

Chapter 1

Introduction



1.1 Background of the Company

In a period of economic downturn, many industries are in trouble. Some industries cannot continue their businesses. Very few companies have successfully managed to overcome difficulties. There are many factors that can be a problem such as low quality of product, low productivity, high volume of inventory, over stock of finishing good, lack of cash flow, high competition, high labor cost, oil price and the time wasted in waiting for maintenance. The manufacturing are facing any of problems, they should consider a tool to eliminate the problem. Discontinuation of the production process is caused by many factors, such as breakdown of only one small part of the machine. It is very hard to know what part is going to breakdown, it's mean that the loss can be occurred every time.

The company was established in the year 1981. The company was set up to fulfill the needs on clients in plastic packaging products. The company started with a simple Injection molding machine, with sizes 60-75 tons. As the company was growing, it has expanded with more machines. In order to meet the clients' demand the company has acquired more machines such as the Blow molding machine. And the company has included more types of machinery to try to meet all requirements of clients, for which including the machines that could offer the whole packaging needs of clients. Some of these machines are Silk-screen, Hot-stamp, automated labeling, and Shrink-film. Nowadays, the company has 24 machines of injection molding machine, with sizes 60-350 tons, 34 units of blow molding machine, with sizes 100-5000 cc. and more than 30 units of specific machine. The plant is working 24 hours per day with two shifts. There is more than full-time 300 workers on the production line and a hundreds part-time workers. Last year sales figure is about 200 million baht.

Continuous of the production (24-hour-day) process is very important. If the production process is not stopped by the time wasted in waiting for maintenance, it will help reduce time and cost. It is because the company has a lot of old model machines such as Blow Molding Machine, Injection molding machine, and Printing Machine. And the plant has very weak in maintenance management. The research is focusing on *milk container process*.

The milk container process can be divided in to main process

1. Forming; by feed the plastic granule in to the blow-molding machine after that the machine will form the milk container automatically. The mechanism of the blow-molding machine is a simple molding process. In the first stage the machine melts the plastic pellets, so that the sticky form of melted plastic pellets is ready to be put in to a mold and to be blown in to a specific designed shape. The mold is designed and cut in to two halves. The second stage of the production is the shaping process where the melted plastic is pushed through the pin die in to the mold. The air is then pressurizes the melted plastic to be pressed against the cool two halves mold so that the plastic is shaped in the form of the specific designed shape.
2. Cutting; feed the milk container in to the cutting machine and then the excess will be cut of. The bottles have unwanted plastic pieces attached to the bottles. They are called scrap. These scraps are the plastic part that are not part of the plastic bottles but is necessary by-product that is attached at the bottom part of the unfinished bottles. They are to be cut off away from the bottles and to be recycled to be as melted plastic for future production.
3. Printing; load the milk container to the printing machine the container will be print automatically
4. Drying; making the color from the printing dry

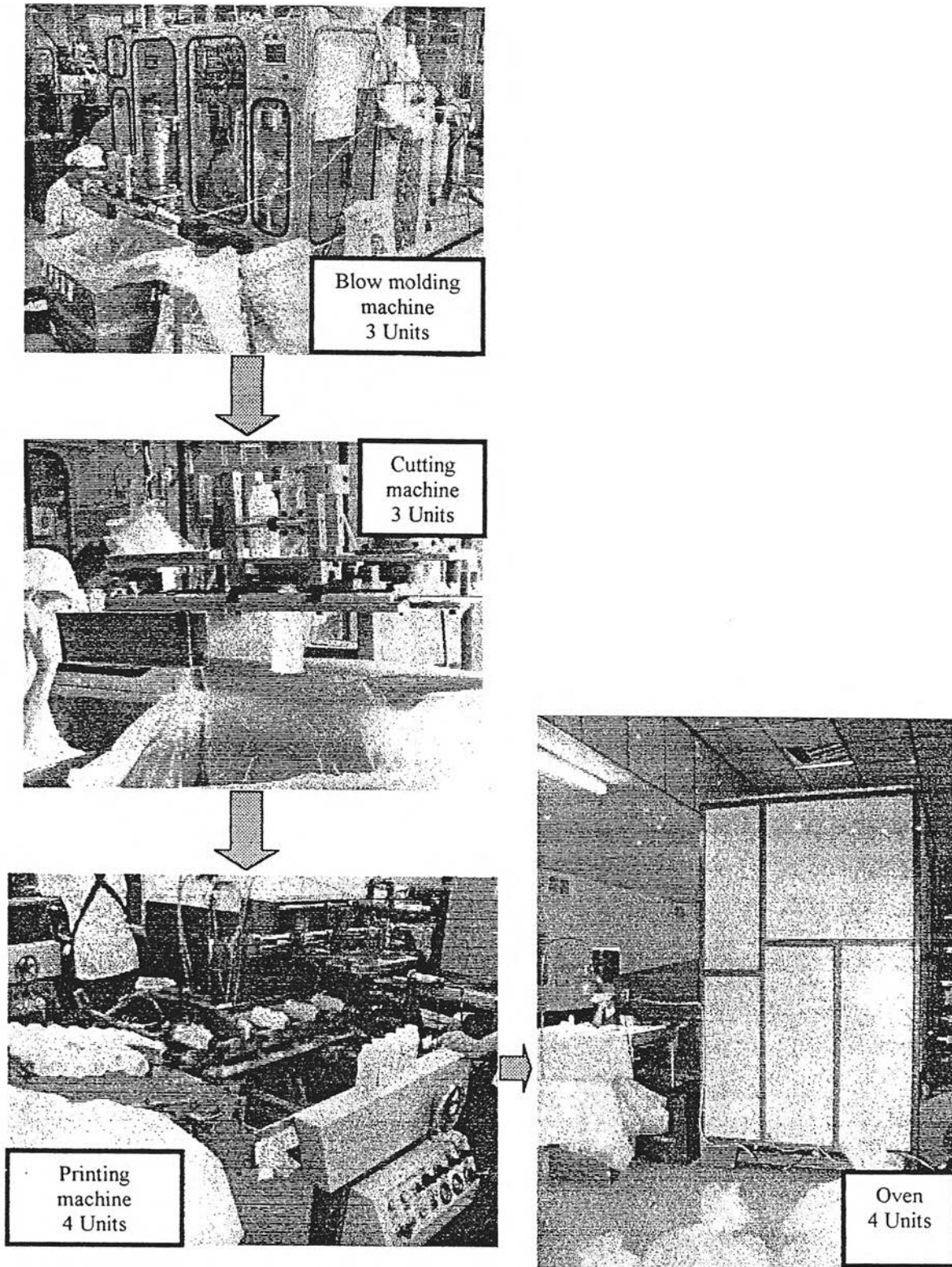


Figure 1.1:Flow of machine in milk container production line (200 cc.)

1.2 STATEMENT OF THE PROBLEM

Referring to the data from the production department, breakdown of the part in the machine has always occurred and created many problems for example breakdown of the relay and wire cutoff in blow molding machine can stop the hold production line. The maintenance management believes that preventive maintenance system will help decrease machine breakdown, thus reducing time waste in fixing and lead-time. They also believe that it will help increase the productivity, which will enable the company to retain its reputation of on-time delivery and product quality.

The maintenance technician will carry out only necessary repairs, when the machine breakdown and cannot operate, in order to bring it back into normal stage.

One case scenario of Blow molding machine:

In August 2001, one of three blow-molding machines was shut down; it meant that one of three of production capacity was loss. One machine can produce 40,000 bottles per day or about 1666 bottle per hour. The maintenance technician was called to check the machine. The cause was identified: the problem was the AC motor (30-hp 3-phase) was burned out it was the main motor of the machine. The cause of damaged was the ball bearing worn out. The maintenance staff did not refill in the machine the lubrication liquid and the data of changed part was not collected. Before the motor burned out it produced noises but no one noticed and identified the seriousness of the noise. The motor had to be sent out of the company to be repaired. It took five days to repair. The company had to pay 5,000 baht for repairing the motor. The problem is not only 5,000 baht for fixing the motor but also loss opportunity in production. The loss of that production line lead to the late delivery for the customers and therefore the credit of the company. The blow-molding machine can produce about 900 baht per hour per machine in this case the machine was stopped for five days it cost about 108,000 baht. This number does not include the loss of opportunities in process development, printing process, drying process and sale.

One case scenario of cutting machine:

In November 2001, one of three cutting machines was breakdown; the maintenance technician was called to check the machine. The cause was identified that the belts were damaged because it is expired. The cause of problem was the belt was used longer than its lifetime. It was no record of changing and no ones care about it.

A case scenario of printing machine:

In September 2001, one of four printing machines was breakdown; the maintenance technician was called to check the machine. The cause was identified that the rack of the conveyer system was bend because bottles fell from the conveyer and stuck the movement of the conveyer system. The worker did not clean the machine properly. It took one day to waiting for spare part and change it. The company had to pay 3,500 baht for the new rack.

One case scenario of dry machine (oven):

In October 2001, one of four ovens was burning. The maintenance technicians were called to fix the machine. The cause of problem was the plastic bottles fell from baskets and lay on the heaters (9,000 watt) unfortunately the cover of heaters was gone so when the time go on the plastic bottles were burned and destroyed the oven. It took one day to repair. The company had to pay 15,000 baht for heater and other equipment.

The weak point of the maintenance department can be defined into many points for example;

1. No record of changing parts
2. No plan for maintenance
3. Low skill staffs
4. No paper work
5. Unpredictable breakdown

Table 1.1: The sum of time loses in maintenance during July to December

process	Repairing time	Waiting time
Blow molding machine	70 hours: 55 min.	187 hours
Cutting machine	7 hours: 25 min.	46 hours
Silk screen machine	16 hours: 40 min.	41 hours
Oven	13 hours: 40 min.	60 hours
Total	108 hours: 40 min.	334 hours
	Total	442 hours: 40 min.

The working hours for six months are about 4320 hours and the loss time in maintenance is about 443 hours. It means that the loss time is about 10.25%.

1.3 OBJECTIVES

To set up the Preventive maintenance planing for the plastic company. To understand further the problems incur in a production line for a blow molding and printing type plastic company.

1.4 SCOPE OF THE STUDY

In this research study on blow molding machine, cutting machine, silk screen machine and oven of milk container production line (200 c.c.) (Supporting equipment is not included-supporting equipment is Air pump, Cooling system, electric system and etc.).

1.5 EXPECTED RESULTS

The expectation of the thesis is to understand all problems related to maintenance system as part of the production department of the company, including successfully develop preventive maintenance system, control and reduction of loss time in the production line. Benefits are:

1. The preventive maintenance system
2. To reduce the time wasted in waiting for maintenance.
3. It might be useful data for another researcher.

1.6 RESEARCH PROCEDURE

1. Study the comment and suggestion that related with thesis topic from literature surveys.
2. Study theoretical that related with thesis topic from book and journal.
3. Study Preventive maintenance system from books and journal. Searching knowledge from human experts and related books.
 - Productive Maintenance
 - Maintenance Planning & Scheduling
 - Job order system
4. Collect the data related with the manual & Analyze causes of the problem.
5. Establish the preventive maintenance system.
6. Compare the down time that causes of repairing time and waiting time for maintenance in milk container production line.
7. Summary the improvement of study on preventive maintenance system of the plastic packaging company.
8. Write up the Thesis.

	October 2001	November 2001	December 2001	January 2002	December 2002	January 2003	February 2003	March 2003
Study literature surveys	██████████							
Study theoretical	██████████							
Study Preventive maintenance system		██████████						
Collect & analyses problem	██████████							
Establish & Implement				██████████				
Compare						██████████		
Summary						██████████		
Write Thesis						██████████	██████████	██████████

1.7 LITERATURE SURVEYS

Krishina (1987), "Preventive Maintenance (management guide)"

Preventive Maintenance is based on the old saying, "Prevention is better than cure". Preventive Maintenance is a systematic maintenance course where the condition of the company constantly watched through a systematic inspection and preventive action taken to reduce the incidence of breakdowns. The major aim of preventive maintenance is to prevent unscheduled interruptions to the machines and equipment.

The fundamental activities of Preventive Maintenance are:

First, Periodical inspection of machines and equipment are to discover conditions of deterioration. Second, Maintenance of equipment to remove or repair such provisional while they are in a minor stage. The quintessence of the Preventive Maintenance is a well-planned inspection system.

Ebi (1987), "Cost reduction with in the factory"

The concepts with regard to the Preventive Maintenance, the Corrective maintenance and the Maintenance Prevention are the mains propose to improve productivity and reduce machine breakdown.

The book presents the concept to save cost in connection with machinery equipment that base on certain economic and management factors. The cost saving concepts will be put together with PM, CM and MP in order to develop the normal maintenance to the Productive Maintenance system in the future. This book also gives suggestions on techniques to upgrade the reliability and the effectiveness of machine repair, maintenance and techniques on how to evaluate such repair and maintenance program.

CL. Dunlop, (1990)

This book is talking about document and information for maintenance such as;

1. Equipment record card
2. Planed maintenance sheet
3. Equipment failure sheet
4. Maintenance record form
5. Daily check list
6. Trouble shooting guide
7. Maintenance task sheet
8. Maintenance schedule

A.Raouf, (1992)

This research is talking about maintenance management system by Delphi method, scope of maintenance planning and relationship to another section.

Poonporn Sangbangpla (1995), "Total Productive Maintenance"

This book proposes the importance of maintenance data collecting and the use of the data. The book also indicates the certain objectives of data collecting, the characteristics of good data, type of data collecting on daily basic, inspection checklist, accidental report, a maintenance schedule and its advantages, a plan for machine maintenance, a plan for machine modification and inspection, record and analysis, and feedback toward of the data collecting. That will be beneficial for future.

Pornsawan (1997), “Improvement of machine preventive maintenance planing system”

This thesis is talking about improve machine preventive maintenance planing system for the integrated circuit manufacturing factor in order to increase the mean time between failure and reduce the percent of machine downtime. This study improved the machine preventive maintenance planing system by setting up an annual maintenance plan, 5 years maintenance plan, and part supporting management system and also maintenance documentation management system.

Wipas (2000), “Reduction and control of loss time in a process by preventive maintenance”

This thesis is study about reduce and control the machine breakdown of critical machine in the production line as a result of lacking of the appropriate and effective machine maintenance system. The study has been conveyed by adopting the preventive maintenance system to increase the effectiveness the effectiveness of the operation of the machine in the production line. In order to reduce and prevent the machine breakdown and provide the safety awareness in the workplace. The study begins with the analysis on the existing maintenance system. The data in connection with the down time and cost of loss time caused by the sudden machine breakdown have been collected throughout the study. The analysis equipment and method being used is to compare the existing machine maintenance system with the preventive maintenance program based upon types of cause of machine damage and the appropriate maintenance system to prevent the re-occurrence of such damage.