

## CHAPTER 2

### DESCRIPTION OF THE COMPANY

#### 2.1 Company brief

X Company was established in 1962 to assemble, distribute and service the company's automobiles and parts. The company produces a variety type of automobiles, under license from X Company Japan. Table 2.1 shows the company information.

Name :	X Company
Business :	Automobile manufacture, distributor, importer, exporter and leasing
Registered capital :	Bht 520 million
No. of employees :	4721
Manufacturing plant :	Samrong -(3 shifts) Gateway

Table 2.1 : General data concerning the company

Note: The Gateway plant is in Chachoengsao Province and started its operation in 1996 with an initial production capacity of 50,000 units per year.(1 shift)

Nowadays, X Company has two manufacturing plants at Samrong and Gateway. In this study, it involves the paint line of Samrong plant. At this plant the annual capacity is 150,000 units of two categories of products, passenger and pick-up car, in various models.

The major component parts of these car models, called Completed Knock Down (CKD) or Partially Knock Down (PKD), are supplied from Japan. Approximately 40% of total components are manufactured in local factories.

## 2.2 Production process

An automobile is composed of some 1,500 to 2,000 parts. At this assembly factory, these stamped, casted, machined, and partially assembled parts enter at one end then the finished automobile leaves at the other end. Completed parts and parts pre-assembled at the sub-assembly lines arrive in proper time and are placed at the main assembly line. These parts will be further assembled to the body shell, and become a complete automobile.

Although there are many models, all closely follow same processes. There are 6 main processes of car assembly at Samrong plant. Figure 2.1 shows the sequence of the main processes of assembly

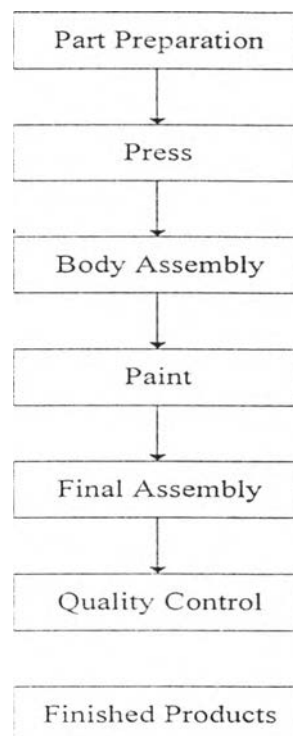


Figure 2.1 : Main process of a car assembling.

The first process is preparation of locally-made parts and completely knocked down (CKD) parts supplied from Japan. Some parts are prepared for the next process, press and weld, but some are for the further process, body assembly.

The second is pressing the parts such as doors, roof, etc. using automatic pressing machine.

In the body assembly process, both robots and human are employed to weld some parts together to make the body.

Next is paint process. Beginning with cleaning metal surface, coating with zinc film, applying anti-rust coat using “Cation EDP” system (a base coat rust-proofing system) and finally top coat painting by robot.

Then the other parts, such as engines and car accessories, are installed and assembled to the body shell to finish a completed car.

The last process is quality control. There are toe testing, brakes system checking, engine operation checking, ABS testing, final inspection, shower test, and road test.

The following study will focus only one particular stage of the processes, top coat painting.

### **2.3 Machine brief**

Top coat painting machines are automatic spraying machines. These machine have been employed since 1992. At that time, X Company was the only company in Thailand who possessed the painting robots in production line.

At present there are 3 types of automatic spraying guns used in painting process :

1. Hand gun ; noncomplex structured, lower price comparing with other types, manual operated and gives best coloring quality. Used for

metallic color spraying with 2 Kgf/cm<sup>2</sup> and gives low color adhesiveness percentage approximately 20 %.

2. R.E.A. gun ; manual operated or attached to work automatically on the machine, closely structured to Hand gun type but this type use electrostatic to increase color adhesiveness percentage to 40 - 50 % with - 60 KV. The weakness is that accidents may happen when operate due to such voltage.

3. Bell gun ; heavy, complex structured, highest price comparing to other types, designed to be attached to the machine and run automatically, use centrifugal force theory in that bell head will spin and cause color to spread over. There are small drains at the side and the edge of bell head to spray color. Speed of bell head is approximately 5,000 - 50,000 rpm. (5,000 - 30,000 rpm. for solid color, 30,000 - 50,000 rpm. for metallic color) Using electrostatic in spraying with - 90 KV. increases color adhesiveness percentage to 85 - 90 % However, there is possibility that accidents may happen if the gun is not well enough controlled and maintained.

Since there are 3 types of color spraying for automobiles ; metallic, solid, and clear, the company has to employed 2 types of gun for suitable color quality and adhesiveness percentage which are :

1. Bell gun ; for solid and clear color spraying.

2. R.E.A. gun ; for metallic color spraying use only since color quality is better but cause more paint lost than Bell gun do.

R.E.A. gun and Bell gun installation are shown in figure 2.2 below:

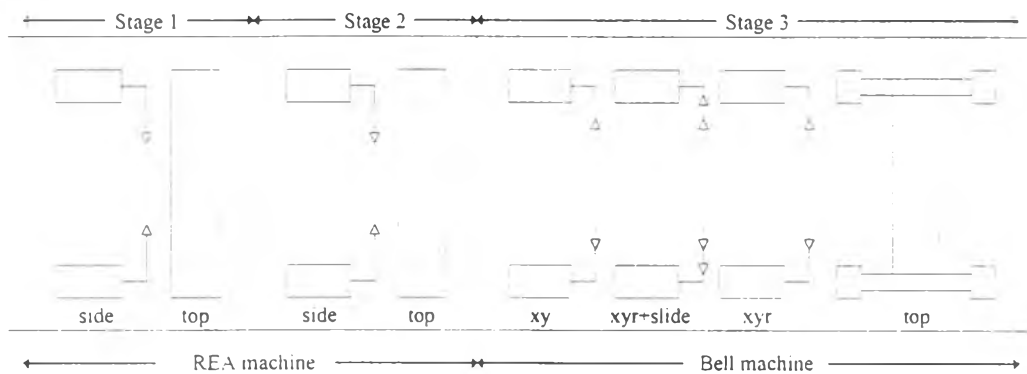


Figure 2.2 : Layout of the machine installed in the paint process.

The figure shows that there are 3 stages, in stage 1 and 2 are same machines with same R.E.A. gun type while in stage 3 are machines with Bell gun type. Each stage consists of these machine :

Stage 1. consists of - R.E.A. side machine ( left and right )  
 - R.E.A. top machine

Stage 2. consists of - R.E.A. side machine ( left and right )  
 - R.E.A. top machine

Stage 3. consists of - Bell xy machine ( side 1 )  
 - Bell xyr + slide machine ( side 2 high and low )  
 - Bell xyr machine ( side 3 )  
 - Bell top machine ( roof machine )

Areas on the car body shell are divided into 9 different sections and each section will be particularly painted by 9 automatic spraying machines. In this study, the machine that sprays roof of the body shell is selected to be analyzed and designed a preventive maintenance scheduling for. Approximately, the machine is able to spray-paint 1 vehicle every 1.7 minutes. Descriptions of the machine such as machine drawing, machine manual, inspection check sheet, and paint system are shown in appendix A.

At the moment these machines are operated 22 hours a day, 5 days a week (Monday-Friday). They will be off during 6.00-8.00 everyday.

#### **2.4 Maintenance system**

The whole maintenance of the plant is carried out by the maintenance section. This section is under the supervision of maintenance manager, who reports directly to the production department 2. The maintenance section is supposed to plan and implement preventive maintenance and maintenance scheduling of plant equipment. It also monitors and record maintenance related data pertaining to the plant equipment. For the emergency machine failures, there is a number of maintenance staffs assigned to stand by in production lines to solve any problems occurred.

The maintenance section is also responsible for planning maintenance & repair expense budget annually, usually at the start of the fiscal year. The section performs as a supervisory function, therefore, the budget must be identified clearly to end users. Because the budget is set up once a year, so preventive maintenance for the whole year must be broadly set up at the beginning of the fiscal year either.

The policies of the maintenance section are shown as following :

1. Support manufacturing process by preparing machine in production line (Press, P), (Weld, W), (Paint, T), (Assembly, A) to its maximum efficiency
2. Support engineering process by discussing about the machine
3. Maintain the machine to its maximum efficiency by inspecting, lubricating, and part replacing
4. Continuously plan and monitor machine maintenance schedule
5. Appropriately prepare and control spare parts using with minimum costs
6. Adjust the machine to increase efficiency and safety
7. Improve personnel's abilities to support rising technology

8. Obtain new technologies from X Company Japan
9. Use QC, 5S,IDEA, KAIZEN, TPM and SAFETY activities

Due to the fact that the machine has frequency to be shut down while performing some preventive maintenance activities and the company is off on weekend, so most of preventive activities are set up to carry out on Sunday. In general there are such as lubrication, inspection, cleaning, etc. but there is no preventive replacement existed.

The maintenance section consists of 5 sub-sections as shown in the following figure.

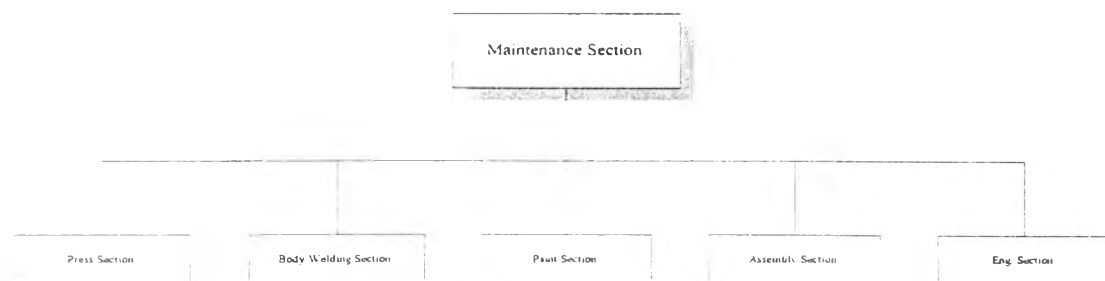


Figure 2.3 The 5 sub-sections of the maintenance section.

For the paint section, there are about 33 persons of maintenance staffs divided to shift A and B. The work scheduling is planned fairly so that both shift A and B have equal work hours either in daytime or night-time.

Each staff earns salary of 10,000 baht on the average, each works overtime for 80 hours per month in mean, and each holds 5 years work experience on the average.