CHAPTER 1

INTRODUCTION

1.1 Introduction

Since the changing of technology and high competition in the market, there will be some problems which the most companies are likely to have in common. It may no longer required to produce the same model of products in high volumes and long product life cycles. Therefore, extensive use has been made of line balancing concepts in improving the manufacturing flexibility. The product design and the market demand for products ultimately determine the technological process steps and the required production capacity of production lines. The number of workers, attend and unattended machines, and tools required to provide the market demand must then be determined. This information is provided by line balancing,

Over the last few decades, in competitive market, the manufacturers want to reduce the manufacturing costs as well as improve the product quality. Also, there are needs for process optimization. Therefore, production or assembly line balancing is required to determine gating the bottleneck, to improve the manufacturing flexibility, and to reduce cycle time or increase output in order to meet the market demand.

Production line or assembly line has work stations arranged in sequence along a straight or curved line. The product moves from one station to the next until it is finished at the end of the line. Typically, one worker operates each station, performing repetitive tasks. There is little inventory to decouple stations, so the line's output is only as fast as the slowest workstation. Therefore, the main purpose of line balancing is to achieve well-balanced workloads between the workstations in order to receive the minimum idle time.

As presented above, the objective of 'assembly line balancing problem' is to equalize the assignment of work to the stations. This objective is required in such a way that either output is maximized or the number of station is minimized. If the number of

stations is specified, the main objective of line balancing is to equalize the assignment of work to stations in a manner that maximizes output. Alternatively, if the amount of output is specified, the main objective of line balancing is to equalize the assignment of work in a manner that minimizes the number of stations.

1.2 Statement of the Problem

In this case study, products of the company are hard disk drives, that have many varieties of product model. Besides, most of their product life cycles are short because of the quickly change for better in the hardware market. Thus, the company needs to have the appropriate method to design the balancing of new assembly line when setting up the new line for new product model. Otherwise, this method should be used to redesign the balancing of existing assembly line in order to achieve the productivity and also meet the demand.

A number of models and methodologies for assembly line balancing are existing but majorities of them are not suitable enough for practical problems and our requirements. Therefore, there is a need for developing many methodologies as possible so that we can compare and evaluate them in order to select a relevant method for this specific problem.

1.3 Objective of the Study

The objective of this thesis is:

- To develop a mathematical model for HGA assembly lines that can be used for balancing line, predicting productivity, gating the bottleneck and any sub optimal improvement.

1.4 Scope and Assumptions of the Study

The product, Head Gimbal Assembly (HGA hereafter), is a critical component in Disk Drive, its function is to record data onto magnetic media and readback recorded from that media. This product has certain way to assemble but different in some details of each model or each customer. In this thesis, the scope is to study line balancing at the HGA assembly line. Developing a mathematical model for an assembly line which can be improve or apply to any HGA production line in the company.

The following assumptions are made in this study:

1. An operator performs only one work element at a time, and the operators perform the same work element in the same manner in a same operation.
2. Cycle time measured in each operation is an average value of actual cycle time and is considered to be constant.

1.5 Thesis Schedule

1. Establish current organization line balancing
2. Study relevant literature and cases
3. Data gathering and analysis
4. Develop the suitable method
5. Implementation
6. Monitor the effect of new method
7. Conclusion
8. Write and review report

Table1.1: Thesis Schedule

Month	Dec	Jan	Feb	March	April	May
Procedure						
1						
2						
3						
4						
5						
6						
7						
8						

1.6 Expected Benefits

The study will benefit corporate in the sense of 1) Applying the appropriate method to improve the balancing of the assembly line. 2) Increasing efficiency because the idle time reduces. 3) Receiving the suitable model that is able to calculate resources requirement (man, tooling, and space) and also detect efficiency of those requirements.