

# Enhancing Plastic Industry Business by Using the Internet

by

Mr. Piya Opasphatikul

A Final Report of the Six-Credit Course  
IG 6998 E-Commerce Practicum

Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Science  
in Internet and E-Commerce Technology  
Assumption University

July 2002

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The logo of Assumption University of Thailand is a circular emblem. It features a central shield with a cross and a book. Above the shield is a crown. The shield is flanked by two figures. Below the shield is a banner with the text "LABOR OMNIA VINCIT". The outer ring of the logo contains the text "ASSUMPTION UNIVERSITY OF THAILAND" at the top and "มหาวิทยาลัยอัสสัมชัญ" at the bottom. Below the banner is the text "SINCE 1969".

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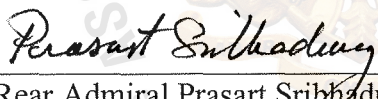


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Academic Year	July 2002

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The Graduate School of Assumption University has approved this final report of the six-credit course, IC 6998 E-Commerce Practicum, submitted in partial fulfillment of the requirements for the degree of Master of Science in Internet and E-Commerce Technology.

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## ABSTRACT

This project is concerned with setting up company's web site to be a complement channel of traditional business. The web site is built to provide information and knowledge about plastics, how to process plastics, causes and countermeasures, our product's information, on line technical supporting etc. The report studies the evolution and effect of Internet on business-to-business distribution. The possibilities and benefits of setting up web site. Marketing plan, such as SWOT analysis, target market and marketing mixes (4Ps) including strategies in order to achieve marketing objective. The design, development and implementation of web prototype, which consists of registration, product's information, price checking, company's profile, online customer support and e-mail contact functions etc, is also mentioned and demonstrated in the report.

This report is separated into three main parts; Introduction to Plastics, Marketing plan, and Web design and implementation.

The first part, *Literature Review*, contains background information about e-commerce. This information is aimed to provide background knowledge about e-commerce to all people in order to smoothly study this report.

The second part, *Introduction to Plastics*, consists of useful information about plastics. Such information as what plastic is, features of plastic, types of plastic, and raw materials for plastics are provided. However, all information is not too complex. They are useful for people who just started learning about plastics.

The third part, *Marketing Plan*, consists of the analysis of the market, trend, business overview, business goals, etc. Also, we had analyzed the strategies used for doing this business successfully. Our marketing strategies had been set up in order to

achieve targets. This part consists of Situation Analysis, SWOT analysis, Target Market, and Marketing Mix.

The fourth part, *Web Design and Implementation*, also creates a prototype of Web site. Moreover, we had proposed the criteria for well-designed Web sites which can build up a user-friendly environment.

Although our Web site cannot replace the traditional business, it can help to improve the service and image of our company and enhance the efficiency and effectiveness in distributing knowledge and information.



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## **I. INTRODUCTION**

### **1.1 Background of the Project**

As we know, the Internet offers a lot of benefits to us. Internet's user can look for information and retrieving information directly. At the same time, e-commerce revolutionized the way companies sold their products and services and the way they managed their supply chains. Many businesses such as wholesales, retails or business-to-business, business-to-consumer and consumer-to-consumer commerce have to change their strategies to be alive in this new circumstance. Customer support via the internet changed the way businesses addressed customer needs and concerns, and Web-based, employee self-services empowered workers to access and seek information once limited to a select few. For the early adopters, these applications garnered huge productivity gains and cost savings, while increasing customer satisfaction, accelerating time to market, and providing competitive agility. Nowadays there are many new kinds of businesses that are founded every day. Some of them are doing only on line business but some of them have both on line and traditional business. They are trying to utilize the Internet as one of their distribution channels to support their business. By using the Internet, manufacturers can sell their products directly to customers and provide customer support on line to them. It helps them to improve the service during expanding the market. In this sense, it can effect the business cycle that makes it shorter than before.

In the competitive world, every business has to plan and adapt their strategies to suit the situation. Our company also has to do it by using the benefits of the Internet. We set up company's Web site to support customers and our business. We can expand the market internationally by exporting our product. It helps us to reach more targets. At the same time, the Internet provides many kinds of mechanisms; such as electronic mail, on

line technical support, product's information etc. We can utilize them to improve our services, For example, customers can send inquiry to us via electronic mail or they can find the solution for the technical problem from our Web site without requesting engineers to solve for them.

## **1.2 Objectives of the Project**

- (1) To apply the knowledge learnt in the Master of Science in Internet and E-commerce Technology.
- (2) To expand the business to worldwide international.
- (3) To provide information and background of plastics.
- (4) To create a prototype of company's Web site.
- (5) To promote and improve company's image.
- (6) To expand export business.

## **1.3 Scope of the Project**

- (1) Part one, *Literature Review*, contains a Brief History of Electronic Commerce, Benefits of Electronic Commerce and Limitations of Electronic Commerce.
- (2) Part two, *Introduction to Plastics*, provides useful information about plastics such as types of plastics, what is plastic and its benefits.
- (3) Part three, *Marketing Plan*, contains the analysis of the plastics industry by using marketing tools. Situation analysis, SWOT analysis, Market Segmentation, Target Market and Marketing Mix (4Ps) are used for analysis.
- (4) Part four, *Web Design and Implementation*, consists of design which is shown the interface, menus, site structure or site map of company's Web site, and a prototype of Web site.

#### 1.4 Deliverables

- (1) A final report in details covers the scope mentioned earlier.
- (2) A prototype of a Web site.





## II. LITERATURE REVIEW

### 2.1 A Brief History of Electronic Commerce

Electronic commerce applications started in the early 1970s, with such innovations as electronic fund transfers (EFT). However, the extent of the applications was limited to large corporations, financial institutions, and a few daring small businesses. Then came EDI, which expanded from financial transactions to other transaction processing and enlarged the participating companies from financial institutions to manufacturers, retailers, services, and so on. Many other applications followed, ranging from stock trading to travel reservation systems. Such systems were described as telecommunication applications and their strategic value was widely recognized. With the commercialization of the Internet in the early 1990s and its rapid growth to millions of potential customers, the term electronic commerce was coined, and EC applications expanded rapidly. One reason for the rapid expansion of the technology was the development of networks, protocols, software, and specifications. The other reason was the increase in competition and other business pressures. From 1995 to 1999 we have witnessed many innovative applications ranging from advertisement to auctions and virtual reality experiences. Almost every medium and large-sized organization in the United States already has a Web site. Many are very extensive; for example, in 1999 General Motors Corporation ([www.gm.com](http://www.gm.com)) offered 18,000 pages of information that included 98,000 links to its products, services, and dealers.

### 2.2 Global Electronic Commerce

Electronic commerce is an emerging concept that describes the process of buying and selling or exchanging of products, services, and information via computer networks including the Internet.

The term commerce is viewed by some as transactions conducted between business partners. Therefore, the term electronic commerce seems to be fairly narrow to some people. Thus, many use the term e-business. It refers to a broader definition of EC, not just buying and selling but also servicing customers and collaborating with business partners, and conducting electronic transactions within organization.

A global electronic marketplace has become the mantra of the free market and free traders. It means access to larger markets, mobility (to minimize taxes), and flexibility to employ workers and manufacture products anywhere using a worldwide telecommuting workforce. The potential for a global economy is certainly here, but artificial borders are being erected through local language preference, local regulations, access limitations, and so on.

While geographical market boundaries may be falling, global interest-based communities will spring up. These cybernations' interest or taste differences are as real as political boundaries. Online firms may gain access to these cybernations and to a specific segment of consumer groups on a worldwide scale.

Global electronic markets have existed for more than 20 years, mainly in support of B2B financial and other repetitive, standard transactions. Most well known are the EFT and EDI. However, these markets were supported by expensive private telecommunication lines and, therefore, were limited to medium and large corporations as well as to the nature of the transactions. The emergence of the Internet and the Extranet resulted in an inexpensive and flexible infrastructure that can greatly facilitate global trade. The major advantage of EC is the ability to do business anytime and from anywhere and do it rapidly at a reasonable cost. Indeed, we have seen some incredible success stories in this area.

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## **2.3 The Future of Electronic Commerce**

In 1996, Forrester Research Institute ([www.forrester.com](http://www.forrester.com)) predicted that B2C would be a \$6.6 billion business in 2000, up from \$518 million in 1996. Then they revised the figure to \$20 billion, and the predicting keeps growing. In 1997, about \$10 billion worth of B2B transactions were conducted over the Internet. Predictions on the total size of EC vary. For 2002, total online shopping and B2B transactions are estimated to be in the range of \$500 billion to \$3 trillion. Some EC applications, such as auctions and online stock trading, are growing at a rate of 15 percent to 25 percent per month, and the number of Internet users worldwide is predicted to reach 750 million by 2008. As many as 50 percent of Internet users are predicted to be online shoppers. One indication of the prospect of EC is the price of EC-related stocks on the Internet. For example, on November 12, 1998, the price of a share of AcTel surged from \$2 to \$31 in one day (more than 1,250 percent) after Actel developed a high-speed Internet connection. A day later, the shares of the Internet community, Theglobe.com soared on their first day of trade by 606 percent.

Most EC companies, such as Amazon.com, are not making a profit. They are expanding operations and generating sales growth. It is believed that by 2002 most of the major EC companies will start to generate sizable profits.

## **2.4 Benefits and Limitations**

### **(1) Benefits of Electronic Commerce**

Few innovations in human history encompass as many potential benefits as EC does. The global nature of the technology, low cost, opportunity to reach hundreds of millions of people, interactive nature, variety of possibilities, and resourcefulness and rapid growth of the supporting infrastructures (especially the Web) result in many potential

benefits to organizations, individuals, and society. These benefits are just starting to materialize, but they will increase significantly as EC expands. It is not surprising that some maintain that the EC revolution is just “as profound as the change that came with the industrial revolution”

#### Benefits to Organizations

The benefits to organizations are as follows:

- (a) Electronic commerce expands the marketplace to national and international markets. With minimal capital outlay, a company can easily and quickly locate more customers, the best suppliers, and the most suitable business partners worldwide.
- (b) Electronic commerce decreases the cost of creating, processing, distributing, storing, and retrieving paper-based information.
- (c) Ability for creating highly specialized businesses.
- (d) Electronic commerce allows reduced inventories and overhead by facilitating “pull”-type supply chain management.
- (e) The pull-type processing enables expensive customization of products and services which provides competitive advantage to its implementers.
- (f) Electronic commerce reduces the time between the outlay of capital and the receipt of products and services.
- (g) Electronic commerce initiates business processes reengineering projects. By changing processes, productivity of sales people, knowledge workers, and administrators can increase by 100 percent or more.



- (h) Electronic commerce lowers telecommunications cost-the Internet is much cheaper than VANs.
- (i) Other benefits include improved image, improved customer service, new found business partners, simplified processes, compressed cycle and delivery item, increased productivity, eliminating paper, expediting access to information, reduced transportation costs, and increased flexibility.

#### Benefits to Consumers

The benefits of EC to consumers are as follows:

- (a) Electronic commerce enables customers to shop or do other transactions 24 hours a day, all year round, from almost any location.
- (b) Electronic commerce provides customers with more choices; they can select from many vendors and from more products.
- (c) Electronic commerce frequently provides customers with less expensive products and services by allowing them to shop in many places and conduct quick comparisons.
- (d) In some cases, especially with digitized products, EC allows quick delivery.
- (e) Customers can receive relevant and detailed information in seconds, rather than days or weeks.
- (f) Electronic commerce makes it possible to participate in virtual auctions.
- (g) Electronic commerce allows customers to interact with other customers in electronic communities and exchange ideas as well as compare experiences.

- (h) Electronic commerce facilitates competition, which results in substantial discounts.

#### Benefits to Society

The benefits of EC to society are as follows:

- (a) Electronic commerce enables more individuals to work at home and to do less traveling for shopping, resulting in less traffic on the roads and lower air pollution.
- (b) Electronic commerce allows some merchandise to be sold at lower prices, so less affluent people can buy more and increase their standard of living.
- (c) Electronic commerce enables people in Third World countries and rural areas to enjoy products and services that otherwise are not available to them. This includes opportunities to learn professions and earn college degrees.
- (d) Electronic commerce facilitates delivery of public services, such as health care, education, and distribution of government social services at a reduced cost and/or improved quality. Health-care services, for example, can reach patients in rural areas.

## **(2) Limitations of Electronic Commerce**

The limitations of EC can be grouped into technical and nontechnical categories:

#### Technical Limitations of EC

The technical limitations of EC are as follows:

- (a) There is a lack of system security, reliability, standards, and some communication protocols.

- (b) There is insufficient telecommunication bandwidth.
- (c) The software development tools are still evolving and changing rapidly.
- (d) It is difficult to integrate the Internet and EC software with some existing applications and databases.
- (e) Vendors may need special Web servers and other infrastructures, in addition to the network servers.
- (f) Some EC software might not fit with some hardware, or may be incompatible with some operating systems or other components.

As time passes, these limitations will lessen or be overcome; appropriate planning can minimize their impact.

#### Nontechnical Limitations of EC

Of the many nontechnical limitations that slow the spread of EC, the following are the major ones, according to a survey conducted by InternetWeek (1998).

- (a) **Cost and justification:** The cost of developing EC in-house can be very high, and mistakes due to lack of experience may result in delays. There are many opportunities for outsourcing, but where and how to do it is not a simple issue. Furthermore, to justify the system one must deal with some intangible benefits (such as improved customer service and the value of advertisement), which are difficult to quantify.
- (b) **Security and privacy:** These issues are especially important in the B2C area, especially security issues which are perceived to be more serious than they really are when appropriate encryption is used. Privacy measures are constantly improved. Yet, the customers perceive these

issues as very important, and, the EC industry has a very long and difficult task of convincing customers that online transactions and privacy are, in fact, very secure.

- (c) Lack of trust and user resistance: Customers do not trust an unknown faceless seller (sometimes they do not trust even known ones), paperless transactions, and electronic money. So switching from physical to virtual stores may be difficult.
- (d) Other limiting factors:
  - (1) Lack of touch and feel online. Some customers like to touch items such as clothes and like to know exactly what they are buying.
  - (2) Many legal issues are as yet unresolved, and government regulations and standards are not refined enough for many circumstances.
  - (3) Electronic commerce, as a discipline, is still evolving and changing rapidly. Many people are looking for a stable area before they enter into it.
  - (4) There are not enough support services. For example, copyright clearance centers for EC transactions do not exist, and high-quality evaluators, or qualified EC tax experts, are rare.
  - (5) In most applications there are not yet enough sellers and buyers for profitable EC operations.
  - (6) Electronic commerce could result in a breakdown of human relationships.

- (7) Accessibility to the Internet is still expensive and/or inconvenient for many potential customers. (With Web TV, cell telephone access, kiosks, and constant media attention, the critical mass will eventually develop.)

Despite these limitations, rapid progress in EC is taking place. For example, the number of people in the United States who buy and sell stocks electronically increased from 300,000 at the beginning of 1996 to about 10 million in fall 1999. As experience accumulates and technology improves, the ratio of EC benefits to costs will increase, resulting in a greater rate of EC adoption.

The potential benefits may not be convincing enough reasons to start EC activities. Much more compelling are the business drivers that may force companies to engage in EC.

## **2.5 Business-to-Business E-commerce**

### **What Is Business-to-Business E-commerce**

On the Internet also known as e-biz, is the exchange of products, services, or information between businesses rather than between businesses and consumers. Although early interest centered on the growth of retailing on the Internet (sometimes called e-tailing), forecasts are that B2B revenue will far exceed business-to-consumers (B2C) revenue in the near future. According to studies published in early 2000, the money volume of B2B exceeds that of e-tailing by 10 to 1. Over the next five years, B2B is expected to have a compound annual growth of 41%. The Gartner Group estimates B2B revenue worldwide to be \$7.29 trillion dollars by 2004. In early 2000, the volume of investment in B2B by venture



capitalists was reported to be accelerating sharply although profitable B2B sites were not yet easy to find.

### **Type of Business-to-Business Web sites**

Business-to-Business Web sites can be sorted into:

- (1) Company Web sites, since the target audience for many company Web sites is other companies and their employees. Company sites can be thought of as round-the-clock mini-trade exhibits. Sometimes a company Web site serves as the entrance to an exclusive Extranet available only to customers or registered site users. Some company Web sites sell directly from the site, effectively e-tailing to other businesses.
- (2) Product supply and procurement exchanges, where a company purchasing agent can shop for supplies from vendors, request proposals, and, in some cases, bid to make a purchase at a desired price. Sometimes referred to as e-procurement sites, some serve a range of industries and others focus on a niche market.
- (3) Specialized or vertical industry portals which provide a “subWeb” of information, product listings, discussion groups, and other features. These vertical portal sites have a broader purpose than the procurement sites (although they may also support buying and selling).
- (4) Brokering sites that act as an intermediary between someone wanting a product or service and potential providers. Equipment leasing is an example.
- (5) Information sites (sometimes known as infomediary), which provide information about a particular industry for its companies and their

employees. These include specialized search sites and trade and industry standards organization sites.



### III. INTRODUCTION TO PLASTICS

#### 3.1 What Is Plastics

When questioned what plastic is, many are perplexed. In general, however, we may safely say that plastic is an organic synthetic polymer with plasticity.

Plasticity is a nature, which causes a substance to change the shape when a force is applied but does not let it recover the original shape if the force is removed, as the case of clay. Its antonym is the elasticity which causes a substance to change the shape when a certain force is applied but lets it recover the original shape when the force is removed, as the case of rubber or a spring. Substances with such elasticity are called elastics.

Some plastic materials have some degree of elasticity even under normal temperatures, but many become elastic substances when heated beyond the softening temperature. We mold plastics into various shapes utilizing such elasticity given to plastic materials through heating.

Today, plastics products can be found in practically every field of human activity, e.g. medicine, agriculture, sport and leisure, transport (land, sea, and air), packaging (retail), electrical/electronics, and construction/building.

As an illustration of the “ubiquity” of modern-day plastics the following list gives examples of some familiar plastics products found around the home:

- (1) Food blenders
- (2) Hair dryers
- (3) Combs
- (4) Bottles
- (5) Toys
- (6) Refrigerator interior linings

- (7) Cabinets (TV, Radio, PC, Video)
- (8) Telephones
- (9) Pens
- (10) Toothbrushes
- (11) Table tops (Formica)
- (12) Yogurt cups, margarine tubs, etc.
- (13) Knobs and handles
- (14) Electrical plugs, sockets, switches, etc.

There is now quite a large range of different plastics materials, but the most familiar (and the most widely used) types are PVC, polystyrene, polyethylene, polypropylene, and nylon. Other common plastics, though perhaps less well known by name, are acetal, polycarbonate, acrylic, ABS, SAN, phenolics and aminos, epoxides, PTFE etc.

### **3.2 Features of Plastics**

#### **Merits**

- (1) Easy to mold

Products with considerably complex shapes can be easily produced, provided that the configurations allow the products to be ejected from the mold. Furthermore, the injection molding method allows for molding a finished product through a single process. Thus, plastic molding is far more efficient than metalworking.

- (2) Freely colored and made opaque or transparent

Material resins can be freely colored by adding colorants and be given a glossy transparent finish as desired, thereby improving the product quality.

- (3) Light, yet strong products are obtainable

While plastic is lighter than metals or porcelains, some plastic products have better mechanical properties. Especially, plastic products containing glass fiber feature a high physical strength. Besides, the lightness considerably reduces the overall weight of the product using plastic components.

- (4) Free from rust and corrosion

Generally speaking, plastics can endure various chemicals, so they do not rust or corrode as metals do and are not affected by oils, chemicals or mildew.

- (5) Low heat transmission

Since the specific heat of plastics is low, plastic products ensure a high adiabatic effect in various applications.

- (6) Superior electrical insulation; but can be made conductive

Essentially, plastics features a good electrical insulation. We may say that there is not electric appliance which does not involve plastic components using this feature. But if a plastic resin is mixed with metal powder or chips, the molded product is given a good electrical conductivity.

- (7) Reduced production costs

Although the material itself is not very cheap, production costs can be reduced and relatively low initial investment for the equipment.

### **Shortcomings**

- (1) Susceptible to heat and inflammable

This is the biggest shortcoming- in heat resistance plastics is inferior by several ranks to metals and glass. Even slightly high temperatures cause



deflection. Furthermore, many plastics burn easily and generate a large quantity of calories, smoke and toxic gases when burned. Even thermosetting resins smolder and scatter at temperatures exceeding 200 degree Celsius.

(2) Adversely affected by temperature changes

Physical properties of plastics are deteriorated by an excess temperature change to either high or low.

(3) Insufficient mechanical strength

If compared with metals with an equivalent volume, the mechanical strength of plastics is much lower. This difference is especially significant for thin-walled products.

(4) Low resistance to some solvents and chemicals

Generally, plastic is highly resistant to chemicals, but they are made very fragile by some. However, thermosetting resins are fairly resistant in general.

(5) Inferior durability

The durability of strength, glossiness and transparency is all inferior. Furthermore, plastics are generally susceptible to ultraviolet and solar rays.

(6) Easily scratched, and stained and attracts dust.

Since surface hardness of plastics as a whole is poor, plastic is easily scratched. Since plastic is an insulator bearing static electricity, it attracts dust.

(7) Poor dimensional stability

Since plastics have larger shrinkage factors than metals, it is difficult to mold plastics in precise dimensions. Furthermore, the size of plastic product is subject to thermal and humidity effects during a long time of use.

The outstanding properties, or characteristics, of plastic materials (when compared with metals) are:

- (1) They can be coloured throughout (and brightly coloured)
- (2) They will not rust or corrode
- (3) Very complicated shapes can be easily and quickly molded
- (4) Normally, no finishing operations are needed on molded parts
- (5) Several complex shapes can be molded integrally (at the same time)
- (6) All plastics possess excellent electrical resistance
- (7) They are good thermal (heat) insulators.
- (8) They are low weight materials
- (9) Some plastics are optically transparent (e.g. PS,PC,PMMA, and SAN)

### 3.3 Types of Plastics

Plastics may be roughly classified into thermosets and thermoplastics.

#### Thermosets

Relatively low polymer resins become fluid when heated to approximately 90 degree Celsius. If the temperature is raised further, a chemical reaction (bridging) occurs, and they become high polymer compounds and harden. Since products molded in this way have a heavy molecular weight and bridging is made into a net-like three dimensional structure, they do not soften at temperatures below the decomposition point. Consequently, when a thermoset product is heated, it does not soften but just gets scorched.

Thermosets include the following (shown in parentheses are generally used acronyms or symbols):

- (a) Phenol (PF)
- (b) Melamine (MF)

- (c) Urea (UF)
- (d) Epoxy (EP)
- (e) Diallyl phthalate (PDAP)
- (f) Silicone (SI)

### Thermoplastics

When a polymer with a long chain coupling is heated, it gradually softens into a rubbery state. If the temperature is further raised and a force is applied, the polymer starts flowing. If the temperature is raised further, its viscosity diminishes. If it is then cooled, it hardens. Since the polymer starts melting at temperatures below the decomposition point, melting and solidification can be repeated alternately in a desired number of times. Thus, recycled materials can be used.

Typical thermoplastics include the following:

- (a) Polystyrene (PS, including GPPS and HIPS)
- (b) Polyethylene (PE, including HDPE and LDPE)
- (c) Polypropylene (PP)
- (d) Polyamide (PA)
- (e) Polyacetal (POM)
- (f) Polyvinyl Chloride (PVC, including HPVC and SPVC)
- (g) Polycarbonate (PC)
- (h) Acryle (PMMA)
- (i) Acrylonitrile styrene (SAN or AS)
- (j) Acrylonitrile butadiene styrene (ABS)
- (k) Polyphenylene ether (PPE)
- (l) Cellulose acetate (CA)

- (m) Polyethylene terephthalate (PETP)
- (n) Polybutylene terephthalate (PBT)
- (o) Polyphenylene sulfide (PPS)

### 3.4 Raw Materials for Plastics

In the early days of the plastics industry, i.e. the early 1900s, coal was the chief raw material for the manufacture of plastics, which were thermosetting materials such as PF resin. With the introduction of vinyl-type plastics (thermoplastics) in the mid- 1930s the consumer demand for plastics began to grow very rapidly and the large scale supply of monomers could not be met by coal as the raw material. So, from that time onwards the raw material source began to change from coal to oil (petroleum) and natural gas.

Like coal tar, crude oil was fractionally distilled to give various boiling point fractions based on the molecular weights of the chemical components of the oil. The naphtha fraction of distilled petroleum would then be further distilled, using much narrower boiling point ranges, to obtain purer ‘fractions’. Various petrochemical processes (catalytic cracking, reforming, etc.) would then be carried out on the fractions to yield very pure monomers necessary for making polymers – the main components of plastics materials.

Natural gas, another raw material source for the production of polymers, is often found together with oil deposits, or it may occur on its own. It consists predominantly of methane, but varying amounts of ethane, propane and butane can also be present. The natural gas is refined, by ‘gas processing’, to yield ethane, propane, etc. These ‘alkanes’ then undergo further processing such as ‘steam cracking’ to produce the monomers ethylene, propylene, etc. – the monomers used for making plastics, e.g. ethylene is used for making PE, propylene for making PP, etc. Ethylene is also used to make other monomers, e.g. VCM (vinyl chloride monomer) used for making PVC.

### 3.5 Plastics Processing Method

Plastics processing methods are the processes used to manufacture (mould, extrude, etc.) plastics products. These processes usually involve heating, shaping and cooling operations. The choice of process is usually determined by the shape of the final product required and whether the material being processed is thermoplastic or thermoset. There is a wide range of processing methods, therefore only the major processes will be described.

- (1) Melt processes
- (2) Heat softening
- (3) Solution processes
- (4) Paste processes
- (5) Powder processes
- (6) Monomer polymerization processes
- (7) Foam processes

Mostly, the Melt Processes are used for converting raw materials to be finished products. It could be classified into Injection Molding, Extrusion, Calendering, and Blow Molding.

#### (1) Injection Molding

Process: Plastic granules fall from a hopper into a heated barrel where the granules melt. The molten plastic (the 'melt') is then injected at high pressure into a cold mould. The melt fills the cavities (shape of products) and solidifies on cooling. After a given time, when the (thermo) plastic inside the cavities is rigid enough, the mould opens and the moldings (products) are ejected.

Sequence:

- (a) Mould closes and clamps at high force

- (b) Melt is injected at high pressure into mould cavities
- (c) Melt inside cavities cools and solidifies
- (d) Mould opens and parts (moldings) ejected

Features of the process:

- (a) The parts (moldings) are produced in their finished state
- (b) It is a highly sophisticated process
- (c) Intricate, complicated shapes are easily produced-repeatedly
- (d) Very high output rates
- (e) Complicated moulds are used-expensive
- (f) Metal 'inserts' can be molded into parts, e.g. for pliers and knives
- (g) It is a repetitive, cyclic process (e.g. 20 second cycles)
- (h) Very high clamping forces and injection pressures are used
- (i) Sturdy machines and moulds are essential-high costs
- (j) For moldings of surface area greater than  $1000 \text{ cm}^2$ , the injection machine becomes excessively large and very expensive
- (k) It is not suitable for moldings over 5-10 mm thick
- (l) Molding features such as holes, screw threads, ribs, and bosses, are easily molded into parts 'in situ'
- (m) Not suitable for molding parts having large variations in thickness

From the foregoing, we can say that the injection molding process is suitable for:

- (a) Making small intricately-shaped moldings
- (b) Runs of several thousand (even millions) of parts to cover the high mould and machine costs



Hence, the design of injection machine is known as an ‘in-line screw machine’, or, more fully, an ‘ in-line reciprocating screw injection molding machine’.

The sizes of injection molding machines range from small, bench-top models that can mould items such as miniature gear wheels, cogs and washers to very large machines that can mould kitchen tables and garden furniture.

Injection molding is a cyclic process, meaning that a number of operations are performed, in sequence, by the machine to produce a molded article. The whole series of operations is then repeated, i.e. the cycle is repeated, to mould another article. The cycle is repeated again and again, often fully automatically, to produce identical moldings. Each step in the molding cycle requires precise adjustment of machine parameters such as pressure, speeds, times, temperatures, distances and volumes. Arriving at optimum machine setting conditions is therefore no easy matter. However, once optimum conditions have been established most modern machines have the facility to make a permanent record of the setting data, e.g. on a floppy disc, for future use. Furthermore, the more sophisticated injection machines incorporate closed-loop feedback control systems to prevent the molding conditions from straying from their set values-an expensive feature, but necessary for certain types of high precision molding operations.

Despite the large range of available injection machines, they all perform basically the same type of cyclic operation as follows:

- (a) The mould closes and locks at high force
- (b) The injection unit moves towards the mould and stops when the nozzle contacts the mould

- (c) Molten plastic ('melt') is injected from the heated barrel into the mould at high pressure (the screw acts as a 'piston' for this operation)
- (d) High injection pressure is reduced to a lower dwell pressure in order to pack the melt inside the cavity-without over-stressing the material
- (e) After the mould has been packed with molten plastic, the screw starts to rotate and move backwards-this operation (plasticisation) prepares melt for the next cycle
- (f) The screw stops moving when the correct volume of melt has been prepared for the next molding shot. Then the screw moves back a short distance, e.g. 5 mm, to decompress the melt ('suck-back' function)
- (g) Immediately after suck-back the injection unit moves away from the mould, e.g. by about 1 cm, to separate the hot nozzle from the cold mould and therefore prevent chilling of the nozzle (hardening of the melt inside the nozzle). This operation is called 'sprue-break'
- (h) There is now a waiting period until the molding has hardened sufficiently inside the mould to allow it to be ejected without being distorted
- (i) The mould opens and the molding is ejected
- (j) After a short pause (1/2 to 1 second) the above sequence of operations is then repeated for the next 'cycle'

## (2) Extrusion

Process: Plastic granules, or powder, falls from a hopper into a heated barrel where melting takes place. Inside the barrel a continuously rotating screw mixes and transports the melt along the barrel. When the melt finally reaches the end of the

barrel it is forced through a die which imparts the shape to the 'extrudate' (the material leaving the extruder).

After the extrudate emerges from the die it is subjected to a variety of operations depending on the end-product required-pipe, sheet, film, profile, wire-covering. For example, in the case of pipe production the extrudate is slightly pulled before it passes into a water-cooled sizing die. From the sizing die the hardened pipe is further cooled by passing through a long water trough. Then the pipe passes through a haul-off device before being sawn off to standard lengths.

Features of the process:

- (a) It is a continuous process (not cyclic like injection molding and blow molding)
- (b) In view of the normally very long production runs the overall cost of dies is low
- (c) Long lengths of constant cross-sectional shape are produced, e.g. annular (pipe and tubing), round (rod), L-shape (edging), and profile (channeling)
- (d) Products with fairly wide range of section thicknesses are possible
- (e) The capital costs of the extruder and auxiliary (downstream) equipment can be high
- (f) Secondary operations are often required on the extruded product, e.g. HF welding, bag making operations, vacuum forming, and printing

From the foregoing we can say that extrusion is suitable for:

- (a) Making continuous lengths of product having a constant cross-sectional shape (extruded product is cut to lengths, wound into rolls, etc.)

- (b) Producing semi-finished products requiring some additional process to give the finished product
- (c) Long production runs (lay-flat film, pipe, sheet, etc.)

Many plastics processing methods are based on extrusion, e.g. pipe and profile extrusion, blown film extrusion, chill-roll cast film extrusion, sheet extrusion, and wire coating. All of the above processes use more or less the same design of single screw extruder.

### (3) Two-Roll Milling (Calendering)

The process of 2-roll milling is one method by which additives are incorporated into polymers in the molten state, i.e. it is a 'compounding' process. Other common compounding processes are Banbury mixing (internal mixing) and twin-screw extrusion (also a form of internal mixing).

Two-roll milling is used for compounding both rubbers and plastics, in particular plasticised PVC. Mills range in size from about 15 cm roll length (laboratory size) to over 2 m roll length used for production work in industry. The rolls are made from cast iron and the surfaces are hardened and polished. When, in use, the rolls rotate towards each other at the top where the material (stock) tumbles to form a 'rolling bank'. Either a mill knife is used to cut and fold the molten band (manual process) or a stock blender is used (automatic process) to improve the mixing efficiency. The gap between the two rolls-the 'nip'-can be adjusted to achieve optimum mixing conditions.

The roll speed used depends on the roll diameter but typical speeds are about 20 rpm. Machines are usually designed so that the two rolls can be run either at the same speed or at different speeds, e.g. with a friction ratio of 1:1.2. For optimum compounding, the rolls should have facilities for independent heating and cooling.

In practice, the polymer is first added to the mill and ‘banded’, i.e. made to melt and form a continuous band of molten material around the front roll. The additives are then added one after the other (or sometimes as packages of 2 or more additives) with good mixing between each addition. Good mixing is achieved by cutting and folding the band in itself, cutting and rolling up the band in the hand and passing it back through the nip after turning it through 90 degrees, and by opening and closing the nip at appropriate stages of the mixing cycle. Finally, the band is cut across, squarely, and removed as a sheet. The whole mixing process usually takes about 15 to 20 minutes.

A feature of 2-roll milling is that it is labour intensive and the quality of mixing is subjective, i.e. the operator decides, visually, when the compound is homogeneously mixed.

Two-roll milling is a mixing process, i.e. it produces a mixed compound which is used in a subsequent process (e.g. compression molding) to produce a finished product.

#### (4) Injection Blow Molding

Approximately 10% of blow molded products are made by the ‘injection blow’ process, the rest (90%) are made by ‘extrusion’ blow molding.

Compared with extrusion blow molding, injection blow molding is a relatively new process—it has only been used since 1970.

##### Process:

- (a) A ‘preform’ is injection molded around a ‘parison stick’—which later serves as a ‘blowing mandrel’

- (b) The injection molded preform is thermally conditioned to the optimum blowing temperature for the molding material-the 'thermoelastic range' ( e.g. 125 degree Celsius for GPPS)
- (c) The conditioned preform is then transferred to a blow mould
- (d) Air is blown through the parison stick to inflate the preform into the shape ( e.g. bottle) of the blow mould cavity
- (e) The blow mould is opened and the product is removed (ejected)

Features of the process:

- (a) There is no wastage of material (no sprues, runners, neck or tail flash)
- (b) It is easy to thicken the preform at required parts
- (c) There are no visible seamlines due to pinch off (as for extrusion blow) on the product base-only small pin-gate mark remains on the base of the product.
- (d) The polymer melt strength is unimportant since the melt is injected into the cavities of a closed mould-it does not have to support its own weight as does as extruding parison. Thus, GPPS can be injection blow molded without difficulty-not so with extrusion blow molding
- (e) The cost of the equipment is high since it includes both an injection machine and blow molding machine together with their separate control systems
- (f) The process is suitable for only relatively small components

Typical outlets for injection blow molded parts are pharmaceutical products, cosmetic containers, and food containers.



### 3.6 Company's Products (PVC Compound Resin)

Approximately 70 to 75% of all plastics used worldwide are the so-called commodity plastics, e.g. the polyolefins (PE and PP), the styrenics (GPPS and HIPS) and PVC (rigid and flexible). Thailand's plastics industry, at its present stage of development, processes mainly the commodity plastics but some engineering and specialty plastics such as POM PC and PES are also being processed-mainly by injection molding. As Thailand continues to develop economically and technologically it is to be expected that these types of high value-added materials will be used more and more.

We are the manufacturer for PVC compound in both rigid and flexible grades. We have experience in this kind of business for more than 10 years. Most of our customers use our material for producing wire and cable, hose, shoe, soft and hard profile. We have a variety of grades which are suitable for customer's applications. At the same time, we also produce the material as required specification for customers. PVC is the abbreviation of Polyvinyl Chloride. We use PVC resin mixing with many additives and stabilizers to produce variety grades of PVC compound. The properties of PVC compound depending on additives and stabilizer which are mixed with them.

#### Types of PVC (Polyvinyl Chloride)

There are two general types of PVC:

- (1) uPVC (or unplasticised PVC or rigid PVC)
  - (a) Pipes
  - (b) Bottles (clear)
  - (c) Profile (e.g. conduit, edging, and trim)
  - (d) Rigid sheet
  - (e) Injection moldings (e.g. pipe fittings)

(2) Plasticised PVC (or flexible PVC)

- (a) Wire and cable coating
- (b) Floor tiles
- (c) Calendered sheet (for making car seat covers, stationery files, wallpaper)
- (d) Shoes
- (e) Toys

Approximately twice as much rigid PVC (mainly in the form of pipes and blow-molded bottles) is consumed than flexible PVC.

Although PVC is inherently one of the most unstable polymers in common use it is, paradoxically, one of the most widely used polymers. This is because of its combination of useful properties and its versatility – available in many grades. PVC must always be stabilized – even before melt processing – otherwise it will rapidly degrade (i.e. turns black and loses its strength properties).

Another unusual aspect of PVC is that it is usually blended with lots of additives – fillers, stabilizers, lubricants, plasticisers, pigments, etc.

Manufacture of PVC

There are two general types of PVC polymer: (1) suspension polymer, and (2) emulsion polymer. Both types of polymer can be made in the same reaction vessel. The most obvious difference between the two types of polymer produced is that suspension PVC has a much larger particle size (approx. 0.1 mm) than emulsion PVC (approx. 0.001 mm).

PVC is made from VCM (vinyl chloride monomer) – a highly toxic gas. VCM itself can be made by two chemical routes: (a) from acetylene, or (b) from ethylene

## (1) Suspension Polymerisation

The polymerisation of VCM is strongly 'exothermic', i.e. a lot of heat is created during the reaction (polymerisation). This exothermic heat, which can cause serious production problems, is controlled by allowing the polymerisation reaction to take place inside lots of very small monomer droplets which are dispersed, or suspended, in a large mass of relatively cold water. Suspension agents are added to the reaction mixture to keep the monomer droplets suspended in the water. The catalyst used is a 'free radical' type.

## (2) Emulsion Polymerisation

Again, due to the highly exothermic reaction, the polymerisation process is carried out in the presence of a large amount of 'cold' water. The monomer droplets are 'emulsified', i.e. stabilized in the water, using an 'emulsifying agent', e.g. a type of detergent or soap. In contrast to suspension polymerisation, emulsion polymerisation uses catalyst systems (e.g. potassium persulphate) which are soluble in the water, not in the organic phase.

The actual polymerisation 'mechanisms' (the way polymerisation occurs) of emulsion polymerisation and suspension polymerisation are very different.

In general, suspension PVC polymer is used for making products by melt processes – extrusion, injection molding, calendering, and blow molding. Emulsion grade PVC is normally used to make pastes and powders which are then used to make products such as rotationally molded parts, spread fabric, fluidized bed coated parts and foamed PVC parts.

## The Versatility of PVC

In general, many additives are mixed with PVC to give particular types of products having the required properties. This means that, depending on the type and amount of additives used, many different types and grades of PVC are possible:

- (a) Flexible PVC products ranging from very soft to hard
- (b) PVC products having specific properties such as low temperature flexibility and fire retardancy.
- (c) PVC foam
- (d) Microcellular PVC---for the footwear industry
- (e) Flexible and rigid calendered sheet--- having glossy or dull surfaces, or embossed
- (f) PVC pastes---for coating fabric, rotational molding, dip casting, etc.
- (g) PVC powders---for fluidised bed coating, electrostatic spraying, etc.

It is evident from the above list that there are a great many different processing methods that are used to make PVC products. In fact, PVC is often considered to be a separate industry on its own---within the plastics industry as a whole. Technologies such as PVC stabilisation and plasticisation are quite complex and specific to PVC.

## PVC Additives

PVC differs from most other polymers in the wide range of additives that are usually blended with it to make useful products. A typical flexible PVC formulation for electrical wire covering---for use in mines---would be:

Table 3.1. Flexible PVC Formulation.

<u><b>Material</b></u>	<u><b>Parts per hundred of resin (Phr)</b></u>
PVC	100
DIOP	40
TXP	20
China clay	20
TBLS	6
Stearic acid	1
Extender	25
Pigment	2

- (1) PVC---the polymer base for the compound
- (2) DIOP---a low cost general purpose plasticiser (di-isooctyl phthalate)
- (3) TXT---a plasticiser specifically to impart flame retardancy to the compound (trixylyl phosphate)
- (4) China clay---a low cost filler (to reduce the cost of the PVC compound)
- (5) TBLS---a stabiliser to prevent premature degradation of the PVC (tribasic lead sulphate)
- (6) Stearic acid---a lubricant to prevent the molten PVC from sticking to the processing machinery
- (7) Extender---a low cost oil or wax to reduce the overall cost of the PVC compound
- (8) Pigment---to impart colour to the PVC compound

## IV. MARKETING OVERVIEW

### 4.1 Business Overview

Bangkok Plastic Compound Co., Ltd. (hereinafter called “BPC”) is a manufacturer of PVC compound in many kinds of grades and for many applications. Our customers are plastic injection factories, extrusion, and calendering. They use our products as raw material to produce many kinds of products such as wire and cable, soft and hard profile, and shoes etc. BPC has to provide technical support to customers if they face problems while processing or if they need the processing condition by sending our engineers to solve the problems. Also, our engineers have to support new customers if they request us for making products to match their specifications. By this way, BPC has to absorb operating cost and expenses for traveling fee, working time, and staff's work force in servicing customers.

In the online business era, most companies have started to utilize the Internet for their businesses. It can help them to expand businesses and promote their companies to reach their target market. Internet can be used as a tool to provide products information and to support various services to customers, including the fact that it can help to reduce time and travelling expense. The companies can reach closer not only local customers but they can reach distance-customers closely.

As the Internet can offer great benefits to business world, [www.bpc.co.th](http://www.bpc.co.th) is established to be a complement channel of BPC's traditional business. BPC can easily expand business overseas by using Web site which can publish company information and product information as well as promote company image to distance-customers. The Web also provides customers with countermeasures for the problems that occur from using the products. By this way, customers can solve problems by themselves without



stopping the production processes in order to wait for the engineers and BPC can avoid operating cost. Moreover, BPC's Web site provides more convenience to customers by allowing them to order products online.

#### **4.2 Business Goals**

- (1) To expand the marketplace to national and international markets. With minimal capital outlay, a company can easily and quickly locate more customers, the most suitable business partners worldwide.
- (2) To improve image, improve customer service, new-found business partners, eliminating paper and increase flexibility.
- (3) To provide countermeasure to users by online technical support,
- (4) To overcome time and geographical constraints by using the Internet and World Wide Web as tools for distributing information about company and its products, including countermeasure for problems of using the products.
- (5) To provide information about background of plastic industry and processing of plastic.

#### **4.3 Situation Analysis**

##### Trend

Thailand has recently become a major producer of commodity polymers in the region. The raw material used for these polymers is natural gas, which is abundantly available in Thailand -- mainly in the Gulf of Thailand. Thailand has been manufacturing polymers, based on natural gas, for only 10 years or so. The industry has concentrated on the production of polyethylene, polypropylene, and polyvinyl chloride, i.e. mainly the commodity plastics. As with any new venture of this magnitude, the initial costs of establishing the plants, services, infrastructure, etc. are enormous. And part of these costs must be borne by charging higher initial price for the products made.

Thus, at the present time, locally produced polymers are more highly priced than those from other countries which have more mature, developed polymer manufacturing facilities. In order to protect local polymer producers, the government imposed tariffs on imported polymers in order to make indigenously manufactured polymers more attractive (cheaper) for local plastics converters. However, as the Thai polymer producing industry is now becoming more established the tariffs on imported polymers is being gradually reduced until, in a few years time, the tariff on imported polymers will be zero rated. When this happens Thailand must compete with foreign competitors on equal terms, i.e. the plants must be run at maximum efficiency.

At the present stage in the development of Thailand's polymer industry the trend is a gradual progress towards the manufacture of engineering plastics which are more 'value added' materials than the commodity plastics. The table below shows the present polymer manufacturing capabilities of Thailand, reflecting the trend towards the production of engineering plastics. Note that many engineering plastics are used in automobiles and Thailand is fast developing into a regional center for automobile assembly and parts manufacture. Many major overseas car manufacturers are interested in using Thailand as a base for their vehicle assembly plants.

Revenue from exported plastics products in 1995 was 37 billion baht. (approx).

The main overseas markets for Thai plastics products were:

Singapore:	37.9 %
Japan:	8.0 %
Hong Kong:	7.8 %
USA:	6.1 %
UK:	3.2 %

Thus, Thailand's petrochemical and plastics industries are both predicted to develop into strong regional centers. The potential for the plastics industry in Thailand is very good when one considers the present low per capita consumption of plastics in the country.

### Competitor

Every business industry has seen the benefits of the Internet. It can help to reach more new targets and improving services. Many companies have set up their own Web site to promote their business and selling their products.

In plastic industry, most plastic manufacturers have seen these benefits and also set up their Web sites to promote their companies and products. They are trying to find more new targets and expand markets both domestic and overseas. The Internet is used as a new of distribution channel for selling products and providing information. Now, our main competitors are TPC, ACI and DB. We are producing the same products but previously focused on different targets. Because of the economic situation, it creates more competitors. Everyone tries to expand market and increase market share.

## **4.4 SWOT Analysis**

### Strengths

- (1) Reducing processing, distributing, storing, and retrieving paper-base information: In traditional business, customers always request for material specification. BPC has to send such information via fax to them. Then, we provide product information to customers on Web site. They can compare grade and can see specifications by themselves. This way can help BPC to reduce paper-based document and customers can get their desired information more quickly.

- (2) Providing more convenience for customers to contact BPC: By conducting business via this Web site, BPC provides other ways besides the traditional ways for customers to contact the company. Customers can post their requests or questions on inquiry form or send them via electronic mail to us.
- (3) Providing customers support 24 hours per day: Traditional business is conducted only during office hours. If customers need support during nighttime, this Web site is usually available for them. It operates 24 hours per day and it is virtually immediately accessible. Then, when customers need information about products or technical support, they can see it from our Web site. Moreover, our customers are the manufacturers and most of them run the machines 24 hours per day. If they face problems in production processes, they can use information about technical problem and countermeasures on the Web site.
- (4) Providing customers with product information: Customers can look for our product information which is necessary for them when using products. For example, new customers may need to know the condition of machines when they use our products. Such information is available for them on the Web site, in online technical support section.
- (5) Providing more efficiency in distributing company news and information: Web site can help BPC to distribute company news and information as well as promotion and its details to customers. Also, all information on this Web site is up-to-date.
- (6) Providing flexibility in customizing products to customers: BPC can produce the compound resin as customer request. They can request to produce the materials which match their specification in minimum volume.

We serve our customers with product customization services in order to reach customer's satisfaction.

- (7) Providing high quality products with lower cost: BPC provides high quality PVC compound resin to customers with reasonable price. We have set up the bracket price as the standard price. The prices of our products depend on volume which customers would like to buy.
- (8) Providing new channel for placing an order: BPC provides the order form in our Web site where customers can place an order to us. We provide it for the existing customer only for their convenience. The customers have to get the username and password from us in order to use this menu.

#### Weaknesses

- (1) High cost for developing company's Web site: Like any first time challenge, setting up the company's Web site usually takes lots of money, especially e-commerce Web site. BPC has to invest money for this coming technology, including for training employees and inducing the existing business customers to use it.
- (2) Lack of IT personnel who are experts in Web technology and e-commerce business: In order to create stable Web site that matches our requirements and is suitable for our business, we need IT personnel who are experts in Web technology. Thus, lack of these people is one of the major weaknesses in doing e-commerce business.

#### Opportunities

- (1) Popularity of Internet in Thailand: Internet becomes popular in Thailand for both personal and business use. Many businesses have seen a lot of benefits

of the Internet and are rapidly moving toward electronic communication via the Internet in order to improve business-to-business interaction.

- (2) Providing new choice of customer support for long distance customer: For the long distance customers when they are facing problems about our products, it is quite difficult to support them on time because it takes time for travelling and our engineer have to be on site to solve the problem for them. When we set up the Web site, customers can look for the countermeasure in the first stage. The customer can solve the problem on time.
- (3) New sales opportunities: The Internet operates around the world. We can use the Internet to expand our business. The business can reach out to new customers (both locally and globally) that cannot be reached effectively with a traditional business.
- (4) No competitors who offer same services: From our competitors, there is no one who has the Web site which is doing the on line technical support, products specification matching. This is one of our advantages which can support our customers.

### Threats

- (1) Lack of well-designed network and telecommunication infrastructure in Thailand: The Internet infrastructure in Thailand is still poor. The user of Internet requires a well-designed network and telecommunication infrastructure. But Thailand currently faces the limitation of bandwidth. It will effect the Internet's user if it is too slow in retrieving information from our Web site.



- (2) The ratio of the Internet users in Thailand is low compared to the population: Even though the growth rate of the Internet users is continuously increasing, the ratio of the Internet users in Thailand is still low compared to the population, which will result in the limitation for distributing information through the Internet.
- (3) The customer's behavior which always need the support from engineers coming to factory: Our customers normally, when they start to use our products, require our engineers to set up their machine for them. They need the advice from engineers to setting the molding condition. Then, this behavior may have some effect on our purpose in setting up the on line technical support. They may not want to set up the machine by themselves.
- (4) Customer Supporting on line is new for our customers: Most of our customers still use the traditional communication way, such as phone or fax. And the Internet is a new choice for them and they may lack experience to use the customer supporting on line.

#### **4.5 Benefits**

##### Benefits to Company

- (1) To expand the marketplace to national and international markets.
- (2) To decrease cost of creating, processing, distributing, storing, and retrieving paper-based information.
- (3) To lower telecommunication cost and traveling cost.
- (4) To improve company image and customer services, as well as to get more opportunity for new found business partners.

### Benefits to Customers

- (1) Customers can use the online technical support or find information from our Web site 24 hours a day, all year round, from almost any location.
- (2) Customers can receive relevant and detailed information in seconds, rather than days or weeks.
- (3) To improve services providing for customers such as product information and details.
- (4) Current customers can place an order to us by using order form in our Web site. We provide the convenience for them.

### **4.6 Cost and Benefits Analysis**

By setting up company's Web site, we need to invest money for creating it. Cost and benefits analysis is used to evaluate and find the optimum way from comparing between cost and benefit by calculating all the anticipated costs associated with the system.

#### Cost Estimation

Cost estimation in setting up our company's Web site is mainly come from Web site design fee. The main costs for creating company's Web site are the following:

- (1) Web site Design
- (2) Domain Name Registration
- (3) Web Hosting Fee
- (4) Maintenance Fee

Table 4.1. Cost Estimation.

Description	Price/Unit	Total Price (Baht)
Web Site Design	30,000	30,000
Domain Name Registration (2 years)	3,000	3,000
Web Hosting Fee (12 months)	1,000/month	12,000
Maintenance Fee (12 Months)	1,000/month	12,000
Total Cost		57,000

Benefit Estimation

Benefit can be measured in any ways such as cost reduction, creating company image, saving time, etc. The following are the benefits that can be deserved from creating Web site:

- (1) Gaining the business opportunities
- (2) Promoting and create company image
- (3) Creating brand awareness
- (4) Saving cost for technical advice to customers
- (5) Improving services provided for customers

It is quite difficult to measure the benefits into amount of baht. However, the cost investment for creating company's web site is not too high comparing with other ways to gian same benefits as mentioned above. For example, we can promote our company to many targets at the lower cost comparing with making the advertising exposing to targets. The other example, we can save travelling cost and save time for technical support to customers. Normally, our engineer has to give advice to customers in case of technical problems at their factories and sometimes they need urgent support. From our web site, the customers can immediately get the technical support and solve the

problems in some cases by themselves. Then, customers are not necessary to wait for supporting from our engineers.



## **V. MARKETING STRATEGIES**

### **5.1 Keys to Success**

- (1) The Web site has to be easy to use and quickly viewable. The user satisfaction is an ultimate priority.
- (2) Informing about the company's Web site to current customer and informing about the available information of product and online technical support to them.

### **5.2 Market Segmentation**

Markets consist of buyers and buyers differ in one or more respects. They may differ in their wants, resources, geographical locations, and buying practices. Any of these variables can be used to segment a market. Anyway, we have segmented a market according to demographic, purchasing approaches, situational factors and personal characteristics as the followings:

#### Demographics:

- (1) Industry: Plastic industry (Injection, Extrusion and Calendering)
- (2) Location: Domestic and international

#### Purchasing Approaches:

- (1) Nature of existing relationships: Focusing on new customers and business customers whom we already have strong relationships.
- (2) Purchasing criteria: Focusing on business customers that are seeking high quality products with reasonable price and good service.

#### Situational Factors:

- (1) Urgency: Focusing on companies that need quick service and short lead-time in producing products for them.

- (2) Size of order: Focusing on every size of order.

Personal Characteristics:

- (1) Buyer-Seller similarity: Focusing on companies whose people and values are similar to ours.
- (2) Loyalty: Focusing on business customers that show high loyalty to their supplier.

### **5.3 Target Market**

Our target market are the manufacturers in plastic industry in Thailand and other countries who are using PVC compound as raw material to produce products such as wire and cable, soft and hard profile etc.

### **5.4 Marketing Objectives**

- (1) To promote company and improve company image.
- (2) To provide information and knowledge about plastics for interesting person.
- (3) To create brand awareness to plastic users.
- (4) To expand business by exporting plastics to worldwide international.
- (5) To improve service to customers such as on line technical support.
- (6) To gain more market share.

### **5.5 Marketing Mixes (4Ps)**

#### **Product Strategies**

Objective: To provide high quality of PVC compound with reasonable price to customers including good services and technical support.

(a) Product Differentiation:

- (1) Providing all customers with high quality and reliable products with reasonable price.



- (2) Providing information and knowledge about plastics to visitors such as what plastic is, the ways to process plastics, and types of plastic.
  - (3) Providing customers with information about technical support or material specification such as cause and countermeasure when processing.
  - (4) Providing well-designed Web site with user-familiar interface.
  - (5) Providing customize products in lower minimum volume for customers.
  - (6) Providing new channel for current customers in placing an order to us.
- (b) Image Differentiation:
- (1) Creating our image as a specialist in PVC compound resin for any applications of products.

### **Pricing Strategies**

Objective: To set up the standard price which is reasonable to customers and attract customers to buy in the low season period.

- (a) Setting product's price related to volume: BPC has set up the price of product based on volume which customers want to buy. We set up the bracket price of our product for customers to choose. Customers who order high volume will get the lower price.
- (b) Arranging special price for low season: BPC set up the special price period for the low season which will attract the customers to continue buying and maintain the volume.

### **Distribution Strategies**

Objective: To be a complement channel of traditional business such as online customer support and matching grades etc.

- (a) Distributing products and services mainly on traditional business: Our products are raw material for manufacturers. We have to distribute through traditional business only. However, we provide feature for regular customers to order products online and they can look for product's information from our Web site too.
- (b) Providing online customer support: Usually, we have to support customer for technical problems. And sometimes, they need urgent support from our engineer. If they face the problem at night, they have to wait until the working hours for contacting us to support them. From our Web site, we provide option of technical customer support, they can look for it and solve it by themselves in the first step.

### **Promotion Strategies**

Objective: To create awareness to targets about our Web site and maintain sales volume, including motivate them to use the online customer support.

#### **(1) Advertising Strategies**

- (a) Posting banners for advertising our Web site on well-known and related Web sites for creating awareness: Posting banners for advertising our business on related Web site such as Thai Plastics Industries Association ([www.tpia.org](http://www.tpia.org)) etc. in order to create awareness to plastic's users.
- (b) Informing information about our Web site through electronic mail in order to reach our target: BPC will create awareness to target by advertising our Web site through a variety of media which reach our target and sending an electronic mail to inform them.

(2) Sales Promotion Strategies

- (a) BPC set up the sales promotion program in order to motivate customers to buy more and we can maintain the sales volume in low season period including providing free sample for customers when they need the material to test.



## **VI. WEB DESIGN AND DEVELOPMENT**

### **6.1 Objectives of the Web Site**

- (1) To build company's Web site (www.bpc.co.th) as a complement channel for traditional business.
- (2) To publish company information and provide products information, data sheet, and technical support.
- (3) To attract the existing customers to look for information and use service on our Web site.
- (4) To expand our target market to world wide international countries.
- (5) To support our marketing strategies.

### **6.2 Key to Success**

- (1) The Web site must be easy-to-use and convenience for customers to search for information.
- (2) The Web site must take not much time to load or access to desired information.
- (3) The Web site must be able to view by any browser and version.
- (4) Information which provides on our Web site must be kept up-to-date and serves customers' need.
- (5) The Web site must be designed for being easy to update and maintenance.

### **6.3 Web Prototype Features**

- (a) Language Options (Thai and English)

We provide the options for customers to choose between the Thai Language and English Language in Home Page. The customers can choose the Language they prefer. However, the main reason to provide options in

language is that both customers in domestic and overseas can see the information in our Web site.

(b) About us

In the menu About us, we provide information about background and contact address of our company for customers. It can help the customer to know more about our company and our business.

(c) Products

The customers can search or look for our products from Products menu. We provide the search menu that the customer can search the information about product more quickly. We also provide the choice in search menu. The customer can search our products from Application, Grade, Product Name and Resin Type. It is convenience for customers to look for what they want.

(d) Order Products

We provide an order form for current customers. Only authorized customer can log in and place an order to us. The customers have to request for the username and password from us in order to use the on line order form. The customer has to fill the username and password to pass through the order form page. Every time the customers would like to place an order, they have to fill in all the details in order form such as company name, products, price, terms, conditions etc. The order will be sent to us in the form of e-mail and we will send the confirmation mail to customer for acknowledgment.

(e) Technical Support

In the Technical Support menu, we provide the technical support online for customers. The customer can use the information to solve their problem by themselves. We provide the topic of Technical Tips & Case Studies, Troubleshooting Guide and Condition Processing Guide for customers. The customer who faces the problem in using our products, they can see the troubleshooting guide to solve the problem without to wait for our engineer to solve for them in some cases. And if the customers have never use our products, they can find and use the condition processing guide to adjust the condition at their machine. It is convenience for customers to solve the problems by themselves.

(f) Contact us

We provide the convenience way for customers to communicate with us. Normally, we use the telephone and fax to contact with our customers. E-mail is the new way that the customer can send the comments, suggestions, questions, inquiries or problems to us. We can receive information from customers and can utilize it to improve our products or services. And at the same time, we can get the list of customers or potential customers from e-mail that we can send any information or news to customers at a time and also save time and cost.

(g) Site Map

Our Web site contains a lot of information and there are many menus. Then, we provide Site Map for visitors to look for where they can find what they need. It can help customers to save time to look for information page by page. They can directly go to the information page they need.



(h) Quick Links

We provide the following menus in the quick links: Data sheets, Buy Resins, Product Catalog and Matching Grades. The customers or visitors can access to the information more quickly. It can reduce time for searching information.

(i) BPC Library

We provide all visitors with information about plastics. They can search for their desired information with free of charge.

6.4 Site Structure

According to all features which describes above, the site map of the Web site is the following:

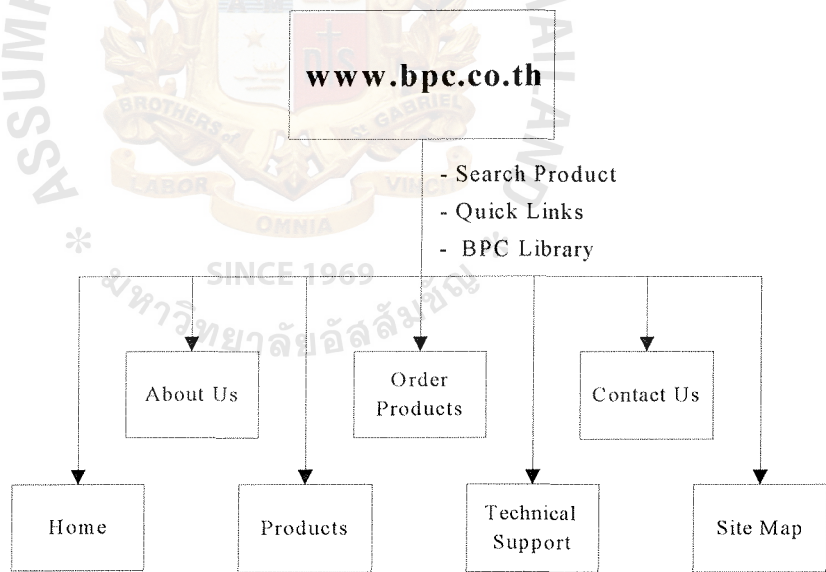


Figure 6.1. Site Structure.

6.5 Web Implementation

Our Web prototype was designed and created to achieve our objectives. We would like to use it as a complement channel for existing business. It can provide the

information about our products, customer support, technical information to our customers. We design our Web prototype to have two languages which are Thai and English. It can support customers in local and overseas. The following is the main page of our Web prototype:

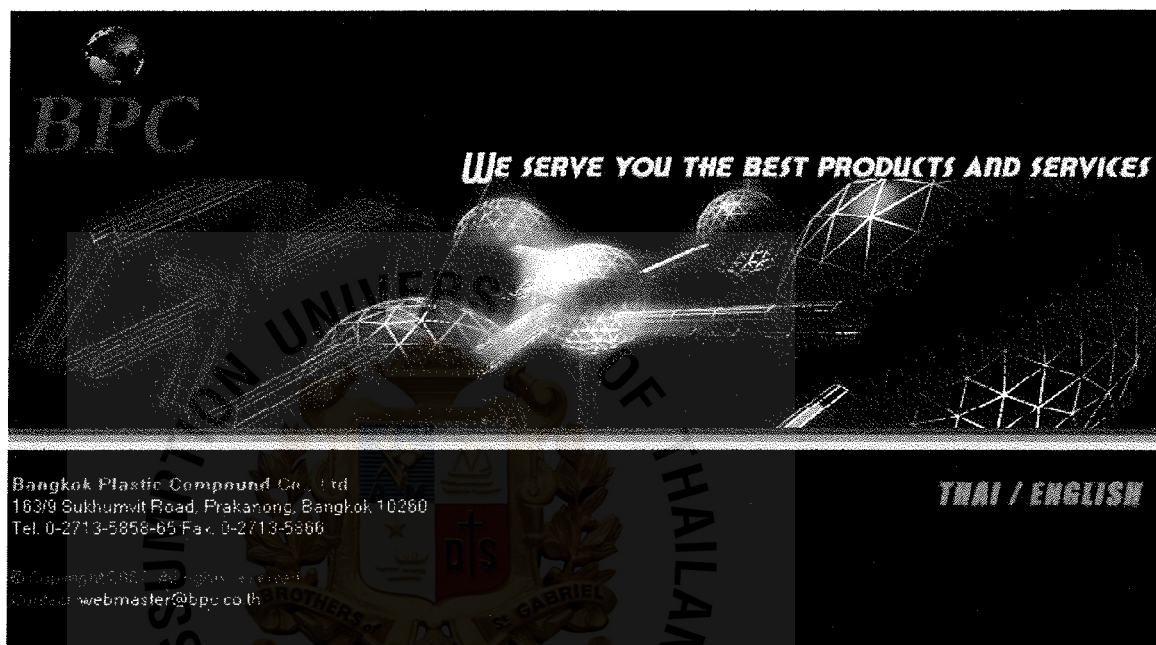


Figure 6.2. Home Page.

Our homepage is designed to present the image of company who produces and supply the quality product with high technology. We use the image of chemical structure of plastic in this page. The image files are small size and can be download faster. The shade color of image is also important factor in designing the Web to present the company image. The Home Page uses black color to be the background color. However, our Web site aims to provide information, it should be clear enough to display all information. Then, the other pages in the Web site, we use white color to be background color with the black color of font. Background color is white for clearly displaying all

information. We try to use few pictures in Web site that can support fast downloading in each page. We put the main menus at the top of each page which can provide convenience for customers to use it. And in the left side of each page, we put the search box for searching our product and provide the quick link menus where customers can directly go to information we provide such as Data sheets, Product catalogue etc. The format of each page is similar, so the visitors can smoothly navigate through the whole Web site without getting lost even if they are not familiar with the Internet. They can know exactly which parts of the site they should go to find out their desired information.

Our Web site is as follows:

- (1) Company profile of our company.



Figure 6.3. About Us Page.

(2) Page for selecting the products.



Figure 6.4. Products Page(1).

(3) Page for selecting products by product name, users also can choose searching by resin type or applications.

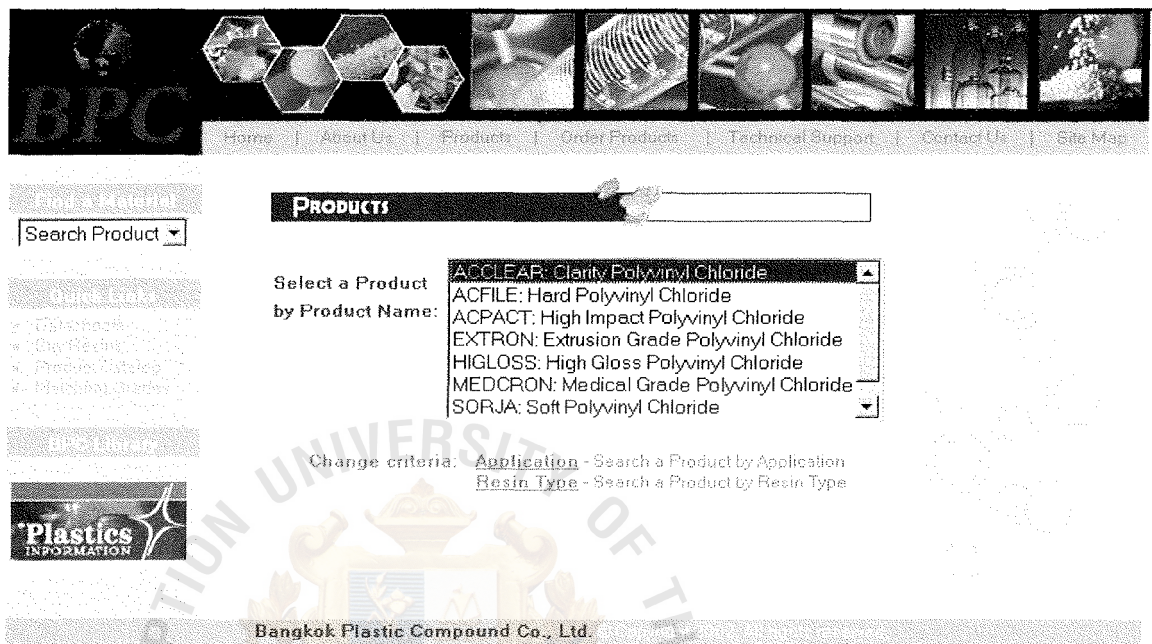


Figure 6.5. Products Page(2).



(4) Page for order products, user has to log in by username and password to pass through order form.

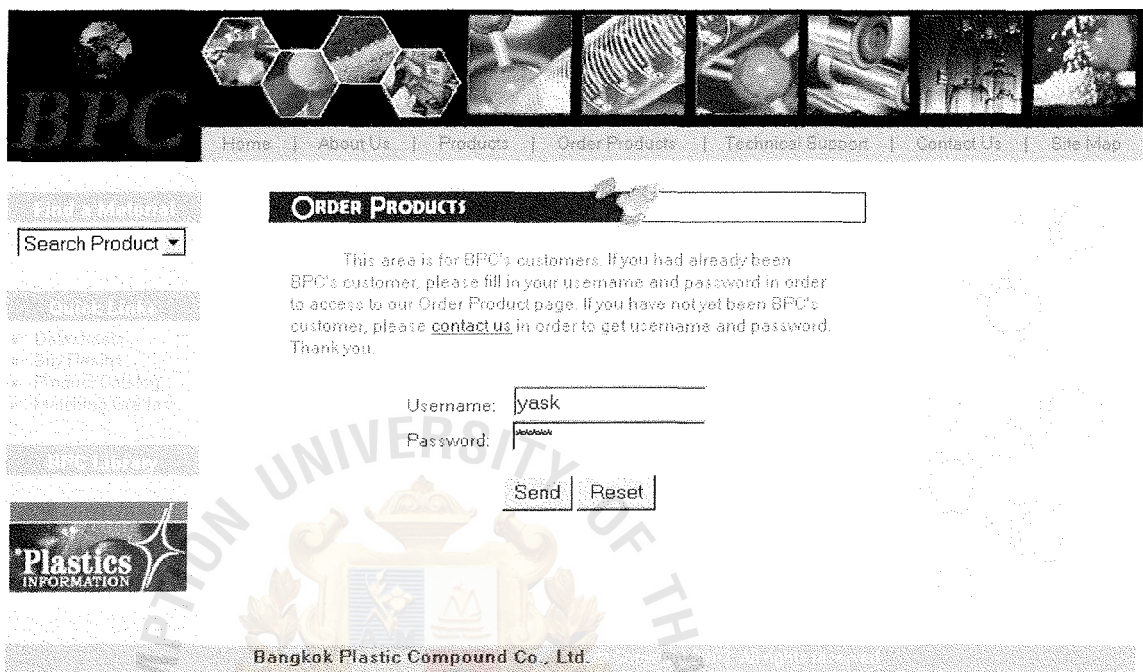




Figure 6.6. Order Products Page(1).




(5) Page for order product form.



Home | About Us | Products | Order Products | Technical Support | Contact Us | Site Map

Find a Product  
Search Product

Company Links  
a. Technical  
b. New Products  
c. Product Catalog  
d. Marketing Material

Media Gallery  


ORDER PRODUCTS

Purchase Order

Order No.: 380/2002  
Order Date: 19/07/2002

Company: Yasaku Co., Ltd.  
Contact: Mr. Somkid Sangsuk Tel.: 0-2551-6549  
Address: 59/21 Sukhumvit 62 Road, Bangkok 10260  
Country: Thailand

Product: ACCLEAR: Clarity Polyvinyl Chloride Grade: 6

Quantity: 500 Kgs. Unit Price: 45 Baht

Term of Payments: 15 day after delivery date

Request Delivery Date: 23 July 2002

Send Reset

Bangkok Plastic Compound Co., Ltd.

Figure 6.7. Order Products Page(2).

(6) Page for technical support.

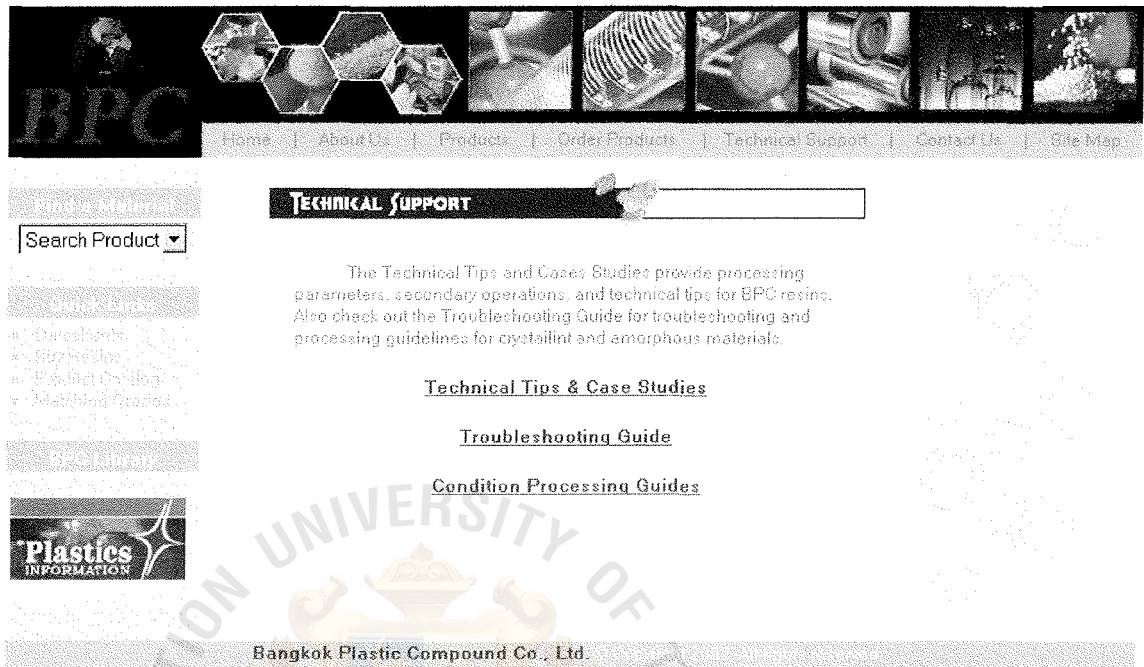




Figure 6.8. Technical Support Page.

(7) Page for users sending comment, suggestion or contact us by e-mail.



Home

About Us

Products

Order Products

Technical Support

Contact Us

Site Map

Thai Compound

Search Product

Products

Plastic Parts

Plastic Pipes

Product Catalog

Shipping Service

Information

Plastics INFORMATION

CONTACT Us

BPC is willing to receive all comments and suggestion. Please fill your information in below form and we will contact you back. Thank you.

Name:

Pornthip

Surname :

Somcharoen

Company:

Thai Plastics Co., Ltd.

Tel.:

0-2759-8582

E-Mail:

pornthip@hotmail.com

Message:

Please contact me back. I'm interested your products.

Send

Reset

Bangkok Plastic Compound Co., Ltd.

Figure 6.9. Contact Us Page.

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## **VII. CONCLUSIONS AND RECOMMENDATIONS**

### **7.1 Conclusions**

The Internet offers a lot of benefits to people such as acting as source providing information for people, helping people overcoming time and geographical constraints, reducing telecommunication cost etc. It also provides many benefits to business such as using it to promote company and expanding market place internationally, improving company image, improving service for customers etc.

BPC also would like to utilize the benefits of the Internet by setting up company's Web site. Normally, we have only the traditional business. Our Web site can be the complement channel for us to reach more new targets and providing good services. BPC Web site provides information about products, customer support on technical, data sheet etc. Our objectives expand the business internationally, promote and improve company image and improve services. We target manufacturers in plastic industry who use PVC compound as raw material to produce many kinds of products. Our main customers use our products to produce wire and cable, shoes, soft and hard profile. We provide high quality and reliability of products with reasonable price including good services. Our Web site provides information and knowledge about plastics, data sheet, matching specification etc. It can help us to reduce the paper-based document and at the same time, we can improve the services for customers. We provide the order form in our Web site for current customers to place an order to us. They need username and password from us in order to use it. It is more convenience for them. We also provide online technical support and molding conditions of each grade in our Web site. In the traditional way, manufacturers run machines all the time 24 hours per day. Sometimes when they face problems about processing, they have to stop machines and wait for engineers. It effects their production. Our Web site provides information about cause

and countermeasure of technical problems when using our material. They can solve the problem by themselves as a first step before discussing with our engineers. We set up our image as specialists in PVC compound resin for any application of products. In order to provide standard price to customers, we set up the standard price by setting product's price related to volume and arranging special price in low season to maintain the sales volume. For the distribution channel, our products are industrial products, we have to supply in traditional way only. We could not supply it online but we provide order form for regular customers to place order to us. We also use our Web site to support information to customers and improve our services. We give information about our Web site through electronic mail to our customers. Moreover, we also post banners of our Web site on Well-known and related Web sites for creating brand awareness.

## **7.2 Recommendations**

In the future, we plan to improve our Web site in both design aspect and functional aspect in order to attract customers to use it. We will add more information which is useful for visitors and customers such as price trend and global price. Also, all information will be updated constantly. We will provide more services which give convenience and are utilized by customers such as order tracking, stock availability, production schedule etc. .

The Internet connects and links people and business around the world. BPC's Web site also can reach both customers and targets in domestic and international. We can use it to promote our company, expand market, and improve services to customers. The Internet can be a good complement channel for our business.



## APPENDIX A

### USER MANUAL



## USER MANUAL

User Manual is the guideline to help visitors to navigate smoothly through [www.bpc.co.th](http://www.bpc.co.th) Web site. The main menus in our Web site are as the following:

- (1) About us: Providing background of company, company profile.
- (2) Products: Providing information about our products.
- (3) Order Products: Customers need username and password to use the order form in Web site. We provide the order form the current customers only.
- (4) Technical Support: Providing the technical tips, troubleshooting guide for customers to solve the problems when using our products.
- (5) Contact us: Providing new channel for customers to contact us directly.
- (6) Site Map: Providing the guide for customers or visitors where they can find information.
- (7) Quick Links: Providing the quick access to information.
- (8) BPC Library: Providing plastics information for all visitors with free of charge.

Homepage of [www.bpc.co.th](http://www.bpc.co.th) is shown in Figure A.1 and all features available on the site are shown in Figure A.2.



Figure A.1. Home Page of www.bpc.co.th.



Figure A.2. About Us Page.

(a) Steps for searching product information are the followings:

- (1) User accesses to Products menu by click at “Products” button on the top of page or use the search box “ Find a material” on the left side of page as seen in Figure A.3. Then, Product Search page will appear as seen in Figure A.4.

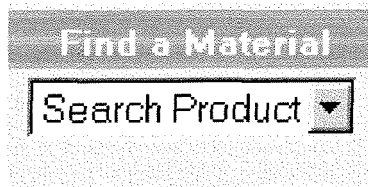


Figure A.3. Find a Material Function.

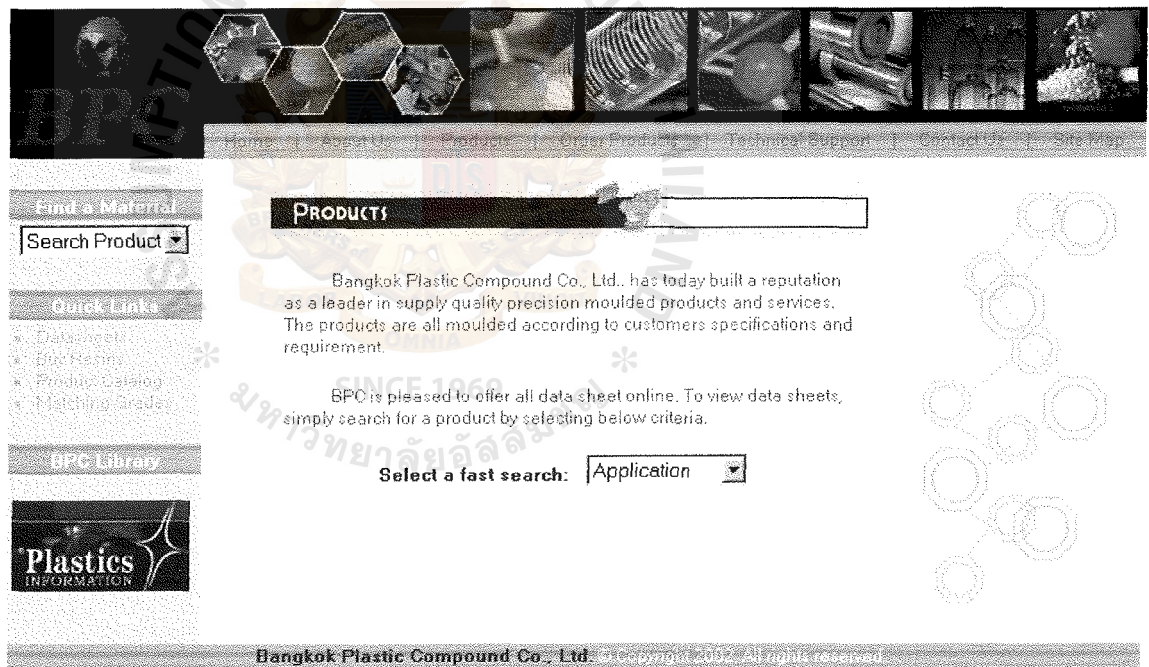


Figure A.4. Product Search Page(1).

- (2) From Figure A.4, user chooses the criteria providing in search box. User can search by Application, Product name and Resin type.

- (2) From Figure A.4, user chooses the criteria providing in search box. User can search by Application, Product name and Resin type.
- (3) If user choose search by Product name, all products name will show in the search box for choosing as seen in Figure A.5. User can choose the product from their name.

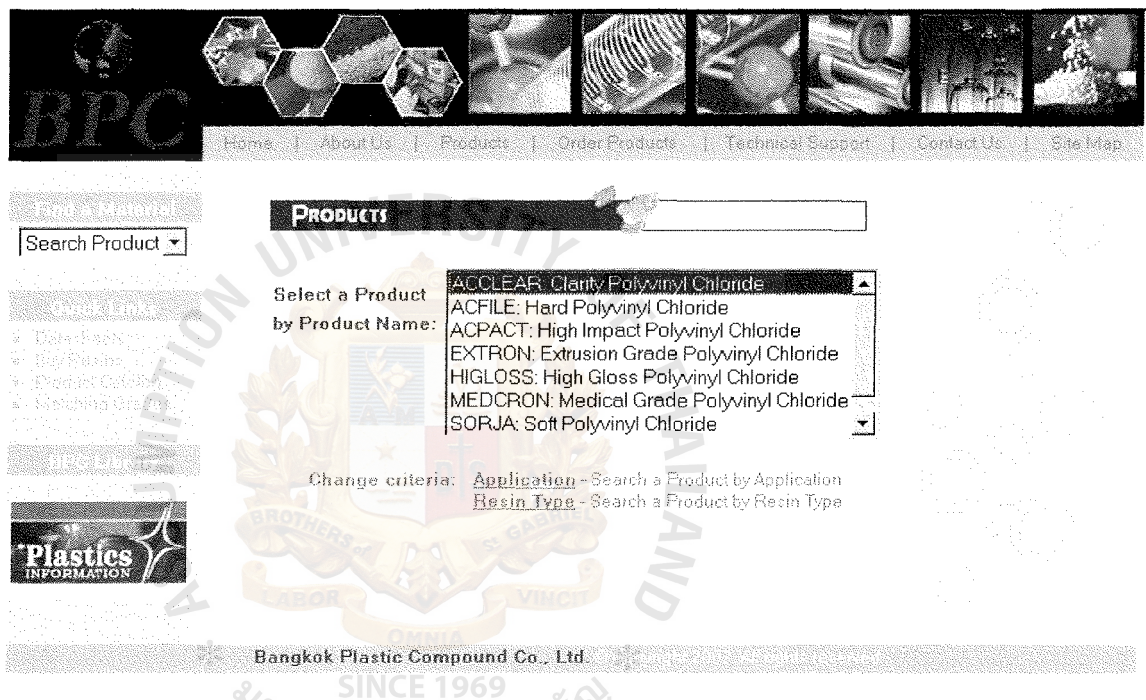

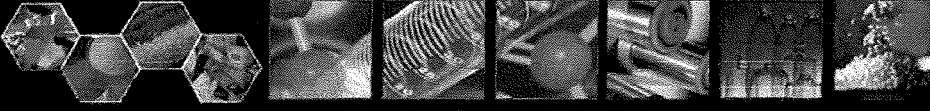


Figure A.5. Product Search Page(2).

- (4) After user chooses the product name, all grades of that product name will be shown as seen in Figure A.6. The user can choose to view the datasheet as seen in Figure A.7 by clicking “Datasheet” button or to place an order by clicking “Order Product” button.




[Home](#) | [About Us](#) | [Products](#) | [Order Product](#) | [Technical Support](#) | [Contact Us](#) | [Site Map](#)

### Find a Material

### Quick Links

- Datasheets
- Buy Resins
- Product Catalog
- Matching Grades

### BPC Library



## Products

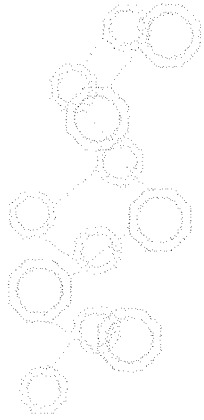
### ACCLEAR Clarity Polyvinyl Chloride

Grade [6], [8]

Grade 6		
ACCLEAR 6219	<a href="#">Datasheet</a>	<a href="#">Order Product</a>

Grade 8		
ACCLEAR 8249	<a href="#">Datasheet</a>	<a href="#">Order Product</a>
ACCLEAR 8649N	<a href="#">Datasheet</a>	<a href="#">Order Product</a>
ACCLEAR 8939	<a href="#">Datasheet</a>	<a href="#">Order Product</a>

Search by: Application | Resin Type



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Figure A.6. Product Search Result Page.

ACCLEAR 8249		
Product Characteristics		
Material Status	Commercial, Active	
Availability	North America	
Test Standards Available	ASTM	
Features	Copolymer, Random Clarity, High Impact Resistance, Good Antistatic	
Uses	Bottles Packaging	
Agency Ratings	FDA 21 CFR 177.1500	
Forms	Pellets	
Processing Method	Extrusion, Sheet Thermofforming Extrusion, Sheet Injection Molding Stretch Blow Molding	
Properties		
Physical	Nominal Values (English)	Test Method
Density (ASTM D1505)	0.906 g/cm	ASTM D1505
Melt Flow Rate (230C/2.16 kg - 1)	2.00 g/10 min	ASTM D1238
Mold Shrink, Linear, Flow	0.010 to 0.025 in/in	ASTM D935
Water Absorption @ 24 hrs	0.04%	ASTM D670
Mechanical	Nominal Values (English)	Test Method
Tensile Strength @ Yield	4700 psi	ASTM D638
Flexural Modulus	220000 psi	ASTM D790
Impact	Nominal Values (English)	Test Method
Notched Izod Impact	2.00 ft-lb/in	ASTM D256

Figure A.7. Example of Datasheet.

(b) Steps for placing an order are the followings:

- (1) User accesses to log in page by click at “Order Products” button on the top of page or click at “Buy resins” button” in the Quick links at left side of page.
- (2) In the order product page, there will be the boxes for filling the username and password as seen in Figure A.8. Only the customer who receives the username and password from us can use it. And then, click send button to enter.



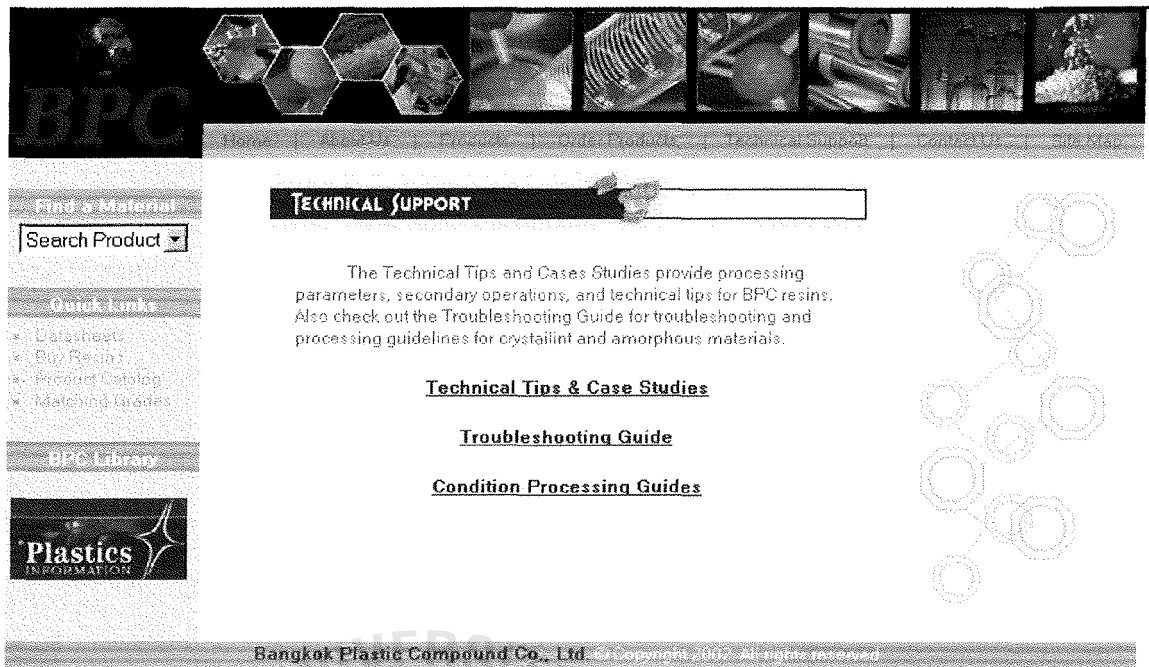


Figure A.11. Technical Support Page.

- (3) If user select Troubleshooting Guide, all countermeasures for problems will be shown as seen in Figure A.12. User can choose the countermeasures which match to their problem.

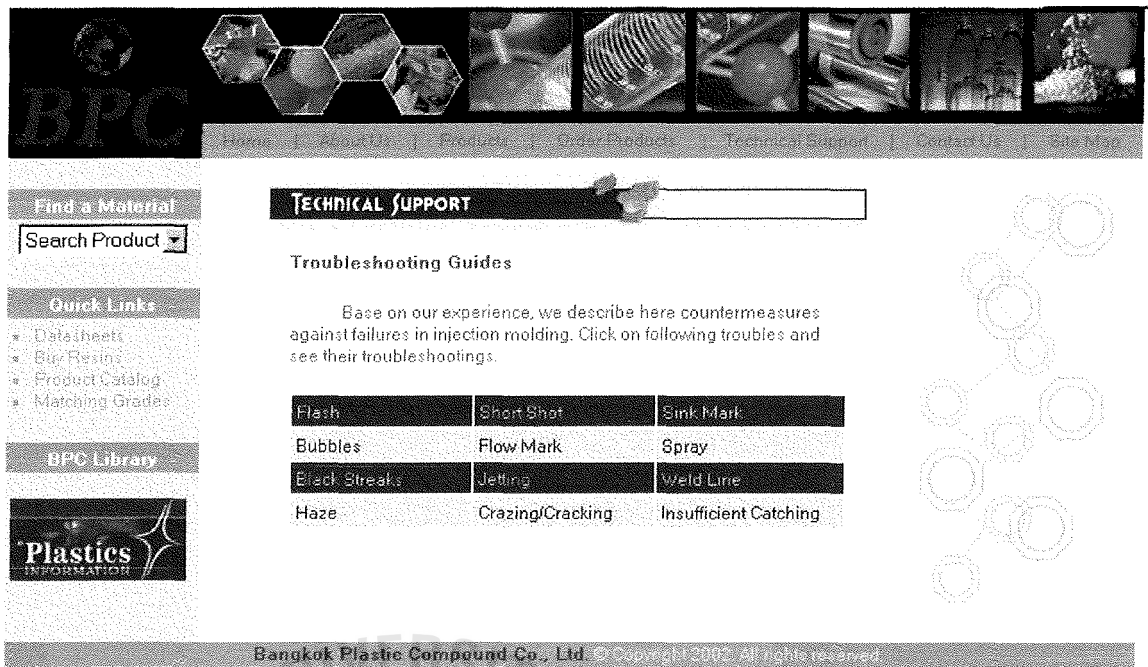


Figure A.12. Troubleshooting Guides Page.

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7. <http://www.tpia.org/>



St. Gabriel's Library, Au



