

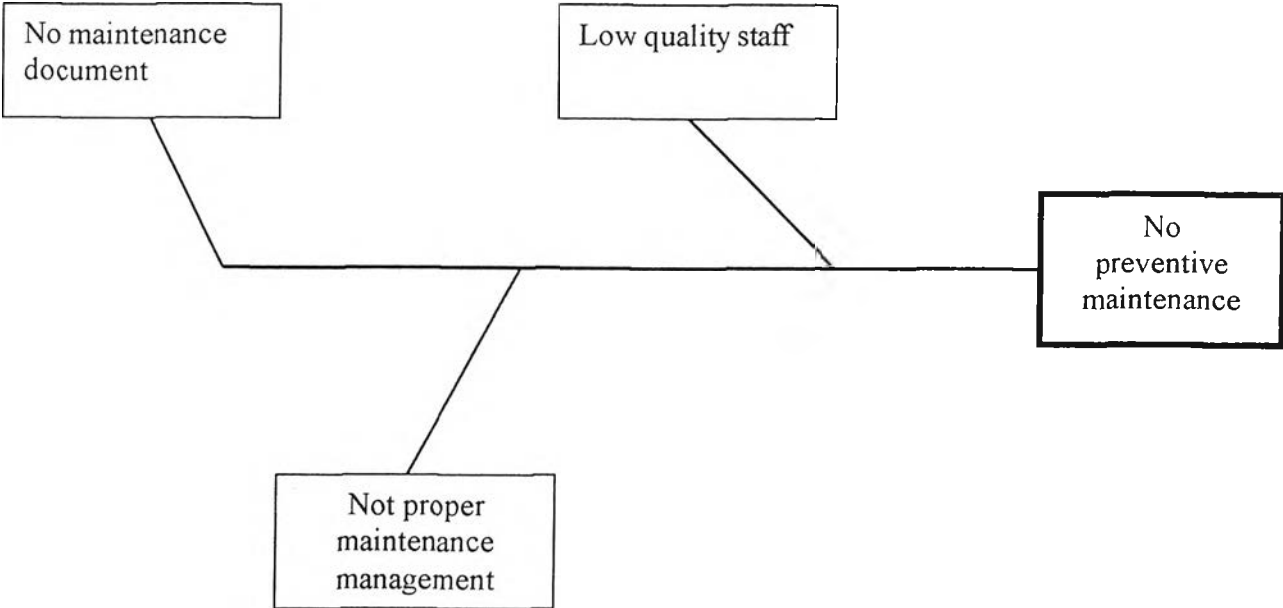
Chapter 3

Statement of problem of maintenance in the factory

The factory has its own maintenance section in order to fix the machine as fast as possible when the break down is occurred. The maintenance technicians have to respond to fix the machine as good as they can. After they finish their job in one day they must record in their daily report. The daily report will record the number of machine that he has fixed, the problem of the part breakdown and the type of changing part. In this chapter we shall talk about the problem of maintenance system. And this thesis is scope only in one production line. After collecting data and studying problems of machine breakdown in the company. We found that the production line is stopping many times by machine breakdown. The production line has only 14 machines but the breakdowns occurred more than seventeen times in each month. The number seventeen is come from the average of machine breakdown report during July 2001 to December 2001. So every machine has a change to breakdown in every month. Each breakdown takes time to correct about one hour. One breakdown can stop the production line, it means that the company will lose the opportunity in producing the bottle, 1666 bottles per hour. The chapter concentrates about the problem of maintenance and it can be defined in to three major points as follow

- 1) Maintenance document
- 2) Maintenance management
- 3) Technician

Figure 3.1: fish bone diagram of no preventive maintenance



3.1 Maintenance document

Maintenance section has many data and manuals but no one care about it. Many data do not filing and many manuals are not brought to use. The section is very weak in paperwork because the head of engineering department comes from Iran, he can speak Thai and he can read and write English but he can not read or write Thai language. And the technicians are not of high education so they can not read and write English. By this barrier is one of the major causes of lack in document. Normally the maintenance document should have some paper form in order to make sure that the job will be done and every thing will be recorded. Some reason that causes of lack in document for this company are as follow

- 1) All of the machines are local made so some machines types have no user manual. In this situation the technicians must use their experience to maintain the machines.
- 2) The machines are variety in design and the parts it cause of the complicated in recording.
- 3) Technicians are weak of knowledge in using document.
- 4) Lack of data collecting.
- 5) The head of the department and technician can communicate to each other by talking only.

Some simple uses of maintenance document that maintenance section should have are as follow

- (1) Job request
- (2) Machine user guide
- (3) Maintenance guide
- (4) Troubleshooting guide
- (5) Work order
- (6) Job description
- (7) Machine inspection card
- (8) Maintenance report
- (9) Machine maintenance record and etc.

Job request system

When the machines break down, the production staff calls machine setting technician. After that machine setting technician call maintenance staff. It seems to be very simple and easy but it causes many problems. For example the blow molding machine No. 16 breakdown in the afternoon the production staff announce machine setting technician in order to call maintenance technician but the machine setting technician is busy. So he forgets to call maintenance staff. It's because the system has no document about job request. It is very easy to forget to call maintenance staff or the technician may call unskilled maintenance staff. If the maintenance staff has no skill he should call other maintenance staffs that have more skill to maintain. Unfortunately no skill maintenance staff is in busy so he forgets to call other technician. Some time he tries to fix the machine by him self but he has not much skill in that situation or he is the only one free at that time. It will take time in fixing and very easy to make another problem. The example when the low skill staff tries to fix the machine. One day the blow molding machine is oil leak at hydraulic blow pin unit and the staff tries to change seal and o-ring but he never change it before. He tries to remove hydraulic cylinder by clamping the clamp on the hydraulic bar so he make the scratch on the bar. After he finish assembles hydraulic cylinder and run the machine for hours. He found that the oil still leak because oil leak at the scratch position. There is the only way to stop the oil leak problem that the hydraulic bar has been change. By this case the machine has to stop again in order to change the hydraulic bar and the company has to pay for new hydraulic bar. If skill technician fixes the machine at the first time it will not happen. It happens because the head of engineering department doesn't know that this breakdown is occurring so he does not send the proper technician to solve this problem. If the machine setting technician write the job request to the head of engineering department and the head of engineering department sent skill staff to fix the machine the company wills not loss opportunity and money as this. The job request document is a tool to solve this problem. The flow chart in step of request is showing in figure 3.2, it looks very simple and easy but it causes of many problems and not works.

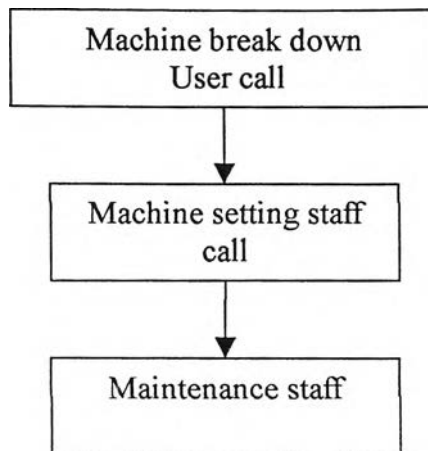


Figure 3.2: Flow chart of existing steps of request

Maintenance report & Machine maintenance record

The factory has many machine maintenance records. It records in each technician daily report book. The data is not filed in to each machine record book. Every machine that the technician fixes in one day he will record in his dairy report. So one his daily report is a mix with every machine maintenance data when he start new working day he will record every thing and every machine that he fix in the new day dairy report. The data of each machine need to record in machine maintenance record book. The maintenance section has no machine record book. It is very difficult to know that when the part was changed and what number of the changed part. Each technician has his own daily report. It means that the data of one machine can appear in many technician dairy report incase of more than one technician go to maintenance the machine in one time. On the other hand the data of maintenance that the machine will separate in to difference daily report if the machine undergoes maintenance more than one time in one day and every time of maintenance done by difference technician. One day the head of engineering department goes back to his hometown for a week so the manual of the machine was locked. However, the blow molding machine oil leak at clamping unit. The maintenance staff was call to change seal and o-ring after the staff removes the hydraulic cylinder and read the number of seal and brings o-ring to compare with the new one in store. He found that the o-ring spare part is out of order so he has to

put the old one back in order to making the machine run. After that he has to wait for the new spare part and after the part has come he has to remove the hydraulic cylinder again. If the machine has its own maintenance record book the staff can search the number of the part and prepare the parts before remove it. The machine will not be stopped twice. Another case is the cutting machine it has no machine manual. And it has no machine maintenance record book. The staff has to remove the part first and check the spare part at store or he must remember the number of each part. As you can see in the beginning the maintenance activity is very difficult and complicated when it has no machine maintenance record. So machine maintenance record book can solve this problem.

Work order

At the beginning maintenance section has not much document. It has on work order. The staffs go to work automatically or ask for help from the setting technician. Some time the head of engineering department order maintenance technician to fix the machine. But he never write the work order he just tell the staff. For example, when the blow molding machine No. 5 breakdown the supervisor of production reports to the head of production soon afterward the head of production ask for help from the Head of engineering department. The head of engineering department just looking for the skill technician and order him to fix the machine after the technician finish his present job. When the technician finishes his job, he goes to fix next machine but the technician does not go to fix machine No. 5 because he forget the order.

Some time Head of engineering department ask the staff in production line looking for the particular technician and tells him to fix the particular machine. For example the machine breakdown and Head of engineering department is not free. He has to go to fix another machine but there is no maintenance technician in that area at that time. So he tell the name of the skill maintenance technician to the production staff in that line and let the staff looks for the particular maintenance technician.

3.2 Maintenance management

In the past, the head of engineering department is directly order to maintenance technicians and he is the only one who can monitor all of technician in engineering department. There are about thirty-five staffs in engineering department and all of them are directly under the head of the department so they have to wait for his order and his decision making. Many jobs are waiting for the head of engineering department in order to make a decision or command.

In fact the head of engineering department has many sections to take care of. The head of engineering department not only manages the sections but also repair the machine. It causes of weak in control and manages the technicians and maintenance section. It may cause of unpredictable machine breakdown and unclear job responsibility in each technician. That is why some job is very quick to repair, while some job are forgotten or take long time to take care. The technicians are poor in knowledge and below standard in maintenance because the head of engineering department has a lot of work to do. For example the new maintenance staff talks to the head of engineering department very little after interview because head of engineering department has no time to teach him. So the new staff will learn techniques from old technicians but old technicians are not good enough. It is very easy that the new staff will learn the long way form old technicians. The head of engineering department should have his assistance. He will have more time to teach the new staff.

For many reasons that bring the maintenance system in to trouble and it effect to the company. So the engineering department organization chart should be change. The engineering department organization chart is showing in Figure 3.3.

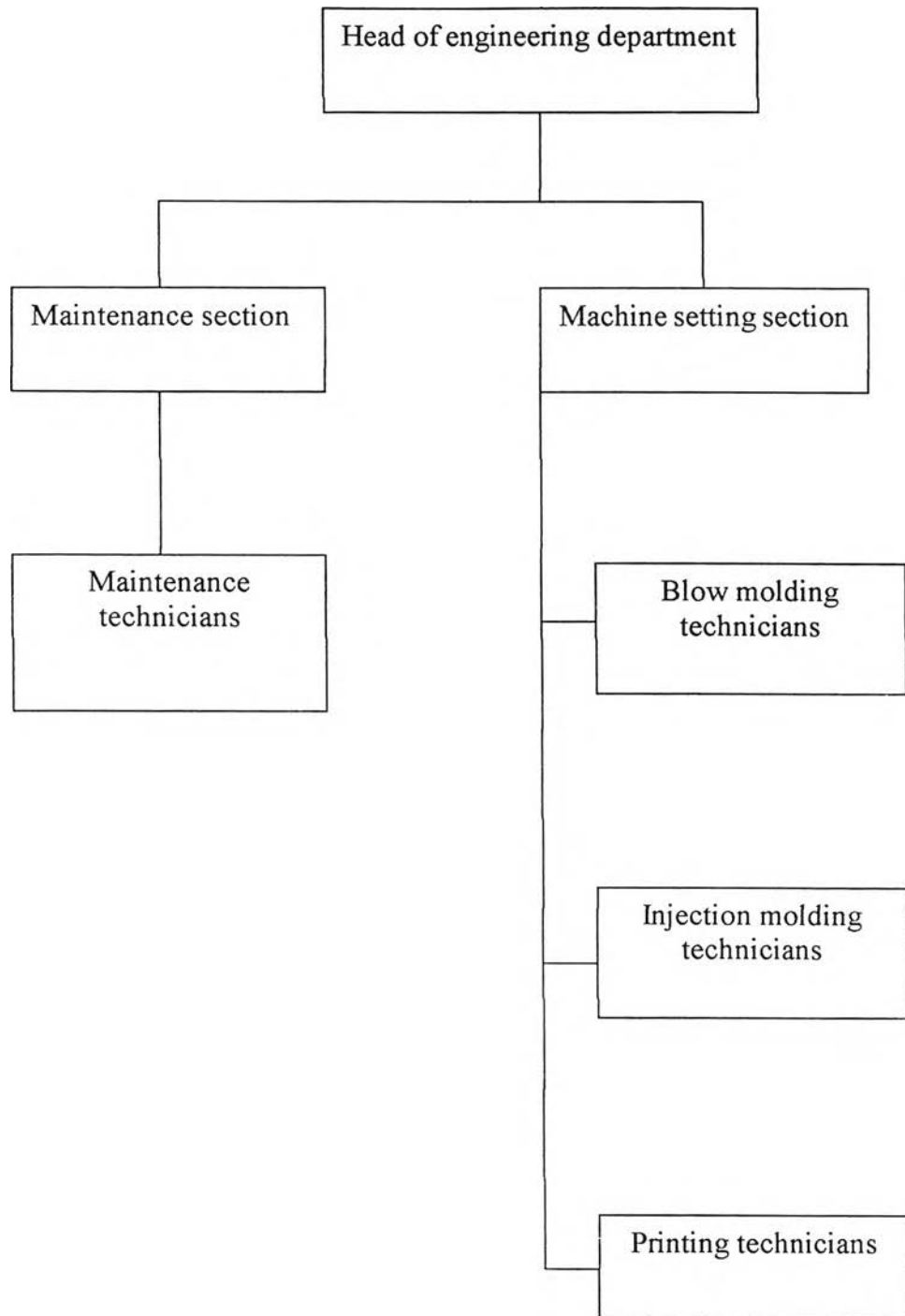


Figure 3.3: The engineering department organization chart

3.3 Technician

The problem of maintenance technicians can be defined into six major causes as follow;

- 1) Staff work more than 10 hours every day
- 2) low education
- 3) high turn over
- 4) no job description
- 5) lack of training

There are only seven staffs in maintenance section and it includes two staffs of plant cleaner. It means that only five staffs have to maintain every machine in the plant. If one of them is sick other people have to carry his job. They work six day per week and more than ten hours per day. They start working at 8 AM and continue over time until 7 PM or 8 PM. The holiday of each technician is not the same day. If the two staffs of plant cleaner are not counted the section will has five technicians. Because of their holiday are not the same so there will have two days that have five technicians and five days have four technicians. If one technician is ill on that day and we have only four technicians. We will have only three technicians on that busy day.

The maintenance technicians are not high educated some staffs graduated only primary school. Normally the maintenance technicians graduate high school. So they are not good in English. Although the machines are local made but the machine manual is in English. They can study from the picture but they can not read the machine instruction. So they can not study the correct way from the book.

The maintenance section has very high turnover rate it about thirty percent per year. It effects to the skill of technician directly. There are many cause of loss the technician such as the technician that take respond in hydraulic part get more salary in the new plant. The company give him 6,000 per month at the new place he get 7,000 per month. The technician that takes care of electric system is conflict with his supervisor. And the average age of the technicians is between 22-29 years old so they have not much experience in working. Some of them just graduated and

start working in the plant. The young people and low experience are very easy to make decision in order to change their job.

The plant has no room for maintenance staff, for example, when the machine breakdown occur the staff goes to remove the breakdown part and put the new one in order to make the machine continue running. After he has free time he will bring up the broken and repair it. But the maintenance has no room for him in order to repair it. So he has to search for the place in the plant and repair the part. It has no particular place for maintenance staffs.

From above, it make the section has low skill technicians. It means that the company has to train staff again and again. It will loss much money and takes much time. And the rate of losing opportunity still remains constant.

The maintenance section has no job description so the technicians are not clear in their responsibility. For example when the machine breakdown occurred the free technicians don't go to fix immediately because they don't know exactly whose respond to the machine. When the hydraulic part breakdown two free staffs contend to each other that who must fix it.

Nowadays head of the department has many jobs to do so he has no time to train staff. He let the staff study from the old technician. Some time he tells the way to the staff and let him go to work. If the staff cannot solve the problem the staff will go back and ask the head again and again until the staff can finish his job or the staff may call the head to fix it. By this way it quite takes time and may cause of breakdown in other part

The cause and effect of lacking in maintenance technician quality is showing in figure 3.4.

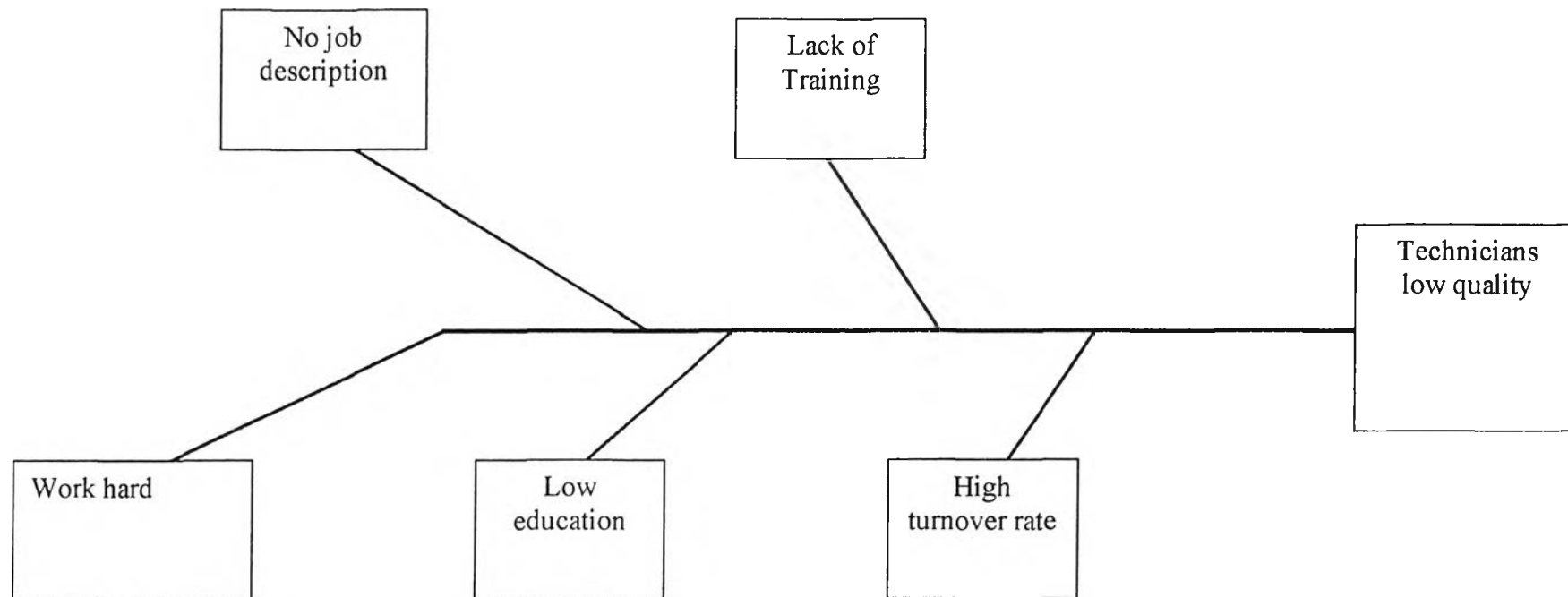


Figure 3.4: fish bone diagram of the maintenance technician's problem

As you can see from the beginning of chapter 3 until now, the three major problems (maintenance document, maintenance management, and human) are the cause of low quality in maintenance system. And it is the major problem in implement preventive maintenance system. The low quality in maintenance affect directly to the loss of opportunity to production when machine breakdown. The number of loss times in waiting for maintenance is show in table 3.1

Table 3.1: the sum of time loses in maintenance during July 2001 to December 2001

Machine type	No. of emergency breakdown	Repairing time	Waiting time
Blow molding machine	59	70 hours: 55 min.	187 hours
Cutting machine	13	7 hours: 25 min.	46 hours
Silk screen machine	20	16 hours: 40 min.	41 hours
Oven	13	13 hours: 40 min.	60 hours
<i>Total</i>	<i>105</i>	<i>108 hours: 40 min.</i>	<i>334 hours</i>
		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's mean that the loss time is about 10.25 %. Refer to the beginning one hour the machine can produce about 1,666 bottles so *the company loss approximates to produce the bottle about 738,038 bottles in six months*. One bottle cost about 1, it mean that the company loss opportunity to sale the product about 738,038 in six months.

From the summary table it show a lot of waste time in the production line. The waste time can be separated in to two major points. First is loss time in maintenance activity or can call it "Repairing time" such as:

1. remove
2. clean
3. adjust
4. fix and etc.

Second loss time is waiting for maintenance. It calls "Waiting time". There are four causes of waiting time. They are listed as follows:

1. The maintenance staff is not free they has many breakdown machine that waiting them to fix.
2. The changing part is not available because that particular part is never breakdown before or it very fill breakdown.
3. Some part has to send out side in order to fix it.
4. Waiting for maintenance staffs because no maintenance staffs in night shift.

From the staffs daily report show that the emergency breakdowns can occur any time during 24 hours. Some time it occurs when maintenance staffs are available but sometimes it occurs when maintenance staffs are not available. When it occurs during working time of maintenance staffs (dayshift) the cause of waiting time is come from two reasons. First, the staff is not frees. He is repairing other machines. Second the spare part is not available or parts were sent to repair outside the company. For example on 2 August 2001, the main motor of blow molding machine is burning out the maintenance staff is send to repair. The breakdown is more damage than the staff can do. The head of department makes a decision to send the motor to repair out side. So the machine has to wait for repairing the motor for five days. On 25 July 2001, the speed control of cutting machine is breakdown. This part is never breakdown before so this part is no available in store. In order to has the new one, it take time about twenty four hours. So take for twenty four hours in waiting the part. When it occurs out of working time of maintenance staffs, the cause comes from waiting for maintenance staffs. It because at night shift has no maintenance staffs so the machine breakdown has to wait until the day shift. For example the blow molding machine No. 16 is broken-down on 20 July 2001 at 3.00 am. The machine has to wait until 8.00 am in the morning. So the production line loss opportunity in production for ablest 5 hours in order to waiting for maintenance staff in the morning.

It affects to the opportunity in produce the milk container 200 cc. The company needs to solve this problem as fast as possible. The problem is not easy to solve because it requires high skill instructor, time, budget and etc. It will reduce the number of machine breakdown and take the production line has more opportunity in produces the goods.