only on production line in a manufacturing industry. Bottleneck refer to any point on production line that slow down the entire process of the line. The imbalance causes bottleneck in the packaging line, some operator was idle and some operator might overburdened. The bottleneck on packaging department cause late shipment to customer, thus it also affect the company reputation and image for customer. The monthly target at packaging department Everts (M) was on average achieve 80% only. Thus, this data shows that the production on packaging line was unstable and need to improve by provide better control of process flow and avoid delay in these process. This will help to increase efficiency and effectiveness on operator, thus result in better productivity.

Based on the preliminary observation in the packaging department, the current packaging system did not follow any standard operation procedures (SOP). The operator do not have a set of standardize work sequence, that all the operator doing the different way following their perception and experience when doing sorted picking. The manual packaging department have two similar packaging line that utilize weighing workstation. Figure 1.6 shows the overview of the manual packaging line layout and the measurement. It consists of one big rectangle table with 4ft width and 8ft long for weighing and inner, outer packing and one extra table attached together for the safe sealed machine with 0.8ft width and 2ft long. Figure 1.7 shows a safe sealed machine used on packaging line. There are total eight operator working in one packaging lines, three operator on pick up process, following by two operator weighing for the requirement amount, and one operator doing safe sealing and the remaining two operator was assign to doing inner packing, outer packing and labelling.

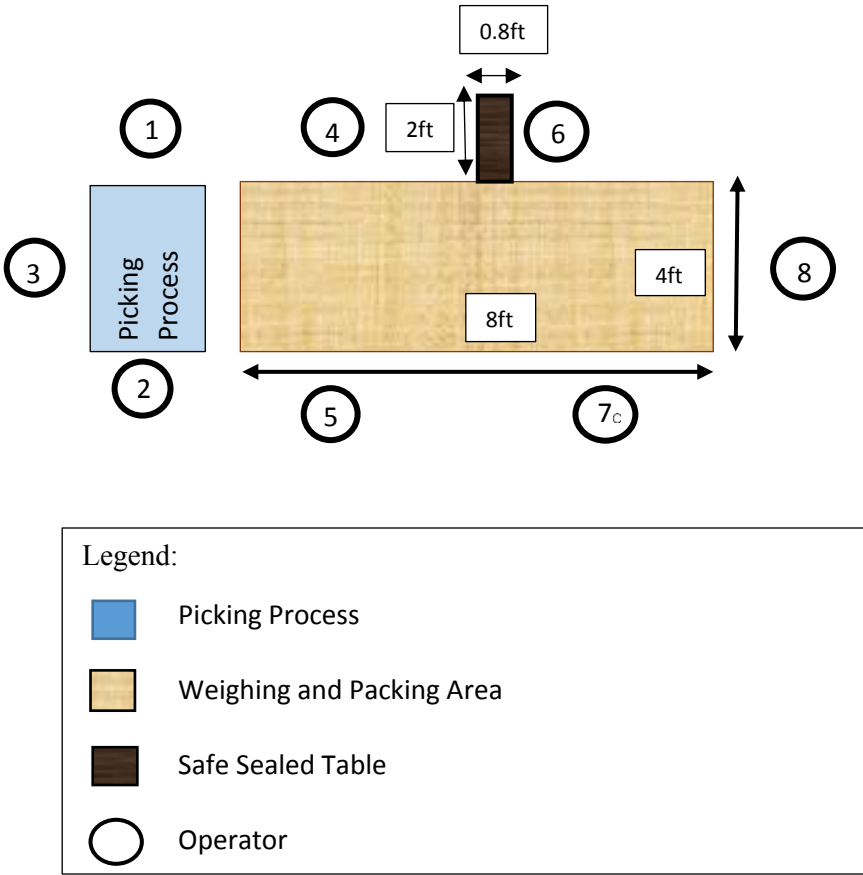


Figure 1.6: The overview on packaging line layout



Figure 1.7: The safe sealed machine

In addition, the current system consists of many non-value added activities, which is considered as waste in lean manufacturing concept. The operator has to set up approximately 15 minutes every time when changing packaging product. Two lines are set up for this weighing packaging purpose but there is no specific product dedicated to those lines. Due to the observation being made, the operator has many unnecessary motions due to the layout of the workstation, such as passing the packaging packet by box after weighing, walking to take the packet bag and walking to take the hand tools (tape dispenser). Figure 1.8 shows that the box is used to pass the packaging packet after weighing. Figure 1.9 indicates the packet bag requires the operator to walk. Figure 1.10 showing the hand tools to seal the box.



Figure 1.8: The box is used to pass the packaging packet after weighing



Figure 1.9: The packet bag requires the operator to walk



Figure 1.10: The hand tools using to seal the box

1.3 Objectives

- i. To identify current problem in the packaging department of a balloon manufacturing company (Everts(M)Sdn.Bhd)
- ii. To analyse efficiency of current packaging process.
- iii. To propose and recommend the packaging process that improve productivity.
- iv. To evaluate the proposed packaging process.

1.4 Scope

This case study is focus on the packaging area of the manufacturing company. The packaging which involved weighing in manual packaging system. Activities that involved in packaging area such as process on packaging, process labelling was investigate in the study. In the case study, two main type of product is focusing according to customer demand. It is concerned with the efficiency, effectiveness and productivity on the process packaging and focus on the line balancing of the packaging department.