

CHAPTER 1

INTRODUCTION

1.1 Background of the Research

In Thailand, where the construction and installation of steel fabrication is still highly demanded from both private sector and government sector, there are many companies trying to increase the demand and also the variety of the product to meet the customer satisfaction. This industry is having the effect of the growth of the country and also this industry is continually growing as same as the Sahawatana Corporation is. Sahawatana Corporation was established in 1983, started from the family business. There is no effective planning and control, while using only simple management but somehow the company survives and grows acceptably.

In this industry where the improvement of the efficiency can be done in many ways by using the engineering knowledge such as quality control, work and time study, plant layout, etc.

Plant layout can be used to improve the productivity since the good layout can lead to the full utilization of the space, machine, material, and workforce. From that result the company can produce the high quality product with the right delivery time and can reduce the ineffective movement of material handling and work in process. The company is intended to respond to the growth of industries in Thailand. Currently the plant is located in Chongnonsri area, Bangkok. The company needs to move out from the existing plant location to the new bigger space in Bangna area because of the space limit, the regulation, and to expand the capacity of the company.

Without awareness of plant layout design, many companies including Sahawatana Corporation have many problems such as complicated workflow, bad material handling, high workforce needed, bottleneck, and delay. With a good opportunity of moving to the new area, the project of plant layout will be used to design the new plant layout of the Sahawatana Corporation in order to have a fully utilized design layout of new plant.

Sahawatana Corporation's product ranges have many varieties of the products produced from the construction of the steel sheet such as oil tank, pontoon, pier, etc. The characteristic of the manufacturing is job shop process. The following flow chart is the production process of constructing the product.

1.2 The procedure of manufacturing the product

Working as the custom order, the company makes the product from the customer's requirement. The general procedure of manufacturing (Fig 1.2) is explained in the following. In this case, the pontoon will be used as a main product (Fig 1.1).

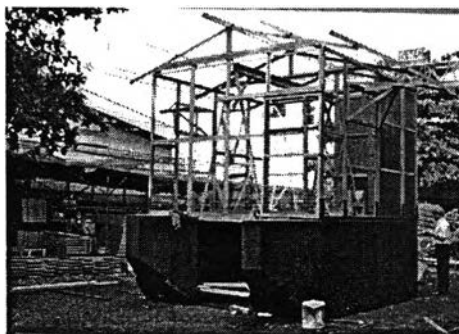
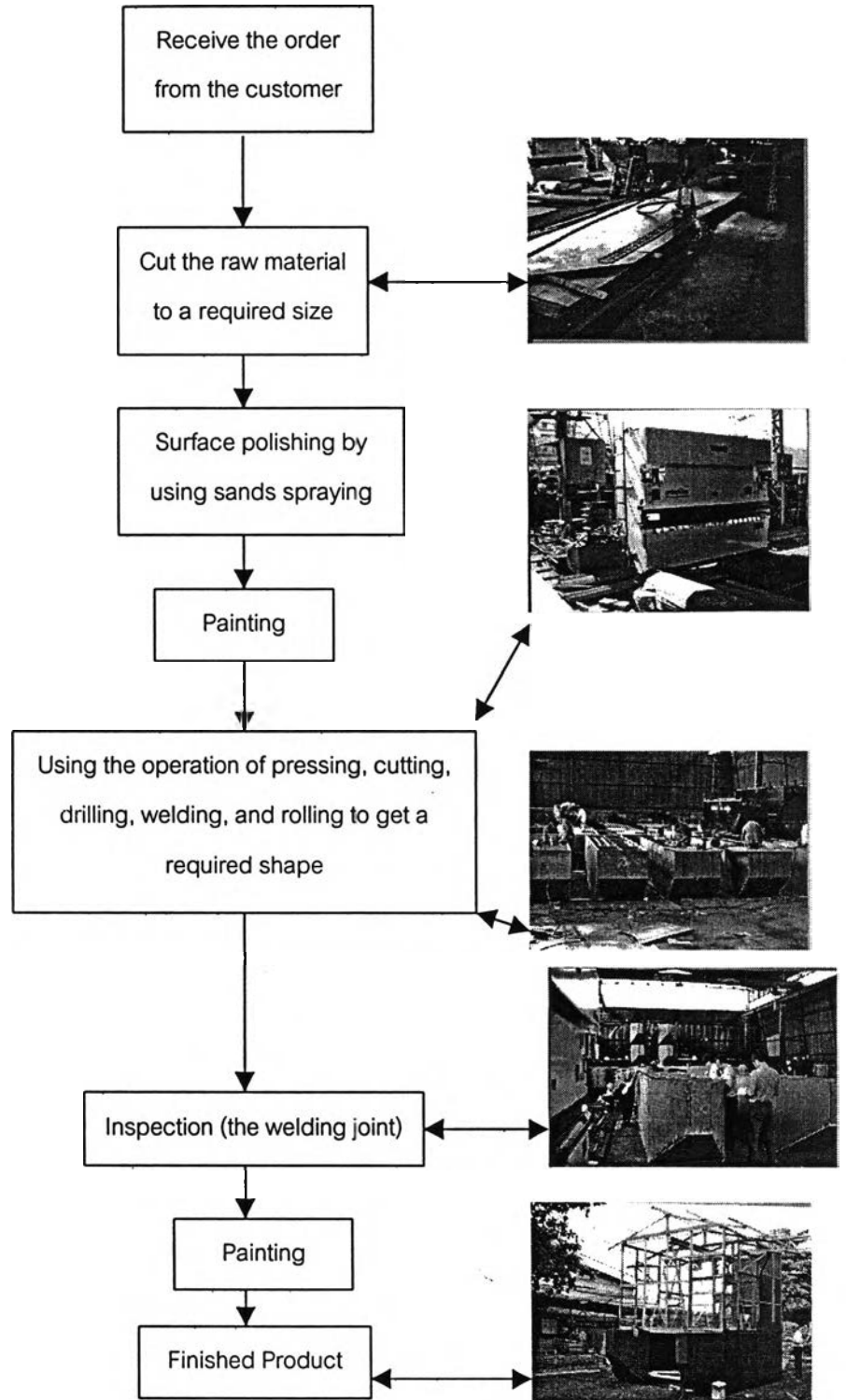


Figure 1.1: Pontoon

1. Raw material, which is the steel sheet, will be cleaned after receiving from the supplier. All the oil, rust will be removed in cleaning process.
2. The steel sheet will be cut to the required size by using the manual gas-cutting tool or the automatic electric cutting tool.
3. The steel sheet will be send to the polishing room where the worker will use the sand spray equipment in order to make the surface of the steel sheet smooth. (This process is optional, depending on the customer's requirement)
4. The steel sheet will be painted (1st layer) to prevent the rust.
5. The operation of the pressing and cutting will be applied to the steel sheet in order to get the required shape.
6. All the required shape of the steel sheet will be pre-construct (fit-up) by having an inside welding operation at each joint.
7. After the welding process, the pre-product will be cleaned.
8. The structure of the product will be welded inside and outside the product in order to strengthen the structure of the product.
9. The product will be painted inside.
10. After painting, the product needs to be leave out for 18 hours in order to let the paint dry.
11. The top part of the product will be welded together.
12. The product will be painted (2nd layer) in any color, as a customer required.
13. The finish product will be delivered to the customer.

Figure 1.2: The general process flow of the manufacturing



1.3 Current situation of company

Currently, the company has limitation of working capacity, and especially the availability of working space that effect the limitation of overhead crane which is indicate the route of material flow, the area of the existing plant is approximately only 1369 square meters. Consequently some manufacturing project has to finish half of a project and deliver the product out of the factory area and then start the other half of the project. In some case, some of the project, the product is too large for the company to make. It is not because of the ability to produce but because of the limitation of workspace and the limitation of the overhead crane that reflect to the type of the machine that is not be able to locate in the plant. The flow of the work is also another obstacle that company has been facing for a long time, since there is no plant layout study before locating the machine mainly because of the limitation of the space in workplace (Fig 1.3).

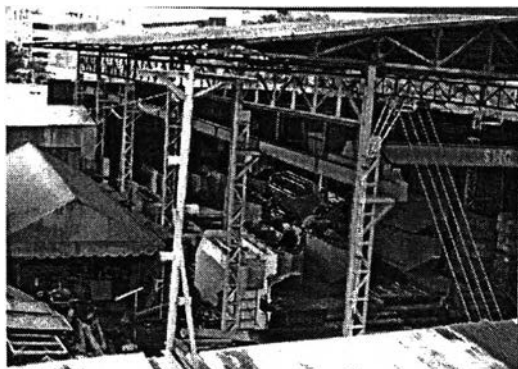


Figure 1.3: Limitation of the working space

From the figure 1.3, it can be seen that the company has very limited space to make the product, the finished product need to be kept in the same area of working

space. The finished product needs to be delivered out before next batch of product can be made.

Having found the new place to locate the new plant, fortunately the company had found the new place in Bangna area. The land has 70 meters wide and 110 meters deep, which is 7,700 square meters, bigger than the current place, in order to use it to establish the new plant. The area that will be used as a workspace will be 70 meters wide and 80 meters deep which is 5,600 square meters, the rest of the area will be used as office building, parking, and worker living area. The new area are expected to be large enough to have effective design new plant layout in order to work more efficiently and be able to expand the variety of product.

1.4 Statement of the Problem

Since Sahawatana Corporation has a limitation of working in an existing plant so the company has a plan to move the plant location from the Chongnonsri area to the Bangna area. So the company would like to design a new plant layout in the new plant location in order to have a good designed plant and to increase the capacity and capability of working. Moreover, from producing the relatively large product, the company needs to use the overhead crane to transfer the product between processes. From that reason the company need to concern the use of the overhead crane because the position of the overhead crane will be mainly indicate the route of the workflow.

1.5 Objective of the Research

The objective is to design a new plant layout within the new available space in order to utilize the space effectively and efficiently, and also to reduce the production time, labour cost, increase working safety level, increase the utilization of the material handling, all of these are directly effect from the design of the plant.

1.6 Scope of the Research

The research concerns with the designing new plant in new available area for a steel fabrication manufacturer by using quantitative analysis, such as flow time and material handling route and distance, and qualitative analysis such as the relationship between facilities.

The designing of the overhead crane location, type of the overhead crane, and flow of the process in the plant will be mainly concerned.

By using the simulation program, all the related production time can be recorded in term of the amount of time between the facilities and the frequency of trips between facilities. The record can be used to compare between each alternative of the layout.

The qualitative analysis can be analyzed by using the relationship chart. This concept was introduced by Muther (1973), the concept is based on the relationships for each facility pair (Fig 1.4). The relationships are presented in 6 alphabets.

- A Absolutely necessary
- E Especially important
- I Important
- O Ordinary
- U Unimportant
- X Undesirable

Importance of relationship between department 1, 2, and 3 (A, E, I, O, U, X)

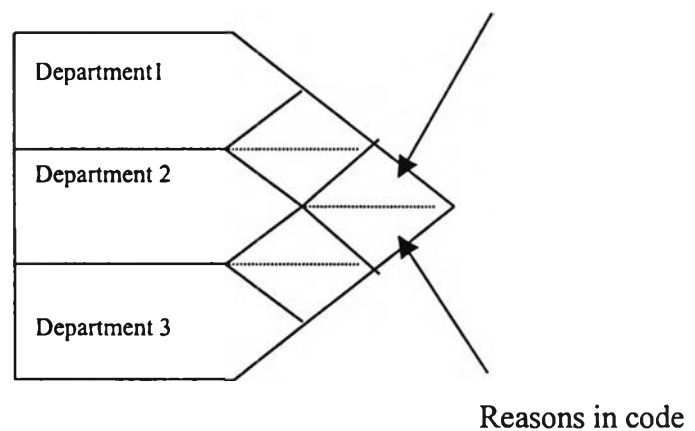


Figure 1.4: The relationship chart

1.7 Expected Results

1. The fully utilized design layout of new plant in new area
2. Increase the productivity
3. Effective transportation
4. Reduction of production cost

1.8 Research Procedure

1. Study the related literatures
 - Theory of plant design
 - The characteristics of steel fabrication process in Sahawatana Corp.
2. Study, analyze the problem that occurred in the existing plant and use it as a guideline of designing a new plant
3. Design the layout
4. Write the thesis report