

CHAPTER I

INTRODUCTION

1.1. Background

Lean Manufacturing is a popular term, which is applied widely and brings a lot of benefits. As a result, there is a large number of companies applying lean in manufacturing and achieving success (Nguyen & Do, 2016). Lean technique, also one of the method that recently use in the manufacturing industries right now. Lean manufacturing could prove effective for driving waste out of manufacturing process. Continuous improvement is required to create more value for customers with fewer resources(Lam, Toi, Tuyen, & Hien, 2016). Many of manufacturing industries compete each other to become the great one among each other. The majority of the study focuses on single aspect of lean element, only very few focuses on more than one aspect of lean elements, but for the successful implementation of lean the organisation had to focuses on all the aspects such as Value Stream Mapping (VSM), Cellular Manufacturing (CM), U-line system, Line Balancing, Inventory control, Single Minute Exchange of Dies (SMED), Pull System, Kanban, Production Levelling etc. (Sundar, Balaji, & Satheesh Kumar, 2014). One of the technique that really help them to achieve each goal is using lean technique in the industries. Example of manufacturing company that use lean technique in the production of technology is X. In the example of hard disk manufacturing company around the world, X is one of the most well known for making a good hard disk. The manufacture itself located around the world, X Co. make a lot of products but mostly in storage device. To create a good product, X Co. need to look carefully on production line in every area well in this case in Thailand, one of the most critical point is in the assembly line in the clean room.

X Co. located around the world. It has more than 100.000 employees. Which in the location that separated by X, all of the X company have each different job, X that located in Thailand is one of the manufacturing of HDD production for X. The main products that produce and manufacture in Thailand are slider fabrication (SF), Head Gimbal Assembly (HGA), Head Stack Assembly (HSA) and will become Hard Disk Drive (HDD). It has exactly 6 buildings to support each of production process that they needed in producing HDD in Thailand, each of the products will be produce in the different building and department in the industrial area Bang Pa-in.

In the manufacturing process of head stack assembly in Thailand, there are main process flow started from warehouse, receiving, be kitting in and out, assembly line after finish good it will be packing and will be send to next building that have another assembly products but in this case head stack will be put in the hard disk to become finish HDD goods.

Based on ISO 14664-1, Clean room is a room which in the concentration of air born particle is controlled and contains one or more clear zones, so the main target is to keep the room clean without any bacteria inside or another particle that can disturb the productivity of hard disk. Some of the main component of hard disk need to be made in the clean room such as head stack because it need to be very hygienic. The key concern for this industry in cleaning parts is to ensure there is no recontamination of the parts of hard disk itself.

In the production in the way to make head stack, there are many types of assembly line in the X Company. Start from manual line, hybrid line and fully automated line. The type of which assembly line in the production line will support depend almost in every aspect in the main production line itself. Each of line have different type of machine and man to operate, in the manual line all of the machine need to be operate by each of operator. Hybrid line is one of line that using both man and machine inside, there are some machine that can run automatically but still need some operator in the line to loading HGA, but in the fully automated line all line consists of the machine that can run automatically that still need operator to observe and input goods to the machine.

The main problem that happening in X Co. in Thailand is they always want to reduce the cost in many aspects available. The main purpose of LEAN project is to reduce HC and improve productivity of every line that possible to improve by using continues improvement (Jori, 2017). The other aspects that X still have manual and automation line running because of the limitation for the machine that cost really expensive if X running all of the production line in the form of fully automation line. Therefore, there are some line in the production that combined by operators and each support to help making the Hard Drive production. Some of products that will help assemble the Hard Disk Drive is Head Stack Assembly, one part of assembly in X Co. Thailand that need to be done by continuous improvement in the production line, such as Diablo 2305AB hybrid automation line that have been calculated in the previous research by implementing Lean

technique using Line balancing and ECRS technique that will come up with good result by option that can remove 1 HC (Head Caught) by changing some of the process steps in the production but this option still in the conclusion of X Co. itself because this option need to be considered for total saving and investment needed (Jori, 2017). The cycle time of assembly Head Stack need to be minimize every time to reach the maximum productivity in the line, which related to the man and machine that will support to make Head Stack. Exact problem that happening in the production line which is not easily to improve the cycle time of productivity in the production line with sometime a lot of limitation and cost needed to implement in the production line, therefore the best way to eliminate some waste that could improve the productivity in other way.

We can determine which assembly line will fit in the production line, we need to do the continuous improvement in the production line to keep improving step by step to increase the productivity and utilization in the assembly line. In the manufacturing industries, method to improve the productivity are really variant based on the type in the production. The concept of lean manufacturing was developed for maximizing the resource utilization through minimization of waste, later on lean was formulated in response to the fluctuating and competitive business environment (Sundar et al., 2014). In this case, the method that used to analyse the production hybrid assembly line is line balancing method and ECRS technique. ECRS (Eliminate, Combine, Re-arrange, Simplify) is one of the motion study technique used to improve production lines. ECRS processes activities with the following core principles eliminate the unnecessary work, combine operations, rearrange sequence of operations, simplify the necessary operations (Chueprasert & Ongkunaruk, 2015). The main objective of Line Balancing is to distribute the required tasks evenly over the work station by minimizing the time of the machines (Raj, Mathew, Jose, & Sivan, 2016). Line balancing method allow to make the new option that will balance the cycle time of the production in the assembly line while not reducing any positive aspect, which will make the cycle time of each machine in the production line balance within each other and improve the productivity. Cycle time is one of the important data for the line balancing at any production line. The time required to finish one product, or the total time takes before the product leaves the workstation and move to the next workstation is called cycle time (Raj et al., 2016). Method of line balancing will

support by ECRS technique, which allow to eliminate, combine, re-arrange, simplify in this case some of the process steps in the production line.

The steps to make head stack assembly started from APFA Load, ACF Laminate, ACF Inspection, HGA (Head Gimbal Assembly) Loading, Swage, ALT (Auto Long tail machine), ACF Final Bond, Jet Tacking, Ultraviolet ray, CT(Co-Tacking), Flip \$ Comb, VMI and Gasket Install. Finally, after all those steps, they will produce finish goods of head stack assembly. In every process that included above, there are some process steps to always follow each sequence. The process steps itself need to be analyse one by one by following every second in detail. Each of the station have different process steps that have each time to finish every finish goods that will assemble in the assembly line. Each of the station also consists by different operator with different skill.

1.2. Problem Formulation

How to improve in-line and off-line hybrid automation line head stack assembly production process by improving labor productivity and unit per hour.

1.3. Purpose

From the problem that have been analyzed above, the main target of this project is to improve productivity labor and unit per hour. Producing head stack with better cycle time will increase the unit per hour that they can produce, by combining and eliminate each step that unnecessary will lead to improve utilization and productivity in that area. Which also connected with saving operators in each between in-line and off-line will also saving cost for company in each year.

1.4. Problem limitation

- a. Data taken from April – August 2017 at X Co. Thailand
- b. Data only taken in clean room building 2 3rd floor X Co. Thailand
- c. Hybrid automation line only for products Apollo because access is not granted for another product.