UNIVERSITI TEKNOLOGI MARA

JUST IN TIME PRODUCTION IMPLEMENTATION THROUGH LEAN MANUFACTURING PRINCIPLES

AHMAD NAUFAL BIN ADNAN

Thesis submitted in fulfilment of the requirements for the degree of Master of Science

Faculty of Mechanical Engineering

July 2014
AUTHOR'S DECLARATION

I declare that the work in the thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree of qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student : Ahmad Naufal Bin Adnan

Student I.D. No. : 2010194867

Programme : Master in Mechanical Engineering (EM780)

Faculty : Faculty of Mechanical Engineering

Thesis Title : Just In Time Production Implementation Through Lean Manufacturing Principles

Signature of Student : .................................................................

Date : July 2014
ABSTRACT

The purpose of this research is to investigate the effectiveness of Just In Time implementation by adopting the Lean Manufacturing principle. The lean manufacturing principle here is referring to the systematic and non-wasteful manufacturing operation; using the set takt time and production scheduling based on the customer’s demand. The objective of this study is to examine the existing manufacturing operation at Cylinder Head Cover manufacturing process using Material and Information Flow Chart (MIFC), and identify the waste. From here, effective kaizen activities such as i) Work Standardization ii) U-shaped layout formation, and iii) Improved Material Handling System were recommended and implemented. Consequently, continuous flow process at the Cylinder Head Cover manufacturing line is achieved. Kanban system is the heart of Just In Time operation. To initiate kanban, the aforementioned activities must be in-placed. To complement the kanban operation, the establishment of i) kanban tool, ii) effective flow rack system and iii) appropriate layout is vital. With these implementation, the manufacturing performance were then measured according to the identified lean metric; such as i) productivity, ii) inventory level, iii) lead time, iv) manpower requirement and v) space utilization. These lean metrics were analyzed and compared against the manufacturing operation before the implementation was carried out. The research outcomes revealed that the company had gained significant improvement in term of performance and profit. It can be concluded that this research is successfully carried out and the same approach can be adopted in other manufacturing line. Ultimately this organization (the case study subject) is targeting to implement company-wide lean manufacturing operation. The research finding shows that this move is economically viable and justified.
ACKNOWLEDGEMENT

I am grateful to my wife; Suhaila Sahabudin, my daughter; Auni Syafiah Ahmad Naufal, my son; Ahmad Ilman Shafiy Ahmad Naufal and all my family members for their personal support at all time.

I wish to acknowledge and express my gratitude and appreciate to: (i) my supervisor; Professor Ir. Dr. Hj. Ahmed Jaffar for his supervision and support from initial to the final of research, (ii) my co-supervisor; Mrs Noriah Yusoff whose constant give good advice, support and encouragement to pursue this study. The guidance from both of them enables me to develop an understanding of this research area.

Similar gratitude also goes to management of UMW Advantech Sdn Bhd, especially to the Operations Manager, Mr. Jeffridin Sinteh, Lean facilitator, Mr Sharifuddin Yasin, Kaizen Unit team as well as shop floor members for permission and support to this study. Not forgetting to Kaizen Supplier Unit team from Assembly Service Sendirian Berhad, for their guidance during the implementation research activity.

I am thankful to Ministry of Higher Education and Universiti Teknologi MARA for the financial support, particularly for the scholarship award under Tenaga Pengajar Muda scheme. Last but not least, to all the individuals and colleagues who have contributed so much throughout my study.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTHOR’S DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>iv</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>ix</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF ABBREVIATIONS</td>
<td>xiii</td>
</tr>
</tbody>
</table>

## CHAPTER ONE: INTRODUCTION

1.1 Background of the research  
1.2 Problem statement  
1.3 Hypothesis of the research  
1.4 Objectives of the research  
1.5 Scope and limitation of the research  
1.6 Significance of the research  
1.7 Structure of the research study

## CHAPTER TWO: LITERATURE REVIEW

2.1 Lean manufacturing  
2.2 Seven types of waste  
2.3 Introduction of Kaizen  
2.4 Value stream mapping  
2.5 Introduction of Just In Time (JIT)  
2.6 JIT implementation  
2.7 Continuous flow of product under JIT  
2.7.1 Kaizen activities for continuous flow of product  
2.8 Pull Manufacturing under JIT  
2.8.1 Introduction of Kanban System  
2.8.2 Kanban tool