

CHAPTER 1

INTRODUCTION

This chapter is explaining the research background, following by the problem formulation. Thus, this chapter started by constructing the background, which includes the study case on a manufacturer, and Lean Manufacturing Theory that implemented on the company. The scope and limitation on this case also included at the end of the chapter.

1.1. Background

A manufacturer in Thailand has to improve their productivity, due to the competition with their competitors. To pursue their objective, company has X Department who performed improvement projects. X Department has performed improvement based on the lean principle.

Lean principle is a principal method to reduce waste that was made in the manufacturing process, and it is developed by Toyota Production System (TPS). The manufacturer is implementing the Lean Manufacturing on their production improvement. There are seven waste in lean manufacturing that was proposed by TPS, such as Transportation, Inventory, Motion, Waiting, Over Production, Over Processing, and Defects (Marchwinski, Shook and Schroeder ,2014).

This research try to solve the problem in the company relate to the inventory waste in the manufacturing. There are a lot of inventory of trolley in the company, its occupied the shop floor and the storage room. The company has over than 1000 trolley and each two year will buy the same trolley to replace the old trolley. The current condition makes the storage room filled with excess trolley.

In addition, the trolley also described as the transportation or material handling tool, which serve the movement the work-process between each station. Tompkins (2003), said that material handling should be the activity that can serve several criteria on 9R that is Right for Material, Amount, Condition, Place, Time, Position, Sequence, Cost, and Methods. Tompkins also was estimated that material handling cost was occupied 20-50% production cost depends on the type of material handling. Therefore, to eliminate the inventory waste and production cost, it is important to optimize the material handling system inside the company.

There are two different trolleys operated on the shop floor. The first trolley is the Dolly Trolley that has capacity for 120 product, and it only can be used for product

family A. The second trolley is the L-Trolley that has capacity to transport two or four totes, the totes have capacity respectively 20 products for product family A and 50 products for product family B.

The production process on the manufacturer consider as flow shop production. However, there are several types of machine on the same process, such as on Process Testing I using Machine X and Machine Y ; on Process Testing L using Machine Y, Machine P, and Machine Q.

Due to the high complexity of the process movement, the simulation is needed to know the right amount of trolley and amount of the product-movement. Moreover, if we want to directly apply the proposed number of trolley, there is a high risk of buffer in some process. However, there are Simulation software that could portray the real condition based on the reality. Therefore, simulation is a process that happened after knowing the requirement of the trolley from the lead time.

1.2. Problem Formulation

There are several causes that lead to the problem, that there are a lot of idle of empty material handling equipment. The main causes are that there is no recorded data to know the current requirement of the material handling, and also there is no signal to process the material handling area for the operator. Hence, to optimize the condition of production floor, the determined number of material handling equipment should be conducted.

The number of material handling that should be operated in the shop floor is determined using the lead time requirement. However, there are several aspects that always change, such as demand. Therefore, there will be three different alternatives from demand condition. After that to ensure the best solution among three alternatives, there will be a simulation using ARENA software.

1.3. Objectives

The aim of the research is to determine the number of material handling equipment based on the requirement and capacity. Also giving a proof using simulation approach.

1.4. Scope and Limitation

Scope of the research is to determine the number of material handling requirement based on the current production system, calculate the benefit of the

implementation, and also to generate program for the daily requirement material handling equipment.

This research also has several limitations as follow:

- a. The calculation will be based on current station. There will be no checking whether the current station in each stage is the optimum stage.
- b. The load and unload path for the material will be fixed based on the current system.
- c. The simulation would analyze the process on the main process, while the reworking process would not be analyzed.
- d. The trolley that would be analyzed is dolly trolley that function is to support the transportation for product family A.
- e. The scope in the company is only conducted on some operations (From Process F until Process M)