

# Chapter I

## INTRODUCTION



### 1.1 Company Background

Rianthai Interplas Co., Ltd. was established in 1961. The main business of this company deals with manufacturing and sales of plastic packaging. This company also provides wide range of products with different types of material to suit each client's requirements. The main products consist of:

- Bottle, jar, and extrusion blow molded tube: materials used include PE, PVC, PET, PETG and PC.
- Cap and plug: PP and SAN are materials used for caps. LDPE is used for plugs.

This company serves most multinational cosmetics and personal care product companies prevailing in the Thailand. Moreover, the company has the customers in Europe, USA, and Japan. The direct export accounts for approximately 15% of the company's total turnover.

Currently, the company has a total area of approximately 24,000 sq.m, which is currently utilized approx. 16,000 sq.m. There is a vacant area of approx. 8,000 sq.m for the future expansion. The company consists of 4 production plants, an office building and a canteen. The working area includes 1,560 sq.m. of office area and 10,720 sq.m of production area. Now, the company employs 600 people, which includes 530 factory workers, 45 technicians and engineers and 25 administrative staffs. The list of machinery is as follows:

1. Injection Stretch Blow Molding machine
2. Injection Blow Molding machine
3. Injection Molding machine
4. Extrusion Blow Molding machine
5. Printing machine
6. Labeling machine
7. Hot-stamping machine
8. Welding machine
9. Heat transfer machine
10. Other

### 1.2 Background of the Problem

Generally, there are 4 types of layout: fixed product, product, group, and process layout. First, the fixed product layout is implemented when the product is too large or cumbersome to move through the processing steps. Thus, the processes are taken to

the product. Second, the group layout is used when production volumes for individual products are not sufficient to use the product layout. The method of designing layout is to group products into logical product families. Third, the process layout consists of a collection of processing departments. All machines involved in performing a particular process are grouped together in process layout. It is used when there are low order volume or high variety of products. Finally, the product layout results when processes are located according to the processing sequence for the product. Therefore, the product volume must be sufficient to achieve satisfactory utilization of the machines.

A company that provides the variety of products manufactured and their low production volume employs process layout. Two main limitations of implementing this layout are that the production time is longer and flow lines of products are also longer. Thus, the cost of handling materials is higher. In fact, the number of order is unstable; the number of orders of some products is high or low (depends on many factors such as seasonal, market favor, etc.). Consequently, some disadvantages in the production line occur. The examples of the disadvantages are as follows:

1. Long production time
2. High inventory (Raw materials and work-in-process)
3. High handling cost
4. Hard to design schedule
5. Long moving distance

Additionally, the theory also suggests that the process layout should be changed to response the change of the environment such as number of order, the production technology and so on.

Rianthai Interplas Co., Ltd. is aiming at the cost reduction and the productivity improvement. Thus, the company is finding the way to achieve this aim. When considering the current layout used since 1986 and the long moving distance in the production, it is reasonable to study and recommend the current layout. Moreover, the new plant layout should be suggested to be the alternative way for the production improvement.

### 1.3 Objective of the Study

The objective of this thesis is to find an acceptable and good layout considering from the total cost (i.e., movement distance, frequency and the volume of the movements).

### 1.4 Scope of the Study

1. Orders used in the model are based on past records.
2. Problems of scheduling will not be considered.
3. Focus on only production area in Factory A.
4. Simulation model is coded via ProModel.
5. At most 5 alternative layouts are considered in this thesis.
6. Management is the one who makes final decision regarding on which alternative is best.

7. Redesign of the facility layout in each section (e.g. machine location) will not be considered.

### 1.5 Process of Research

1. To study theory and technique involving thesis such as Layout, Layout generating tool, Group Technology, Inventory management, Simulation tool (ProModel) and so on.
2. To study and collect common information such as organizational tree, working time, remaining values of fixed assets, time of amortization, production costs, number of employees, existing layout, fuzzy border of workstations, transportation distances between machines, handling cost, machine capacity, and so on.
3. Then, data will be analyzed by using the statistical method (e.g. using beta or normal distribution to analyze processing times).
4. To make the criteria for layout generation based on the data collected
5. To generate 4 new layouts by using the criteria in item 4 and then estimate them.
6. To develop the simulation model for the experiment via ProModel software and then evaluates the productivity of the current layout and the suggested layouts.
7. To provide the result from the simulation in the alternative models to management in order to make final decision.
8. To evaluate and compare these models and then conclude the decision of management.
9. To summarize and write the final report.

### 1.6 Expected Benefits

1. To understand the effect of the inappropriate layout design
2. To understand how to improve the layout by considering the total production cost
3. To study the simulation application for the process layout improvement. This will be the cost and time effective for the company.