



**DESIGNING COSMETIC MANUFACTURING MODEL ACCORDING
TO ASEAN COSMETIC GMP GUIDELINE**

CHATCHAI SATSITAPONG

**MASTER OF COSMETIC SCIENCE
IN COSMETIC SCIENCE**

MAE FAH LUANG UNIVERSITY

2007

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**AN INDEPENDENT STUDY SUBMITTED TO
MAE FAH LUANG UNIVERSITY IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF COSMETIC SCIENCE
IN COSMETIC SCIENCE**

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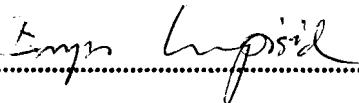
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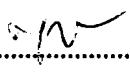
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2007

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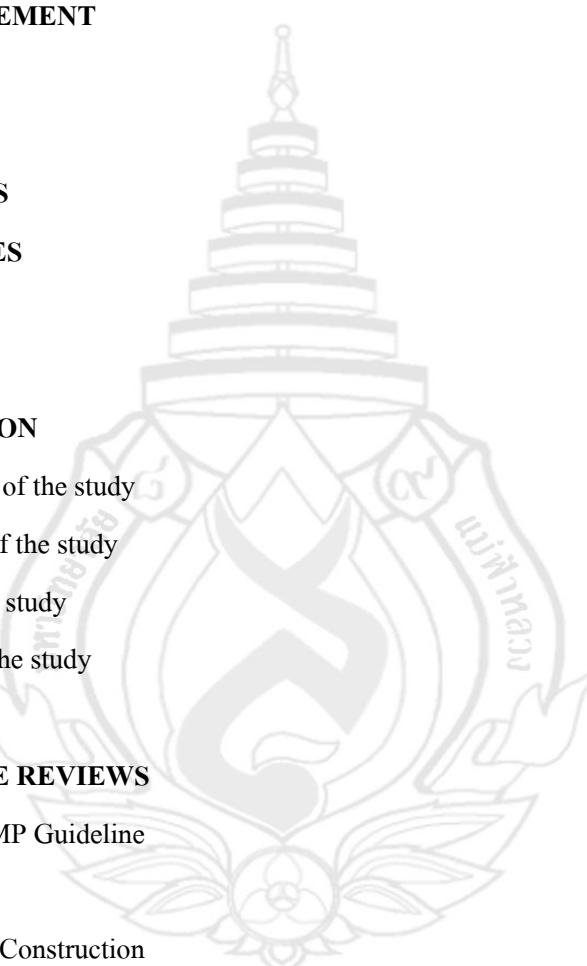
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ABSTRACT

GMP implementation in cosmetic industry is one of Thai FDA policy in improving the production of manufacturers. The cosmetic GMP is established by the GMP subcommittee and used as the reference by the FDA inspectors. However, ASEAN Harmonized Cosmetic Regulatory Scheme will, no doubt, assist regulators in networking for best practices and ensuring safety for consumers will be use and comply with the Cosmetic GMP guidelines to ensure that cosmetic manufacturer can followed the regulation required by Thai FDA. Therefore, this report provides an illustration of ASEAN cosmetic GMP manufacturing infrastructure design to recommend an appropriate location, design and proper production flow. Hence, before the design can be achieved, the production flow is carefully study for an effectiveness of the plant layout. However, to decide which layout is more suitable than the other depend on many factors such as operating the pilot plant for prototype, comparing the cost of investment, comparing the productivity, comparing the space utilization, consider the sequence or the flow chart, factor analysis, ranking and considering the pros and cons of various alternatives.

Keyword: GMP / Good Manufacturing Practice

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CHAPTER I

INTRODUCTION

1.1 Background of the study

Nowadays, cosmetics play a major role in the modern society and become as a part of our life and necessity. In other words, not a single person can get through the day without having to use any cosmetic product. Products such as soap, shampoo, or toothpaste are typical cosmetics consume each day for either personal hygiene, beautify or improving personal looks. Therefore, the production of cosmetic is important because improper processing methods, low standard quality production or contamination would lead to fatal outcome such as hypersensitivity reactions (rashes), allergy, dermatitis or even toxicity could occur. Of these entire incidence cases impact the public health and has invoke the Ministry of Public Health's concern as repeatedly express in the consumer protection policy.⁽¹⁾ Therefore, to prevent these unnecessary incidents to the consumers, the governments (Thai FDA) provide close attention on the safety of the consumers as well as efficacy of the cosmetic products. As a result, the Thai FDA constantly promotes the entire cosmetic manufacturer to become more standard in production of good quality cosmetics with required close supervision through inspections in every step of the manufacturing process.⁽¹⁾

According to the Ministry of Public Health under cosmetic regulation, The Cosmetic Act 1992 (B.E. 2535) defines cosmetic products into two categories namely specially-controlled and controlled. Those cosmetic products that fall outside this scope will be regarded as general cosmetics. Moreover, The Cosmetic Act 1992 (B.E. 2535), the Cosmetic Committee with thirteen representatives from government sector and six representatives from private sector is appointed as advisory board to the Minister of Public Health on regulatory and technical aspects of

cosmetics. The Cosmetic Committee appoints the three subcommittees namely Standard and Pre-Marketing Approvals, Quality Improvement, Labeling and Advertising, and Good Manufacturing Practice (GMP) to assist it on particular functions. GMP implementation in cosmetic industry is one of Thai FDA policy in improving the production of manufacturers. The cosmetic GMP is established by the GMP subcommittee and used as the reference by the FDA inspectors.⁽²⁾

Furthermore, Thailand as one of the ASEAN country has comply with the Agreement on the ASEAN Harmonized Cosmetic Regulatory Scheme which was set up to conformity assessment, harmonization of standards and technical regulations for important contribution to the economic integration in ASEAN. Member of the ASEAN (Member States of the Association of Southeast Asian Nations) are the Government of Brunei Darussalam, the Kingdom of Cambodia, the Republic of Indonesia, the Lao People's Democratic Republic, Malaysia, the Union of Myanmar, the Republic of the Philippines, the Republic of Singapore the Kingdom of Thailand and the Socialist Republic of Vietnam.⁽³⁾ According to Mr. Ong Keng Yong, Secretary General of ASEAN, ASEAN Cosmetic Documents, mentions that “The operation of the ASEAN Harmonized Cosmetic Regulatory Scheme will, no doubt, assist regulators in networking for best practices and ensuring safety for consumers. In turn this will assist regulators in networking for best practices and ensuring safety for consumers. In turn, this will assist the cosmetic industry in reducing the cost of doing business and gaining market access for its products in ASEAN and international markets”.

According to the 11th meeting during 26-27th of July 1993 Manila, Philippine, “The ASEAN Harmonization of Cosmetic Regulation” had confronted an agreement for the use of ASEAN Harmonized Cosmetic Regulatory scheme, Schedule B-ASEAN Cosmetic Directive for ASEAN Cosmetic GMP starting January 1st 2008 (B.E. 2551)⁽⁴⁾. This is the time when Thai FDA passes out rules and regulations by the year 2008, all cosmetic manufacturer company to meet the standard of Cosmetic Good Manufacturing Practice. However, there are only 66 cosmetic industries that eligible for GMP certified manufacturing plants up until today and many more did not qualified due to problems of inadequate design of building or facilities which did not meet the ASEAN cosmetic GMP standard.⁽⁵⁾

1.2 Objective of the study

1.2.1 To attain the ASEAN Cosmetic GMP guidelines for ensuring that cosmetic manufacturer will have sufficient information and be ready for the regulation required by the Thai FDA.

1.2.2 To establish the manufacturing infrastructure in an appropriate location, design, and proper production flow so that contamination are minimize.

1.2.3 To illustrate ASEAN cosmetic GMP manufacturing infrastructure prototype in a minimized budget.

1.3 Scope of the study

The study involved two types of data collection procedure which is primary data collection and secondary data collection. Primary data usually involved (1) the key informant approach; (2) the public forum approach; (3) the nominal group process technique; (4) the Delphi technique and (5) the survey approach. Each represents a unique method for gathering information on the concern citizen.⁽⁶⁾ The secondary data is collected by other to be reused by the researcher such as documents (bibliographic skill); public statistics (guide to official statistics, digest & abstracts, primary publication); and electronic sources (gateway, search engines).⁽⁷⁾

The primary data which information will be gather for this study involved Qualitative data that consist of the survey approach that come from open-ended questions asked in personal interview. This primary data will be used as an extensive information as to the complexity of making change in term of infrastructure including advantages and disadvantages of changes occurred in the company that which to convert themselves into ASEAN Cosmetic GMP manufacturer. However, the secondary data in this study was obtained from textbooks, website (URL), primary publication and etc.

This research is limited to only providing the guideline to insure that the cosmetic manufacturers in Thailand will have a higher tendency of becoming ASEAN Cosmetic GMP manufacturer in term of infrastructure design (Premises), consistently manufactured and

controlled to the specified quality (process flow). However, the company should also follow the structured and adapted to the company's activities and the nature of its products accordingly to the ASEAN Cosmetic GMP guidelines. On the other hands, this research is limited to mainly the premises of the building and excluding some of the topics which are also required for ASEAN Cosmetic GMP standard. The following topics are not elaborated in this study: personnel, sanitation, equipment and maintenance, raw materials and packaging materials handling, production (process and packaging), quality control, documentation (master formula, batch documentation, quality control report), specification (raw materials specification, packaging materials, bulks and finished products specification), SOP & WI (recalled records, distribution record, complaints and reports of cosmetic allergy, return products). The overall scope of this study mainly involved with the following criteria:

- 1.3.1 Providing the guideline of rules and regulation for designing cosmetic manufacturers according to the ASEAN Cosmetic GMP manufacturer in term of infrastructure.
- 1.3.2 Recommend the process flow for used in cosmetic manufacturers.
- 1.3.3 Designing the cosmetic manufacturing model

1.5 Benefits of the study

- 1.5.1 To provide an alternative choice for designing the cosmetic manufacturing model.
- 1.5.2 To provide an information on the process flow when designing the infrastructure.
- 1.5.3 To provide a partially fulfill the objective of becoming ASEAN Cosmetic GMP certified manufacturing plants.

CHAPTER II

LITERATURE REVIEWS

2.1 ASEAN GMP Guideline

Usually the Cosmetic Good Manufacturing Practice (GMP) guideline is to ensure that products are consistently manufactured and controlled to the specified quality. It is concerned with all aspects of production and quality control. However, this independent study is limited to only the infrastructure of the plant layout, recommended appropriate location and the process flow of the facility. The GMP Guidelines have been produced to offer assistance to the cosmetic industry in compliance with the provisions of the ASEAN Cosmetic Directive.⁽⁸⁾

The Good Manufacturing Practices presented here is only a partial general guideline for the manufacturers to develop its own facility layouts, facility location and its process flow. The important objective must be met in any case, i.e. the final products must meet the quality standards appropriate to their intended use to assure consumer's health and benefit. However, the manufacture of cosmetic products should also consider the overall control and monitoring which is essential to ensure that the consumer receives products of specified quality. The quality of the product does not only depend on the plant layout (building) itself, but the starting materials, production and quality control processes, equipment and personnel involved.

2.2 Premises

An example of premises of ASEAN GMP can be found in appendix A. The premises for manufacturing should be suitably located, designed, constructed and maintained as followed: (Appendix A)

2.2.1 Effective measures should be taken to avoid any contamination from the surrounding environment and from pests.

2.2.2 Household products containing non-hazardous materials/ingredients and cosmetic products can share the same premises and equipment provided that due care should be exercised to prevent cross contamination and risk of mix-up.

2.2.3 Painted line, plastic curtain and flexible barrier in the form of rope or tape may be employed to prevent mix-up.

2.2.4 Appropriate changing rooms and facilities should be provided. Toilets should be separated from the production areas to prevent product contamination / cross contamination.

2.2.5 Defined areas should be provided for, wherever possible and applicable:-

1. Materials receiving.
2. Material sampling.
3. Incoming goods and quarantine.
4. Starting materials storage
5. Weighing and dispensing.
6. Processing.
7. Storage of bulk products.
8. Packaging.
9. Quarantine storage before final release of products.
10. Storage of finished products.
11. Loading and unloading.
12. Laboratories.
13. Equipment washing.

2.2.6 Wall and ceiling, where applicable should be smooth and easy to maintain.

The floor in processing areas should have a surface that is easy to clean and sanitise.

2.2.7 Drains should be of adequate size and should have trapped gullies and proper flow. Open channels should be avoided where possible, but if required they should be able to facilitate cleaning and disinfection.

2.2.8 Air intakes and exhausts and associated pipework and ducting, when applicable, should be installed in such a way as to avoid product contamination.

2.2.9 Buildings should be adequately lit and properly ventilated appropriate to the operations.

2.2.10 Pipework, light fittings, ventilation points and other services in manufacturing areas should preferably be installed in such a way as to avoid uncleanable recesses and run outside the processing areas.

2.2.11 Laboratories should preferably be physically separated from the production areas.

2.2.12 Storage areas should be of adequate space provided with suitable lighting, arranged and equipped to allow dry, clean and orderly placement of stored materials and products.

1. Such areas should be suitable for effective separation of quarantined materials and products. Special and segregated areas should be available for storage of flammable and explosive substances, highly toxic substances, rejected and recalled materials or returned goods.

2. Where special storage conditions e.g. temperature, humidity and security are required, these should be provided.

3. Storage arrangements should permit separation of different labels and other printed materials to avoid mix-up.⁽⁸⁾

2.3 Design and Construction

2.3.1 The equipment surfaces coming into contact with any in-process material should not react with or adsorb the materials being processed.

2.3.2 Equipment should not adversely affect the product through leaking valves, lubricant drips and through inappropriate modifications or adaptations.

2.3.3 Equipment should be easily cleaned.

2.3.4 Equipment used for flammable substances should be explosion proof.⁽⁸⁾

2.4 Installation and Location

2.4.1 Equipment should be designed and located to suit the production of the product.

2.4.2 Equipment should be located to avoid congestion and should be properly identified to assure that products do not become admixed or confused with one another.

2.4.3 Water, steam and pressure or vacuum lines, where applicable, should be installed so as to be easily accessible during all phases of operation. They should be clearly identified.

2.4.4 Support systems such as heating, ventilation, air conditioning, water (such as potable, purified, distilled) steam, compressed air and gases (example nitrogen) should function as designed and identifiable.⁽⁸⁾

2.5 Facility Decisions

The key strategic structural decision for a firm is where to locate its facilities. Facility decisions have significant effect on the overall success of every firm because they typically involve significant investments and long-term commitments. Facility decisions can be divided into two major categories:

- (a) Where to build it, when to build it, and how much capacity it should have.
- (b) How the facility should be laid out for the most effective and efficient operation.

In weighing the advantages and disadvantages of alternative sites, the analysis should include an evaluation of both qualitative and quantitative factors.⁽¹¹⁾

2.5.1 Qualitative Factors

The qualitative factors include (a) local infrastructure, (b) worker education and skills, (c) product content requirements, and (d) political/economic stability. Some large cosmetic industries locate their facilities in clusters because they emphasize the same qualitative factors, for example Unilever.⁽¹¹⁾

2.5.2 Local Infrastructure

The local infrastructure necessary to support a manufacturing operation can be divided into two broad categories: institutional and transformational. With manufacturing operations becoming more flexible and responsive to customer requirements, there is a growing dependence on local institutions or suppliers to be more flexible and responsive, which requires that the local transportation network that links the suppliers to the manufacturer be efficient and reliable [11].

2.5.3 Worker Education and Skills

The increased sophistication of today's manufacturing processes requires that the workforce be highly educated and equipped with a wide variety of skills. Increased emphasis on automation requires specific worker skill to operate the maintain equipment, for example R&D in the cosmetic plant.⁽¹¹⁾

2.5.4 Quantitative Factors

The quantitative factors include (a) labor costs, (b) distribution costs, (c) facility costs, (d) exchange rates, and (e) tax rates.⁽¹¹⁾

2.6 Types of Manufacturing Layouts

Manufacturing plants use three basic types of layouts: (a) process layout, (b) product layout, and (c) fixed-position layout. However, the process layout is the most suitable layout for cosmetic manufacturer in which complies with ASEAN GMP guideline. In a process layout (also

called a job shop layout or layout by function), similar equipment or functions are grouped together, such as in a machine shop where all the lathes are in one area and all the stamping machines are in another. A part being worked on travels from one area to the next, according to the specific sequence of operations required. This type of layout is often found in high-mix, low-volume manufacturing plants that use an intermittent process. A hospital provides a good example of a process layout in the service sector; customers (patients) go to Radiology for X-rays and to the lab for blood tests. Similarly, in a cosmetic manufacturer, starting from the raw materials continued to flow through each processing room until become a finished product. The most common approach for developing a process layout is to arrange departments consisting of similar or identical processes in a way that optimizes their relative placement. In many installations, optimal placement often translates into placing departments with large amounts of interdepartmental traffic adjacent to one another. The primary goal in designing a layout for a manufacturing or distribution facility is to minimize material handling costs. In a service organization, the main objective is to minimize customer and worker travel time through the process.⁽¹¹⁾

Table 2.1 Characteristic of a good layout.⁽¹¹⁾

Characteristics of a Good Layout	
Manufacturing and Back-Office Service	Face-to-Face Services
Operations	
1. Straight-line flow pattern (or adaptation).	1. Easily understood service-flow pattern.
2. Backtracking kept to a minimum.	2. Proper waiting facilities.
3. Production time predictable.	3. Easy communication with customers.
4. Little interstage storage of materials.	4. Customer surveillance easily maintained.
5. Open plant floors so everyone can see what's going on.	5. Clear exit and entry points with sufficient checkout capabilities.
6. Bottleneck operations under control	6. Departments and processes arranged so that customers see only what you want them to see.
7. Workstations close together.	7. Balance between waiting areas and service areas.
8. Minimum material movement.	8. Minimum walking.
9. No unnecessary rehandling of materials.	9. Lack of clutter.
10. Easily adjustable to changing conditions.	10. High sales volume per square foot of facility.

2.7 Types of Manufacturing Processes

Modern industrial processes require a variety of layouts and arrangements. The layout of cosmetic manufacture is primarily determined by the type of process it supports. However, industrial processes (not only cosmetic manufacture) vary widely, that it would be divided into classifications with common characteristics. Manufacturing industries may be classified

according to the nature of the process performed as: (1) continuous-process, (2) repetitive-process, (3) and intermittent-process industries.⁽¹²⁾

2.7.1 Continuous-Process Industry

A continuous-process industry is one that is carried on twenty-four hours per day. The manufacturing of large scale mass production of international cosmetic company (P&G or Uniliver) would fit into this category. It is not likely to stop the production process on short notice without suffering great losses in partially processed materials as well as possible damage to the processing line. However, the problems of plant design in continuous-process industry are quite different from those in the repetitive-process, and intermittent-process industries. Continuous-process industry usually required technical processes and high technologies involvement, therefore needs lots of investment and will not be discussed further because of its specialize nature.⁽¹²⁾

2.7.2 Repetitive-Process Industry

A repetitive-process industry is one where the product is processed in lots or batch. In this type of industry a variety of operations may be involved, but the nature of the processing flow cannot be as rigidly controlled as in the continuous-process industries. The product moves through the process in specified quantities, called lots or batches. Each item in the lot/batch follows successively through the same or similar items follow one another with regularity through the process, the situation becomes similar to the continuous-process type of industry, except that the production is seldom carried on twenty-four hours out of the day. This type of industry is the ideal type of industry which will be further discussed in more details. However, many industrials today fall into this category such as the production of shoes, telephones, television, tubes, and cosmetics.⁽¹²⁾

2.7.3 Intermittent-Process Industry

An intermittent-process industry is one that processes items of production when and as ordered. It is sometimes called a job-lot industry or Original Equipment Manufacturer (OEM). Here a small lot of items may be ordered by a customer to be made to his/her specifications. Once the lot is completed, it is likely that the item will never be manufactured again. In this type of industry “flexibility” is the most importance of all operations.⁽¹²⁾

The intermittent-industry deals with small-volume items. As customer demand increases for a product turned out by an intermittent-process industry, the company usually turns more and more to mass-production techniques. Eventually the industry may evolve into a repetitive-process type of industry. This category type of industry will be further discussed together with the repetitive-process industry since the nature of its flow through the process is quite similar in the plant design.⁽¹²⁾

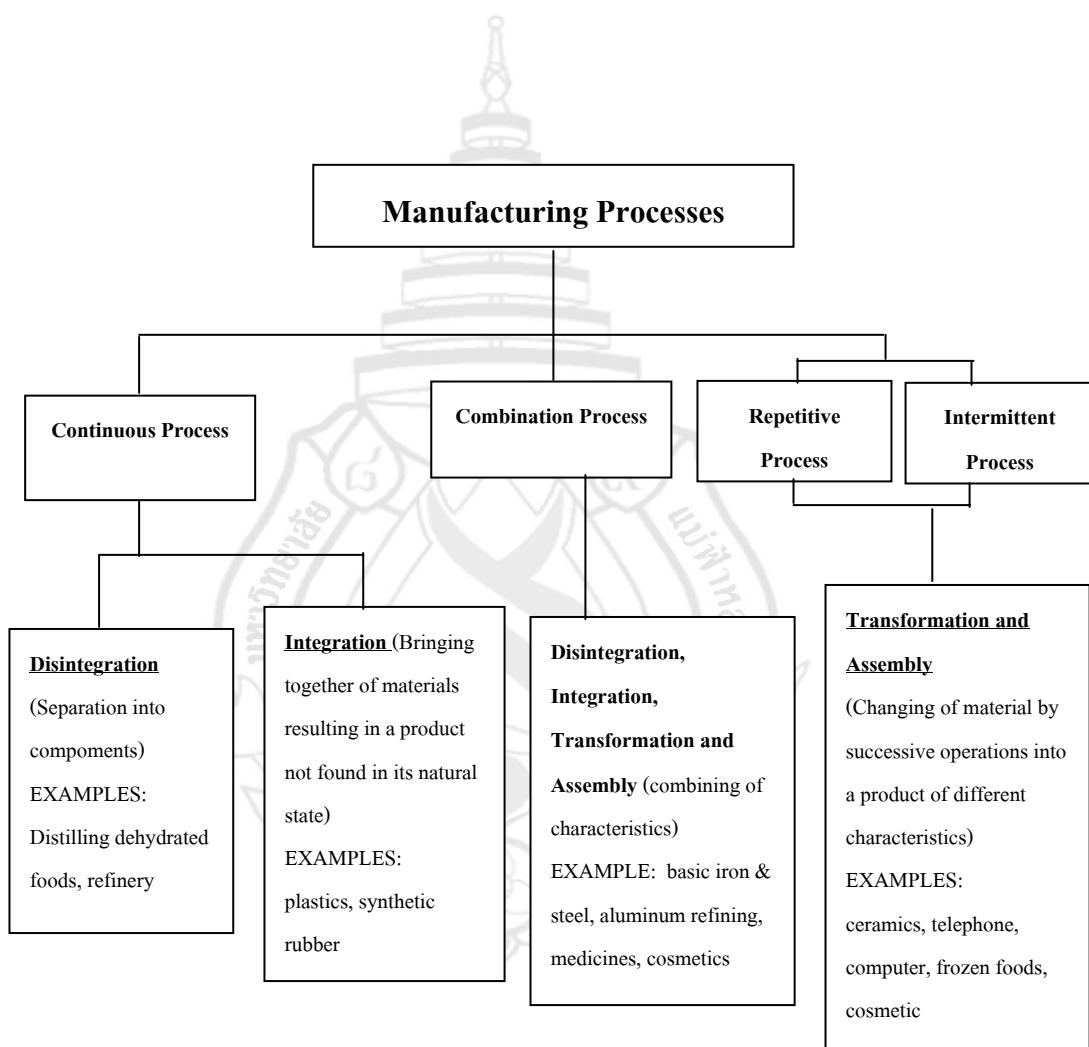


Figure 2.1 Plant layouts vary differently according to their types of industries classified and their functioning process.⁽¹²⁾

Before designing the cosmetic manufacturing plant, it is recommended that one should stop and discuss further the flow within the process and operations. Work-place layouts are quite different from place to place determine by the process involved in making the products from raw materials to the final finished products. However, one must also consider the storage space for the finished product as well as raw materials storage space that should be allocated in an appropriate place and match the operation.

2.8 Plant Design

The aim of this study is to design “the over-all design” of the cosmetic manufacture which complies with the ASEAN GMP guideline as well as a proper functioning of the plant layout.^(12,14)

Eugene Richman, substantiates the idea of over-all planning in his explanation of the term “factory planning.” He says, “Factory planning is the formulation of a complete plan for the creation of goods or services. The term embraces the determination of the location, production processes, equipment, physical arrangement, provisions for personnel, offices, and all functions that are necessary to the completion of the goods. It implies that a careful study has been made of the several alternatives at each phase of the process and that the course has been adopted that has the greatest likelihood of providing the required service most economically considering the long run.”⁽¹³⁾

Other decision that management should make for effective plant design might be as followed:⁽¹²⁾

- 2.8.1 Acquisition of capital
- 2.8.2 Product design of cosmetic packages
- 2.8.3 Sales planning for requirements (sales forecast)
- 2.8.4 Selection of the production process
- 2.8.5 Make or buy
- 2.8.6 Plant size
- 2.8.7 Product price range

- 2.8.8 Plant location
- 2.8.9 Building type selection
- 2.8.10 Diversification
- 2.8.11 Organization development

2.9 Acquisition of Capital

The capital needs of an industrial concern fall into three categories: (1) obtaining capital for the initial establishment of a concern, (2) raising funds necessary to cover operating costs, and (3) changing the financial structure of the going enterprise and securing funds for expansion.

The primary sources of capital are personal savings, loans and sale of bonds, sale of stocks, trade credits, and profit. Each of these has certain desirable and undesirable features which should be considered. Most businesses are financed initially by the personal savings of the founder (owner). Using personal savings to finance a business enables the owner to retain complete control over his/her activities. However, as the business expands, personal savings may become inadequate as a source of capital. Small businesses are often started by obtaining a loan from relatives or friends. Loans can also be obtained from the institutions that are in the business of lending money such as from banks and financial business companies. Other source of funding which is common for small manufacturer to do is to finance the new machinery through bank (in other words, to borrowed the future production that this machinery will turn out). By doing this, manufacturer can accumulate profits and use them to expand their facilities.⁽¹²⁾

2.10 Production Design

The design of the cosmetic product is the foundation upon which type of plant layout is to be built. The nature of the product and the volume to be produced determine the manufacturing process to be utilized. Therefore, the design of the cosmetic products and the manufacturing process will determine the specific used of equipment, machinery, and the type of plant layout needed to have an effective plant layout design.

A good product design has three aspects: (1) design for function, (2) design for making, and (3) design for selling. Each of these aspects can become quite specialized, but good product design attempts to strike a reasonable balance between the three of them.

Design for Function. To satisfy the customers, products must perform the function for which the customer intend to use it. Quality and functionality of the product must be considered in the functional design.

Design for Making. Productions that are design nicely but facing difficulty to manufacture all the time is worthless. Therefore the manufacturing process should consider the raw materials from all aspects as well as technologies involved in making the cosmetic products.

Design for Selling. If the cosmetic products function well and has high quality as well as it easy to make, but is wanted by no one, then it is useless. A good packaging design for selling makes the customer lay down their money and pick the products from the shelf when the products stand side by side with the competitors.^(12,14)

2.11 Plant Location

The problem of selecting a location for a plant has been given considerable thought by many authorities. Selecting a location involves large commitments of capital and must be done with care. The problem involves selecting a region as well as specific site within the region. The most difficult part of a plant location analysis is determining the criteria of the various locations and other alternative in the area.

Historically, manufacturers have located plants with little thought given to the serious economic and engineering consequences or even the government area motivation. Many plants are located in a given community because the plant executives or owners have lived there all their life. Now a day, many manufacturer move to the site motivated by government due to the attractive lower tax rate promises and waste water treatments purposes.

A new business is always faced with the problem of where to locate and usually the organization of a new business seldom considers sites outside of their own community. The plant location problems usually face with condition of: (1) expansion, (2) decentralization, and (3) economic factors, such as a shift of the market or an inadequate labor supply.

Expansion is the most frequent cause for considering the problem of plant location. Established industries often expand when: (1) their facilities become obsolete (too small or unable to used), (2) market demand grows beyond a capacity of the plant site and facilities, or (3) inadequate services are available to the customers (needs of GMP certified or ISO certificate).

When the company plan to move to a new area for their newly plant construction, the owner must also considered the community and site selection. In this case the owner has a choice of choosing the area between the suburban area and the country side because, now a day, selecting the city area (central of Bangkok) and in some territory (green area) is prohibited by the law of industrial of Thailand due to the environmental concern, therefore, owner must check with the Department of lands and properties in that local area for approval. However, by choosing the area of the suburban is more costly than choosing the area further into the country side, but gets the advantages in transportation, and government contact. Other advantages and disadvantage for choosing suburban area versus countryside are as followed:

Condition suggesting a suburban location:

- a) Semiskilled or female labor force required.
- b) Avoidance of heavy city taxes and insurance desired.
- c) Labor force live close to plant.
- d) Plant expansion easier than in the city area.
- e) Close to the community, but not in the large population center.
- f) Traffic is not too congested like in the city area, but still need to travel to the city.

Condition suggesting a country location:

- a) Need to find a larger site property for the present demands and for further expansion.
- b) Lowest property taxes available desired
- c) Required unskilled labor force.
- d) Low wages required to meet the competition of other company.
- e) No needs to be close to the community and want to avoid over populated condition.
- f) Lighter traffic and no need to travel to the city regularly.

However, when planning to expand to the new site or looking for a new site, one should keep in mind of the future expansion as well, regarding the size of a site which is recommended not to be less than five times than the actual size of the plant itself. The reason for considered the five times over the size of the plant as a minimum because the factor such as: area for loading platforms, tractor-trailer access, parking facilities, employees walk-way, canteen, and storage area. However, if possible, an open land is more desired on two or more sides of the factory to allow for future expansion.^(12,14)

2.12 Influence of Location on Plant Layout

Plant location should be determined by the proximity of a plant to its source of raw materials and its market area. The distance from the plant to these two areas tends to determine the method of transportation to be used. The type of transportation that is mostly used should be determined whether the layout should provide for railroad, truck, or water loading and unloading facilities. The arrangement of the shipping and receiving departments will vary in the layout according to the type of transportation utilized in and out from the plant.

Sometimes, in a large cosmetic manufacturer, boilers are the main source of energy power to operate the machine in the plant as steam; therefore owner should be aware of the fuel requirements and the transporting of fuels. In some plant layout, it is required to design and provide the storage of these fuels whether it is coal, oil, or gas because the industrial regulation

state that the storage place for fuels should be position in a highly safe condition to avoid explosion and fire or any hazardous affect nearby. Also, the layout should consider the necessary requirements for power generation used in the plant.

The demands of future expansion on the plant layout are influenced by the location of the plant. When plant expansion in a nearby city area (suburban) location must take place by adding stories to a presently constructed building, the plant layout problems are somewhat different than they would be in a country location, where plant expansion might take place horizontally by adding a wing to a single-story building. Materials handling problems (construction materials and expansion authorize papers) in a single story building, for example, are quite different from those in a multiple story building.^(12,14)

Table 2.2 General factor to consider in a typical location problem.⁽¹²⁾

Location Factor	Territory Selection	
	Suburban Area	Country Area
Market	***	*
Raw Materials	***	*
Available Transportation	**	*
Climate and Fuel	**	*
Labor and Wages (lower)	*	***
Laws and Taxation	**	**
Community Services and Attitude	*	**
Water and Waste	*	**
Ease of Local Property Authorization	*	*
Easy Access To Power and Energy	***	**
Easy Access To Communication	***	**
Horizontal Expansion Capability	*	***
Traffic Congestion	***	*
Environmental Friendly	*	***

Note

- * for possible of occurrence.
- ** for good opportunity.
- *** for great chance of occurrence.

2.13 Building-Type Selection

The building should be selected which best suit the over-all requirements of the layout plan. For the new plant construction, the building type should be selected only after the layout is fairly well developed. This will be assured that the building will be fitted to the layout, rather than redesigning the layout again to fit the building. It should be realized that the building is only a shell protecting the production facilities from the elements; therefore the building is closely tied in with the production process.⁽¹²⁾

2.14 Relationship between Buildings and the Layout

Although the primary purpose of an industrial building is to provide protection for the plant facilities, it can contribute greatly to the effectiveness of the plant layout it contains. Some may have wonder, should the building be built first and the layout planned to fit it? Or should the layout be planned first and the building built around it? Most plant-layout work is actually relayout work, in which given manufacturing process must be laid out so that it will fit within the limitations of an already constructed building.

Occasionally, when management makes the decision to build a brand new plant, it becomes reasonable to plan the layout first and then construct the building around the layout and its process (especially the processing area). Usually, it is better over-all results are obtained by making the building fit the layout than by stuffing the layout into an existing building.

A number of problems common to plant layout must be closely integrated with the plant building. Among the important things that must be considered are:

1. Overall materials handling used in the factory
2. Lighting in the processing area
3. Unusual storage requirements
4. Air-conditioning room or controlled temperature room
5. Type of cosmetic product
6. Processing equipment

Often materials handling must be closely related to the building structure. For example, using loading and unloading docks, elevators, folk-lifts are some of the materials-handling facilities which must be considered when planning the plant building.

Lighting is also important because it must provide sufficient light to the working area. Lighting is depend upon the construction of the side wall as well, when some plants have been built with windowless-walls the lighting problem is very different from plant with window-walls.

Unusual storage requirements frequently must be built into the industrial building, because sometime it might be useful for future changes of rooms or an additional usage of storage required.

If the air-conditioning is to be installed in the plant, this must be considered when creating the building design. If the whole plant is to be air-conditioned, a centralized air-conditioning system will probably be used. The building materials used are the primary importance when air-conditioning is being planned, such as choosing an insulating wall will help reduced the heat transferred into the building resulting in energy saving factor.

The equipment used frequently demands the special features be built into the building. For example, a large homogenizer machine, specialize mixer, high folk-lift or even large boiler may demand an exceptionally high ceiling clearance as well as heavy reinforced concrete footing under the machine due to its heavy weight. In addition, when moving large machine tools must provide inside and outside doors large enough to facilitate this movement. If the plant building is multistory, elevators should have the capacity to handle such moves, not only in terms of elevator dimensions, but also considering the load capacity of the elevators.

Whenever there is choice, it is highly desirable to plan the layout before specifying the building which will contain it. This should always be the sequence when building a brand new

industrial plant. Many hardships and unnecessary expenses can be caused when the layout must be crammed into inadequate buildings.^(12,14)

2.15 Construction or Modernization?

Whenever management comes to realize that the plant layout is obsolete, it becomes necessary to determine whether it is better to relayout the process in the existing buildings or to build an entirely new plant. There is considerable difference between the two alternatives.

If management decides to use existing buildings and revise the layout contained therein, the layout analyst is faced with a number of limitations. The objective is then to provide the plant layout which will satisfy the requirements of economical production within the limitations of the existing buildings.

One of the early steps for relayout of existing buildings is a survey of the buildings to ascertain facts regarding their construction. Included in this survey should be scale prints of each of the floors of the building, showing accurately all the permanent building features, such as doors, windows, columns, elevators, piping, stairways, and etc. which will have to be included in the proposed layout. Any signs of weakness in the building structure should be noted. Foundations, footings, walls, roof decks and ventilation system should be examined and kept in mind. Cosmetic industries using large and heavy equipment must check the types of floors and determine their safe floor loads (usually in kilograms per square inch) and the materials use in flooring the plant especially in the processing area (epoxy flooring recommended). Any structural repairs that are needed should be noted in the initial survey in order that any such repairs can be completed along with the alterations that will take place when the new layout is installed.

When management decides that a new cosmetic plant will be more economical than attempting to revise existing facilities, the layout analyst is faced with a different problem. In this situation he should plan his departmental arrangements, production layouts and the support equipment to house these optimum efficiency. The building then can be designed to column

spacing, floor loads, floor types, the location of stairs and elevators to provide the most economical means of formulating the desired product.

Today one of the most important obstacles in deciding to build a new factory is the high construction costs. Nevertheless, new building materials are being constantly developed, and the skill of experienced architects can be helped reduce these costs. It is customary for cosmetic industrial firms to hire architects or engineering firms to do the detailed responsible for the arrangement of production facilities; the management must therefore keep in close contact with the architect in order to coordinate his plans with those of the architect.^(12,14)

2.16 Building Design and Construction

Historically industrial buildings have been narrow because they needed natural light. They were built roughly in the shapes of the letters I, L, E, T, U, H, or F, depending on the required flow of the materials and the processing flow. However, electric power today is relatively inexpensive, so that artificial lighting has eliminated the need for natural light. Therefore, today's cosmetic industrial buildings are relatively square or block-shaped, and the letter-shaped plant has been nearly abandoned.⁽¹²⁾

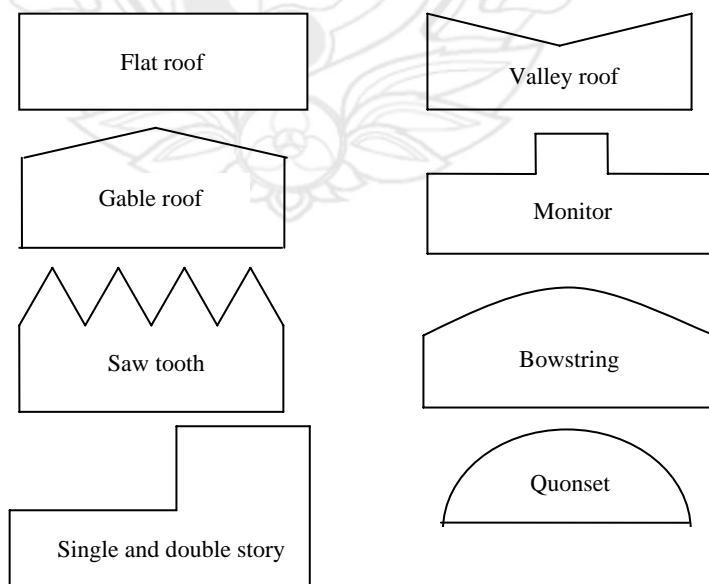


Figure 2.2 Typical building cross-sections.⁽¹²⁾

2.17 The Self Design Strategy

Changes occurred all the time in the business world, some changes are for the good of business and some changes in business are enforcing by laws and regulation for the good of the society. Hence, the changes in cosmetic rules and regulation passed out by the Thai FDA, is the changes for the good of society, standardization of the products, qualities, and consumers benefits. Therefore, the firm should act quickly and adapt to changes so that it can aggressively compete with the competitors. According to Richard L. Daft (2004), mention that some time an organization has to meet with pressures in order for it to grow and many executive believe that firms must grow to stay economically healthy. To stop growing is to stagnate and to be stable means that customers may not have their demands met fully or that competitors will increase market share at the expense of your company. Scale is crucial to economic health in marketing intensive companies. Richard L. Draft (2004) believes that, greater size of the company give the company's power in the marketplace and thus increased revenues. In addition, growing and changing in the organizations are vibrant, exciting places to work, which enables the company to attract and keep quality employees. When the number of employees is expanding, the company can offer many challenges and opportunities for advancement.^(9,12,14)

Cummings & Worley (2001), stated that an organizations must adapt to increasingly complex and uncertain technological, economic, political, and cultural changes with a rapid and effective response to these changes in order to survive and prosper in today's environment. Cummings & Worley (2001), mentioned about the self-design strategy in response to a number of demands facing organizations engaged in transformational change. These demands strongly suggest the need for self-design, in contrast to more traditional approaches to organization change that emphasize ready-made programs and quick fixes. The transformational change generally occurs in situations experiencing heavy change and uncertainty. This means that the changing is never totally finished, as new structures and process will continually have to be modified to fit the changing conditions. Thus, the change process needs to be dynamic and iterative, with organizations continually changing themselves. The self-design strategy accounts for the

demands of organization transformation in which describe in three stages, in practice the stages merge and interact iteratively over time. Each stage is describes as:

2.17.1 Laying the foundation:

This initial stage provides organization members with the basic knowledge and information needed to get started with organization transformation which involves three kinds of activities. The first is acquiring knowledge about how organizations function, about organizing principles for achieving high performance, and about the self design process. This information is generally gained through reading relevant material, attending in –house workshops, and visiting other organizations that successfully have transformed themselves. The second activity in laying the foundation involves valuing, determining the corporate values that will guide the transformation process. The third is to diagnosing the over all condition of the organization, then moves on to the designing stage.

2.17.2 Designing:

In this second stage of self-design, organization designs and innovations are generated to support corporate strategy and values. The design should be specified and process recognizes that designs need to be refined and modified as they are implemented throughout the firm.

2.17.3 Implementing and assessing:

This last stage involves implementing the designed organization changes. It includes an ongoing cycle of action research: changing structures and behaviors, assessing progress, and making necessary modification. Information about how well implementation is progressing and how well the new organizational design is working is collected and used to clarify design and implementation issues and to make necessary adjustments. This learning process continues not only during implementation but indefinitely as members periodically assess and improve the design and alter it to fit changing conditions. The loops of self-design strategy is shown in figure2.5.⁽¹⁰⁾

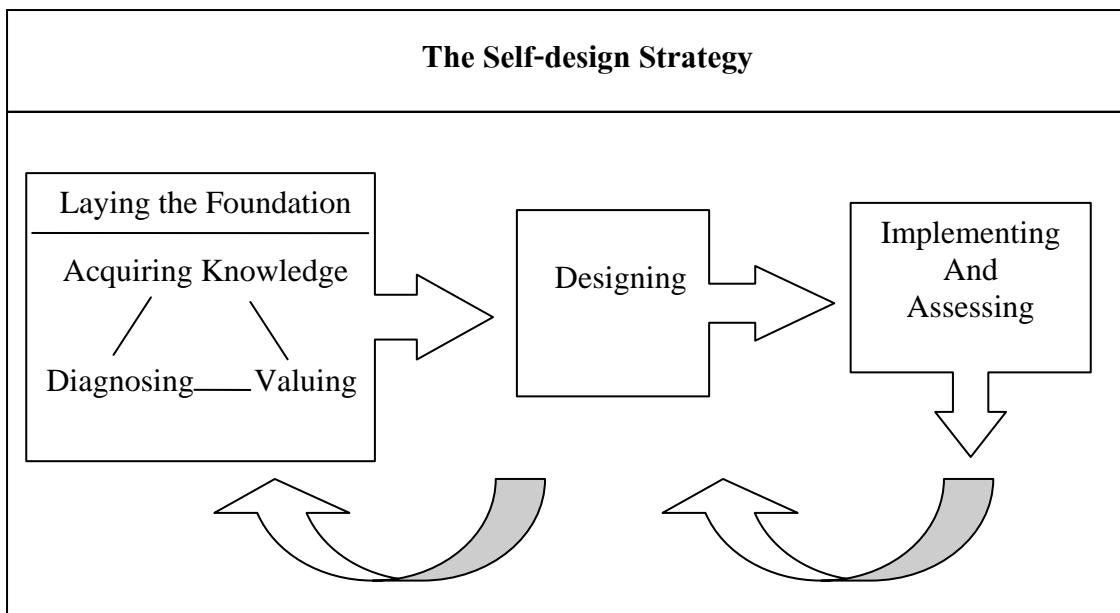


Figure 2.5 The Self-Design Strategy.⁽¹⁰⁾

2.18 Type of Research Methodology

Achieving sustainable development has become a recent global priority. It is necessary for the R&D community to shift its activities from research for science toward research for society. This shift, however, requires the establishment of a new, flexible and effective research methodology, as research for specific societal needs requires a different methodology from that of traditional scientific basic research.

Recognizing the integrative and nonlinear characteristics of R&D activities, this report proposes a new concept for research methodology that consists of Type 1 Basic Research and Type 2 Basic Research. This new methodology is designed to increase the effectiveness of industrial technology R&D.⁽¹⁵⁾

2.18.1 Type 1 Basic Research

It is clear from the definition in the Table that the purpose of Type 1 Basic Research is the pursuit and discovery of novel rules, laws and principles that govern natural phenomena. Type 1 Basic Research is conducted within each discipline and its main goal is to deepen the content of the respective disciplines. The research activities are not usually based on any specific socio-economic needs, but are driven by a curiosity-driven pursuit of the truth through studying unknown phenomena.

Type 1 Basic Research has a long history. Almost all research scientists who engaged in this type of research work in universities and public research institutes. Research methodologies and performance evaluation criteria for the quality of research activities are already very well established. As the theories formed through this type of research are not easily eroded, the productivity of knowledge is high. Since the results of Type 1 Basic Research can be published as academic papers, Type 1 Basic Research is a low risk activity for researchers.⁽¹⁵⁾

2.18.2 Type 2 Basic Research

The goal of Type 2 Basic Research is to synthesize multiple disciplines and create methods for the use of integrated knowledge. The motivations for Type 2 Basic Research are based on socio-economic needs, such as the commercialization of new materials, new equipment, new products, new systems, new processes, and new services, or to make significant improvements to existing products. In other words, Type 2 Basic Research is to connect the theories acquired by Type 1 Basic Research with industrial or social needs.⁽¹⁵⁾

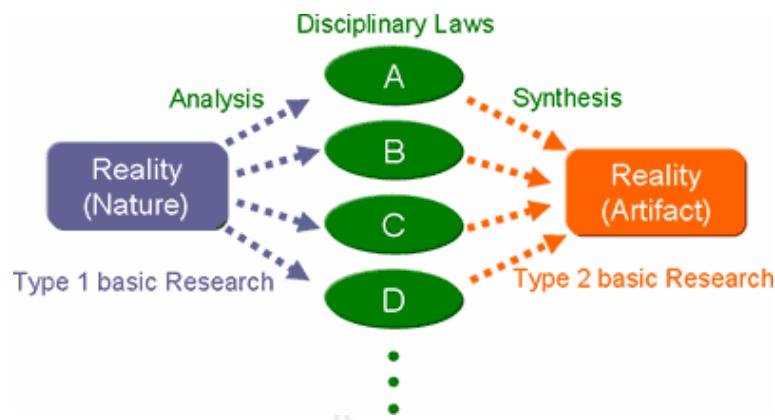


Figure 2.6 Correlation between Type 1 & Type 2 Basic Research.⁽¹⁵⁾

Type 2 Basic Research covers a very wide spectrum and involves multidisciplinary activities, whereas Type 1 Basic Research is conducted within each discipline. Therefore, it requires the establishment of an integrated institutional structure in which researchers from various disciplines can participate on specific projects.

The results of Type 2 Basic Research can sometimes erode easily because of rapidly changing socio-economic needs. The results of Type 2 Basic Research can not be published in traditional academic journals, which recognize new findings within each discipline. Only parts of research projects can be commercialized. Even when commercialization is a success, the results will be kept within enterprises or institutes without being publicly shared. This can cause declines in productivity for knowledge production.

However, Type 2 Basic Research also requires a high level of creativity in selecting, integrating, and applying knowledge and theories. Even in cases where R&D activities do not succeed, there remains certain universal knowledge that can be applied to other projects. Therefore, in order to promote national R&D effectively, it is essential to accumulate all R&D efforts, including Type 2 Basic Research, and share them publicly.⁽¹⁵⁾

CHAPTER III

RESEARCH METHODOLOGY

This independent study is based on literature review by using the concept of research methodology known as Type 2 Basic Research. The primary data which the information is obtained for the study involved qualitative data which consist of consultation from Thai Food and Drug Administration officer, Pharm. Supattra Boonserm, an experience GMP implementation officer. However, this primary data is used as extensive information to the changes in the infrastructure of the cosmetic manufacturing model. Thus, the secondary data of information is obtained from various sources such as textbooks, website (URL), primary publication and etc.

Hence, when all the necessary information is obtained, the data is analyze, diagnose and evaluate, then infrastructure of cosmetic manufacturing model can be design and implement so that all the process flow and activity in the line is efficient and cost effective. Moreover, the cosmetic manufacturing models are design into 3 different types subsequent to the assessment of data on GMP guideline so that different creativity of model can be implemented. Furthermore, the common flow chart of cosmetic process flow is also provided as a guide to understanding of the model layout.

CHAPTER IV

RESULTS AND DISCUSSIONS

4.1 The Product Flow

From the consultation of Pharm. Supattra Boonserm, an experience GMP implementation officer in Thai Food and Drug Administration officer, she recommended that it is essential to study the product flow of the cosmetic manufacturer first before beginning with the design of plant layout. She explains that, “The flow of the product through the cosmetic manufacturing process is closely tied in with the arrangement of facilities. Therefore, it is essential to study the flow closely before formulating a plant layout or designing the model.”

4.2 Flow-Process Chart

One of the most useful techniques for the study of flow is the flow process chart. The flow process chart act as ‘a graphic representation’ of the sequence in all operations, direction, inspection and storage occurring during the process or procedure. In Figure 4.1 is an example of a common flow process chart of cosmetic manufacturer; however the flow chart can vary in some case depending on the suitable utilization and work load or the procedure of man-flow.

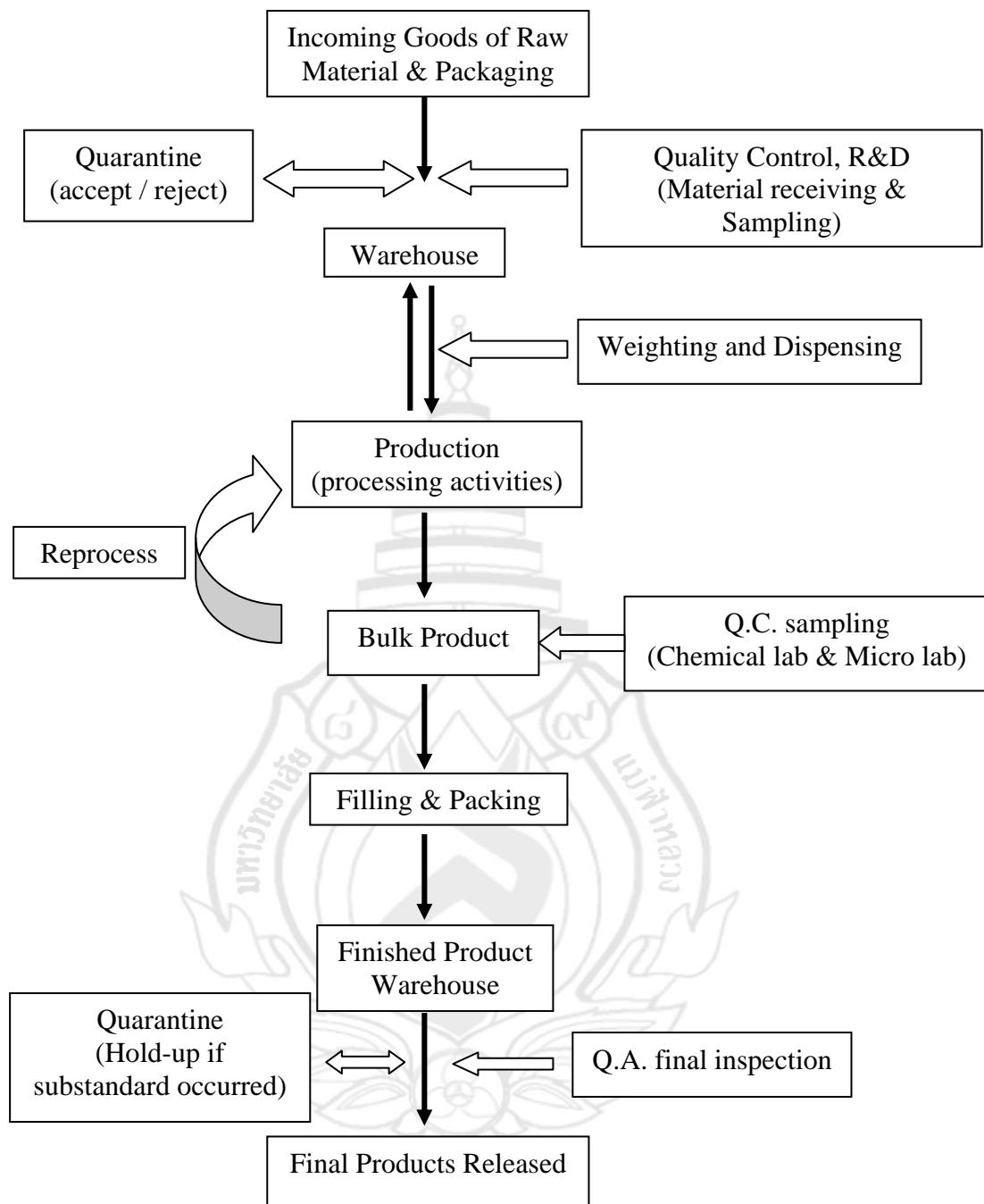


Figure 4.1 Cosmetic Flow Process and Activities

4.3 Cosmetic Manufacturing Model Layout

This cosmetic manufacturing model layout is a diagrammatic representation of a 'block plan' which is smaller than 12 inch (1foot) of a building showing the internal partitions and columns and area allocation but not machinery, equipment, or facilities. The reason for designing as block plan because, if relayout is being done in existing facilities, this block plan layout can provide information on all permanent fixtures such as: elevators, stairway and doors. However, this layout also provides 'area allocation' which indicates the purpose function of each room. The over-all flow of a product move along the layout as shown in Figure 4.1, which usually has similar type of flow. Hence, there are 3 type of design layout which has different aspect showing a various infrastructure in the following Figures below.

Figure 4.2 Model I: Cosmetic Manufacturing Plant Type I (1 storey)

Figure 4.3 Model II: Cosmetic Manufacturing Plant Type II (1st floor)

Figure 4.4 Model II: Cosmetic Manufacturing Plant Type II (2nd floor)

Figure 4.5 Model III: Cosmetic Manufacturing Plant Type III (hexagon)

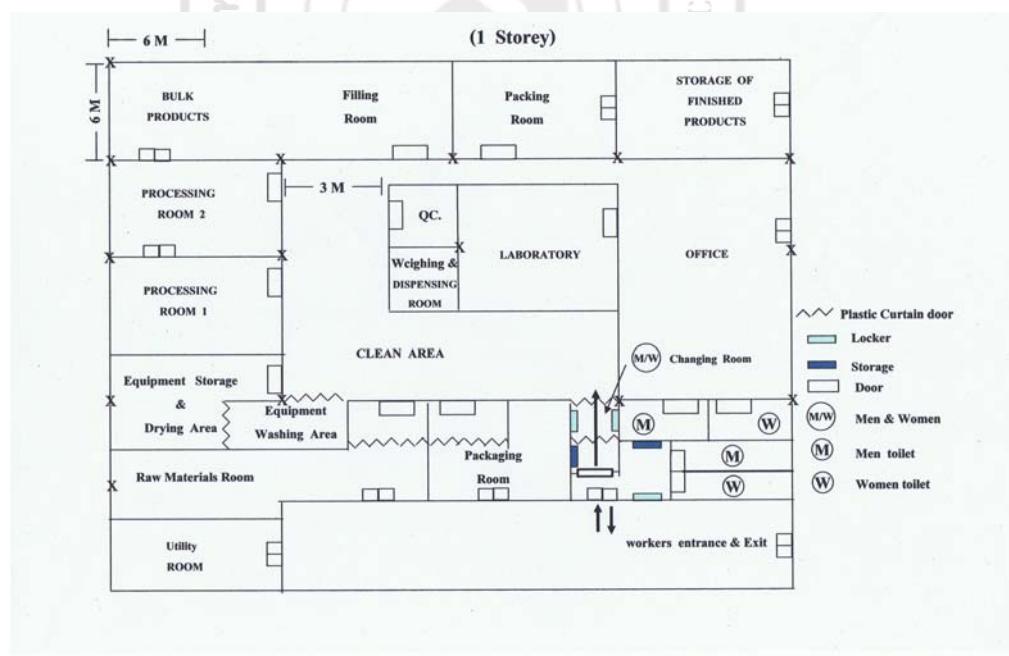


Figure 4.2 Model I: Cosmetic Manufacturing Plant Type I

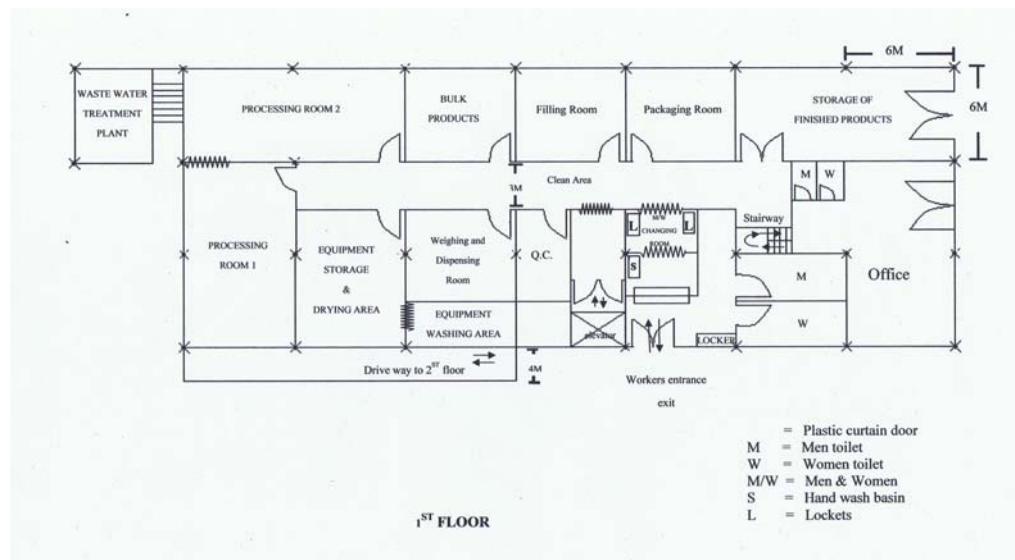


Figure 4.3 Model II: Cosmetic Manufacturing Plant Type II (1st floor)

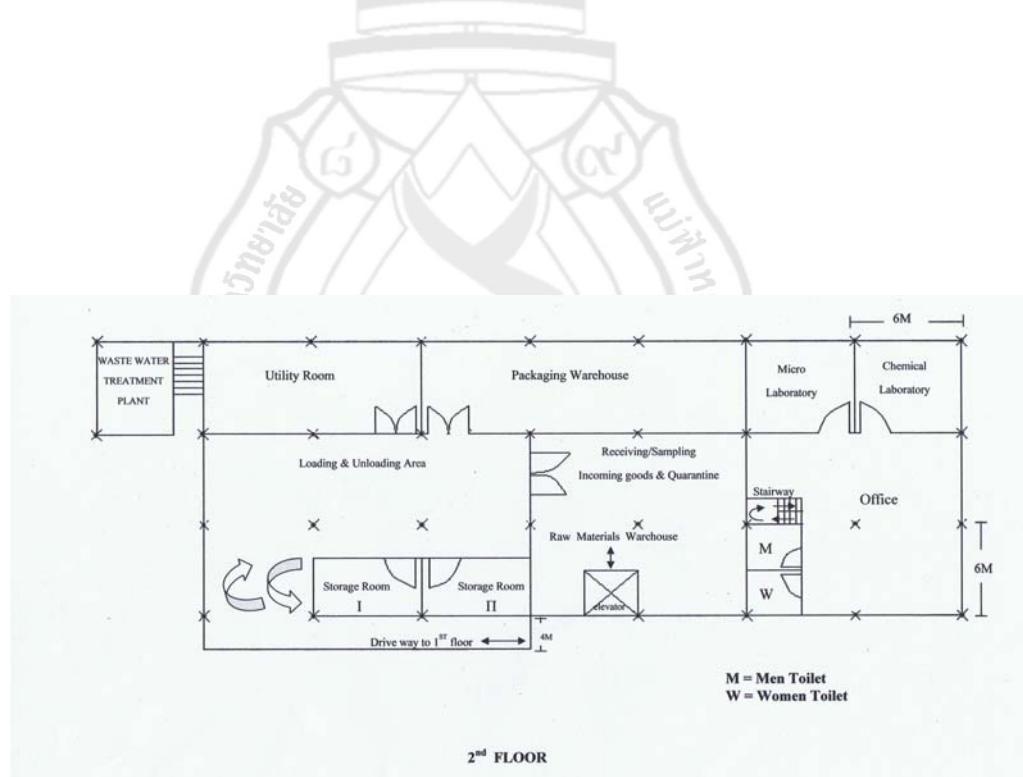


Figure 4.4 Model II: Cosmetic Manufacturing Plant Type II (2nd floor)

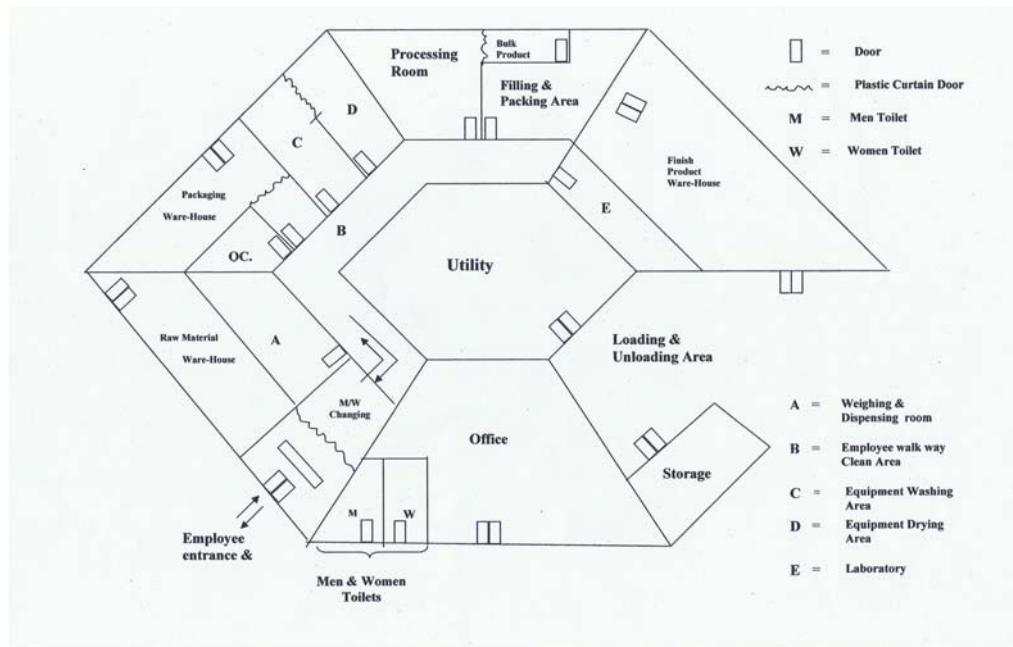


Figure 4.5 Model III: Cosmetic Manufacturing Plant Type III (hexagon)

4.4 Choosing and Evaluating the Layout Design

The most difficult part of the plant layout procedure is the evaluation of the various alternative choices to choose. There are many ways that the layout solutions may be systematically evaluated. To determine which plant layout is suitable, the following evaluation must be considered such as; pilot plant, cost comparison, productivity evaluation, space evaluation, process flow, pros and cons.

4.4.1 Pilot plant

The best way to evaluate a layout before choosing which layout is the best is to build and operate a small pilot plant. By building a pilot plant, the problem of process flow can be solved step by step in a most likely prototype environment; this way the layout problems can also be solved, but this evaluation type is enormously expensive.

4.4.2 Cost comparison

The most common type of evaluation used in selecting which type of plant layout model to use is the cost comparison. It is more likely that before choosing the type of plant layout to build, the investment budget is usually the prime factor an investor had in mind. Investor should forecast the future production, investment budget, an adequate estate space to build the factory and also other subsidiary (factory cost) and general cost as well. Factory costs such as the materials and labor, as well as general cost like floor space, flooring type, power, fuel, taxes and etc must be taken to be aware. Other cost that the investor must considered should include not only the initial cost of the new equipment, but also such accessory costs as fixtures, decorating, machine used in line process, handling equipment, and installation.

4.4.3 List of Pros and Cons (arguments for or against a particular issue)

The easiest and cost saving way to evaluate an alternative layout is to make a list of the advantages and disadvantages of each alternative. For example; an investor must consider the problem of deciding where incoming materials should be received in a new plant; receive at front of building or receive at rear, just 1 level is enough or 2 level is more adequate but costly. An investor must compare the advantages and disadvantages by rating and ranking the layout so choosing which design is proper become more realistic.

4.5 Evaluating the Design Model

The preliminary design presented in the earlier three models was developed to show the logical step-by-step approach in the cosmetic flow process. The exact procedure may vary from company to company depending on the products the company is specializing in.

4.5.1 Model I

Model I has an area of about 720 square meters (24 meters x 30 meters) and the design is suitable for cosmetic production of skin care and hair care product such as cream, liquid and gel. Hence, this particular design is the smallest in all of the 3 models which is suitable for certain type of cosmetic production such as producing spa products, SME, or OTOP which involve lower investment than all the others. The advantages of this small scale cosmetic manufacturer are

process flexibility, continuous operation possibility, less energy consumption, lower maintenance costs and low investment costs. However, the disadvantages of Model I are no possibility of future developments, insufficient of space expansion, no waste water treatment plant.

4.5.2 Model II

The infrastructure of Model II is a two storey building which has an area of about 1512 square meters (42 meters x 18 meters). The waste water treatment has an area of about 36 square meters (6 meters x 6 meters). The drive-way from first floor to the second floor is about 72 square meters (4 meters x 18 meters), adequate enough for a small truck to load and unload raw materials and finished products through the building. The design of Model II can be used as a manufacturer of larger scale cosmetic production since it has twice as much area as Model I and contain its own waste water treatment which means a more potential of standard certified manufacturer. This larger scale cosmetic manufacturer can be used to process cream, liquid and gel type as well. The advantages of this model are process flexibility, energy saving plant (direct energy transfer from utility room like piping on second floor down to processing room on first floor), continuous operation, expansion possibility, possibility of future developments, larger working space and storage, environmental friendly concern, and higher production capacity. However, there are also disadvantages in Model II such as higher investment costs, larger land required, and higher maintenance costs.

4.5.3 Model III

This infrastructure of Model III is a one storey hexagonal building which has an area of about 1064 square meters. This model is an ideal for creativity in infrastructure which pointed out that the external infrastructure does not necessarily have to always be in a square or rectangular shape building but can also be shaped in an alternative dimension as well. This model shows that the main concern aspect of designing the infrastructure of the building is the important of the flow of the product through the manufacturing process. The production flow must be decided and established first before the design of the infrastructure can be proposed. The infrastructure of the building acts as an external shelter which covers the process flow, therefore the formulation to this model design is to prioritize the process flow first then comes the infrastructure design as shelter. This design Model III can also be used for the cosmetic production of cream, liquid, and gel type and is suitable for a small to medium scale cosmetic manufacturer who looks for an innovative

ideal infrastructure. The utility room of this model is place in the center of the building which imitates the heart of the human body that transfer all the necessary energy used for production to the processing room in a spider-web like action. Hence, the advantages for this model are, innovative and creativity building, consistency of flow process, efficiency of energy transferring (piping utilization), and continuous operation. However, the disadvantages are higher investment cost, large land required, higher maintenance costs, and availability of space utilization due to the hexagonal shape.

4.6 Cost Estimation

An appropriate plant design must present a process that is capable of operating under conditions which will yield a profit. Since net profit equals total income minus all expenses, it is essential that the investor must be aware of the many different types of costs involved in manufacturing processes. Capital must be allocated for direct plant expenses, such as those for raw materials, labor, incurred, and these must be included if a complete analysis of the total cost is to be obtained. Before a cosmetic plant can be put into operation, a large sum of money must be supplied to purchase and install the necessary machinery and equipment. Land and service facilities must be obtained, and the plant must be erected complete with all piping, controls, and services. In addition, it is necessary to have money available for the payment of expenses involved in the plant operation. Hence, the construction cost of infrastructure building has a range from 6,000 baht per square meter to 10,000 baht per square meters (information gather on April, 2008) depending on the load of platform and specific materials used during construction.

4.7 Flooring and Air Ventilation System

There are three characteristics of major importance when considering cosmetic manufacturer flooring:

- 4.7.1 Flooring should be strong enough to support equipment and product.
- 4.7.2 The floor levels should be constant for all buildings.
- 4.7.3 Flooring should have easy cleaning property and non-dust collecting property.

When a new plant is under construction, the layout man should check the floor strength with the architect, builder, or contractor for the safety load in each specific room that need more or less strength in flooring, especially the room that contain heavy machine in process. Good flooring material must meet many stringent requirements. Desirable flooring material such as epoxy flooring can be taken into consideration because epoxy flooring can provide durability, resistance to oxidizing chemicals, high impact resistance, easily be clean, hygienic smooth finish surface, good abrasive resistant film, good adhesion to steel and concrete. However, the only disadvantage property is the cost of installing is quite high. The price of epoxy flooring can vary from 480-800 baht per square meter depending on the strength level of the epoxy flooring.

In addition to flooring, the air ventilation system is also crucial for the new plant under the regulation of ASEAN GMP. The clean area should contain a positive air pressure from internal through out the building; also the inlet air from the external should pass through HEPA-filter to filter the incoming air.

CHAPTER V

CONCLUSION AND DISCUSSION

When determining the design of cosmetic manufacturing plant layout, it is also essential to recognize the size of the machine and the human resources needed by the particular manufacturer. However, the size of the property that the infrastructure must be fit into as well as investment budget must be considered before choosing the appropriate layout or creating the design.

To discover the proper measure of effectiveness of the plant layout or which plant layout is more suitable than the other can be determined by which plant layout can achieve the goal better. The plant layout that can satisfy the most and fulfill the overall criteria of the objective can be considered as the most essential proper layout. Therefore, the ASEAN GMP plant layout has no exact formation of infrastructure or specific plant layout, but it is measured case by case and determined by how well the process flow is organized as well as safety and cleanliness. However, the measure of effectiveness is mostly determined by the investment and the return of investment after a certain period of time. However, to evaluate and choose which plant layout to choose from can be evaluated in many ways such as by operating the pilot plant for prototype, comparing the costs of investment, comparing the productivity, comparing the space utilization, consider the sequence or the flow chart, factor analysis, ranking and considering the pros and cons of various alternatives.

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APPENDIX

PREMISES OF ASEAN GMP BY MR.NIPHON PHAONIMMONGKOL

สถานที่ผลิต ตาม ASEAN GMP โดย คุณ นิพนธ์ เพ่านิมมคงคล

สถานที่ผลิต

1. ออกแบบตามความเหมาะสมของสินค้าที่ผลิต (วัสดุก่อสร้าง ทำเล ขนาด แนว ราก แนวตั้ง)
 - Material Flow วัสดุคง , สินค้าก่อสำเร็จรูป , สินค้าสำเร็จรูป , บรรจุ กับที่
 - People Flow บุคลากรในบริเวณผลิต , นอกบริเวณผลิต
2. ต้องง่ายต่อการนำรุ่งรักษามาและทำความสะอาด โดยไม่ก่อให้เกิดการปนเปื้อน
3. สินค้าที่ใช้ในครัวเรือนประเภทไม่ใช้วัสดุอันตรายสามารถผลิตในที่เดียวกันได้ แต่ ต้องมีการแบ่งให้ชัดเจนด้วยเชือก หรือ เส้นแนวเขต

คลังสินค้า

บริเวณรับส่งสินค้าภายนอกอาคาร



แบบมี Platform



แบบไม่มี Platform

- มีหลังคา กันแดด กันฝน
- สามารถใช้เป็นที่ทำการ ทำความสะอาดภายนอก ของพนักงาน บรรจุภัณฑ์ นำเข้าเก็บ



Source: <http://www.thaicosmetic.org/>

คลังสินค้า

บริเวณรับส่งสินค้าภายในอาคาร



ทางเข้าออกคลังสินค้า



ออฟฟิศคลังสินค้า

- มีไฟดักแมลง
- มีม่านพลาสติก
- วัสดุพื้นปูนคอนกรีต

คลังสินค้า

บริเวณกักกันสินค้าการตรวจสอบ Quarantine



ใช้สันแนม่เจต Quarantine



ใช้บริเวณห้อง Quarantine

Source: <http://www.thaicosmetic.org/>

คลังสินค้า

บริเวณสุ่มตัวอย่างสินค้า



ตู้สุ่มตัวอย่าง

- ตู้สุ่มตัวอย่างสามารถเข็น,เคลื่อนย้ายได้
- ต้องมีม่านปิดเพื่อป้องกันการปนเปื้อน



มุมสุ่มตัวอย่าง

- ต้องอยู่ในบริเวณที่สะอาดเพื่อป้องกันการปนเปื้อน

คลังสินค้า

บริเวณเก็บสินค้าที่ผ่าน QC



การจัดเก็บเป็น Pallet วางบนพื้น



การจัดเก็บเรียงบนชั้นวางสินค้า



การจัดเก็บบรรจุ
ภัณฑ์ที่มีการแบ่งเป็น
สัดส่วน

Source: <http://www.thaicosmetic.org/>

คลังสินค้า

บริเวณเก็บสินค้าไม่ผ่าน QC



บริเวณเก็บสินค้า Rejected
ลักษณะเป็นห้อง



บริเวณเก็บสินค้า
Rejected โดยการใช้เส้น
แบ่งเขต

คลังสินค้า

บริเวณเก็บสินค้าอันตราย, วัตถุไวไฟ









สถานที่เก็บวัตถุ
อันตราย

และก่อช่องด้วยวัตถุไวไฟ ควรเก็บแยก
ในสถานที่ที่มีการระบายน้ำที่ดี มีรั้วล้อมรอบ
ปิดล็อกได้ อุปกรณ์ต้องเป็นประเภทกันไฟหรือ
กันระเบิด ต้องติดตั้งป้ายบอกวัตถุไวไฟ และมี
จำนวนป้ายที่เกี่ยวกับความปลอดภัยเพียงพอ

คลังสินค้า

บริเวณเก็บสินค้าควบคุมอุณหภูมิ



ห้องปรับอุณหภูมิ



ตู้เย็น

คลังสินค้า



บริเวณเก็บสินค้าสำเร็จรูป



บริเวณ Pack สินค้าสำเร็จ



บริเวณผลิต

ห้องเปลี่ยนเครื่องแต่งกาย



ภายในบริเวณห้อง



ผ้าใส่เสื้อคลุม

บริเวณผลิต

ห้องเปลี่ยนเครื่องแต่งกาย



มีอ่างล้างมือและอุปกรณ์净手เชื้อโรค



ตัวอย่างชุดสวมใส่เข้าบริเวณผลิต

บริเวณผลิต



ห้อง Air lock



สินค้าการซั่ง

บริเวณผลิต

ห้องซั่งสาร

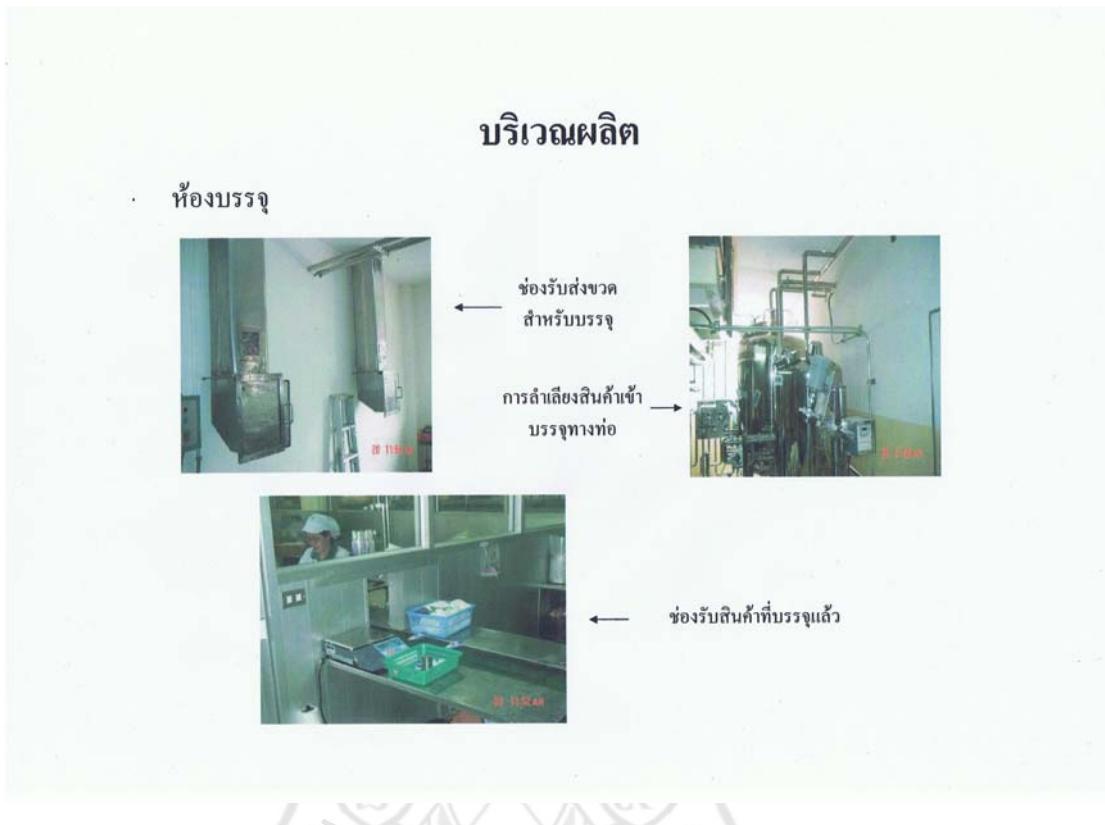


มีเครื่องคูณผุ่นติดตั้งที่ผนัง



มีเครื่องฟอกอากาศติดตั้งได้เครื่องซั่ง









บริเวณล้างอุปกรณ์



การตากท่อและสายยางที่ล้างแล้ว



ห้องเก็บวัสดุอุปกรณ์ที่ล้างแล้ว

ห้องปฏิบัติการ



ห้องปฏิบัติการทางเคมี



ห้องปฏิบัติการทางชีวภาพ



ห้องปฏิบัติการ

ห้องทดสอบทางเคมี



ห้องเก็บสินค้าตัวอย่าง



กำหนดการตรวจสินค้า

ห้องปฏิบัติการ

ห้องทดสอบทางชีวภาพ



ตู้อบเพาะเชื้อ



ห้องเปลี่ยนเสื้อผ้าสำหรับ
ห้องตรวจสอบเชื้อ

ห้องปฏิบัติการ



การจัดเก็บข้อมูล

- ระบบคอมพิวเตอร์
- ระบบแฟ้มเอกสาร
- ระบบการลงบันทึกในสมุด

ระบบน้ำ

ระบบน้ำที่ใช้ในการผลิต



ระบบน้ำ RO
และ DI

ป้ายแสดง
ประเภทของน้ำ



สารเคมีและอุปกรณ์ที่ใช้
ในการบำรุงรักษาระบบ
น้ำ RO และ DI

ระบบนำ

ระบบนำบัดน้ำเสีย

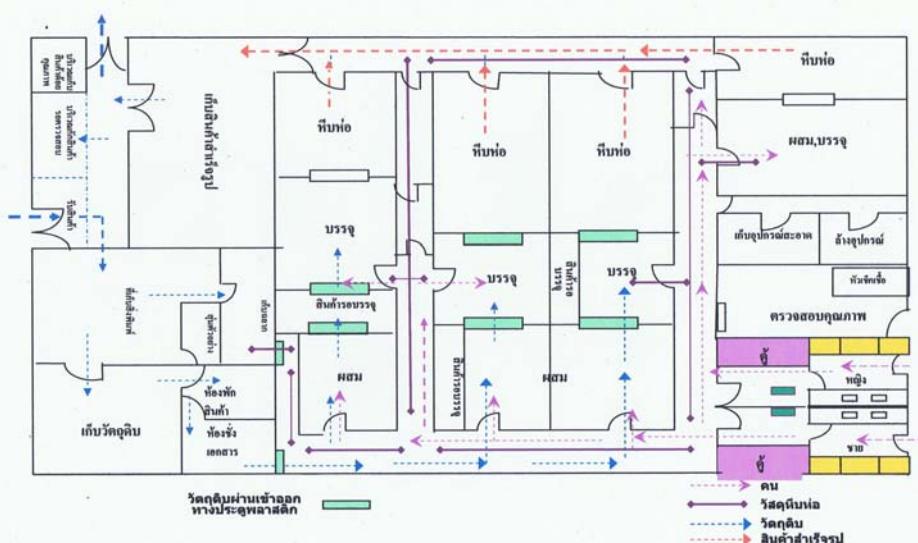


ถังพกน้ำเสียจากโรงงานที่อยู่ใน
ระหว่างขบวนการนำบัดน้ำเสีย

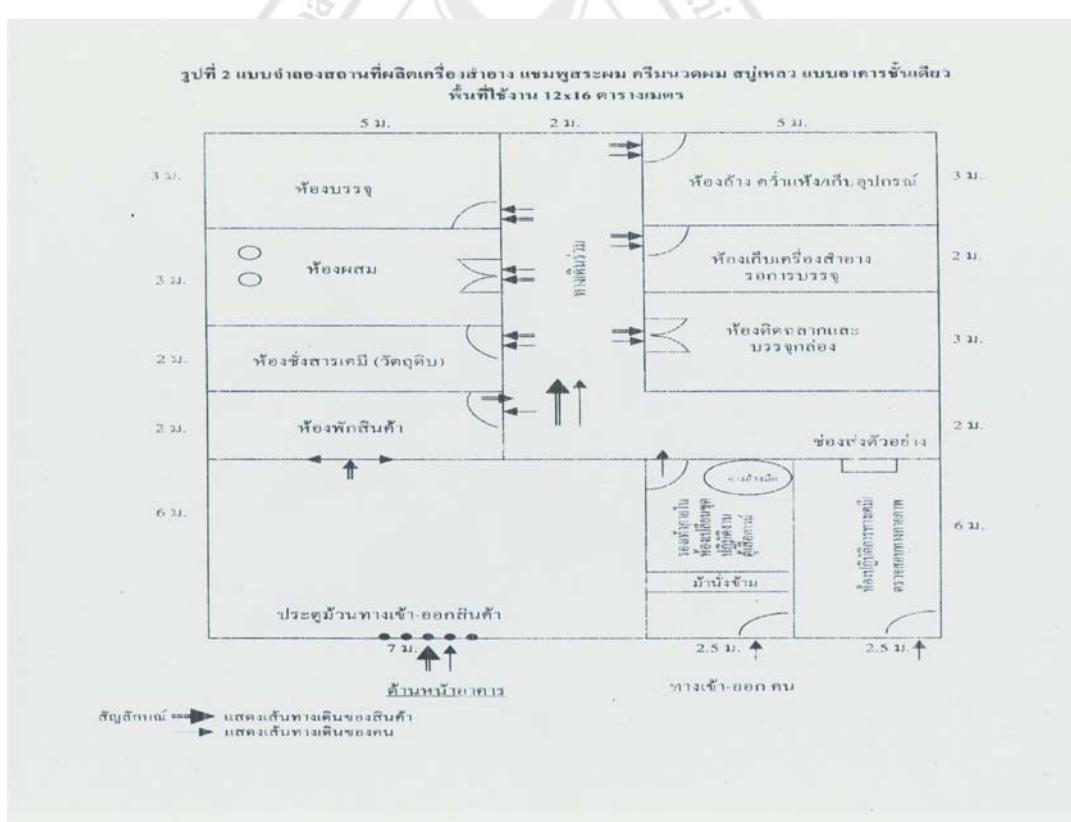
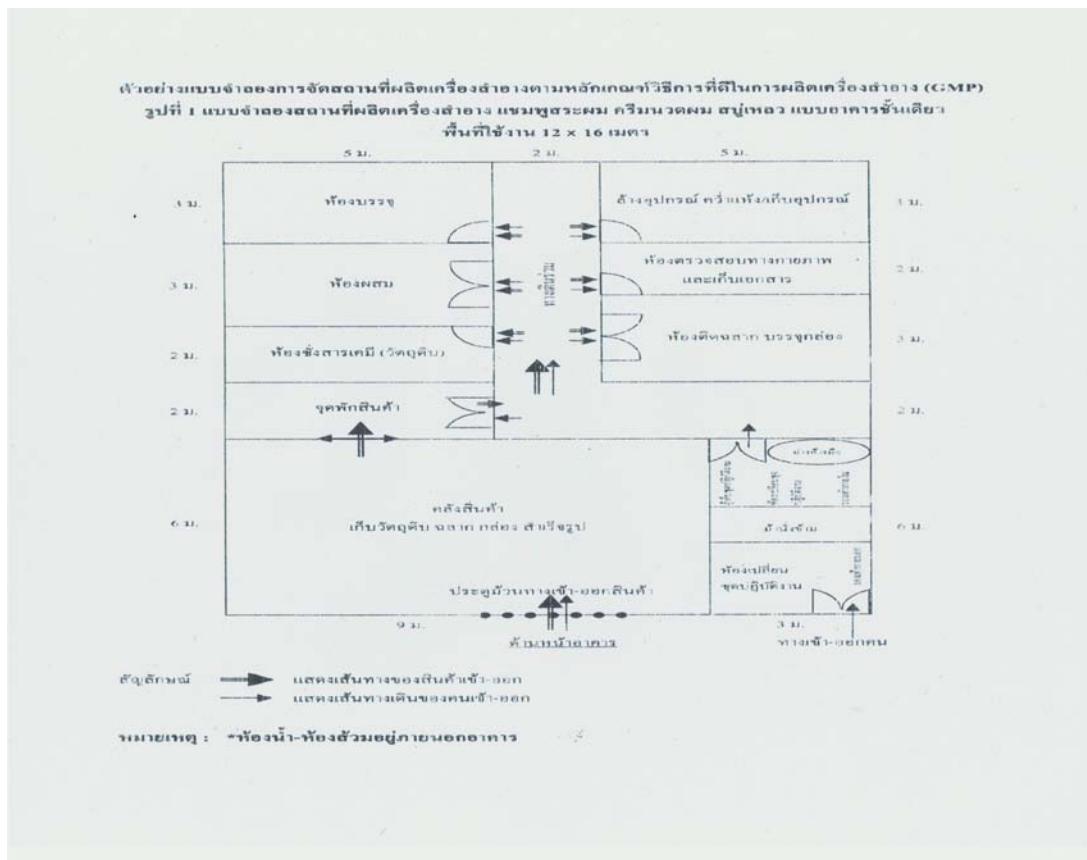


บ่อพกน้ำเสียที่บำบัดแล้ว
สามารถใช้รดน้ำต้นไม้มีหรือ
ปล่อยของสู่ท่อสาธารณูปโภคได้

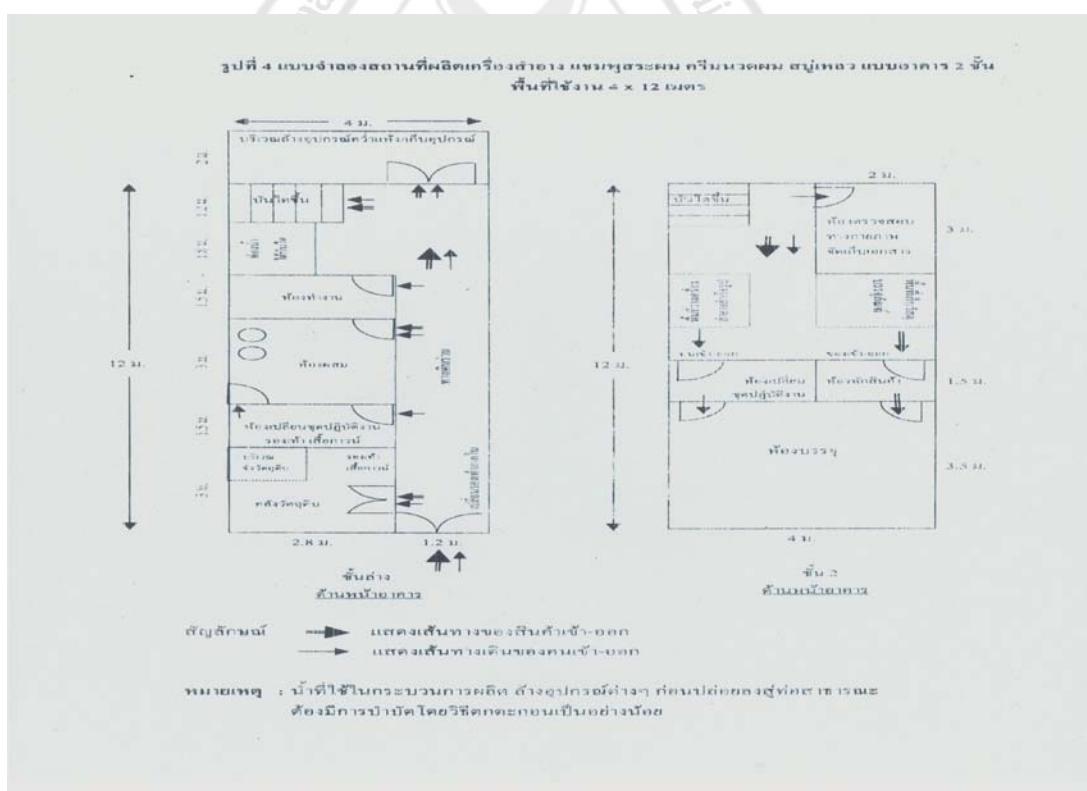
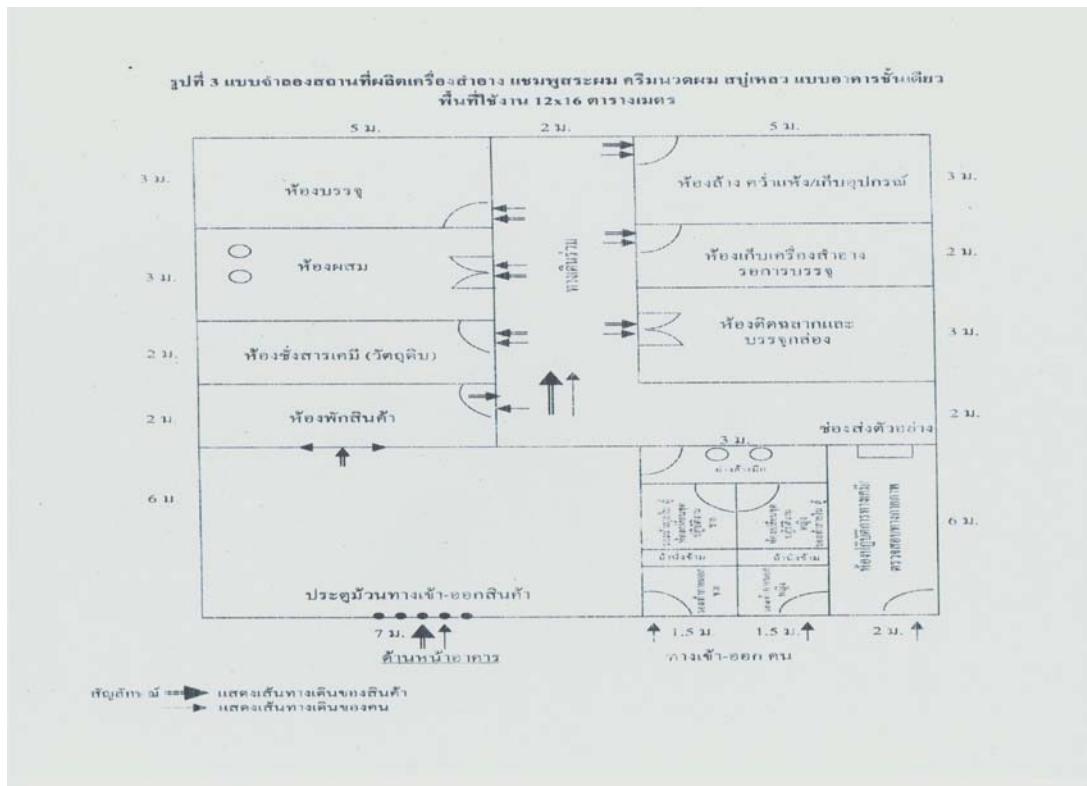
ผู้อำนวยการ



Source: <http://www.thaicosmetic.org/>



Source: <http://www.thaicosmetic.org/>



Source: <http://www.thaicosmetic.org/>

ข้อพิจารณา จากภาพแบบจำลองตัวอย่างข้างต้นมีข้อควรพิจารณาดังนี้

สถานที่ผลิตควรตั้งอยู่ในที่เหมาะสม แยกเป็นสัดเป็นสัดเป็นส่วนจากบริเวณที่อยู่อาศัย

1. ขนาดของห้องแต่ละห้องไม่มีข้อจำกัด ทั้งนี้ขึ้นอยู่กับความเหมาะสมกับบริษัทการผลิต/การจัดเก็บ
2. ทุกห้อง/พื้นที่ที่เกี่ยวข้องกับการผลิตสามารถป้องกันการปนเปื้อนจากสิ่งแวดล้อม ภายนอกได้ รวมถึงสัดว์และแมลง เช่น กรณีเป็นห้องอาศาปักดิใช้พัดลมดูดอากาศด้วยผ่านแผ่นกรองฝุ่น เป็นต้น
3. ทุกห้อง/พื้นที่ต้องมีแสงสว่างเพียงพอ และมีระบบการหมุนเวียนของอากาศที่เหมาะสม ไม่ร้อน อบอ้าว
4. ห้องน้ำห้องส้วมต้องอยู่ภายนอกโรงงาน/อาคารผลิต
5. ต้องมีการบันทึกน้ำที่ใช้แล้ว ก่อนปล่อยลงท่อสาธารณะ
6. ห้องปฏิบัติการทางเคมีควรแยกออกจากพื้นที่การผลิต
7. ห้องตรวจสอบเอกสารยานยาร์/ตรวจสอบทางการแพทย์ สามารถอยู่ภายในพื้นที่การผลิตได้ น้ำที่ใช้ในการผลิตเครื่องสำอางต้องเป็นน้ำที่สะอาด คุ้มครอง
8. น้ำที่ใช้ในการผลิตเครื่องสำอางต้องเป็นน้ำที่สะอาด คุ้มครอง

Source: <http://www.thaicosmetic.org/>



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