A STUDY ON MATERIAL MANAGEMENT AT AN AEROSPACE PRODUCTION

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2014

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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Yang benar,

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

A STUDY ON MATERIAL MANAGEMENT AT AN AEROSPACE PRODUCTION

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

by

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2014

DECLARATION

I hereby, declared this report entitled "A Study on Material Management at an Aerospace Production" is the results of my own research as cited in references.

Signature	:	…….
Author's Name	:	…….
Date	:	…….

APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management) with Honours. The member of the supervisory committee is as follow:

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…….

(Official Stamp of Supervisor)

ABSTRAK

Dalam setiap organisasi perkilangan memegang stok dari beberapa jenis. Kerana stok ini adalah mahal dan memerlukan pengurusan yang berhati-hati untuk membolehkan perubahan dan ketidaktentuan dalam membekal dan permintaan. Masalah kawalan inventori adalah hampir universal dan telah membangunkan pelbagai pendekatan untuk mengatasi masalah ini. Kajian ini adalah diarahkan untuk mencadangkan alat-alat dan teknik-teknik yang sesuai bagi pengurusan inventori yang lebih baik bagi kos inventori yang tinggi di Syarikat X. Kajian ini bertujuan untuk mencadangkan penyelesaian untuk peningkatan produktiviti di unit Pengurusan Bahan pengeluaran Aeroangkasa. Matlamat ini disokong oleh tiga objektif: i) *untuk mengenal pasti item-item kos inventori yang tinggi dan mungkin memberi kesan kepada prestasi pengeluaran,* ii) *untuk menganalisis punca kos inventori yang tinggi* iii) *untuk mencadangkan penyelesaian untuk mengelak / mengatasi kos inventori yang tinggi*. Rajah Ishikawa dan FMEA telah digunakan untuk menganalisis punca inventori yang tinggi bahan masuk. Hasil analisis menunjukkan prepreg telah dikenalpasti sebagai item kelas A bahan masuk yang menyumbang kepada kos inventori yang tertinggi dalam Syarikat X. Punca-punca utama kos inventori yang tinggi prepreg telah dijelaskan sebagai SOP yang tidak sesuai daripada Sistem Pesanan Bahan yang ditentukan melalui skor RPN tertinggi analisis FMEA. Secara keseluruhannya, kajian ini mempunyai penyelesaian yang dicadangkan seperti SOP, Pengurusan Visual, Penggunaan Ruang, Perancangan Kemudahan dan model EOQ di mana alat-alat dan teknik-teknik untuk mengurangkan kos inventori yang tinggi dalam pengeluaran Aeroangkasa di Syarikat X.

ABSTRACT

In every manufacturing organisation holds stocks of some kind. As these stocks are expensive and need careful management to allow for variations and uncertainty in supply and demand. Problems of inventory control are almost universal and has developed many approaches for overcome these problems. This study is directed to propose appropriate tools and techniques for better inventory management of high inventory cost at Company X. This study aims to propose solutions for productivity improvement at Material Management unit in Aerospace production. The aim is supported by three objectives: i) *to identify high inventory cost items and its effects to production performances*, ii) *to analyse the root-causes of high inventory cost*, iii) *to propose solution for avoiding / overcoming the high inventory cost*. Ishikawa Diagram and FMEA have been used to analyse the root-causes of the high inventory of incoming material. Result of the analysis shows prepreg has been identified as Class A item of the incoming material which contributes to the highest inventory cost in Company X. The main root-causes of high inventory cost of prepreg have been clarified as inappropriate SOP of Material Ordering System which determined through the highest RPN score of FMEA analysis. Overall, this study has proposed solutions such as SOP, Visual Management, Space Utilization, Facilities Planning, and EOQ models that are the tools and techniques to reduce high inventory cost in Aerospace production at Company X.

DEDICATION

To the soul of my beloved parents, Ahamad A. P. Mustaffa and Sahubarnisa M. Ibrahim and lovely friends and housemates. There is pleasure to working with all of the persons who contribute and thank you for the support and encouragement.

ACKNOWLEDGEMENT

First of all, my acknowledgement goes to my PSM supervisor, Dr. Zuhriah binti Ebrahim for her thought, patience and continues guidance towards this case study. I also would like to thank all academics staffs in UTeM for teaching me so many things that I have never been thought before. Also to all staffs in other departments in this university for the cooperation they have given. Besides, I would like to thank Head of Continuous Improvement Departmnet, who makes this case study possible through supportive information and allowing me to conduct case study at his employed company. My special thanks to the soul of my family and friends for the continuous support and encouragement.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

ABC	-	Always Better Control
EOQ	-	Economic Order Quantity
FMEA	-	Failure Modes and Effects Analysis
JIT	-	Just In Time
MRP	-	Material Requirement Planning
RPN	-	Risk Priority Number
SOP	-	Standard Operating Procedure

CHAPTER 1

INTRODUCTION

1.0 Preliminary

This chapter consists of background of the study, problem statement, aim and objectives, scope of the study, and background of Company X. The importance and the expected results of this study are also presented at the end of this chapter.

1.1 Background of the Study

The term inventory used in daily life as manpower inventory, equipment inventory, documents inventory, raw materials inventory, spare parts inventory, semi-finished items inventory, finished goods inventory, and others. There is a different between stock and inventory which; stock consists of all goods and materials stored by an industry or organisation where supply of items which kept for future use; but inventory is a list of items held in stock. Waters (2002) have explained that an immediate problem here is that Americans use "inventory" to mean both the list of items in stock, and the stock itself. The primary function of inventory is to serve the customer demand and the primary goal is to minimize

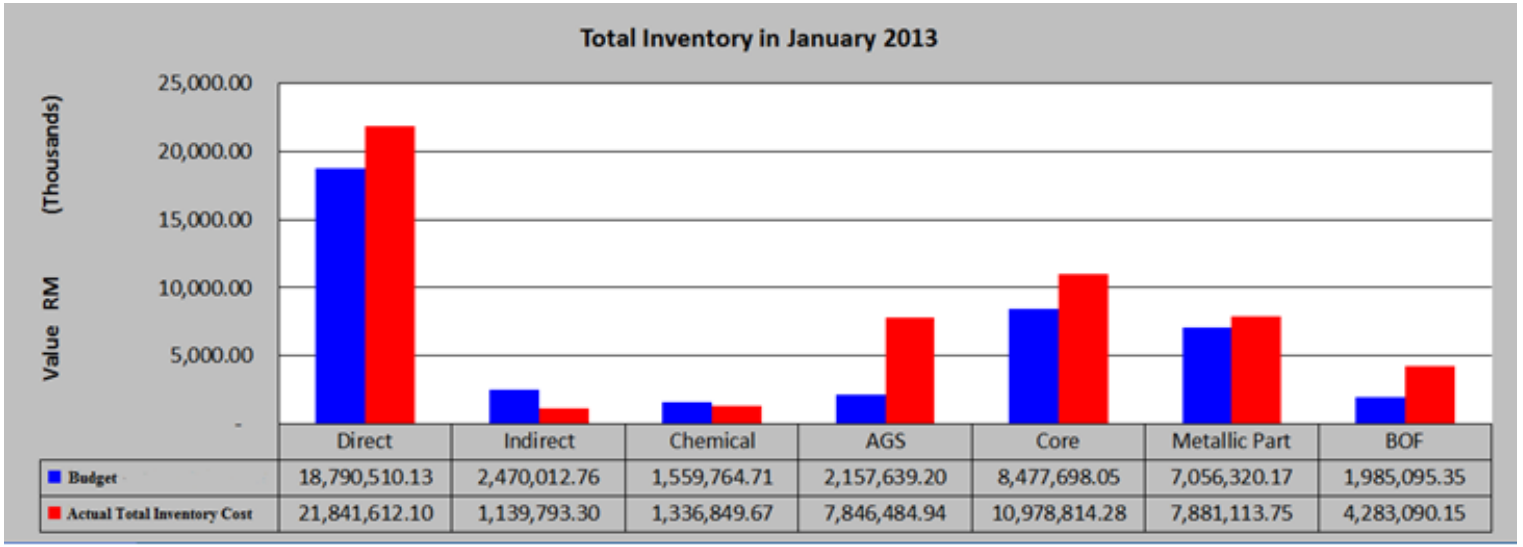
inventory investment while still meeting functional requirements. The system that controls the inventory must be compatible with the goals, functions, and demands of the particular inventory (Toomey, 2000).

Continuing inventory management effort is required to achieve goals. When talking about financial aspects, management of an organization inventory to be at the top of the agenda in the manufacturing industry. An important problem is to make decision which inventories control system should be chosen so as to counter back appropriately when the system is subject demand fluctuating. Booney (2000) discussed the product introduction process, which was taken to include product design, together with manufacturing systems design that is need to control the inventory.

Thus, this study focus on investigate the high inventory cost in Company X which using selective control analysis to find the root-cause. From the understanding of the problem, this study attempts to propose solutions using appropriate Inventory Management Tools and Techniques; and Lean Tools and Techniques in order to reduce the high inventory cost at Company X.

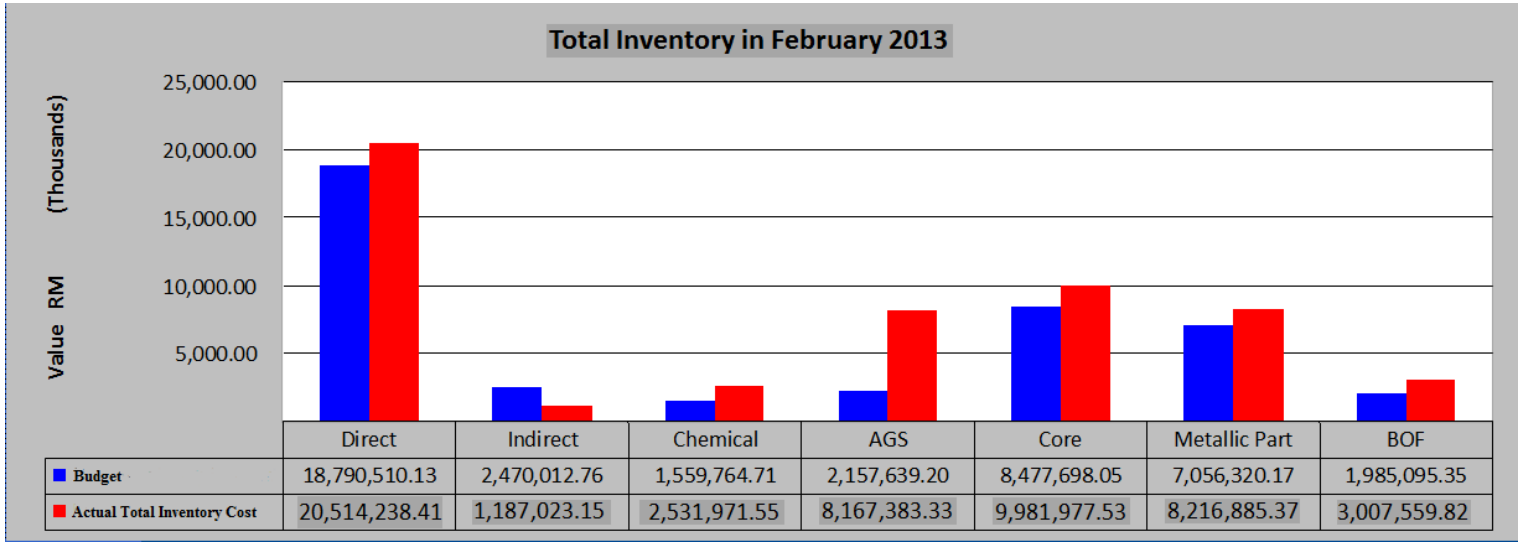
1.2 Problem Statement

Company X experiences problem on frequent high inventory at incoming material that contribute to additional costs in production operation. There is no specific guideline to control the incoming material. When come to the material management, it is more concerned with planning, organizing, and control the flow of material to achieve quantity at right time and right place at good quality with a minimum cost. Though the ordering decision mostly made by Supply Chain Department, but there is still lack of communication within the departments (e.g. Warehouse and Production Line). Therefore, it is crucial for Company X to improve the efficiency of its inventory system. As can be seen in Figure 1.1 and 1.2, there was a fluctuation on the actual total inventory cost for the two months; January (see Appendix A1) and February (see Appendix A2) of 2013.



	Direct	Indirect	Chemical	AGS	Core	Metallic Part	BOF
Budget	18,790,510.13	2,470,012.76	1,559,764.71	2,157,639.20	8,477,698.05	7,056,320.17	1,985,095.35
Actual Total Inventory Cost	21,841,612.10	1,139,793.30	1,336,849.67	7,846,484.94	10,978,814.28	7,881,113.75	4,283,090.15

Figure 1.1: Actual Total Inventory Cost and Budget in January 2013.



	Direct	Indirect	Chemical	AGS	Core	Metallic Part	BOF
Budget	18,790,510.13	2,470,012.76	1,559,764.71	2,157,639.20	8,477,698.05	7,056,320.17	1,985,095.35
Actual Total Inventory Cost	20,514,238.41	1,187,023.15	2,531,971.55	8,167,383.33	9,981,977.53	8,216,885.37	3,007,559.82

Figure 1.2: Actual Total Inventory Cost and Budget in February 2013.

There is also providing actual total inventory cost from March 2013 until September 2013 in Appendix B. The actual total inventory cost (red font) is compared with budget (blue font). Most of the actual total inventory cost of the inventory item exceeds the budget. The figures prove that high inventory has occurred in the Company X. Thus, these studies end up proposing solutions using appropriate tools and techniques for avoiding / overcoming the high inventory cost.

1.3 Aim and Objectives

The aim of this study is to propose solutions for productivity improvement at Material Management unit in Aerospace production. Thus, three objectives set to achieve this aim:

i) To identify high inventory cost items and its effects to production performances.
ii) To analyse the root-causes of high inventory cost.
iii) To propose solution for avoiding / overcoming the high inventory cost.

1.4 Scope of the Study

The emphasis of this study is concerned on the improvement of incoming material management which are the main ingredients used to manufacture the composite parts that having high inventory cost. The study was conducted in Supply Chain Department, Warehouse, and Production Line in Company X (e.g. Boeing, Airbus, etc.). The solution will be proposed for productivity improvement at Material Management unit in Aerospace production.

1.5 Background of Company X

1.5.1 History of Company X

Company X is a wholly owned subsidiary of Company XY. It was incorporated on 1994 as the manufacturing unit of Company XY, focusing on the manufacturing of composites components for both aerospace and non-aerospace segments. As the manufacturing unit of Company XY, Company X is equipped with state-of-the-art equipment and machineries situated in Composites Technology City in Batu Berendam, Melaka, Malaysia. Their main customers are Spirit Aero Systems, Goodrich Aero structures, Airbus UK, EADS CASA, SONACA SA, EADS MAS, GKN Aerospace Services, and BAE Systems Land System. Company X is set to bring the local aerospace industry to a greater height amidst the stiff competition in the global aerospace industry. Their strengths are their experience and skilful personnel, who have attracted a number of leading aerospace companies offering similar contract work.

1.5.2 Core Business

The core business of Company X is manufacture panel or parts by using composite technology. Composite technology main ingredients are the prepreg which use to place inside the panel or parts before curing. Company X has supplier and customer mostly in foreign country and few in Malaysia.

1.5.3 Process Flow

In Company X, same like all other manufacturing organisation start from supplier until customer. Figure 1.3 shows the flow of inventory system for the Company X. In the system, invoice between internal customers are used to control the inventory inside Company X. Each colour in the flow and figure indicates by the legend box for each category from internal process owner until general which is Company X.

1.5.4 Inventory Level

Company X produces many panel and parts in order to meet customer demand by using main ingredient which is prepreg inventory, indirect inventory, and inventory of chemical, AGS inventory, inventory of honeycomb, inventory of metallic parts, and inventory of BOF. This entire inventory consumes total cost from January 2013 until September 2013 with RM558,500,437.00. From this point of view, this inventory are invest by Company X such a huge amount if estimate for one year.