



CHAPTER IV

CURRENT CONDITIONS

One of quality improvement target in many organizations is to gaining a customer satisfaction, since the customers recently conscious more about product/service quality when buying a product. More quality improvement, higher customer satisfaction levels. However, improvement on quality in many companies usually lacks of any plan. Most of them improve the quality whenever, the problems occur, as a result it affects the company plans and their budgeting. Finally, some companies found that the improvement become costly instead of reducing the cost.

In facts, companies need to find out their cost structure, which are discussed in this chapter. The analysis of cost structure is right, the essential quality improvements will be explored and then find out a way to correct and prevent. Doing the right thing on quality, the company loss a little money to pay for it.

4.1 COMPANY BACKGROUND

The case company was a medium enterprise established in 1971 with an eagerness to offer food service equipment for commercial kitchen, according to hotel and fast-food restaurant was thriving and its market value was more over 500 millions a year with low competitors. The products are composed of 2 major categories: Import and factory-made product as shown in chapter I. Its business process was first introduced with only 20 employees from kitchen layout, kitchen and equipment design, manufacturing, delivery and installation as well as after sale service. Its main office is located in Bangkok, and factory is in outside Bangkok. At that time, Its turnover was less than 1 million Baht. It focused on Thailand's market.

Nowadays, the flourish of tourism industry and fast food restaurant result significantly to the employees was up to 300 peoples with the revenue around 250+ millions Baht a year, and it expands its market to Singapore for supporting Asia country's markets. Especially, a corporation with international hotel and fast food restaurants helps them to increase its market shares. However, these customers require high operating standard and high product/service quality with continuity, consistency and reliability.

Like many large companies, the weakness is large organization with obsolescent management, which cannot adapt to modern business. Consequently, the quality problems such as miss-communication, delivery delay and High inventory as well as high scrap and etc. These problems can be identified by cost, a consequential tool for this improvement.

4.2 MISSION AND VISION

Consequently, the mission and vision are provided to achieve a goal.

Mission:

The company committed to providing best in class products to help people get their foods and beverages when, where and how they want it with a focusing on hotel, convenience store, and all kind of restaurants. Also, the company will continue to build a successful business with customers, employees and suppliers.

Vision 2000:

- 1) The company will achieve 45% market share in the commercial market.
- 2) The product cost reduces by 15% of totals.
- 3) Increasing product and service quality to meet customer satisfaction.
- 4) Increase efficiency through the organization by using ISO9000 as a guideline.
- 5) Improving employee know ledges through trainings and seminars.

4.3 ORGANIZATION CHART

In the case company, the organization is separated into 2 groups, Offices and Factory. The offices are located in 2 buildings: main office is in Bangkok and international office is in Singapore, whereas the factory is located in Samuth-sakorn province. In this study, the factory is focused.

Factory organization leans on manufacturing base and separated by machine layout and work activities. The factory contains 6 main departments for examples: Manufacturing, Production planning, Purchasing, Engineering and personal as well as accounting. The organization structure is shown in Figure 4.1.

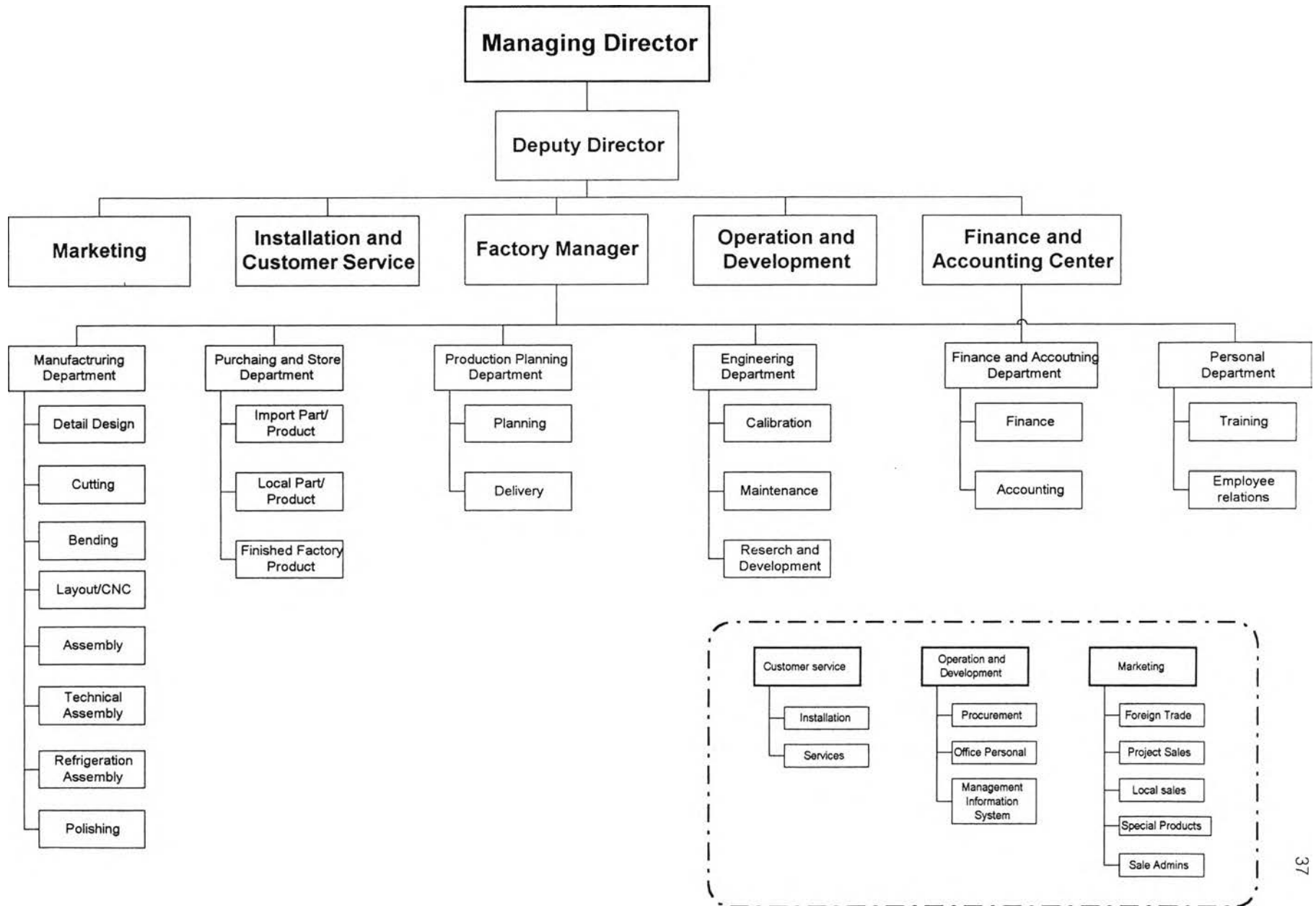


Figure 4.1: Organization chart

4.3.1 Production Planning

In the factory, Production Planning is the first operation. The department has 4 persons: 1 Supervisor, 1 Planning Coordinator and 2 clerks. First, Production Planning Supervisor receives a copy of the quotation from Factory Manager whose get it from Sales Administrative staff including the job order, while another copy is sent to purchasing department. Then, the supervisor verifies the job site and required date for making a production plan, which contains labor requirements, available resources as well as Manufacturing date both start and finish. The planning involves all the processes from Drawing to Delivery.

Finally, The plan will be approved though the weekly meeting and distributed to concerned peoples. For example: All managers of Purchasing&Store, Delivery, Production, Factory manager and Managing director. After the job close, all information such manufacturing time and labor hour will be concluded and analyze for reporting to top management.

4.3.2 Engineering

The department contains three major section; Maintenance and R&D. Its R&D involves new product design and process development, whereas the maintenance section has a response to prevent the machine breakdown. The department has 7 peoples: 1 Manager, 2 Supervisors and 4 workers. The latter result to the machines work properly.

4.3.3 Purchasing and store

The department has 8 persons: 1 Manager, 2 Supervisors and 5 operators, which involve 2 main activities: Purchasing parts and keeping finished products, which the department manager firstly check the job orders received from factory manager, then verified them in term of Bill of Materials (BOM). The BOM will be translated into purchasing order and contact to suppliers.

In store, it has 3 sub sections: Local, Import and finished products. The local store is available for keeping local parts and products, which those are used in manufacturing processes. The import store is available for reserving imported products for sales and services and lastly the finished products are used for keeping the company-made products waiting delivery.

4.3.4 Manufacturing

The manufacturing processes are composed of several sections:

4.3.4.1 Design

The section is the first operation in manufacturing process, which has 11 operators: 1 supervisor and 10 designers. Its main activities that are receiving perspective drawings from office and translate them into detail drawing (Shown in Appendix I) by using CAD, Computer Aided Design. The detail design is so called rider, which all design information included such as Size, Quantity and dimension as well as essential assembly parts.

Then the detail drawings complete, the supervisor will check the finished drawing and check the time usage and record it into the Direct Cost Form as shown in Appendix II, and send them to Production manager for an approval, and finally forward them to production planning coordinator.

4.3.4.2 Cutting

The section is secondly operation, which has 5 workers (1 supervisor and 4 workers) and 3 cutting or shearing machines as shown in Figure 4.2. The supervisor receives the detail design and Direct Cost Form from production planning coordinator. Then, he/she verify the dimension and size of stainless sheet and writes a requisition form to take those stainless sheet from store and assign to operators to cut them as drawing requires. And finally, the supervisor checks both size and right angle. If those work-pieces are wrong such undercut and overcut, they will be identified for examples: Rework, scrap and Repair. After the job is finished, the time will be recorded into the Direct Cost Form, DCF.

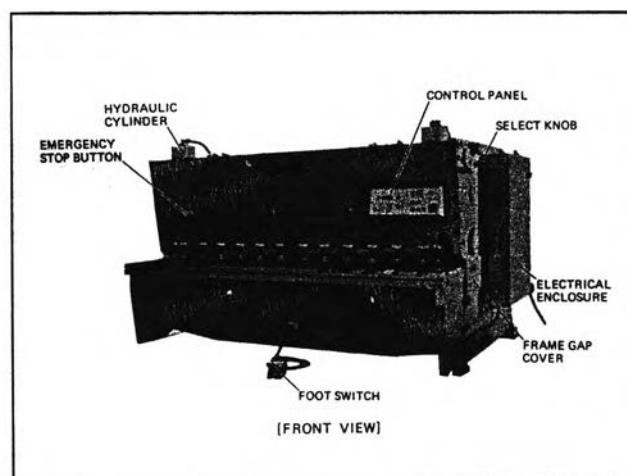


Figure 4.2: Shearing machine

4.3.4.3 Layout & Punching

This section has contained 6 operators, 1 Supervisors and 5 operators and there are 2 machines: CNC punching machine and corner shearing machine, shown in Figure 4.3. In this section, the supervisor receives the drawing

from previous section including DCF. Next, he identifies which one need to be layout first, while the others need to be CNC first.

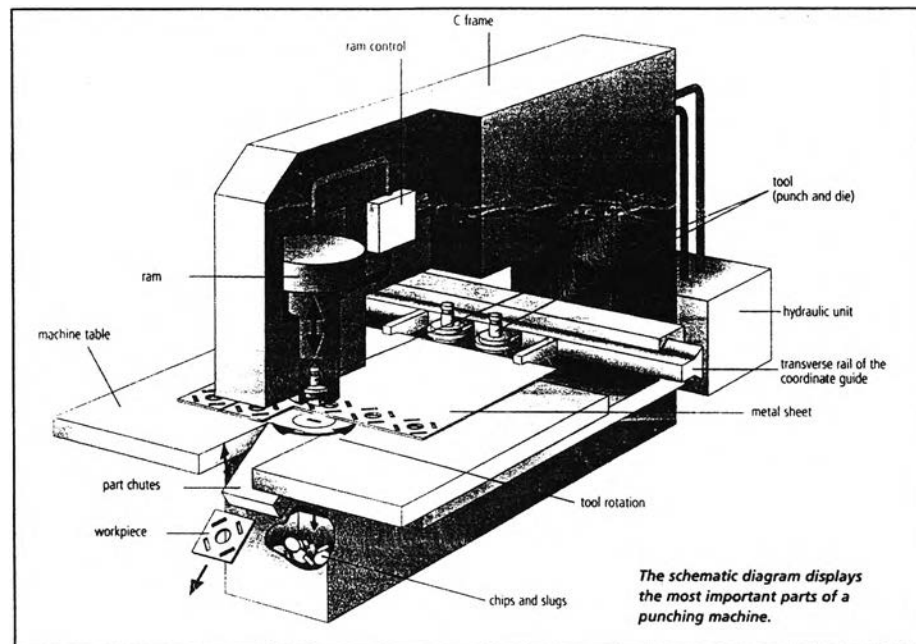


Figure 4.3: Punching machine

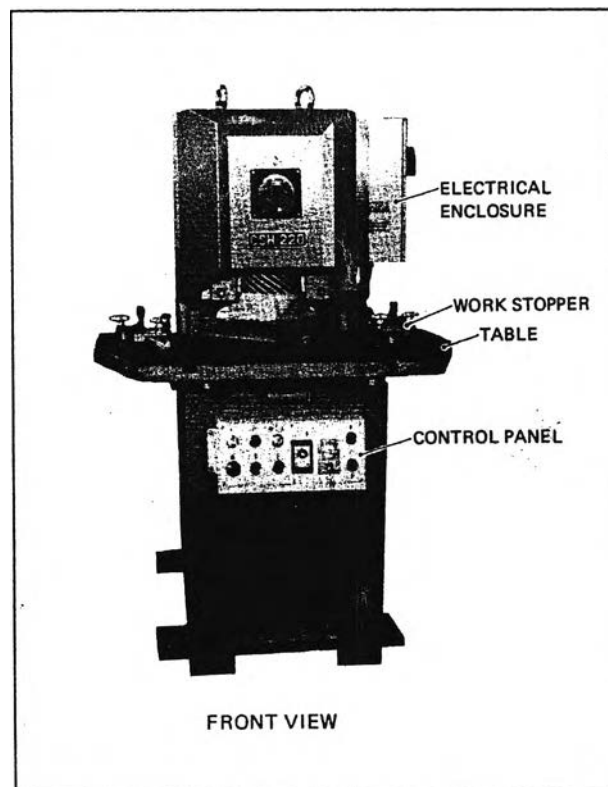


Figure 4.4: corner-shearing machine

In Lay out section, the operators dent lines on the cut sheet as of drawing requirement, whose are such as strength, right angle and curves by using angle measuring tools. The lines, which are laid out on the sheet, help to bend the work piece correctly. For CNC punching work piece, the CNC punching is used for reducing drilling and trimming process, since it is more accurate and suitable for sophisticate layout. For example: Circle and ellipse hole as well as ring and etc.

And finally, the supervisor checks both size and line. If those work-pieces are wrong such slant lines and smaller size, they will be identified for examples: rework, scrap and Repair. After the job is finished, the time will be recorded into the Direct Cost Form, DCF.

4.3.4.4 Bending

In this section, there are 5 peoples: 1 Supervisor and 4 operators working with 4 bending machines as shown in Figure 4.5. After receiving the DCF, Drawings from prior section, bending supervisor will separate the job depend upon the machine capacity, for example: the long length work piece is suitable for large machine. Then the operators will bend the work piece according to drawing and measure the angle and dimension comparing to the drawing. However the decision is leaned on each operator without any tolerances, this effects to assembly problems.

In addition, the finished work piece will be recorded the time on the DCF and then sent to further section including work piece.



Figure 4.5: Bending machine

4.3.4.5 Assembly

In this section, there are 36 persons: 1 Head supervisor, 4 Supervisors and 31 operators. The organization is categorized into 4 sub-sections, Assembly 1 to 4, which are autonomous units. Each sub section can be operated by its self with standard machines and equipment such as Arc Welding Machine, TIG Welder, Files, Hand grinder, Hand finisher and Hammer and etc.

In the assembly section, Head supervisor receives the jobs from previous section, identifies operating skills and the production planning schedule and then assign the jobs to each Supervisor, who distribute the job to his operators. After the products are finished they will be recorded the usage time and pass through the next operation. The finished products will be sent to store, while the uncompleted products will be passed to either Technical Assembly Section or Injection Foaming/Refrigeration Assembly section.

4.3.4.6 Technical assembly

The section composes of 1 Supervisor and 3 operators for preparing electrical parts, water system parts or gas system parts depended upon types of product requirement. In this section, supervisor gets the jobs and its details from former section and later on assigns to their skill operators. Finally, the products are finished the supervisor recorded the time on the DCF and pass the product to next operation.

4.3.4.7 Refrigeration Assembly

The section is mainly established a refrigeration system on the product, which is either refrigerator or freezer. The section has 1 Supervisor, 1 Forman and 7 operators.

4.3.4.8 Polishing

The section is composed of 5 operators and 1 supervisor, emphasize on cleaning and making a desired surface so called Hairline. However, some products do not need to be polished, based on the detail requirements. In addition, the types of finish surface can be divided into 4 surfaces as illustrated below.

4.4 MAIN MATERIALS

In the catering industry, Stainless Steel is the most extensive material and majority using in the industry though many types and sizes depended upon their processes such as cold roll. By the way, it can be identified into 5 categories: Austenetic, Ferritic, Martensitic and Heat resistant. Mainly, it has Fe and C less than 1.2 % including Cr. much higher than 10.5%. The following figure shows the stainless steel family.

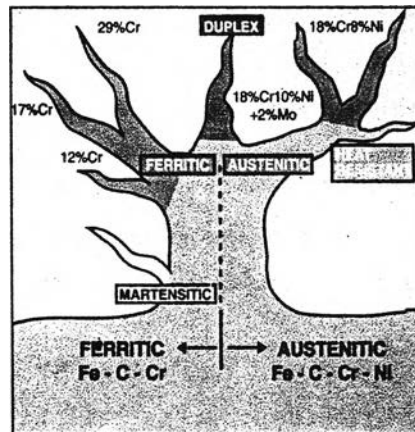


Figure 4.6: The family of stainless steel

Source: Thainox steel limited, Introduction to stainless steel, page 2

4.4.1 Austenetic

This type is usually applied in high humidity area, since it contains a property of non-oxidization. And especially, it has 18% chromium as a result the other property is high corrosion resistant, heat resistant and be used extensively in food catering industry. The type is applied in some products such as table, marinate, exhaust hood and etc. As well as it used as parts for some products. The American standard are grouped this types as AISI-304.

4.4.2 Ferritic

Significantly, this type has magnet property because it contains low carbon and high chromium (13% -15%), usually be applied to any part of products such as the doorframe of refrigerator. And, this type is AISI-430 as American Standard.

4.4.3 Duplex

This type of stainless steel has a structure between Ferrite and Austenite, including 12 – 18 % of Chromium and 4.5 – 8% of Nickel, as a result it is normally used in high corrosion area. This type is AISI-316 as the American Standard, which is used for making such as a sink in chemical laboratory and in kitchen.

4.4.4 Martensitic

This type contains 12% of Chromium and medium carbon, consequently it can be allowed the hardening process and main property is formable and non-corrosion as well as high tensile strength. The products are such as spoon, knife, cutting tools and etc.

The stainless, provided in Thailand for catering equipment fabrications, are grouped into property, size, surface and packaging as well as options. In term of property, the stainless is grouped into the American standard name of AISI-304, AISI-430 and AISI-316, while the size is available in roll and plate as shown in Figure 4.7. In addition, the thickness is classified by no. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22 as shown in table 4.1.

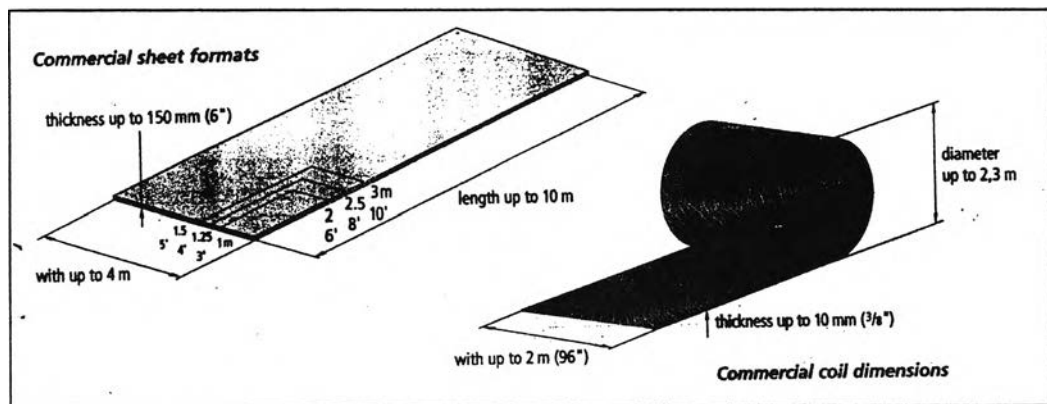


Figure 4.7: Roll and Plate of Stainless Steel

Source: Kawasaki steel, stainless steels

| BWG. | THICKNESS | | Sheet Weight |
|------|-----------|---------|--------------|
| | (mm.) | (Inch.) | |
| #10 | 3.2 | 0.126 | 74 |
| #11 | 3 | 0.118 | 70 |
| #12 | 2.8 | 0.11 | 65.3 |
| #13 | 2.4 | 0.094 | 55.9 |
| #14 | 2 | 0.078 | 46.7 |
| #15 | 1.8 | 0.07 | 42 |
| #16 | 1.6 | 0.063 | 37.3 |
| #17 | 1.4 | 0.055 | 32.7 |
| #18 | 1.2 | 0.047 | 28 |
| #19 | 1 | 0.039 | 23.3 |
| #20 | 0.9 | 0.035 | 21 |
| #21 | 0.8 | 0.031 | 18.7 |
| #22 | 0.7 | 0.027 | 16.3 |

Table 4.1: Thickness types

In addition, having good resistance against corrosion, durability, physical strength, heat resistance and appearance, Stainless steel has many types to provide in the market place today depended upon its component compound and especially its surface.

4.4.5 Steel types

There are various types of stainless steel with different structures and properties, which can be used in various applications. Table 4.2 shows several types of stainless steel popularly used as catering fabrication materials. Among listed types, SUS 304 is the most widely used type for both interior and exterior use. SUS 430 with somewhat lower anti-corrosion properties may be used mainly for interior applications such as decorative panels of escalators or kitchen facilities.

In the meantime, in coastal areas or in industrial areas where environmental conditions include more factors such as salt, steel dust or gases to cause corrosions, SUS 316 with higher resistance against corrosion is preferred. SUS 329 is the type developed for use in much severer environmental conditions at sea shores. For special purposed such as solar water heater, water tank, warm water tank, SUS 444 is often used. Development of a new type, or modifications of the existing types are not unusual in order to meet specific requirements.

4.4.6 Surface finish

Table 4.3 shows the types of surface finish of stainless steel used as building materials, Various finish types are used depending on the locations (interior, exterior, kitchen, etc.) with due considerations to the purposes and environmental conditions to the purposes and environmental conditions. The most widely used finish is hair line finish and mirror finish while applications of colored finish, vibration finish or dull finish are getting popular recently with the sophistication and multiplication of building designs.

Table 4.2: Stainless steel types

| | STAINLESS TYPE | | |
|--|---|--|---|
| | SUS 430 (18 Cr.) | SUS 304 (18Cr. - 8 Ni.) | SUS 316 (18Cr. - 12Ni.-2.5 Mo.) |
| PROPERTIES | | | |
| CLASSIFICATION BY STRUCTURE | FERRITIC | AUSTENITIC | AUSTENITIC |
| RESISTANCES AGAINST CORROSION AND WEATHERING | Applicable for interior use. Risk of rusting for exterior use. Avoid use in corrosive environment where possible. | Applicable for both interior and exterior uses. | Anti-corrosion and anti weathering properties are higher than SUS304. |
| WELDABILITY | Slightly lower weldability. Ductility and toughness are lowered at areas affected by heat due to expansion of crystal size. | Weldability is best among others without lowering of ductility and toughness in the areas affected by heat. If the plate thickness is large (More than 4mm.) fast cooling is required to avoid deterioration of anti-corrosion properties. | Same as SUS 304 |
| HEAT EXPANSION | Almost equal to ordinary steel. | 1.5 times of ordinary steel. | 1.5 times of ordinary steel. |
| HEAT CONDUCTION | One half of ordinary steel. | About one third of ordinary steel. | About one third of ordinary steel. |
| WORK HARDENING | Slight hardening is recognized in cold working. | Large work hardening. | Large work hardening. |
| Impact strength and elongation. | Lower than austenitic steels. | Very good.Easy fabricability. | Very good.Easy fabricability. |
| Strength in low temperatures. | Weak in temperatures below-10 Celsius. | No deterioration of ductility as low as -200 Celsius. | No deterioration of ductility as low as -200 Celsius. |
| GRAIN ORIENTATION | Grain oriented.To be bent in the right angle against rolled lines. | Scarce grain orientation. | Scarce grain orientation. |
| MAGNETISM | This type has magnetism. | No magnetism. | No magnetism. |
| EXAMPLES OF APPLICATION | Interior decoration, furnitures, catering equipment fabrication, etc. Generally for indoor uses. | Exterior walls, low walls, outdoor items such as window frames, roofs, rain water drain pipes, balconies, gate doors, fences and catering equipment fabrication, etc. | Exterior walls, low walls in areas of sea shores and industrial districts, out door items such as window frames, roofs, gate doors and catering equipment fabrications. |

Table 4.3: Surface types

| FINISH TYPE | APPEARANCE AND CONDITION OF FINISHED SURFACE. | METHOD OF SURFACE FINISHING | APPLICATIONS AND REFERRED STANDARDS |
|------------------------|--|--|---|
| Coated stainless steel | Various colour tones are available with low cost of fabrication. | Baked coating with synthetic resin coating material such as fluorine silicone polyester. | Building material,kitchenwares (Not yet listed in any standards) |
| No.2B | Smoother than No.2D finish semi-glossy appearance. | Light cold rolling to produce semi glossy appearance on the material of No.2D finish. | General purpose, building material.(most of marketed SS is in this finish.) |
| #240 | Very fine abraded finished surface. | Abrase materials finished by either No.2D or No.2B with abrasive belt equipped with very fine abrasive grain of approx #240 size. | Kitchen facilities. |
| BA | Very glossy finish, close to mirror finish. | Give bright heat treatment on cold rolled material and give another light cold rolling in order to increase gloss. | Automobile parts, home electric appliances, kitchenwares, decorative ornaments. |
| HAIR LINE | Finish with long running abrasion lines on the surface. | Abrase with abrasive belt with appropriate fine grains(usually #150-240) to make the surface in a long streaky pattern like hairs. | Most popular building material. |

4.5 MACHINES AND EQUIPMENTS

According to, the manufacturing process is leaned on machine, this results the factory is laid out by types of machines and the activities of fabrication processes. The following is the main machines and equipment used in the factory.

4.5.1 Machines

| | | |
|-------------------------------|----|-------|
| 1) Shearing machine | 3 | units |
| 2) Nipper machine | 2 | units |
| 3) Corner Shearing machine | 1 | units |
| 4) Hacksaw machine | 3 | units |
| 5) Plasma cutting machine | 1 | units |
| 6) Fiber cutting machine | 1 | units |
| 7) Bending machine | 3 | units |
| 8) CNC Punching machine | 1 | units |
| 9) Double Polishing machine | 2 | units |
| 10) Belt Sander machine | 2 | units |
| 11) TIG Welding machine | 15 | units |
| 12) Arc Welding machine | 10 | units |
| 13) Foam injection machine | 1 | units |
| 14) Vertical drilling machine | 3 | units |
| 15) Latching machine | 1 | units |

4.5.2 Equipments

| | | |
|-------------------|----|-------|
| 1) Meter measure | 57 | units |
| 2) Layout pointer | 5 | units |
| 3) Layout plates | 45 | units |
| 4) Bending dies | 13 | units |
| 5) Rubber hammers | 15 | units |
| 6) Wrenches | 65 | units |
| 7) Vices | 11 | units |
| 8) Files | 15 | units |

4.6 MANUFACTURING PROCESSES

As mention earlier, the manufacturing process is separated into 8 sections depended upon production department. The following is shown for the process flow.

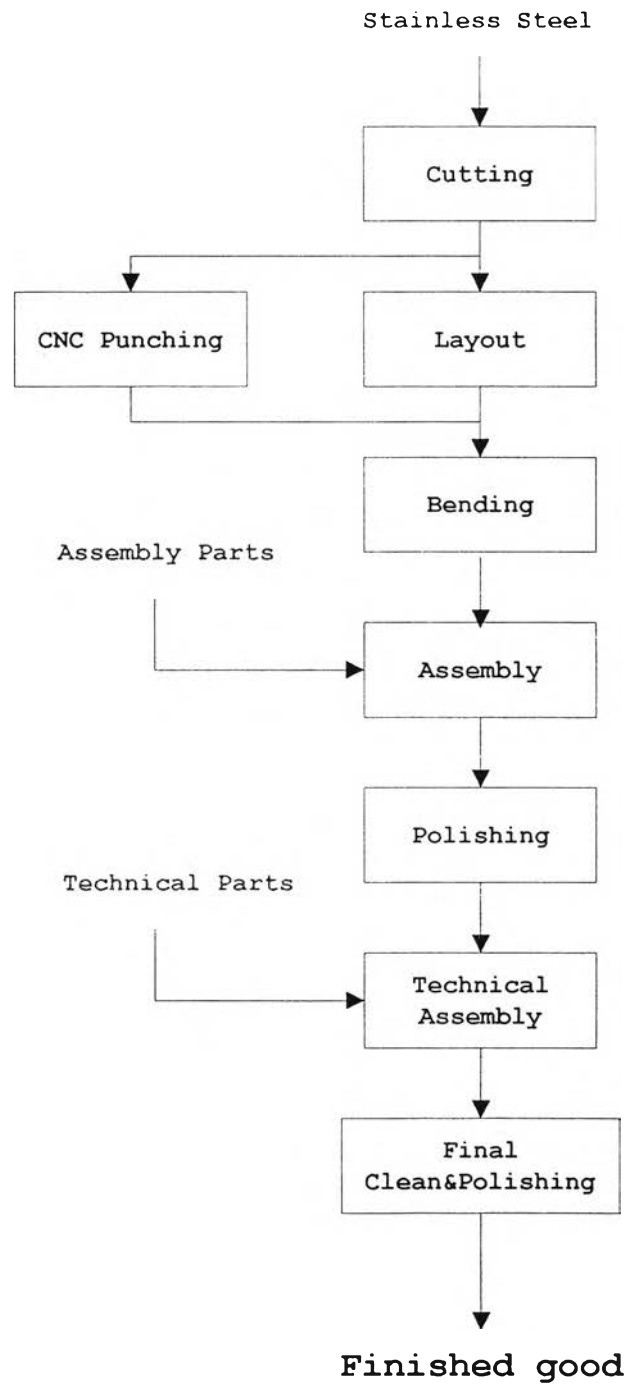


Figure 4.8: Manufacturing process flow