

# CHAPTER I

## INTRODUCTION



### 1.1 Research Background

It is well known in the business world that warehouse is a critical function in almost all business units, except several service companies, and even plays a determining role in a number of cases. The importance of warehouse is attributed to two factors: (1) it functions as a storage place to hold the organization's inventory, Raw Materials (RW), Work In Process (WIP) and Finished Goods (FG), which commonly represents 30-40 percents of business investment; (2) good warehouse management is beneficial to organizations at many aspects such as cost-reduction, time-saving, operation enhancement. For these two reasons, it can be considered that in order to improve the corporate profitability and operation efficiency, the warehouse must receive sufficient attention from everyone within the organization. Many successful enterprises across the worldwide consider good warehouse management as a key factor to determine the successes of their businesses.

However, the factual experience has proved that the warehouse has not enjoyed its due emphasis since it is normal to find that the warehouse is poorly managed by some corporations, especially small and medium enterprises (SME), due to a variety of reasons. The company this study focused serves as a typical example.

### 1.2 Company Description

Besco International Corporation (Hereinafter refer to Company), one subsidiary company of Besco Group, is a mechanical components manufacturer located in Nongkae, Saraburi, Thailand. It mainly produces precision parts, such as plastic injection moulds, machine tools, punch dies, jig fixtures and check gauges by using its raw materials of *steel bars*.

As the Company operates as a make-to-order manufacturing unit and

keeps the good relationship with its reliable suppliers who are able to achieve timely delivery due to the geographical advantage, raw material order quantity is roughly placed in terms of the customer requirements. As a result, it is unnecessary for the Company to hold so many raw materials.

Nevertheless, as the customer specifications are ever-changing, more or less, superfluous raw materials inevitably emerged within the warehouse as time passed. Unfortunately, due to the fact that the warehouse is located in the production plant and shared by all working staffs, no specific individual has ever been assigned to stock area. As time elapsed, consequently, the Company has been failing to efficiently manage the warehouse and long suffering the problems it brings.

### 1.3 Statement of Problems

Owing to less attention given to the warehouse, some unexpected problems have been rolling into the Company in succession, which triggered certain negative effects as a result. Figure 1.1 below spontaneously and clearly illustrates the problems, all of which will be generalized as follows.



Figure 1.1: Warehouse problems in the Besco International Corporation

#### 1) Untidy storage area

Seen from figure 1.1, it is obvious that the storage area is under the messy and untidy condition. In the daily inbound operation, the steel bars are arbitrarily

and disorderly placed on the warehouse floor, which has gradually resulted in the status quo displayed in the picture. As a response, inconvenience and difficulties have been generated for the employees to pick the steel bars. What's the worse, the stock area has increasingly become dusty and dirty, which directly deteriorates the warehouse working environment.

## **2) Inefficient space utilization**

Due to the untidy condition, the space in the warehouse is unable to be effectively and efficiently utilized. Some useful space is taken up by the unnecessary components and even there is no sufficient room for the aisles through which the employees can pick the raw materials.

## **3) Inefficient raw materials utilization**

As raw materials are disorderly piled up, a great deal of bottom steel bars could not be used due to the difficulties of moving them out. Additionally, since the messy condition makes it impossible for the working staffs to conduct the statistics of steel bars and know the available amount, full quantity order has to be made every time, even though some steel bars are utilizable. This has straightly aggravated the Company's expense on the inventory. What the worse is that some raw materials become obsolete due to the customer changing requirements on material type, which directly makes the loss on the Company's investment.

## **4) Excessive steel stock**

As mentioned previously, the Company is a make-to-order manufacturer and the raw materials order quantity is approximately set in accordance to the customer specifications. Theoretically, it is unnecessary for the Company to hold the inventory. However, due to the fact of the customers frequently changing the demands after the raw materials being delivered, excessive steel bars unavoidably turned up in the warehouse as time moved on. Yet, the steel stock increases day after day and exceeds what the Company actually needs. Moreover, certain amount of steel bars has appeared

to be unnecessary any more. The negative effect resulting from the excessive stock is a large amount of warehouse useful space being occupied by them.

#### 5) Raw material being stolen

Another serious problem resulting from the disordered condition is raw material being stolen by greedy workers without being noticed by the managers or supervisors. This is the common case frequently happened in the warehouse, which directly leads to loss of money spent on available resources.

#### 6) Potential safety hazard

In spite of not being described in the figure 1.1, safety issue is identified as a potential hidden trouble in the warehouse.

Although there is no historical injury and accident record being reported, no safety policy for the warehouse has been ever established after inquiring the managers and employees. No formal safety operating procedure and rule have been formulated to follow. No workers wear the helmet in the interim of raw materials movement. In addition, during the investigation, the tool used to fasten the steel bars and link to the crane is *rubber elastic rope* (See figure 1.2) and the fatigue wear emerges after several operations due to weight of steel bars. As a result, the change of rope is often made. From this point, it can be inferred that the rubber elastic rope is vulnerable to sustain the heavy raw materials for long period and might rupture in the operation as well as initiate the hazard although it has not taken place in the past.

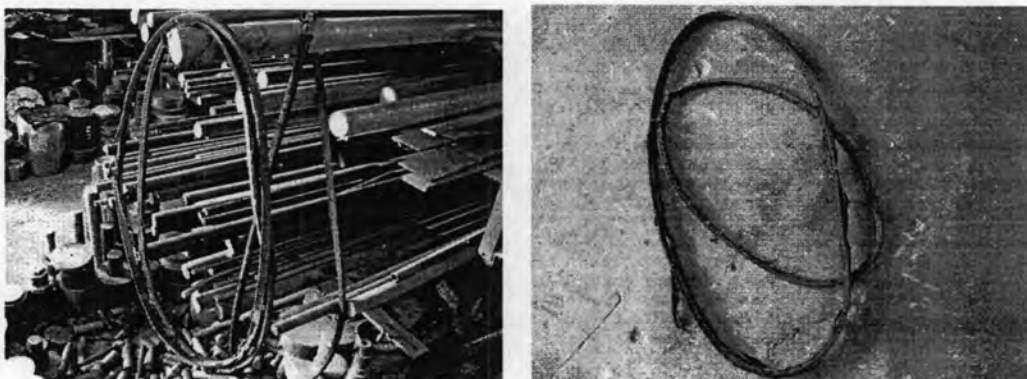


Figure 1.2: Rubber elastic rope

#### 1.4 Purposes and Objectives

After knowing that the warehouse is poorly managed, the purpose of this study is improving the warehouse performance with the following objectives.

- Improve warehouse physical condition
- Improve warehouse space utilization
- Improve warehouse operations
- Better raw materials physical control
- Better safety solutions
- Better raw materials security

#### 1.5 Research Scope

The scope of this study focuses on the following aspects.

- Appropriately set up the warehouse layout
- Properly design the storage equipments and handling system
- Improve the current warehouse operations
- Develop the safety and security measures
- Conduct the implementation activities for warehouse improvement

##### 1) Improve current warehouse layout and materials storage and handling

This aspect focuses on appropriate warehouse layout setup. As the warehouse of the Company is suited in its manufacturing plant and there is no possibility to establish another individual warehouse due to the limitation of space and fund, the existed warehouse site has been *renovated with installation of materials storage and handling system*.

This improvement is measured by the warehouse space utilization and raw material operations.

## 2) Improve the current warehouse operations

This aspect focuses on the way of improving current warehouse operations to control the raw materials. This includes the following researches:

- *Raw materials inbound and outbound operational procedure*
- *Raw materials information trace*

This improvement is measured by the time consumed in the operations.

## 3) Warehouse safety

Due to the hazard may be aroused in a mechanical components manufacturer warehouse, the article also

- *Develop safety measures*
- *Formulate the relevant safety operational procedure and rule*

This improvement is measured by frequency of injury and accident occurred during the period of a month after implementation of safety improving activities.

## 4) Warehouse security

This aspect focuses on measures of preventing the raw materials from being stolen by employees. And the research includes

- *Developing warehouse security rule*
- *Plan the reserved measures*

This improvement is evaluated by the frequency of pilferage during one week.

## 5) Implementation activities

The implementation campaign involves following activities:

- *Sort out necessary things and remove the unnecessary ones*
- *Classification of the raw materials*



- *Implement safety and security plan*
- *Clean the warehouse*
- *Setup the warehouse layout*
- *Install the raw materials storage and handling system*
- *Implement the operational procedure*

## 1.6 Research Methodology

The research methodology in this case refers to approaches deployed to research the following subjects.

- what happened in the current raw materials inbound and outbound operational activities;
- how to efficiently improve the warehouse physical condition and performance;
- how to appropriately design warehouse layout and material storage equipments as well as efficiently develop handling system;
- how to formulate the safety and security plan as well as develop the safety performance measures;
- how to effectively implement the improvement procedure and what the implementation plan should involve;
- how to correctly evaluate the warehouse operations performance before and after the project;
- what criteria for successful warehouse improvement should be set up;

To cope with them, two major approaches of research methodology, *Qualitative* and *Quantitative*, are employed in this study as a result.

### 1.6.1 Qualitative Approach

#### 1) Observation

The observation method is regarded as one of the most useful methods in qualitative research. Through observation, the status quo of warehouse and the current inbound and outbound operational processes are spontaneously recognized. Consequently, the visible warehouse problems are clearly identified. Additionally, classification and physical characteristics of items in the stock area are generally observed as basic inputs to generate the rough ideas of storage and handling equipment choice or design. Besides these, any available resources the Company currently possesses and people's working attitudes are obtained as well.

#### 2) Interview

By interviewing the employees and the managers in the Company, the potential problems and its root causes are distinguished and explored. Through talking with them, information such as tangible and intangible dangers in the materials movement, the frequency and the specific time of pilferage, and their opinions towards improvement are collected as a reference to formulate the safety and security plan.

#### 3) Case Study

With the assistance of case study on certain aspects based on the actual company, useful techniques and models are extracted and their experience is employed as a reference to guide warehouse improvement.

#### 4) Photograph

A picture tells thousands of words. By comparing with the pictures before and after improvement, whether the warehouse physical condition has been improved is obviously recognized. With the help of photographs, moreover, the physical property of the storage and handling equipments are displayed easily in order to avoid lengthy and vague explanation.



### 1.6.2 Quantitative Approach

#### 1) Data Collection

The historical data like the material order and customer demand are collected as part of decision of warehouse layout design. Also, data such as the total amount of exiting raw materials, the floor strength, and warehouse size etc. are measured and gathered to provide as the fundamental inputs for the decisions of material storage and handling equipment design and choice. What's more, the data relating to the operational and safety performance are recorded before and after project and used to determine the successful improvement by comparing the results between corresponding data set.

#### 2) Data Analysis

Without analysis, raw data are useless at all. Thus, all data involved in the research are analyzed. The data relevant to the problems and root causes are analyzed to identify the solutions. The analysis of raw material characteristics decides the structure of storage and handling equipments as well as influences the operation procedure. The evaluation of available warehouse size and material quantity affects the warehouse layout design. The classification of raw materials determines the arrangement of storage equipments.

#### 3) Result Evaluation

The factors of operation time-consuming, space utilization, frequency of raw material pilferage, and safety performance are recorded and evaluated after implementation activities. The results are compared with those of pre-implementation to measure the successful warehouse improvement.

### 1.7 Research Procedure

The research procedure of warehouse improvement is generally divided

into following steps:

- 1) Research current operations process
- 2) Collect and assess the existing data and information
- 3) Analyze the root causes of problems with the consultancy of managers and workers
- 4) Research related documents and academic literature
- 5) Design the appropriate materials storage equipments and handling system
- 6) Formulate the operation procedure
- 7) Set up warehouses layout
- 8) Develop the safety and security measures
- 9) Study the appropriate techniques and approaches for implementation
- 10) Estimate the budget and get funding
- 11) Establish implementation plan
  - a. Intermediate solution
    - Decide what should be eliminated and what should be kept
    - Move all items out the warehouse and clean the stock area
    - Improve the physical condition
  - b. Final solution
    - Implement safety and security plan
    - Set up warehouse layout
    - Install the material storage equipments
    - Move the steel bars back into the stock area
    - Implement the operation procedure
- 12) Implementation action

## 1.8 Benefits Reaped

After the implementation activities, the Company has reaped the following benefits from the warehouse improvement, which in return, helps the Company

eliminate the loss of investment on raw materials as well as enhance the warehouse operations.

- A clean, tidy, systematic warehouse for keeping raw materials is obtained
- Inventory and its holding cost are reduced.
- The space utilization is increased by 45%.
- Raw material operation is easier and faster by 60%, which also reduce the production lead time and machine and employee idle times as well as increases the Company's capacity
- Raw materials physical control is enhanced.
- No injury and accident is reported during a period of a month and the safety trouble is eliminated.
- Pilferage-free warehouse security is achieved.