TECHNICAL UNIVERSITY *of* **MALAYSIA MALACCA**

Productivity Improvement using Line Balancing Technique: A Case Study at an electronic Company

Thesis submitted in accordance with the requirements of the Technical University of Malaysia Malacca for the Bachelor Degree of Manufacturing Engineering in Manufacturing Process

By

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ABSTRACT

The problem of balancing assembly line is a classical industrial engineering problem. Even though much of the work area goes back to mid 50s and early 60s, the basic structure of the problem is relevant to the design production system today. The thesis is cover all the topic of assembly line balancing; methodology and theory and the company approaches to implement this technique. The case study focused on Flextronics Malacca and parallel line in production lot and the model sequenced that both line more than one model. This is know and compare the two model to proven that the line more than one or parallel could be balanced or not. The scope of project characterized by following up the Flextronics approaches and their schedule planning to implement this technique which starting from October 2006 untill January 2007. For chapter 4 the result is used to compare before and after improvement to prove the effectiveness of the parallel line. After that chapter discussion is about the effectiveness of improvement by using this technique shall discuss by comparing the result. Finally the finding that will get from the study case to compare the Flextronics approaches and theory assembly line balancing before whether its relevant and practical or not to solve industrial production problem.

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DEDICATION

For My parent and Supervisor Lecturer

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I would like to thank for god as give me a chance and opportunity during complete this project as well as this project has been successfully completed without any problem. Not forget also to say thanks to my parent as give me encourage especially when I struggle to complete this study and report for my project in final year. Their encouragement as a spiritual to me along the duration of this thesis done. For my supervisor lecturer that handle me during this project I appreciated and dedicated for Miss Zuhriah Bte Ebrahim as give me the guideline, supporting and giving some recommendation to overcome problem faced during the project. I would like also thank to my classmate that give me encouragement and supporting me doing complete this project.

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LIST OF ABBREVIATIONS, SYMBOLS, SPECIALIZED NOMENCLATURE

NVA - Non value added

FMS - Flextronics Manufacturing System

SFM - Synchronize Flow Manufacturing

DFT - Demand Flow Technology

SMT - Surface Mounted Technology

WIP - Work in process

TDE - Test Development Engineering

WIP - Work in process

I.E - Industrial Engineering

WD - Workdays per month

Dc - Daily rate

Fr - Hourly Flowrate

n - Number of stations

c - Station cycle time

$\sum t$ - Total work content time of unit

ALBP - Assembly Line Balancing Problem

K - No of station

t(Sk) - Cumulated task time

s - Station Load

LIST OF APPENDIXES

Appendixes A

- Gantt Chart PSM

Appendixes B

- Collected data (Cycle Time) Before

- Collected data (Cycle Time) After

- Status Quality Yield (Before)

- Status Quality Yield (After)

Appendixes C

- Flextronics Scheduled Approved

- Standard Data Form collected In Flextronics

CHAPTER 1
INTRODUCTION

1.1 The Project

The project is about study on productivity improvement through the application of line balancing concept at Flextronics Sdn. Bhd in Malacca. The company that done the research is sub-con in industrial electronic company which has headquarters at Flextronics, Senai in Johor Bharu. Flextronics Malacca is the fifth plant to be built in Malaysia branches includes Senai, Tampoi, Shah Alam and Pulau Pinang. The Malacca Plant was bought over by Flextronics from Dovatron (M) Sdn. Bhd on the late of 1993, but only started its operation on January of 1994. However, they take almost 3 years to develop before granted with ISO 9002 on 1997.

Figure 1.1: Flextronics Malacca

The work force of this company keeps increasing at an increasing rate and reaches 3600 peoples today. Besides that it has 30 SMT lines which could accommodate the more quantity people that need to get job.

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Figure 1.2: Flextronics line per shift

Assembly lines can be classified into two general groups(with single and multimixed products) and U-Type assembly lines(with single and multimixed products), serial and parallel lines. There are all these types above mentioned assembly line at Flextronics. This project will use Line A1B and A5 as a case study. These two lines is recognized as parallel lines in Flextronics. The lines A1B and A5 which is two models only goldfinger and Sigmund those go through to the both line making assembly process from SMT (Surface Mounted Technology) process until Backend process. The research studied that we done focused on the parallel lines at line A1B and A5 for single model, Sigmund and goldfinger which running for both lines. This project involves parallel line will focus on the single line balancing problem which have parallel workstations. This project will base on Flextronics approaches implementing line balancing technique from the planning schedule that determined by the management headquarters.

The approach is based on the FMS team strategy to develop problem solving method based on DFT (Demand Flow Technology) concept. The objective of their approach is to improve the productivity of the company that such give the profit. This could be achieved by develop stochastic cost integrated into a balancing line to enable an approximately minimum cost balanced to be obtained. The purpose of this project to studied the flextronic's propose an efficient optimal processing based on eliminating Non Value Added by balancing the process.

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1.1.1 The Products

With the experience more than 25 years made this factory become flexible and strongest management to handle all the project that given by customer successfully and fulfill customer satisfaction. In 2002 the management factory is changed again into two sections because of model infocus give many problems. This model is transferred to the new branch factory at Senai, Johor Bahru. Therefore, Malacca Branch only produced model HP and Carrier Access Instead of focusing on manufacturing end products this plant is more on the creation of the main boards of the end products. The main customers of Flextronics Malacca are Hewlett Packard, Carrier Access, In Focus and Baxter. Here in Malacca, the main products manufactured include printers, digital cameras, Liquid Crystal Display Screen, Touch Screen and Video Projectors. Figure 1.3 below shows several end products of the company based on the name given by the customer for the PCBA board produced.
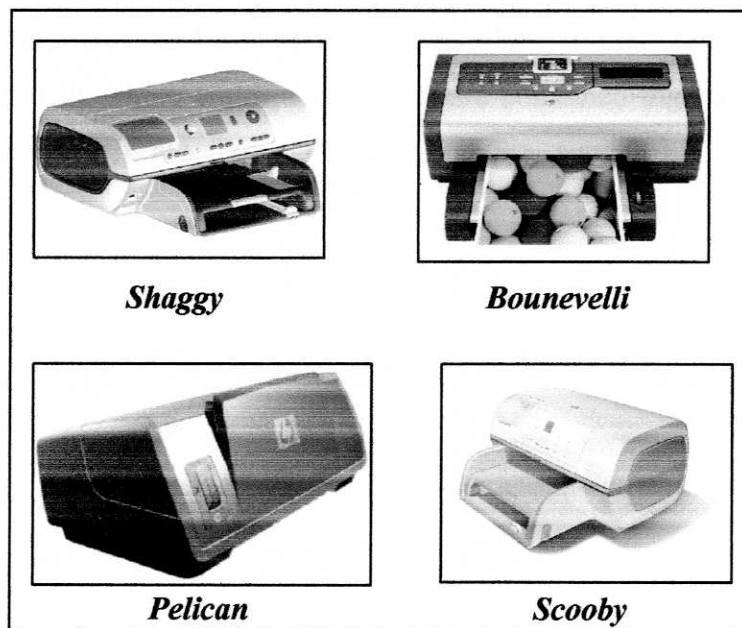

Shaggy   *Bounevelli*

Pelican   *Scooby*

Figure 1.3: Several end product of the company based on the name of PCBA given.

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