

CHAPTER 3



COMPANY BACKGROUND AND PROBLEM IDENTIFICATION

This chapter described about company background, paper manufacturing process and its existing problem. The details was shown as below.

3.1 Company Background

Thai Union Paper Public Company Limited is leading of paper producing manufacturer and distributing printing as well as writing paper including paperboard. The company was established in 1969. In 1979, company acquired Bangkok Paper Company Limited, the neighborhood paper Manufacturer Company, which started its operation in 1956. Accordingly, the company had occupied 7 paper machines.

Thai Union Paper Company is the subsidiary of paper and packaging business of Siam Cement Group.

Thai Union Paper Co.,Ltd.(TUP) is the paper producing manufacturer and distributing printing and writing paper including paper board. The company sell the products through two companies, Siam Cement Group under the company commitment between Thai Paper Company (TPC) which sell printing and writing paper, Siam Kraft Industry Co.,Ltd.(SKIC) which sell paper board. The company's product are white and color, uncoated printing and writing paper ,white and colored card paper, paper and paperboard for special job, white and colored carbonless paper, matted – finished coated paper and one - side coated paper, duplex paper.

At the present, this mill has seven paper machines, two coaters machines, three supercalender machines. The process begin with bringing the pulp in to the mill and produce in to the different kind of paper. The production capacity is about 60,300 ton per year. The export product is about 5,500 ton per year. This mill has 504 employees.

3.2 Paper Manufacturing Process

Papermaking process is continuous process which beginning from stock preparation go to paper machine and then bring the base paper to trim at reeler. Next, the base paper is coated at coater process. After that the coated paper is calendered at calender process.

Next, the coated paper might convert into sheet pattern or roll pattern depending on customers' orders. Then, the product in sheet pattern is sorted and packed to keep at warehouse. On the other hand, the product in roll pattern is packed to store at warehouse.

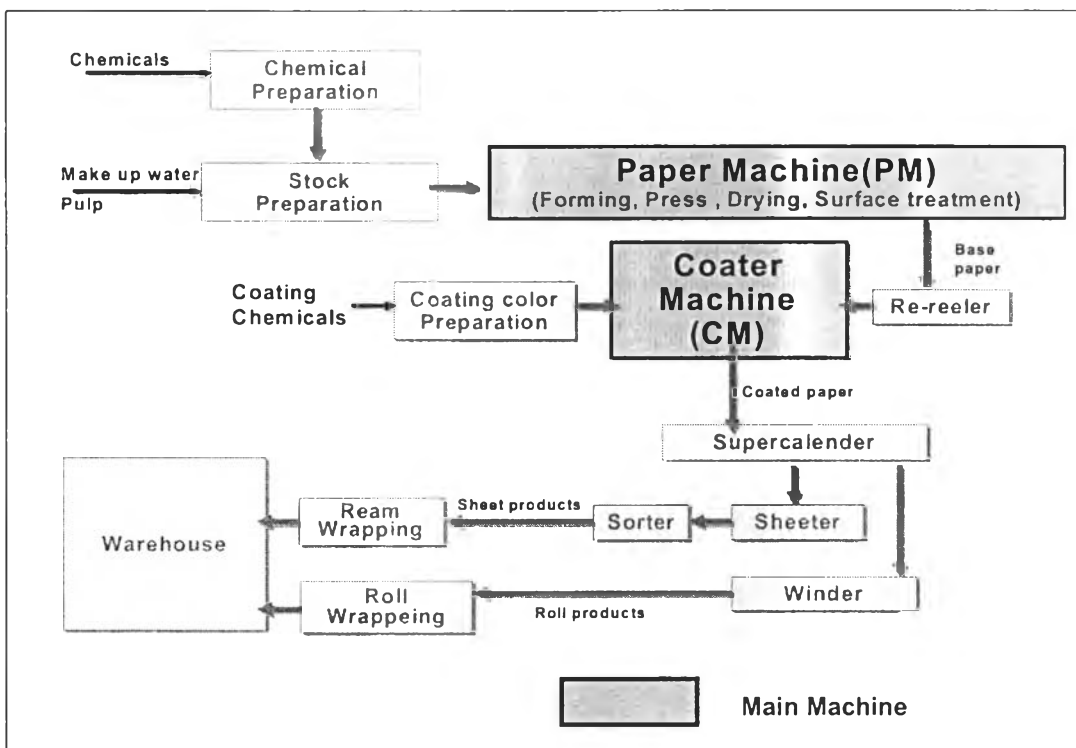


Figure 3.1 Papermaking Process

3.3 Problem Identification

Papermaking process is a continuous process utilizing a series of different machines. Therefore, it is important that all machines be synchronized properly to ensure smooth flow of the production line. Breakdown of only one machine could disrupt the overall process in which leads to company's losses such as time loss, production loss, sale loss, and manpower loss including many unforeseen losses.

The main machines that run 24 hours a day were paper machine and coater machine. Past records collected during the year 2001 shows average loss time of paper machine (PM) and coater machine (CM) of Thai Union Paper are shown in the figure 3.2

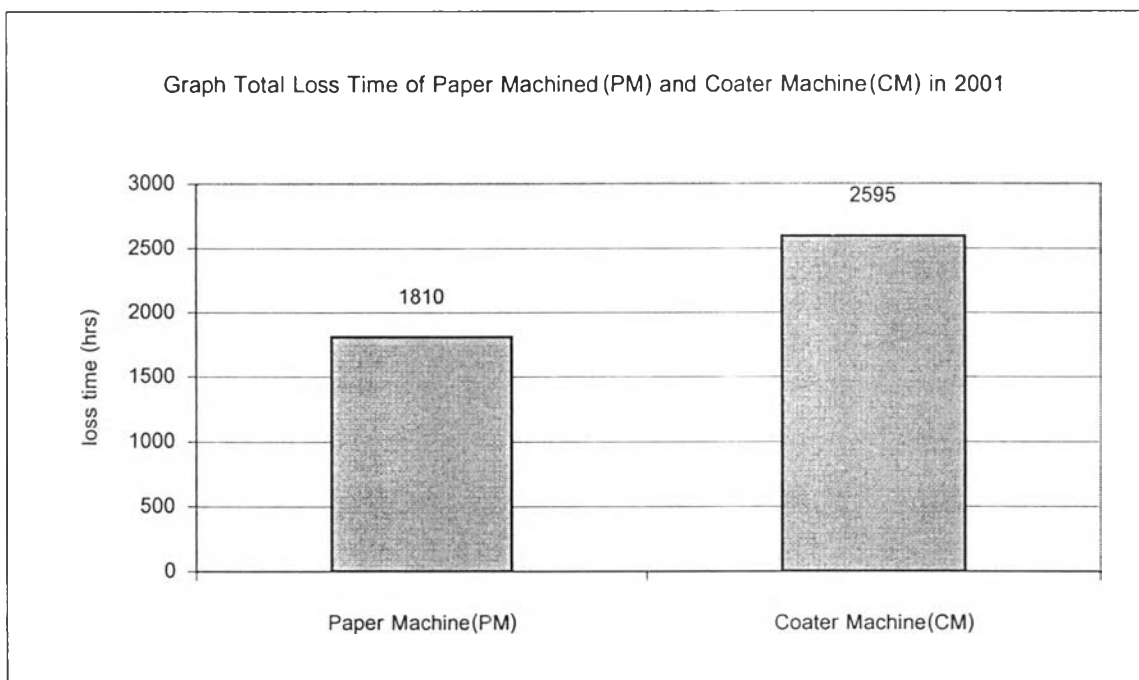


Figure 3.2 Total Loss Time of Paper Machine and Coater Machine

As demonstrated in Figure 3.2, there were considerable amounts of loss time occurring at the paper machine (PM) and coater machine (CM). Improving these two machines thus can lead to substantial improvement of overall production capacity. However, considering between these two machines, it can be seen from the graph that loss time at coater machine (CM) is somewhat higher. In addition to this, the coater

machine (CM) is installed next to the paper machine (PM). Excessive loss time at the coater machine literally slows down the machine's output rate in comparison to that of the paper machine. This results in unbalanced flow of materials, which subsequently creates work in process and a bottleneck at the paper machine station. Based on this consideration, it was thus crucial for the company to reduce the loss time of the coater machine (CM), as it is likely to greatly enhance the overall productivity.

The first thing to do in correcting a problem, perhaps the most difficult part, is to correctly define the most important problem areas to focus attention and efforts on. In the case of this thesis our broad objective was to reduce the loss time of the coater machine (CM). However, this loss time was actually caused by a combination of various causes and it was obviously not possible to solve all the problems during the course of this thesis conduct due to limited timeframe and resources. Therefore, it was of great importance that the appropriate problem area was chosen for correction.

Brainstorming was used to gather ideas from all the people concerned with loss time of coater machine. This was to ensure that the problem was looked at from all angles and no any important cause was being missed out. A meeting was officially held among these people to discuss about potential causes of the loss time problem. People participating in this brainstorming session included.

1. Mechanical Engineer
2. Electrical Engineer
3. Mechanical Technical
4. Electrical Technician.
5. Process Engineer who acted as the coordinator between technicians and operators
6. Operator Supervisor who was the direct user of the machine.
7. Operator.

After the team was set up, following steps were taken to tackle the problem.

3.3.1 Pareto Analysis

Pareto analysis was used to highlight the most important problem areas that deserve special emphasis. Key possible causes of machine loss time were ranked in order of their effects and illustrated by a Pareto diagram.

From production daily progress report of coater machine (CM) in June 2001 to May 2002, we could identify loss time of coater machine by using Pareto analysis as shown in Figure 3.3.

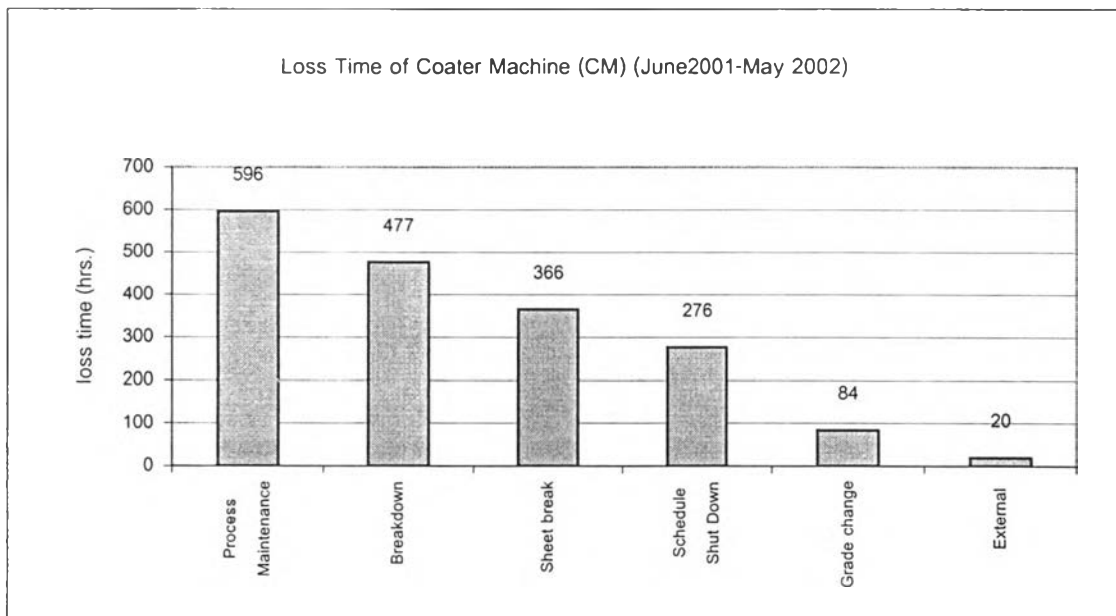


Figure 3.3 Loss Time of Coater Machine (CM)

Loss time of Coater Machine was separate in five categories as follows;

1. Process Maintenance Loss Time – machine stop for process cleaning such as cleaning coating color pipe, coating color pan, vibration screen to avoid accumulation of contaminant in the coating system.
2. Breakdown Loss Time – machine failure from mechanical, electrical problem.
3. Sheet Break Loss Time – machine stop from paper web break. Loss time come from the time for connecting paper web and cleaning paper roll which is sticky by coating color.
4. Schedule Shut Down Time – machine stop for maintenance.
5. Grade Change Loss Time – machine stop for changing paper grade.
6. External Loss Time – loss time beyond the company's control such as electricity shortage.

From Figure 3.3, loss time that was due to process maintenance showed the largest portion of total loss time. However, this type of loss time was inevitable because regular cleanup was necessary for the machine to remain functioning properly. The second most important type of loss time as shown in Figure 3.3 was loss time from machine breakdown, which generally involved mechanical problems, which could be the result of many causes. Reducing breakdown loss time required detailed analysis and was complicated. Therefore, the team had focused to reduce the loss time caused by sheet break and it was obviously a single cause.

- Explanation of paper wrapped up backing roll

Before we went on to find out the root cause of sheet break, an understanding about the paper wrapped up backing roll might be useful.

Sheet (Paper) can break in every position on the coater machine such as unwinder, coating head 1, dryer, etc. as shown in Figure 3.4 . The worst case happens when the sheet breaks at coating head as shown in Figure 3.5 - 3.7. When sheet break occurs at this position, The paper followed will wrap up the backing roll, making the backing roll bigger. When this happens, the force from the coating blade that presses on wrapped paper will damage backing roll. In addition, the coating blade will be damaged, too.

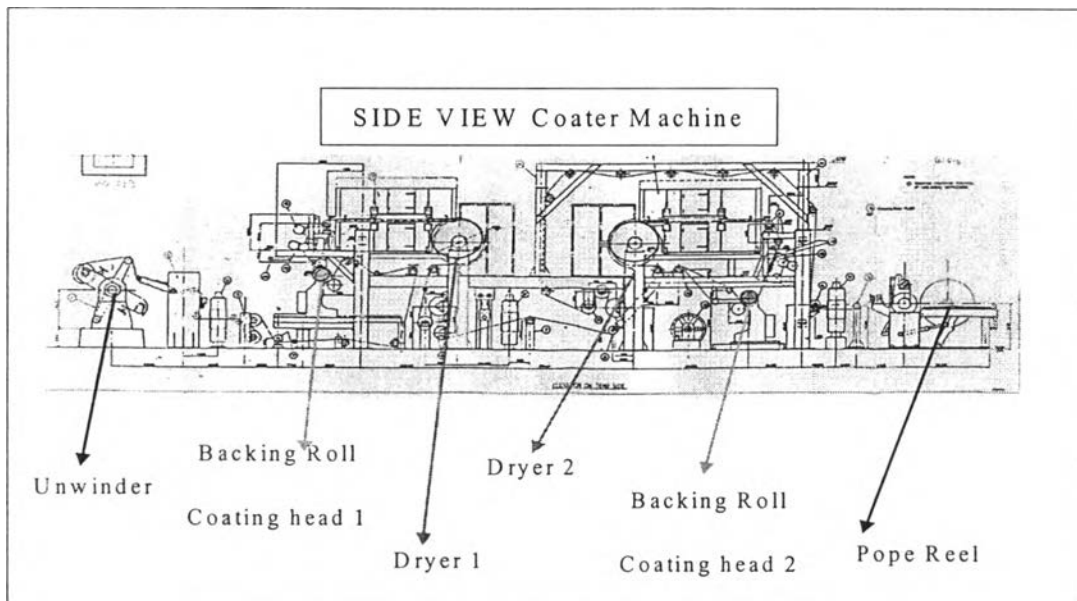


Figure 3.4:Coater Machine

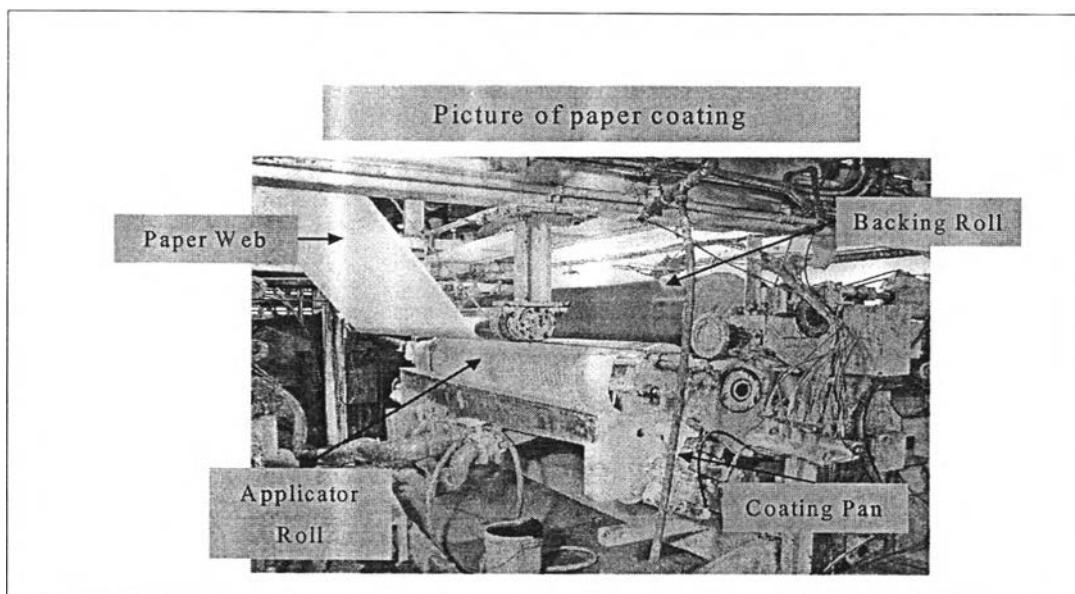
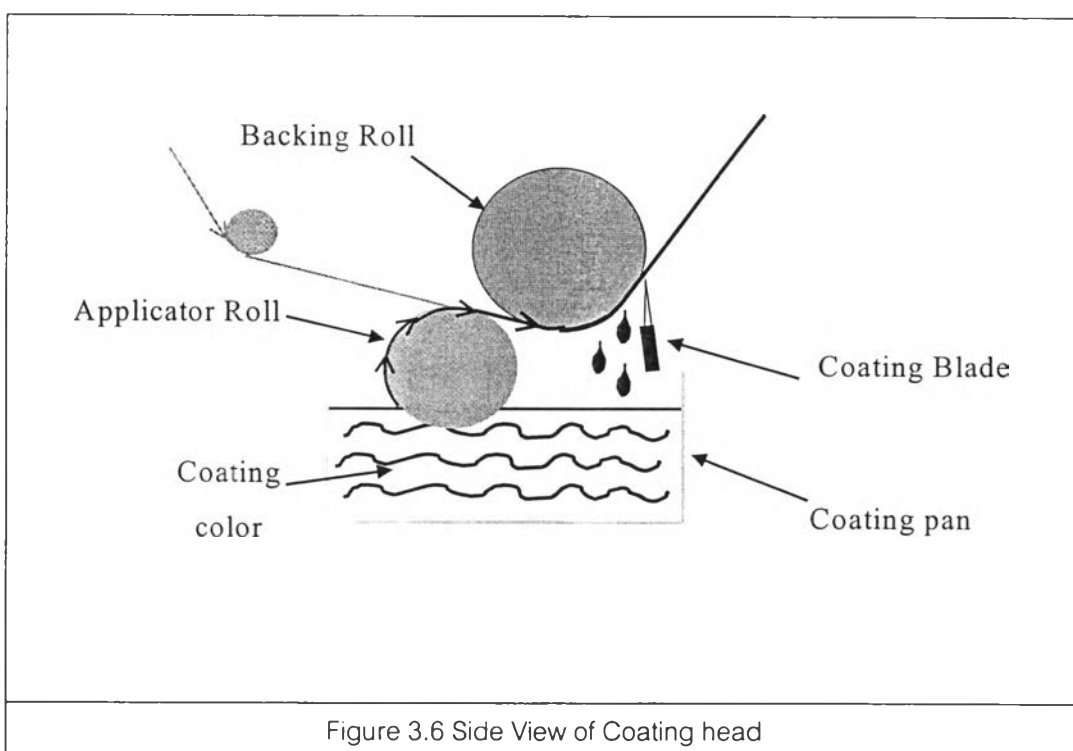


Figure 3.5 : Paper passing through backing roll at coating head



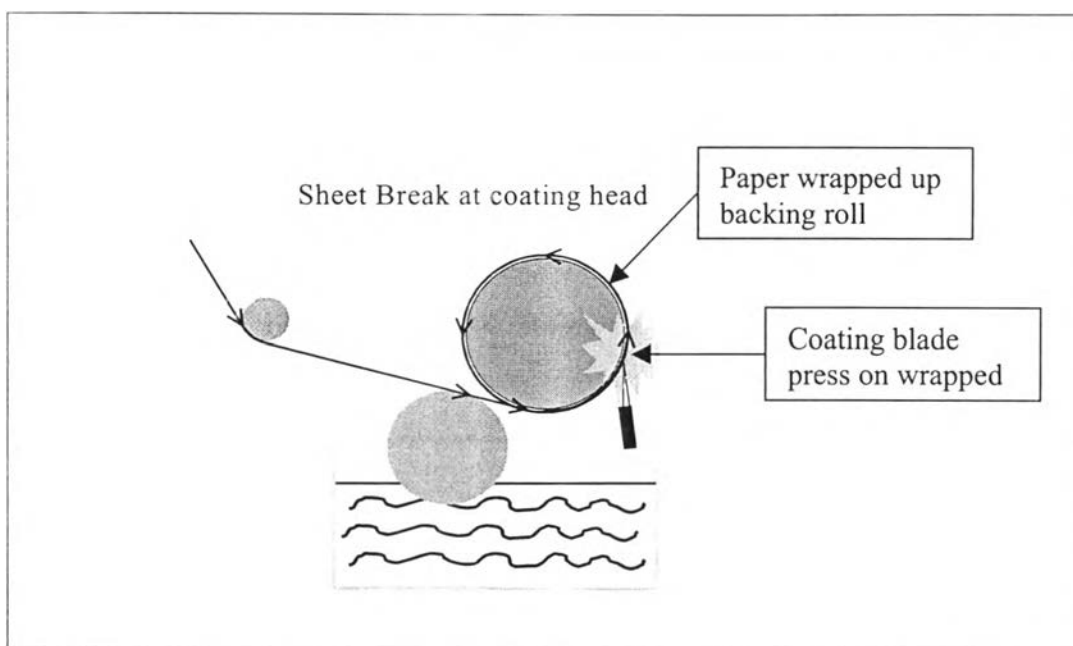


Figure 3.7 Paper Wrapped up Backing Roll

3.3.2 Satisfaction Criteria Set-up

Sheet break loss time was the time wasted for stopping the machine, removing wrapped paper from the backing roll, cleaning the backing roll, and changing the backing roll in case of damage. Obviously the root cause of this problem was actually sheet breakage, which subsequently cause paper wrapped in the backing roll. There are a number of causes making the sheet to break. Examples are holes in paper, paper break at the edge, paper break from adjusting tension. However, preventing the sheet from breaking is very difficult as it is normally caused by many factors and machines in the preceding stations. The team thus discussed another alternative solution to reduce sheet break loss time. Instead of trying to prevent the sheet break which can be very difficult as previously explained, another possibility was to let the sheet break occur but try to cut the torn paper before its gets wrapped. The Team had considered many possible ways to achieve and concluded that a cutting system should be installed at the coater machine. This cutting system must be capable of detecting sheet breaks when it occurs, and atomically cut the paper before it is rolled into and gets wrapped at the backing roll.

The result of implementing the new web cutter would be measured against the following criteria.

1. Runnability of the web cutting system: This is measured as the percentage of the times the cutting system was able to cut the paper in time before the paper gets wrapped at the backing roll.

2. Sheet break loss time: Compare the sheet break loss time before and after installation of the web cutting system.

3.3.3 Check Sheet Design

A check sheet was designed to collect data of the measured criteria, which were the runnability of the web cutting system and sheet break loss time. This check sheet was presented in Figure 3.8.

The check sheet was designed to collect the following data:

1. Sheet break loss time
2. Machine Position that sheet break
3. Number of times that web cutter system functions in occurrences of sheet breaks
4. Number of times that paper was cut by the system before getting wrapped at backing roll.

Sheet Break / Brake Down Coater Machine

Date ____ / ____ / ____

Cause of Machine Stop		Day shift / Grade _____ GSM				Evening shift / Grade _____ GSM				Night shift / Grade _____ GSM			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
		total time (min.)				total time (min.)				total time (min.)			
Cause of Paper Web Break (Sheet Break)	Reel change												
	Tension												
	Web connecting												
	Hole in paper												
	Web break at the edge												
Change Coating Blade													
Process Cleaning													
Brake Down from	Mechanical												
	Electrical												
	Utility												
	Operation												
Remark:													
Number of Paper Web Break		1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Position of web break (dryer#1, dryer#2, coating head#1/2)													
Thickness of paper web wrapping backing roll	Coating head1 (mm.)												
	Coating head2 (mm.)												
Backing Roll damaged (/)													
Removal paper / repaired backing roll time (min)													
Web Cutter System function (yes / no)													
Paper was cut by cutting knife (yes / no)													
		Running time ____ hrs		Stopping time ____ hrs		Running time ____ hrs		Stopping time ____ hrs		Running time ____ hrs		Stopping time ____ hrs	
		Operator's signature _____				Operator's signature _____				Operator's signature _____			

Figure 3.8: Check Sheet of Sheet Break Loss Time/Breakdown Coater Machine