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NHTSA-82-1. III

# Profiles of Major Suppliers to the Automotive Industry

## Volume 3: Plastics, Glass and Fiberglass Suppliers to the Automotive Industry

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August 1982
**Final Report**

This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.

U.S. Department of Transportation
**National Highway Traffic Safety Administration**

**Office of Research and Development**
**Washington DC 20590**

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**Technical Report Documentation Page**

| | | |
|---|---|---|
| 1. Report No. DOT-HS-806 218 | 2. Government Accession No. | 3. Recipient's Catalog No. |
| 4. Title and Subtitle PROFILES OF MAJOR SUPPLIERS TO THE AUTOMOTIVE INDUSTRY: VOL. 3 PLASTICS, GLASS AND FIBER-GLASS SUPPLIERS TO THE AUTOMOTIVE INDUSTRY | | 5. Report Date August 1982 |
| | | 6. Performing Organization Code DTS-322 |
| 7. Author(s) J.A. Mateyka, W.R. Magro, A.S. Karlin, D.J. Yee | | 8. Performing Organization Report No. DOT-TSC-NHTSA-82-1.III |
| 9. Performing Organization Name and Address Booz, Allen and Hamilton, Inc.* Transportation Consulting Division Bethesda, Maryland 20014 | | 10. Work Unit No. (TRAIS) HS275/R2412 |
| | | 11. Contract or Grant No. |
| 12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Research and Development Washington DC 20590 | | 13. Type of Report and Period Covered October 1978-October 1980 Final Report |
| | | 14. Sponsoring Agency Code NRD-13 |
| 15. Supplementary Notes *Under contract to: U.S. Department of Transportation Research and Special Programs Administration Transportation Systems Center Cambridge, Massachusetts 02142 | | |

16. Abstract

This study summarizes extensive information collected over a two-year period (October 1978 to October 1980) on suppliers of parts and components, materials, and machine tools to the automotive industry in the United States. The objective of the study was to provide data and information in support of analyses of the U.S. automotive industry. The results of this effort are published in seven volumes --- Volume I: Overview; Volume II: Iron, Steel, and Aluminum Suppliers to the Automotive Industry; Volume III: Plastics, Glass, and Fiberglass Suppliers to the Automotive Industry; Volume IV: North American Parts and Component Suppliers to the Automotive Industry; Volume V: Multinational Automotive Parts and Components Suppliers; Volume VI: Foreign Automotive Parts and Components Suppliers; and Volume VII: Machine Tool Suppliers to the Automotive Industry.

| | | | |
|---|---|---|---|
| 17. Key Words Automotive Parts, Components, Materials, Plastics, Glass, Fiberglass, Machine Tools | 18. Distribution Statement Document is available to the public through the National Technical Information Service, Springfield, Virginia 22161 | | |
| 19. Security Classif. (of this report) UNCLASSIFIED | 20. Security Classif. (of this page) UNCLASSIFIED | 21. No. of Pages 304 | 22. Price |

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

# PREFACE

Automobile manufacturers, in general, produce only selected, key elements and subassemblies for their final product, and rely on a widespread and complex logistics network including material suppliers, foundries and fabricators for wide variety of other necessary components going into the finished automobile.

Because of the importance of the automobile industry to the United States and to the world economy, it is important to understand the makeup of the logistics infrastructure and to understand its internal interrelationships and workings with the industry it supports.

The purpose of this study was to gather all possible and pertinent information on suppliers to the automotive industry, and to present it in a form for ease of reference and further analysis.

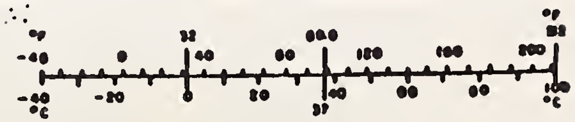
# METRIC CONVERSION FACTORS

## Approximate Conversions to Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | **LENGTH** | | | |
| in | inches | 2.5 | centimeters | cm |
| ft | feet | 30 | centimeters | cm |
| yd | yards | 0.9 | meters | m |
| mi | miles | 1.6 | kilometers | km |
| | **AREA** | | | |
| $in^2$ | square inches | 6.5 | square centimeters | $cm^2$ |
| $ft^2$ | square feet | 0.09 | square meters | $m^2$ |
| $yd^2$ | square yards | 0.8 | square meters | $m^2$ |
| $mi^2$ | square miles | 2.6 | square kilometers | $km^2$ |
| | acres | 0.4 | hectares | ha |
| | **MASS (weight)** | | | |
| oz | ounces | 28 | grams | g |
| lb | pounds | 0.45 | kilograms | kg |
| | short tons (2000 lb) | 0.9 | tonnes | t |
| | **VOLUME** | | | |
| tsp | teaspoons | 5 | milliliters | ml |
| Tbsp | tablespoons | 15 | milliliters | ml |
| fl oz | fluid ounces | 30 | milliliters | ml |
| c | cups | 0.24 | liters | l |
| pt | pints | 0.47 | liters | l |
| qt | quarts | 0.95 | liters | l |
| gal | gallons | 3.8 | liters | l |
| $ft^3$ | cubic feet | 0.03 | cubic meters | $m^3$ |
| $yd^3$ | cubic yards | 0.76 | cubic meters | $m^3$ |
| | **TEMPERATURE (exact)** | | | |
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |

## Approximate Conversions from Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | **LENGTH** | | | |
| mm | millimeters | 0.04 | inches | in |
| cm | centimeters | 0.4 | inches | in |
| m | meters | 3.3 | feet | ft |
| m | meters | 1.1 | yards | yd |
| km | kilometers | 0.6 | miles | mi |
| | **AREA** | | | |
| $cm^2$ | square centimeters | 0.16 | square inches | $in^2$ |
| $m^2$ | square meters | 1.2 | square yards | $yd^2$ |
| $km^2$ | square kilometers | 0.4 | square miles | $mi^2$ |
| ha | hectares (10,000 $m^2$) | 2.5 | acres | |
| | **MASS (weight)** | | | |
| g | grams | 0.035 | ounces | oz |
| kg | kilograms | 2.2 | pounds | lb |
| t | tonnes (1000 kg) | 1.1 | short tons | |
| | **VOLUME** | | | |
| ml | milliliters | 0.03 | fluid ounces | fl oz |
| l | liters | 2.1 | pints | pt |
| l | liters | 1.06 | quarts | qt |
| l | liters | 0.26 | gallons | gal |
| $m^3$ | cubic meters | 35 | cubic feet | $ft^3$ |
| $m^3$ | cubic meters | 1.3 | cubic yards | $yd^3$ |
| | **TEMPERATURE (exact)** | | | |
| °C | Celsius temperature | 9/5 (then add 32) | Fahrenheit temperature | °F |



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# 1. INTRODUCTION

This report on plastics, glass and fiberglass suppliers to the automotive industry is one of seven reports on companies that supply materials, parts and components, and machine tools to automotive manufacturers. It is part of a major study being sponsored by the U.S. Department of Transportation, Transportation Systems Center (DOT/TSC), to gather and assess publicly available information on the behavior and response of major materials, parts and components, and machine tool suppliers to government product and economic intervention.

## 1.1 STUDY BACKGROUND AND OBJECTIVES

This study is being undertaken to help government decision makers increase their understanding of transportation-related industries and to provide them with basic industry information. The information should prove useful in the evaluation of economic impacts caused or encouraged by government regulations. It can also help determine the economic effects of future regulations.

Recent fuel shortages and government mileage regulations are causing the major automobile manufacturers to redesign their cars and produce smaller and lighter vehicles. These changes in automotive design are leading to a change in the materials and processing requirements of the auto companies and thus are having significant impacts on the plastics, glass and other materials companies.

In the plastics industry, for instance, these changes are viewed as a tremendous new market opportunity. In the past, plastics use in cars has to some extent been restricted by the lack of durability and strength of inexpensive plastics and the large expense required to use stronger plastics. Now the need for lighter cars is opening new market possibilities and stimulating research as plastics companies try to develop products that are suitable to the new automotive needs. As each company responds to these factors, decisions are made that can have significant economic impact, especially on local employment trends and economic activity.

## 1.2 SCOPE OF THIS REPORT

This report provides a detailed view of the plastics, glass and fiberglass industries' responses to new car needs by looking at specific companies that are important in the production of automotive plastics and glass. In addition, it provides a baseline of data that can be used to track industry changes or predict industry response to future regulations.

Fourteen important suppliers of plastics, glass and fiberglass to the auto industry are covered in this report. For each company, information is provided on:

- Company size and structure, including revenues, profit and employment statistics and corporate organization
- Major markets and products, including percent of sales to the auto industry, major automotive products, sales strategy, new product plans and market strategy
- Production and operations, including production capacity and output, major automotive facilities, and plans for new plants, plant modernization and expansion
- Financial status including profitability and investment return, capital spending, capital structure and working capital management
- Research and development plans, including budgets and nature of work
- Labor and government relations, including government-industry interaction and company-union interaction.

The report places special emphasis on company plants and operations, focusing heavily on the location of the plants, plant capacity, major automotive products and planned expansions to the plants. This information is of particular significance since major decisions are continually being made (e.g., decisions regarding plant shutdowns, new plant development and plant expansion) which are likely to have far-reaching impacts.

## 1.3 METHODOLOGY

Information for this report was obtained, wherever possible, from published sources. These include:

- Magazine and trade journal articles
- Annual reports and 10K's
- Security analysts' reports on companies
- Company marketing literature and advertisements
- Annual meeting speeches
- Speeches before the New York Society of Security Analysts
- Plant guidebooks.

In addition, plant-specific information generally required contacts with the companies. Some information, such as specific customers supplied by particular plants and plant capacity, was generally found to be proprietary and thus could not be included in this report. Other information, such as the location of plants that do supply a significant amount of their output to the auto industry, could usually be obtained.

## 1.4 ORGANIZATION

This report is divided into two sections, one for plastics companies and one for companies that are primarily glass or fiberglass manufacturers. In some cases, however, glass companies also make plastic products, and these products are covered in the same chapter. The two sections begin with an overview that presents the size and structure of the industry, its relevance to the auto market and the key issues currently confronting the industry. Following these overviews, company analyses are given for the major corporations in the industry.

# 2. PLASTICS INDUSTRY

In recent years use of plastics in automobiles has been over 5 percent of total U.S. plastic consumption.* On the other hand, over 20 percent of U.S. steel production, over 10 percent of aluminum production and over 25 percent of U.S. casting production have been used by the automotive industry. Thus, in terms of share of the market, automobiles are relatively less important in the plastics industry than they are in the metal industries. However, the impact of changes in automobile design on the plastics industry will still be quite significant. Growth of plastics use in the automobile is expected to be quite large over the next decade, giving a vital contribution to the overall growth of plastics during this period. In addition, the growing use of plastics in the automobile is expected to particularly impact certain resins and processors, and changes in the automobile will have a magnified impact on the sections of the plastics industry dealing with these products or processes.

## 2.1 PLASTIC PRODUCTION

The production of plastic parts of the type used in automobiles requires two basic steps: resin production and plastic processing. Resin production involves the basic conversion of plastics from basic feedstocks to plastic materials (resins) in the form of granules, pellets, or powders. This step also usually involves compounding or formulating the base plastic into the finished plastic material by adding various chemicals. Processing refers to the steps required to turn the plastic material into secondary products (sheet, battery cases, hose, coated fabric, fascias).

### 2.1.1 Resin Production

The raw materials for the manufacture of plastic materials or resins are called <u>intermediates</u> or <u>monomers</u>, and are derived from natural gas, crude oil, or petroleum products. (See Figure 2-1.) The major intermediates are <u>ethylene</u>, <u>benzene</u>, and

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* Society of the Plastics Industry.

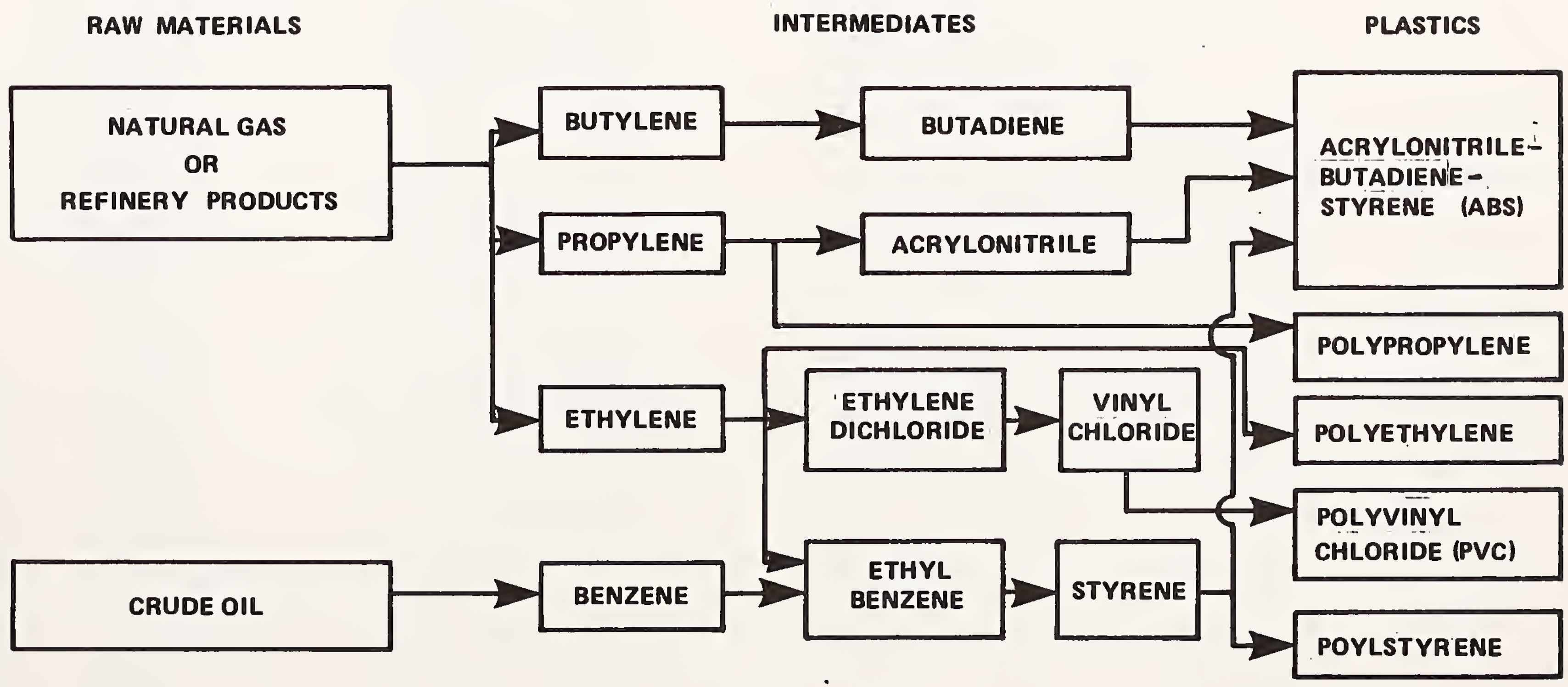


FIGURE 2-1. SIMPLIFIED DERIVATION OF SOME MAJOR AUTOMOTIVE PLASTICS

propylene. In the basic process of making plastics, called polymerization, simple monomers are joined together in large chains called polymers. A single type of repeating unit is called a homopolymer and a chain of two or more monomers is called a copolymer.

Modifiers, chemicals and additives are introduced into the plastic such as pigments for coloring, plasticizers to increase flexibility, stabilizers to make the product more resistant to heat and light, or fiber reinforcements to make the material stronger. This process is called compounding.

Two broad categories of plastic resins exist, thermosetting polymers and thermoplastic polymers.

- Thermosetting polymers, once polymerized or hardened, cannot be softened by heating without degrading the material. Thermosets are usually liquid mixtures or molding compounds which are "cured" or solidified with chemicals or heat.

- Thermoplastic materials can be repeatedly softened or hardened by heating and cooling. Usually, thermoplastic resins are purchased as pellets or granules that are softened by heat under pressure so they can be formed, then cooled and hardened into the final desired shape.

The largest selling plastic resins are polyethylene, polyvinyl chloride, polystyrene, and polypropylene. These four resins account for about 70 percent by weight of all resins sold in 1979.

### 2.1.2 Processing

In plastic processing, the basic material is usually melted (in the case of thermoplastics) and the plastic takes the shape of a cavity, die, or roll. Major processes used for automotive materials are described below.

- Injection molding—The plastic resin, usually in granular form, is fed into a heated cylinder and softened. It is then forced through a nozzle and into a relatively cool mold held under pressure until it cools and hardens. The mold opens and the part in solid form is removed. This process is used for many automotive components, such as battery cases and air conditioning ducts.

- Compression molding—This method, commonly used for thermosetting materials, involves the squeezing of plastic material into a desired shape by application of heat and pressure to the material on a mold. The heated mold is closed around the material and during this time the thermosetting material undergoes a chemical change which permanently hardens it.

- Calendering—Calendering is used to process thermoplastics into sheets. The plastic material is passed between a series of three or four large, heated, revolving rollers which squeeze the material between them into a sheet or film.

- Blow molding—This process is used for hollow plastic products such as gas tanks. Thermoplastic is melted and formed into a tube-like shape with sealed ends. Air is injected inside so that the tube expands and is forced against the walls of the mold. On cooling, the solidified plastic is ejected from the mold.

- Extrusion—Extrusion is used to form continuous sheeting, tubes or rods. Dry plastic material is melted and then forced out of a small opening or die with the shape of the finished product.

- Reaction injection molding (RIM)—This technique is primarily used for polyurethane parts such as bumpers or fascia. Two or more reactive streams are mixed together under high pressure and injected, under low pressure, into a mold. A reaction occurs and continues until the liquid becomes a cellular or solid product.

## 2.2 SIZE AND STRUCTURE OF THE PLASTICS INDUSTRY

The plastics industry is large and consists of a diverse group of resin producers and plastic processors.

### 2.2.1 Size of Industry

In 1979 total U.S. plastic production was over 35.2 billion pounds and the value of industry shipments was more than $14 billion.* Industrial chemicals are the third largest industry in terms of value added by manufacture and plastic resins account for about 14 percent of the industry's shipments. The plastics industry employs over 460,000 people.

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* 1980 U.S. Industrial Outlook.

### 2.2.2 Industry Structure

For the most part, the plastics industry is divided into two broad sectors—the resin producers and the plastic processors.

*Resin Producers*

The resin producers make the basic plastic materials from feedstocks. These companies also usually do any required plastic compounding or mixing. The resin producers tend to be very large chemical and oil companies and usually specialize in just a few types of plastics. Table 2-1 shows some of the largest plastic resin companies and indicates sales and some of the major plastics produced. Many of the resin companies also do processing or fabricating. Even though plastics is a capital-intensive industry, resin production is not highly concentrated.

TABLE 2-1. LARGEST PLASTIC COMPANIES

| Company | Plastic Sales ($ Millions) | Major Plastics |
|---|---|---|
| Dow Chemical | 2,150 | Polyethylene, ABS |
| DuPont | 2,075 | Polyethylene, engineering plastics |
| Monsanto | 1,100 | ABS |
| Union Carbide | 975 | Polyethylene, polyurethane, PVC |
| Dart | 775 | Polypropylene |
| B.F. Goodrich | 450 | PVC |
| Hercules | 425 | Polypropylene |
| Phillips Petroleum | 400 | Polyethylene |
| Ethyl | 375 | PVC |

Source: Society of the Plastics Industry; 1977 data.

Note: Dollars are rounded to nearest $25 million and include fabricated products.

*Processors*

Plastic processors fall into three rather diverse categories:

- <u>Resin producers</u>—Many of the large resin producers process a portion of their plastics and make such products as film, textiles, or calendered plastics. In the auto industry this situation occurs for parts like vinyl seat covers or urethane foam seats but is much less likely to be found in specialized plastic automotive parts like bumpers or grilles. Approximately 20 percent of resin production is processed within the producers' own companies.

- <u>Processors captive to end users</u>—Many end users have their own captive shops that make plastic parts. Industries that process plastics for their own use include the automotive, communications, film, packaging, pipe, appliance, and recording industries. Approximately 50 percent of resin production is processed by captive shops.

- <u>Independent plastic processors</u>—Independent processors purchase resin and manufacture plastic parts which are sold to other companies. This industry is very fragmented, consisting of many companies of varying sizes. The approximately 5,550 custom or independent processing plants process about 30 percent of resin production.

Major processing plants are listed in Table 2-2.

## 2.3 THE AUTOMOBILE AND THE PLASTICS INDUSTRY

The automotive industry uses over 5 percent of plastic production, and this figure is expected to increase in the next ten years.

### 2.3.1 <u>Types of Plastics Used in Cars</u>

Table 2-3 lists the major plastics used in automobiles in 1978 and 1979. The most important automotive plastics are polyurethane, reinforced polyester, polypropylene, polyvinyl chloride, and ABS. This list differs in some important ways from the top four plastics for all markets (polyethylene, polyvinyl chloride, polystyrene and polypropylene). Polyethylene and polystyrene are not particularly important for automotive use, whereas polyurethane and reinforced polyester

TABLE 2-2. MAJOR PROCESSING PLANTS PRODUCING OVER 100 MILLION POUNDS PER YEAR

| Company Name and Location | Principal Plastics | Principal Processes | Principal Product |
|---|---|---|---|
| Acushnet Co., New Bedford, MA | PUR | Casting | Industrial |
| Crown Zellerbach Corp., Orange, TX | LDPE | Extrusion-film | Packaging |
| Davidson Rubber Co., Dover, NH | PUR | Reaction injection | Automotive |
| DuPont Co., Richmond, VA | TPP | Extrusion | Packaging |
| Eastman Kodak Co., Rochester, NY | PS | Injection molding | Cameras |
| Ethyl Corp., La Grange, GA | LDPE | Extrusion-film | Packaging |
| Exxon/Extrudo, Pottsville, PA | LDPE,PP | Extrusion-film | Packaging |
| Firestone Tire & Rubber Co., Pottstown, PA | PVC | Extrusion | Packaging |
| General Electric Co., Louisville, KY | PS,PP | Injection molding | Appliances |
| General Motors Corp., Delco Remy, Anderson, IN | PMMA,PP | Injection molding | Automotive |
| General Motors Corp., Packard Electric, Warren, OH | PP,PS | Injection molding | Automotive |
| General Motors Corp., Saginaw Steering, Saginaw, MI | PP,PS | Injection molding | Automotive |
| General Tire & Rubber Co., Ada, OK | PUR,PVC | Injection molding | Automotive |
| Grace, W.R., Co., Cryovac Div., Duncan, SC | PVC | Extrusion-film | Packaging |
| 3M Corp., St. Paul, MN | TPP | Extrusion | Tapes/seals |
| Mobil Chemical Co., Macedon, NY | LDPE | Extrusion-film | Packaging |
| Presto Products Inc., Appleton, WI | LDPE | Extrusion-film | Packaging |
| St. Regis Paper Co., Hazleton, PA | LDPE | Extrusion-film | Packaging |
| Tupperware Co./Dart, Providence, RI | HDPE | Injection molding | Housewares |
| Tupperware Co./Dart, Hemingway, SC | HDPE | Injection molding | Housewares |
| Tupperware Co./Dart, Jerome, ID | HDPE | Injection molding | Housewares |
| Tupperware Co./Dart, Halls, TN | HDPE | Injection molding | Housewares |
| Union Carbide Corp., Rogers, AR | LDPE | Extrusion-film | Packaging |
| Western Electric Corp., Atlanta, GA | HDPE | Extrusion | Wire/cable |

Abbreviations for plastics:

| | | | | | |
|---|---|---|---|---|---|
| ABS | Acrylonitrile-butadiene-styrene | HDPE | High-density polyethylene | TPP | Thermoplastic polyester |
| POM | Acetal | HIPS | High-impact polystyrene | PF | Phenolic |
| PMMA | Acrylic | LDPE | Low-density polyethylene | UP | Thermoset polyester |
| CA | Cellulose acetate | PA | Nylon | PP | Polypropylene |
| | | PE | Polyethylene | PS | Polystyrene |
| | | PUR | Polyurethane | PVC | Polyvinyl chloride |

Source: Plastics World, January, 1979.

are of major importance. As automobiles are downsized, all those major plastics presently used in cars are contenders for increased usage, as are others such as polyethylene. In addition, engineering plastics, a group of plastics noted for their high strength and ability to be used in engineering applications, are likely to be important as downsizing continues. The most important automotive plastics, and engineering plastics, are discussed below.

TABLE 2-3. PLASTICS IN PASSENGER CARS IN 1978 and 1979 (000 TONS)

| Material | 1978 | 1979 |
|---|---|---|
| ABS | 70 | 70 |
| Acrylic | 20 | 21 |
| Nylon | 24 | 25 |
| Phenolic | 23 | 24 |
| Polypropylene | 150 | 160 |
| Polyurethane | 170 | 185 |
| Polyvinyl chloride | 130 | 128 |
| Reinforced polyester | 160 | 180 |
| Other | 40 | 41 |
| TOTAL | 787 | 834 |

Source: Modern Plastics, January 1979.

*Polyurethane*

Polyurethanes are important in automobiles for use in seat cushioning, bumpers and fascias. Flexible foams are polyurethane materials that are flexible and resilient and can be used for seat cushions or other padding. Semirigid foams have less resilience and are finding applications in bumpers and fascias. Rigid foams have the potential to be used in many automobile parts, including exteriors. Urethanes are made from precursors called polyols and isocyanates. The types and mixture of these chemicals determine the properties the urethanes will have. The reaction injection molding process has recently become widely accepted for molding urethane foams, especially semirigid foams used in automotive front ends. Approximately 22 percent of the polyurethane foam consumed in 1979 was used in cars.

*Reinforced Polyester*

Reinforced polyester refers to a composite of thermosetting polyester plastic and, in most cases, glass reinforcing materials called fiberglass. The reinforced plastic is strong, can be used in various engineering applications and has exceptional strength to weight. Automotive uses include front fascia, spoilers, grille opening panels, fender skirts, and side rails. Reinforced plastic parts often come as mixed components such as sheet molding compound (SMC), a roll of thick sheet, or bulk molding compound (BMC), a slab of extruded log or rope. A common processing method used is press or compression molding where the materials (SMC, BMC, etc.) are placed in matched metal dies and pressed into shape. Automobiles accounted for over 20 percent of 1978 reinforced polyester consumption.

*Polypropylene*

Polypropylene is a thermoplastic found in many under-the-hood parts such as ducts, battery cases and fan shrouds. In some cases it is also glass reinforced. Polypropylene automotive parts, generally injection molded, accounted for 9 percent of total polypropylene consumption in 1979. The plastic can also be extruded into fibers, used in automotive carpeting.

*Polyvinyl Chloride*

Polyvinyl chloride (PVC), or vinyl, has exceptional chemical, weathering and abrasion resistance. The plastic is often processed by calendering and used for automotive upholstery. PVC is also used for vinyl roofs and for certain molded parts. In 1979 autos accounted for about 5 percent of PVC consumption.

*ABS*

ABS is known as both a commodity plastic and an engineering plastic depending on the specific formulation. This thermoplastic possesses outstanding impact strength and high mechanical strength. In automobiles it is used in grilles, lamp housings and instrument panels. Medium and high heat grades of ABS are used for many automotive components which are usually injection molded. Autos accounted for about 12 percent of ABS consumption in 1979.

*Engineering Plastics*

The engineering plastics are generally low-volume, high-priced plastics with relatively few suppliers. The transportation industry accounts for over 25 percent of the consumption of these materials. The major automotive engineering plastics are nylon, polycarbonates (PC), polyphenylene oxide (PPO) and polybutylene terephthalate (PBT). In 1976 automobiles accounted for 31 percent of nylon consumption, 7 percent of PC consumption, 42 percent of PPO consumption and 46 percent of PBT consumption.

Nylon is a strong tough plastic and is usually injection molded for vehicle parts such as fender extensions or master brake reservoirs. Nylon in fiber form can also be used in seat belt webbing, upholstery and carpeting.

Polycarbonates are tough, rigid and easily fabricated. However, they have poor resistance to marring, abrasion and solvents. The plastic is used in automotive front-end panels, rear lenses, and headlamp covers.

Polybutylene terephthalate, a thermoplastic polyester is very strong and has good electrical properties. It is used for exterior and interior automotive applications such as electronic ignition components and backup lights.

Polyphenylene oxide has high impact strength and is easily processed by injection molding. It is used in wheel covers, windshield wiper assemblies, and side window frames.

### 2.3.2 Suppliers of Major Automotive Plastics

Suppliers of the major automotive plastic resins are shown in Table 2-4 along with the capacities of these companies for the various plastics. Table 2-5 shows the major suppliers of engineering plastics and their capacities in millions of dollars. Companies that are the largest producers of these automotive plastics were selected for study in this report. The companies selected are shown in Table 2-6 along with their capacity ranking for the plastics. The largest suppliers of ABS are Borg-Warner and Monsanto. The largest suppliers of polypropylene are Hercules and Amoco. Polyurethane production is led by Union Carbide and Mobay, and B.F. Goodrich is the leading producer of PVC. The major producers of automotive engineering plastics are General Electric and DuPont and the leading fiberglass companies, who are also major producers of the unsaturated polyester used in reinforced plastics,

TABLE 2-4. CAPACITIES OF THE LARGEST SUPPLIERS OF MAJOR AUTOMOTIVE PLASTIC RESINS

| Plastic Resin | Supplier | Capacity (Millions of Pounds) |
|---|---|---|
| Polyurethane* | | |
| Polyols | Union Carbide | 598 |
| | Dow Chemical | 396 |
| | Mobay | 275 |
| | Olin | 253 |
| Isocyanates | Mobay | 385 |
| | Upjohn | 279 |
| | ARCO | 220 |
| | Olin | 220 |
| Thermosetting Polyester* | Reichhold | 352 |
| | W.R. Grace | 253 |
| | Ashland | 176 |
| | PPG | 154 |
| | Owens-Corning | 100 |
| Polypropylene** | Hercules | 1040 |
| | Amoco | 500 (720 in Nov. 1979) |
| | Shell | 550 |
| | Exxon | 480 |
| Polyvinyl Chloride** | B.F. Goodrich | 1,050 |
| | Tenneco | 680 |
| | Diamond Shamrock | 520 |
| | Conoco | 510 |
| ABS** | Borg-Warner | 480 |
| | Monsanto | 460 |
| | Dow Chemical | 270 |
| | USS Chemicals | 210 |

Sources: Modern Plastics, Society of the Plastics Industry, and The Kline Guide to the Plastics Industry.

* 1976.
** 1978.

are PPG and Owens-Corning. (PPG and Owens-Corning are included in the glass section of this report.)

Many of the resin companies are also plastics processors, as is Libbey-Owens-Ford, a company covered in the glass section of this report. This report also covers two other major independent processors: Davidson Rubber (part of Ex-Cell-O) and General Tire. These two companies operate some of the largest independent processing plants that serve the auto industry.

TABLE 2-5. CAPACITIES OF THE LARGEST SUPPLIERS OF ENGINEERING PLASTICS

| Supplier | Capacity (Millions of Dollars) | | | | |
|---|---|---|---|---|---|
| | Nylon | PC | PPO | PBT | Total |
| General Electric | --- | $110 | $90 | $17 | $217 |
| DuPont | $123 | --- | --- | --- | 123 |
| Mobay | --- | 33 | --- | --- | 33 |
| Celanese | 16 | --- | --- | 11 | 27 |

Sources: Modern Plastics, Society of the Plastics Industry, and The Kline Guide to the Plastics Industry.

## 2.4 KEY ISSUES

Several issues currently confront the plastics industry. These include:

- Low profits
- New markets
- Environmental and energy concerns.

### 2.4.1 Low Profits

Much of the plastics industry produces commodity or tonnage plastics characterized by very large volumes and indistinguishability of product. Thus many companies in the industry tend to compete on the basis of price. In recent years the plastics industry has been faced with the situation of overcapacity and low prices. Rates of return for plastics companies have been low.

TABLE 2-6. COMPANIES COVERED IN THIS REPORT AND CAPACITY RANKING FOR IMPORTANT AUTOMOTIVE PLASTICS

| Supplier | ABS | Poly-propylene | Poly-urethane | PVC | Reinforced Plastic | Engineering Plastics | Processing |
|---|---|---|---|---|---|---|---|
| Monsanto | 2 | | | | | 6 | |
| Borg-Warner | 1 | | | | | | * |
| Union Carbide | | | 1 | 10 | | | |
| Mobay | | | 1 | | | 3 | |
| Hercules | | 1 | | | | | |
| Amoco | | 2 | | | | | * |
| B.F. Goodrich | 5 | | | 1 | | | |
| DuPont | | | 6 | | | 1 | * |
| General Electric | | | | | | 1 | * |
| General Tire | | | | 16 | | | * |
| Davidson | | | | | | | * |
| PPG | | | | | * | | * |
| Owens-Corning | | | 7 | | * | | |
| Libbey-Owens-Ford | | | | | | | * |

* No ranking is available.

As a result, many companies, such as Hercules, are attempting to switch their product mix toward higher value products. The specialization of products can insulate the companies from downward pressure on price.

In the next decade capacities are expected to be much tighter as demand catches up with supply and construction of new capacity proceeds at a slower rate. Thus, prices are expected to improve over the next few years.

### 2.4.2 New Markets

Use of plastics has been growing faster than the overall economy and this trend is expected to continue. New markets are emerging for plastic companies, such as lightweight automotive components, structural components, and new insulation markets. The plastics industry increasingly is formulating specialized plastics that will meet the needs of particular market segments.

For the automobile, particular plastics are competing with metals and with other plastics to create lighter vehicles. The changes that are taking place in the automobile have forced the auto companies to look for new materials and processing methods. Thus, plastics companies with strong research and development capabilities have an advantage in capturing the growing automotive plastics market. Hercules is hopeful that a polypropylene-metal system it has developed will be used by Detroit. DuPont and General Electric are aggressively pushing new engineering plastics. Major producers of graphite fiber parts for the aerospace industry, such as Union Carbide and Hercules, are trying to develop the graphite-reinforcement market in Detroit. Plastics processors are working with the auto companies to develop new parts that can be made out of plastic. For instance, PPG has developed a plastic gas tank and works closely with General Motors engineers.

Companies with existing markets in the automotive industry are also seeking to preserve their position. General Tire, for one, has as a high priority the production of vinyl upholstery with less weight than current products.

Growth for most plastics in the auto industry seems assured to some degree. Not only is plastics usage expected to increase in each car, but the number of cars manufactured each year is supposed to increase significantly over the next few years. However, right now the best plastic growth prospects seem to be for polyurethanes and reinforced plastics. These plastics have the potential for replacing major parts of cars—such as body parts and engine parts. If either of these materials succeeds in becoming widely used as a replacement for sheet metal parts, volumes purchased would be quite large. Key companies to watch, therefore, are Union Carbide, Mobay, PPG, and Owens-Corning.

### 2.4.3 Environmental and Energy Concerns

The chemical industry has been affected by several environmental regulations regarding the quality of the chemical environment of company plants and with the toxicity of the chemicals produced. The Government has required all chemical companies to list the chemicals they produce, where they are produced and in what volume. Concern exists about the effect of these chemicals on workers, on the environment and on consumers. The Food and Drug Administration also is looking carefully at the effect of plastic packaging on food.

These various investigations by the Government and other groups have increased the importance of testing and toxicology within the plastics industry.

Concern has also been raised about the effects of plastics in waste disposal systems such as dumps or sanitary landfills. The plastics industry emphasizes that the use of plastics in sanitary landfills creates a stable nonsettling base, and that this helps make the land more quickly recoverable.

Finally, since plastics are derived from petroleum products, the country's current energy problems significantly affect the plastics industry. It is not likely that rising oil prices will make plastic less competitive versus other materials, such as steel. In many cases, plastics actually use less total energy to manufacture, including the energy in the feedstock, than competing materials. Rising oil prices will affect the relative importance of raw material prices in the petrochemical industry. Eventually, rising oil prices may lead to a switch to coal as the basic feedstock, and this would cause considerable changes in the industry. Already the shortages of natural gas have led plastics companies to increase their dependence on refinery products for raw materials. This trend is expected to continue.

* * * * *

The following sections profile the major suppliers of plastics to the automotive industry, and how each of them is responding to the changing automotive market.

# 3. MONSANTO COMPANY

Monsanto is an integrated chemical producer with worldwide sales and extensive manufacturing facilities both domestically and abroad. Plastic polymers and processed plastics make up approximately 25 percent of the firm's gross sales, and Monsanto is aggressively seeking more plastics sales within the automotive community.

## 3.1 CORPORATE SIZE AND STRUCTURE

Monsanto has an overall annual capacity of 800 million pounds of polystyrene and 505 million pounds of ABS. They have the second largest U.S. capacity in both these plastics.

### 3.1.1 Revenue, Profit and Employment

Monsanto's 1979 sales were $6.2 billion, up from 1978's $5 billion. Net income was $481 million, down from 1978 income of $576 million. Monsanto employed an average of 64,000 persons worldwide in 1979. (See Table 3-1.)

TABLE 3-1. MONSANTO COMPANY REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $6,192.6 | $481.1 |
| 1978 | $5,018.7 | $576.3 |
| Average Number of Employees: 64,000 (1979) | | |

Plastics and resins revenues for 1979 were $1.4 billion, up $200 million from 1978's $1.2 billion. Operating profits for this group, however, were $9.6 million—down from $57.6 million in 1978. (See Table 3-2.)

TABLE 3-2. MONSANTO COMPANY REVENUES AND PROFIT FOR PLASTICS AND RESINS

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $1,414.2 | $9.6 |
| 1978 | $1,223.6 | $57.6 |

### 3.1.2 Corporate Organization

Monsanto segregates its operations into six operating companies: Agricultural Products Co., Chemical Intermediates Co., Industrial Chemicals Co., Plastics and Resins Co., Monsanto Textiles Co., and Fisher Controls Co. (See Figure 3-1.)

- Agricultural Products—Monsanto's agricultural products group produces and markets herbicides, insecticides, nitrogenous fertilizer materials such as anhydrous ammonia and blended mixed fertilizers, ammonium nitrate blasting agents, nitric acid, and plant growth regulators.

- Chemical Intermediates—Monsanto's chemical intermediates group is segregated into two subgroups: petrochemicals and process chemicals. The petrochemicals subgroup (including textile intermediates) produces various chemicals derived from oil or gas, such as styrene monomer, acrylonitrile, phenol, acetic acid, benzene, methanol, ethylene and propylene, all used by Monsanto and others to manufacture plastics, man-made fibers, and synthetic rubber. The process chemicals subgroup produces elemental phosphorous and various other acids and chemical intermediates.

- Industrial Chemicals—Monsanto's industrial chemicals division produces detergents and phosphates, specialty chemicals (such as aspirin and other pharmaceuticals), rubber accelerators and antioxidants, plasticizers used to impart flexibility to plastics, and electronic and environmental materials such as silicon and optoelectronic devices.

- Plastics and Resins—Monsanto's plastics and resins group is segregated into three subgroups:

plastic materials, resin products, and fabricated products. The plastic materials subgroup produces all of Monsanto's thermoplastics (including polystyrene, ABS, SAN and Vydyne nylon) and Fome-Cor laminated insulating board. The resin products subgroup produces polyvinyl butyral sheet (used as interlayer for laminated automotive glass), specialty resins (including phenolic, melamine, urea and vinyl acetates) and adhesives and bonding materials. The fabricated products subgroup manufactures plastic bottles, low-density polyethylene film, doormats, and Astroturf recreational surfaces.

- Textiles—Monsanto's textiles group produces a variety of nylon, acrylic and polyester fibers.

- Fisher Controls—Monsanto's newly acquired Fisher Controls group produces process control electronic instrumentation and control valves.

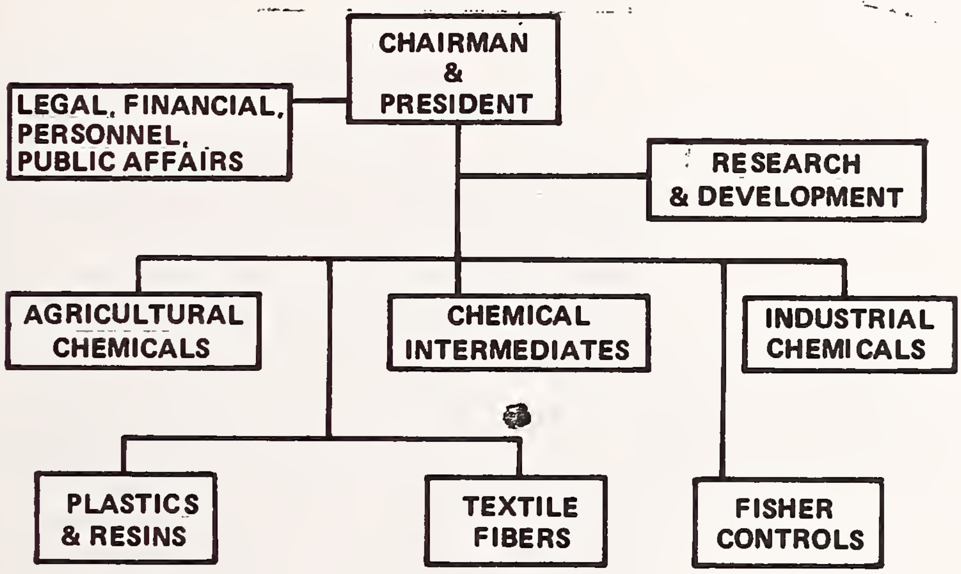


FIGURE 3-1. MONSANTO COMPANY ORGANIZATION

### 3.1.3 Marketing Strategy

Monsanto's automotive marketing strategy is to accentuate its strong and well-established lines—ABS and to a lesser extent SAN, the Vydyne nylons, polyvinyl butyl film, and Fome-Cor laminated polystyrene—and expend little effort on other products. Monsanto has developed extensive "possible applications" materials for use by automotive designers in evaluating the applicability of its products for specific automotive components. They are, in short, attempting to counter the automotive designer's tendency to automatically specify metal when selecting materials for most components.

Monsanto's advertising and overall marketing philosophy is to stress the many strengths, versatility and possible applications of its various products, and to make it easy for the designer or engineer to specify its products if they are at all applicable.

Market data for Monsanto are given in Figure 3-2.

MARKET DATA

Major Markets: Agriculture and food processing, motor vehicles, construction and equipment, clothing, carpets and home furnishings, pharmaceuticals, soaps and toiletries, appliances, chemical industry, and packaging.

Percent of Sales to Auto Industry: 16 percent.

Supplies to the Following Automotive Companies: General Motors, Ford, Chrysler, American Motors, and various parts and component suppliers.

Major Automotive Products: Lustran ABS and SAN, Vydyne (nylon thermoplastic), polyvinyl butyral (interlayer for safety glass).

FIGURE 3-2. MONSANTO CORPORATION MARKET DATA

### 3.1.4 Sales Strategy

Monsanto's sales strategy for its Vydyne nylon is to note how the Vydyne has been used in specific and demanding automotive applications and how its properties lend themselves to other (and similar) demanding applications.

One of Monsanto's advertisements, for instance, leads with this line: "What the Serpent's Tail is Made of—Vydyne Nylon." The advertisement then goes on to describe how Ford selected Vydyne for the tail of the Mustang because of the nylon's light weight, toughness and attractive cost structure. Another advertisement touts Vydyne's usefulness to different makers: "One Common Material for Three Engine Timing Chain Covers—Vydyne Nylon."

Advertisements for ABS are in a similar vein: "The Ins and Outs of Weight Reduction, Brought to You by Lustran ABS." This and other sales pieces stress ABS's lightweight strength, ability to accept plate and applicability for large automotive and light truck grilles.

## 3.2 PRODUCTION AND OPERATIONS

Monsanto operates 64 plants in the U.S., plus research laboratories and technical centers.

### 3.2.1 Major Automotive Facilities

Six of Monsanto's 64 plants ship extensively to the automotive community. These plants are: Addyston, Ohio; Anaheim, California; Muscatine, Iowa; Pensacola, Florida; Springfield, Massachusetts; and Trenton, Michigan. (See Figures 3-3 to 3-8.)

*Addyston, Ohio*

Monsanto's Addyston plant occupies 75 acres and employs approximately 950. Its principal products are polystyrene, ABS, SAN, phenolics, styrene, formaldehyde and foamed polystyrene board.

*Anaheim, California*

Anaheim, with a work force of approximately 600 employees, occupies approximately 300 acres. Its principal products are Vydyne and other engineering thermoplastics.

Company Monsanto Company County ______ Plant Size 75 acres

Plant Addyston Congressional District ______

Address Addyston, Ohio 45001 Standard Metropolitan Statistical Area ______ No. of Employees 950

Telephone (513) 941-2400 Primary SIC Code(s) ______

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polystyrene | 60 million pounds | N.C.A. | N.C.A. |
| Lustran ABS/Lustran SAN | 50 million pounds | | |
| Fome-Cor polystyrene board | 10 million pounds | | |

FIGURE 3-3. ADDYSTON PLANT

Company Monsanto Company

County

Plant Size 300 acres

Plant Anaheim

Congressional District

Address 611 E. Serritose Ave
Anaheim, California
92803

Standard Metropolitan Statistical Area

No. of Employees 600

Telephone (714) 772-2190

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Vydyne nylon thermoplastic | 50 million pounds | N.C.A.* | 10 percent |

*Not Currently Available

FIGURE 3-4. ANAHEIM PLANT

Company Monsanto Company

County

Plant Size 131 acres

Plant Muscatine

Congressional District

Address P.O. Box 473
Muscatine, Iowa
52761

Standard Metropolitan Statistical Area

No. of Employees 550

Telephone (319) 263-0093

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Lustran ABS/Lustran SAN | 110 million pounds | N.C.A. | N.C.A. |

FIGURE 3-5. MUSCATINE PLANT

Company Monsanto Company

County

Plant Size 527 acres

Plant Pensacola

Congressional District

Address P.O. Box 12830
Pensacola, Florida
32575

Standard Metropolitan Statistical Area

No. of Employees 4,150

Telephone

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Vydyne nylon thermoplastic | 100 million pounds | N.C.A. | 15 percent |

FIGURE 3-6. PENSACOLA PLANT

Company Monsanto Company

County

Plant Size 149 acres

Plant Springfield

Congressional District

Address 730 Worcester St.
Indian Orchard,
Massachusetts 01151

Standard Metropolitan Statistical Area

No. of Employees 2,000

Telephone (413) 788-6911

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Lustran ABS/Lustran SAN | 200 million pounds | N.C.A. | N.C.A. |
| Polystyrene | 250 million pounds | | |
| Polyvinyl butyl (sheet) | 100 million pounds | | |

FIGURE 3-7. SPRINGFIELD PLANT

Company Monsanto Company

County ______

Plant Size 200 acres

Plant Trenton

Congressional District ______

Address 5100 West Jefferson
Trenton, Michigan
48183

Standard Metropolitan Statistical Area ______

No. of Employees 700

Telephone (313) 676-4400

Primary SIC Code(s) ______

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Vydyne nylon thermoplastic | 55 million pounds | N.C.A. | 25 percent |

FIGURE 3-8. TRENTON PLANT

*Muscatine, Iowa*

The Muscatine plant is spread over 474 acres, 130 of which are devoted to manufacturing. Muscatine employs approximately 550, and its primary automotive products are Lustran ABS and SAN.

*Pensacola, Florida*

The Pensacola plant, with more than 4,100 employees (including research and development), occupies 575 acres of a 2,200 acre tract. Pensacola's principal products are nylon 6.6 fiber, nylon intermediates, nylon molding resins, spun-bonded fabric and Astroturf surfaces.

*Springfield, Massachusetts*

The facilities include both manufacturing and research and development facilities, and occupy approximately 150 acres of a 326 acre tract. Including research and development, Springfield has approximately 2,000 employees. Springfield manufactures a broad range of plastic materials including ABS, SAN, polystyrene, phenolics, polyvinyl butyral sheet, reinforced nylon, and specialty resins such as phenolic and vinyl acetates.

*Trenton, Michigan*

Monsanto's Trenton plant occupies 200 acres (and is actually two plants located across the street from one another). Trenton employs 700, and its principal products are Vydyne nylon thermoplastic resins.

### 3.2.2 Expansions and New Plants

Monsanto spent $565.9 million on capital expenditures in 1979, up considerably from the $479.9 million spent in 1978. For 1979, the largest percentage of capital expenditures, as well as the largest year-to-year increase in such expenditures, occurred in the Chemical Intermediates Company. Capital projects include continuing plant construction and several cost improvement projects.

## 3.3 FINANCIAL ANALYSIS

Monsanto has had fluctuating results in recent years. Borrowing will likely be needed to fund near-term capital expenditures.

### 3.3.1 Operations

Monsanto has had steadily increasing sales in recent years, but earnings and operating ratios have declined as a result of poorer margins. (See Figure 3-9.) The major consistently strong section of the company has been Monsanto's Agricultural Products Company which has recently come out with the new herbicide Roundup.

Monsanto's chemical business has recently had particular problems due to competition from oil companies and generally falling prices in the entire industry. In addition, the textile division has suffered losses in the past few years and Monsanto has announced a planned closure of faltering European nylon operations. This resulted in a charge against 1979 earnings of $42.7 million.

Monsanto's plastics business had decreased operating income in 1977, 1978 and again in 1979. Although the automotive plastic, ABS, continues to sell well, the entire plastics division has had problems because of low margins in polystyrene and because of losses associated with the Spanish subsidiary Aiscondel. Monsanto recently sold its high-density polyethylene business to Cities Service and its European polystyrene operations to BP.

Stock analysts see continued near-term marginal earnings from Monsanto, but are optimistic that the actions the company has taken to strengthen its good businesses and end or dispose of its weak businesses will lead to a strong performance in the 1980 s.

### 3.3.2 Capital Analysis

Monsanto had a number of major plant completions in 1976 and 1977 and had large capital expenditures in those years. The company increased its long-term debt several times between 1975 and 1978. (See Figure 3-10.)

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | Operating Income* / Sales Percent |
|---|---|---|---|---|
| 79 | 6193 | 331 | 12.4 | 12.6 |
| 78 | 5019 | 303 | 12.2 | 17.9 |
| 77 | 4595 | 276 | 11.9 | 18.5 |
| 76 | 4270 | 366 | 17.3 | 20.6 |
| 75 | 3625 | 306 | 16.4 | 19.7 |
| 74 | 3498 | 323 | 20.0 | 20.3 |

| Year | Earnings / Total Assets Percent | Sales / Assets | Earnings / Sales Percent |
|---|---|---|---|
| 79 | 6.3 | 1.19 | 5.3 |
| 78 | 6.5 | 1.08 | 6.0 |
| 77 | 6.6 | 1.10 | 6.0 |
| 76 | 9.7 | 1.12 | 8.6 |
| 75 | 9.5 | 1.13 | 8.4 |
| 74 | 11.7 | 1.27 | 9.2 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 3-9. OPERATING ANALYSIS OF MONSANTO

|  |  |  | Sources |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | Sales | P/E Ratio[1] | Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings[4] |
| 79 | 6193 | 5.9 | 331 | 295 | (21) | (7.4) |
| 78 | 5019 | 6.9 | 303 | 288 | 193 | (8.2) |
| 77 | 4595 | 8.8 | 276 | 296 | 116 | (17.0) |
| 76 | 4270 | 11.1 | 366 | 226 | 70 | 10.0 |
| 75 | 3625 | 12.6 | 306 | 173 | 258 | 9.0 |
| 74 | 3498 | 16.5 | 323 | 172 | 8 | 32.0 |

|  |  | Uses |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Change in Working Capital | Capital Expenditures | Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ (%) | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ Percent | Current Ratio |
| 79 | 27 | 566 | 121 | 28.1 | 6.4 | 10.7 | 2.2 |
| 78 | 216 | 480 | 115 | 29.7 | 8.7 | 9.5 | 2.5 |
| 77 | (26) | 607 | 111 | 28.1 | 9.9 | 14.0 | 2.6 |
| 76 | (44) | 647 | 101 | 27.3 | 11.0 | 16.3 | 2.9 |
| 75 | 182 | 528 | 93 | 28.7 | 12.8 | 15.3 | 3.4 |
| 74 | 113 | 313 | 84 | 24.5 | 16.5 | 10.6 | 2.9 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 3-10. CAPITAL ANALYSIS OF MONSANTO

Capital expenditures were down to $480 million in 1978 and up for 1979 ($565.9 million). Monsanto's financial position remains strong with its debt to capitalization at near historic levels and $271 million in cash and marketable securities at the end of 1979.

## 3.4 RESEARCH AND DEVELOPMENT

Research and development expenditures were $173.5 million in 1979, up from $144.3 million in 1978. The firm's total research and development efforts utilize approximately 2,500 employees. Monsanto reports that its R&D efforts produced a new generation of Lustran ABS in 1978, and that extensive effort is continuing to upgrade its existing plastics, develop new variants, and develop new applications—especially automotive—for its plastics. In addition, the firm is now testing existing and emerging products in a new $12 million laboratory in St. Louis.

In addition to new products and product applications, Monsanto's research and development efforts have produced a new low-cost process for producing ABS. When commercialized, this will enhance the company's competitive position in the sales of ABS, Monsanto feels.

## 3.5 LABOR AND GOVERNMENT RELATIONS

Monsanto has instituted a corporate-wide program to upgrade the industrial hygiene of the worker, and is constructing "one of the most far-reaching industrial health monitoring systems in existence." Using computer-controlled monitoring equipment, Monsanto's system is intended to medically track its employees throughout their entire careers, with the ostensible aim of assuring an early alert to workplace hazards that could adversely affect health.

# 4. BORG-WARNER CORPORATION

Borg-Warner Corporation is one of the largest companies in the U.S. Sales for this diversified corporation employing over 55,000 persons totaled $2.7 billion in 1979. Approximately 37 percent of these sales dollars were derived from the company's sales to the transportation industry, which has been its most important market since Borg-Warner's beginnings 50 years ago. Components for new cars constitute Borg-Warner's single largest market, providing just under 20 percent of the company's total revenue. For example, sales to Ford Motor Company were approximately 11 percent of consolidated sales in 1978 and 10 percent in 1977.

Though probably most widely recognized as a maker of drive train components such as transmissions, gears, torque converters and drive shafts, Borg-Warner is active in five other major markets besides transportation. They are: construction, consumer products, machinery, agribusiness and energy.

## 4.1 CORPORATE SIZE AND STRUCTURE

The company has 50 major divisions with operations in 20 countries on six continents. These operating units are organized into product and service groups based on similarity of products or technology, and not necessarily the markets they serve. These groups are:

- Air Conditioning
- Financial Services
- Industrial Products
- Transportation Equipment
- Baker Industries, Inc.
- Chemicals and Plastics.

Borg-Warner's sales to the transportation industry are conducted through both the Transportation Equipment group and the Chemicals and Plastics group, the latter being the subject of this report.

### 4.1.1 Revenue, Profit and Employment

Borg-Warner's 1979 sales were $2.7 billion, up from $2.3 billion in 1978. Earnings were $156 million, increasing from 1978's $134 million. The firm had a total work force of about 55,400 persons in 1979. (See Table 4-1.)

TABLE 4-1. BORG-WARNER CORPORATION REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $2,717 | $156 |
| 1978 | $2,326 | $134 |
| Average Number of Employees: 55,400 (1979) | | |

Source: Borg-Warner

### 4.1.2 Corporate Organization

Principal Borg-Warner subsidiaries and divisions and some of their major products include:

- Borg-Warner Acceptance Corporation—Provides inventory, commercial and consumer financing.
- York Division—Manufactures air conditioning and refrigeration equipment.
- York Automotive Division—Manufactures air conditioning compressors for cars, trucks and farm equipment.
- Borg-Warner Chemicals—Manufactures ABS and other thermoplastic resins, and impact modifiers.
- Baker Industries—Manufactures Wells Fargo Alarm and armored car services, smoke and fire detection equipment, and fire extinguishing chemicals.
- Byron Jackson Division—Manufactures centrifugal pumps, nuclear pumps, and submersible motors and other industrial products for the power and petroleum industries.

- Morse Chain—Produces industrial and automotive timing belts, marine bearings, adjustable AC and DC motor drives and other power transmission equipment.

- Automotive Parts Division—Manufactures transmissions, drive train components and universal joints, gears and sprockets, water, fuel and oil pumps, motor mounts, ignition components and many other automotive parts.

- Borg and Beck Division—Manufactures clutches, torque converters, dampers and brake controls.

- Warner Gear Division—Manufactures automotive, truck, industrial and off-road and marine transmissions.

A corporate organization chart is shown in Figure 4-1.

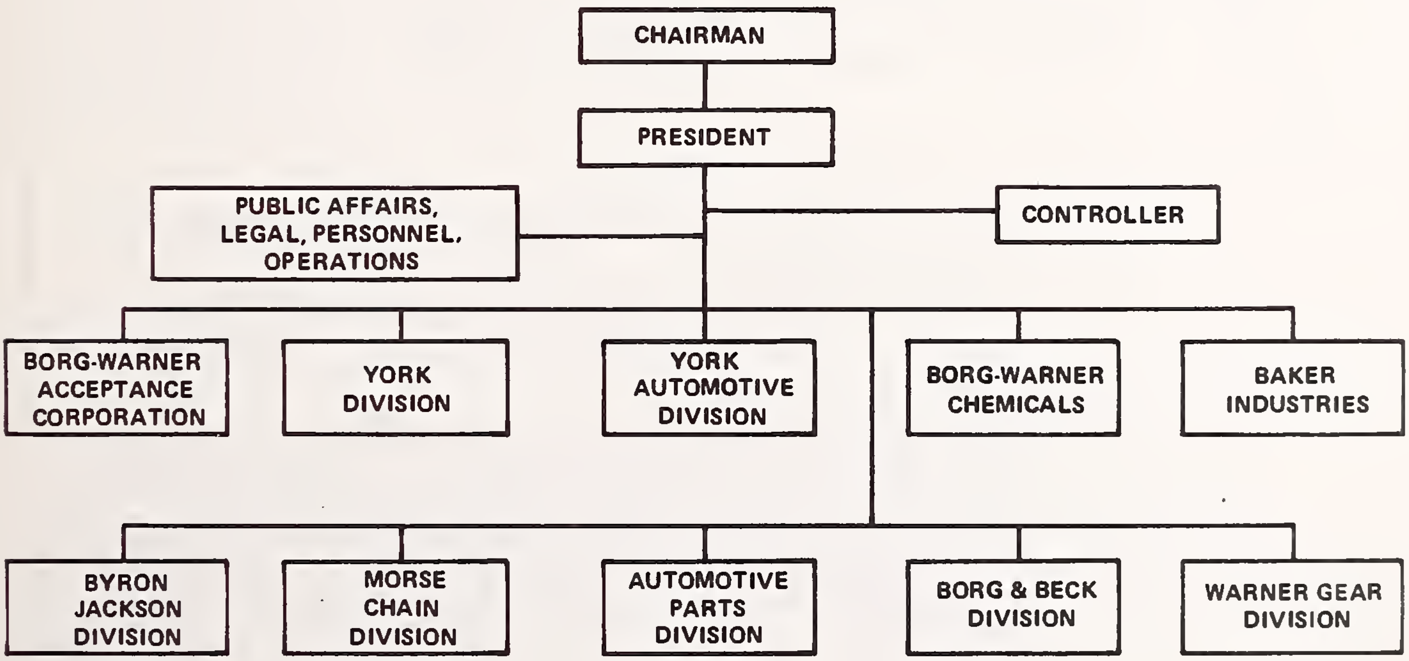


FIGURE 4-1. BORG-WARNER CORPORATION CORPORATE ORGANIZATION

Executive management of the company's operations is provided by a group of five company vice presidents and executive vice presidents representing Borg-Warner's various activities who, with the president and controller, comprise the operations committee. Although the operating structure has become more defined in the past decade, considerable autonomy is still retained, however, by the corporation's many divisions.

## 4.2 MAJOR MARKETS AND PRODUCTS

Borg-Warner's major markets and products are detailed below and summarized in Figure 4-2.

**MARKET DATA**

Major Markets: Automotive, construction, consumer products, agribusiness, machinery.

Percent of Sales to the Auto Industry: 24 percent automotive (components for new cars), 19 percent miscellaneous transportation (replacement parts, truck, off-highway and marine parts).

Supplies to the Following Auto Companies:

| | |
|---|---|
| Ford | General Motors |
| American Motors | Chrysler |

Major Products:

- Air conditioning compressors for cars, trucks and farm equipment.
- Air conditioning and refrigeration equipment.
- ABS plastic resins, impact modifiers, thermoplastic resins, plating chemicals, styrene monomer.
- Industrial and automotive timing belts, marine bearings, adjustable AC and DC motor drives and other power transmission equipment.
- Transmissions, drive train components and universal joints, gears and sprockets, water, fuel and oil pumps, motor mounts, ignition components, clutches, torque converters, dampers and brake controls.

FIGURE 4-2. BORG-WARNER MARKET DATA

### 4.2.1 Major Markets

Borg-Warner's largest transportation-related market is the sale of transportation equipment which in 1979 contributed $986.6 million to Borg-Warner's 1979 sales total of $2.7 billion. As noted previously, another major transportation-related market for Borg-Warner is the sale of chemicals and plastics (i.e., plastic resins and modifiers) used for the fabrication of automotive components. In 1979, chemical and plastic sales totaled $595.4 million. Other major markets include construction, consumer products, agricultural, and equipment and machinery.

### 4.2.2 Major Automotive Products

Borg-Warner's principal automotive product is ABS plastic resin which is produced in either sheet, pellet or powder form. (Principal automotive end uses of ABS include grilles, bezels, dashboards, interior components, wheel covers, bucket seats, taillight housings and exterior trim.) The ABS plastic is produced at three plants in the U.S. and one in Canada (also produced in Europe, Australia and Japan). Additionally, Borg-Warner produces impact modifiers under the brand name Blendex which finds ultimate uses in vinyl auto components. The Blendex modifiers are combined with polyvinyl chloride resins to provide resiliency and flexibility to vinyls whose functions require relative rigidity. Other major products include:

- Polymer additives and dispersions
- Intermediate chemicals
- Styrene monomer.

*Sales Strategy*

Borg-Warner claims to be the largest manufacturer of ABS in the world and the largest supplier to Detroit. According to the company, demand for ABS has increased in response to the need to reduce vehicle weight to improve fuel economy. Borg-Warner calculates that the average car now bears about 20 pounds of ABS components but projects that by 1985 ABS will constitute 32 pounds of the average auto.

In selling ABS to the automotive and other industries, Borg-Warner focuses on three things:

- The attractive physical properties of ABS. ABS is characterized by its toughness, high finished gloss and chemical resistance.
- The adaptability of ABS to various processing techniques. ABS can be molded, extruded, vacuum formed, foamed, cut, routed, drilled, riveted cemented, and welded.
- The many applications of ABS. The firm stresses that ABS can be injection-molded into intricate forms like auto instrument panels and radiator grilles, as well as thermoformed from large sheets of plastic into big, complex shapes.

The company has also developed a new concept that it claims gives it a selling edge over other ABS producers: a special services function that offers design assistance, technical problem solving, even product testing and marketing research assistance for building confidence in a product before it is even introduced to the market.

According to Borg-Warner, new applications for ABS plastics have strengthened U.S. demand in its chemicals and plastics operations.

*New Product Plans*

Borg-Warner recently developed and is marketing a grade of its Cycolac ABS that it claims is the first plastic that can be chromeplated easily and effectively and retain the high impact quality and easy moldability needed for automobile grilles. Another grade of Cycolac ABS subsequently developed is now utilized in auto instrument panels. It is a high heat grade ABS able to retain its dimensional stability even at temperatures approaching 220 degrees Fahrenheit. Most recently Borg-Warner developed a special formulation of ABS which is used in making wheel covers that are one-sixth the weight of conventional metal models.

In addition to these grades of ABS, Borg-Warner is now also marketing two other new grades of ABS. The new grades, Cycoloy HH1 for nonplated applications, and Cycoloy EHA for platable applications, are high heat, highly impact resistant materials for exterior automotive trims, marine and plumbing fixtures, and applicance and power tool housings.

## 4.3 OVERALL CORPORATE STRATEGY

Borg-Warner's overall corporate strategy is to position itself in the fast-growing service sector of the economy. As part of this strategy, Borg-Warner acquired Baker Industries in 1978. A year prior, in an effort to gain access to the rapidly developing electronics field, Borg-Warner sold two million previously unissued shares of stock (10 percent of total equity) to German-based Robert Bosch, GMbH, one of Europe's leading electronics companies. According to Borg-Warner, the combination of Borg-Warner's mechanical skills and Bosch's electronic capabilities promises products that will be superior in both areas.

Borg-Warner management has sought diversification to achieve a higher rate of growth and to insulate earnings from the cyclicality of new car and capital equipment sales. Less than one-fifth of total sales is currently related to the domestic new car market and growing service businesses further buffer the company against the cyclicality of the manufacturing businesses. Service businesses accounted for more than 17 percent of Borg-Warner's first half earnings.

Last year a merger was proposed with Firestone Tire and Rubber Company but it has since been called off. Borg-Warner management called off the deal when Firestone directors proposed changes in terms to Borg-Warner that would have increased the value of securities to be exchanged for Firestone stock.

## 4.4 PRODUCTION AND OPERATIONS

Headquartered in Parkersburg, West Virginia, the Chemicals and Plastics Group is comprised of four domestic plants producing ABS, Blendex impact modifiers, other thermoplastic resins, plating chemicals and styrene monomer.

Three U.S. plants produce ABS: Washington, West Virginia (located approximately four miles from Parkersburg), Ottawa Illinois, and Oxnard, California. Blendex modifiers and plating chemicals are produced at the Morgantown, West Virginia, plant.

### 4.4.1 Major Automotive Plants

According to company sources, no automotive ABS is produced at the California plant. Therefore, those plants supplying the automotive industry are: Washington, West Virginia, Ottawa, Illinois, and Morgantown, West Virginia (impact modifiers for automotive vinyls). The percentage of production which ends up in automotive applications is well under 50 percent at each of these plants and possibly as low as 15 percent. (See Figures 4-3 to 4-5.)

*Washington, West Virginia*

Borg-Warner's Washington, West Virginia, plastics plant has an annual capacity of approximately 335 million pounds and employs a work force in excess of 600. Its principal automotive product is Cycolac ABS. Approximately 25 percent of its production is shipped to the automotive community.

*Ottawa, Illinois*

The Ottawa facility, with a work force of nearly 900, produces approximately 235 million pounds of ABS annually. The plant occupies nearly 200 acres and ships 20 to 30 percent of its production to automotive suppliers.

*Morgantown, West Virginia*

The Morgantown plant produces "Blendex" impact modifiers, polymer additives, intermediate chemicals, and polymer dispersion additives.

### 4.4.2 Expansion and New Plants

Borg-Warner is in the process of expanding ABS production at its Ottawa, Illinois, and Cobourg, Ontario, plants. At the Illinois plant, production was increased by 50 million pounds a year.

In early 1979, it was announced that the company will construct a $50 million ABS plant in Port Bienville, Mississippi. The new plastics polymerization and compounding facility, when completed in 1982, will have an annual capacity of 150 million pounds of ABS and will employ about 100 persons. As of this time, however, groundbreaking has not yet begun.

Company Borg-Warner

County Wood

Plant Size 180 acres

Plant Washington, West Virginia

Congressional District

Address Borg-Warner Chemicals
U.S.A.
Washington, WV 26181

Standard Metropolitan Statistical Area

No. of Employees 650

Telephone (304)863-5353

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Cycolac® brand ABS | 335 million pounds | N.C.A. | N.C.A. |

FIGURE 4-3. WASHINGTON PLANT

Company Borg-Warner

County LaSalle

Plant Size 200 acres

Plant Ottawa, IL

Congressional District

Address 1111 McKinley Rd.
Ottawa, IL 61350

Standard Metropolitan Statistical Area

No. of Employees 900

Telephone (815) 434-7000

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| ABS plastic | 235 million pounds (to be expanded to 285 million pounds by late 1979) | N.C.A. | N.C.A. |

FIGURE 4-4. OTTAWA PLANT

Company Borg-Warner

County Monongalia

Plant Size

Plant Morgantown, West Virginia

Congressional District

Address P.O. Box 816 Morgantown, WV 26505

Standard Metropolitan Statistical Area

No. of Employees

Telephone (304) 296-2554

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Blendex® impact modifiers (used to improve physical properties of vinyl used in auto interiors)<br><br>Polymer additives, intermediate chemicals, polymer dispersions | N.C.A. | N.C.A. | 10-15 percent of sales to automotive industry |

FIGURE 4-5. MORGANTOWN PLANT

Borg-Warner has purchased the rights to ABS manufacturing and processing technology developed by Toray Industries of Japan, and feels that acquisition will broaden Borg-Warner's ability to use the manufacturing technique best suited to each ABS grade.

In 1978 capital expenditures for the Chemicals and Plastics Division totaled $46.9 million, the most spent on any single industry segment.

## 4.5 FINANCIAL ANALYSIS

Borg-Warner had a very difficult time in the 1974-75 recession but is now recovering well.

### 4.5.1 Operations

Borg-Warner has had greatly improved earnings and performance since the poor 1974-75 period. Improvements have occurred principally through better margins. (See Figure 4-6.) Return on equity reached 15.4 percent in 1979 from 6.6 percent in 1975.

In 1974 Borg-Warner faced major decreases in demand from three of its major industrial markets and the chemical operations were particularly affected. Since then the Chemicals and Plastics Division's earnings have fluctuated with a low of $6 million in 1977 and a high of $27 million in 1979. ABS demand was good in the United States and throughout the world.

The company feels that its diversification and expansion in the service sector has made it much less vulnerable to downturns in the economy. Earnings for 1980 are predicted by Standard and Poor's to be moderately below 1979, and the stock appears to be favored by analysts.

### 4.5.2 Capital Analysis

Borg-Warner made a significant effort to reduce its debt during the poor earning 1974-75 period. In 1977 and 1978 it increased its debt slightly. (See Figure 4-7.) Long-term debt

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | $\frac{\text{Operating Income*}}{\text{Sales}}$ Percent |
|---|---|---|---|---|
| 79 | 2717 | 156 | 15.4 | 10.1 |
| 78 | 2326 | 134 | 14.8 | 11.6 |
| 77 | 2032 | 104 | 12.6 | 11.0 |
| 76 | 1862 | 82 | 11.7 | 10.3 |
| 75 | 1639 | 45 | 6.6 | 7.6 |
| 74 | 1768 | 51 | 7.9 | 8.0 |

| Year | $\frac{\text{Earnings}}{\text{Total Assets}}$ Percent | $\frac{\text{Sales}}{\text{Assets}}$ | $\frac{\text{Earnings}}{\text{Sales}}$ Percent |
|---|---|---|---|
| 79 | 8.9 | 1.56 | 5.7 |
| 78 | 8.6 | 1.48 | 5.8 |
| 77 | 7.2 | 1.43 | 5.1 |
| 76 | 6.6 | 1.49 | 4.4 |
| 75 | 3.6 | 1.33 | 2.7 |
| 74 | 4.1 | 1.43 | 2.9 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 4-6. OPERATING ANALYSIS OF BORG-WARNER

| Year | Sales | P/E Ratio[1] | Sources: Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings |
|---|---|---|---|---|---|---|
| 79 | 2717 | 4.4 | 156 | 59.6 | (8) | 2.6 |
| 78 | 2326 | 4.8 | 134 | 55.2 | 16 | (1.1) |
| 77 | 2032 | 6.0 | 104 | 50.9 | 20 | 59.9 |
| 76 | 1862 | 6.0 | 82 | 43.4 | (35) | 7.2 |
| 75 | 1639 | 7.5 | 45 | 42.8 | (84) | (2.9) |
| 74 | 1768 | 6.6 | 51 | 43.1 | 112 | 2.8 |

| Year | Change in Working Capital | Uses: Capital Expenditures | Uses: Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ (%) | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ Percent | Current Ratio |
|---|---|---|---|---|---|---|---|
| 79 | (7) | 131 | 44 | 12.4 | 8.2 | 7.6 | 1.9 |
| 78 | 5 | 115 | 39 | 13.9 | 10.1 | 7.0 | 2.0 |
| 77 | 15 | 77 | 34 | 13.8 | 8.7 | 5.3 | 2.1 |
| 76 | 68 | 36 | 27 | 13.9 | 7.3 | 2.8 | 2.2 |
| 75 | (31) | 56 | 26 | 18.1 | 3.4 | 4.7 | 2.4 |
| 74 | 75 | 83 | 26 | 25.8 | 3.7 | 6.4 | 2.6 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 4-7. CAPITAL ANALYSIS OF BORG-WARNER to capitalization, though, is still quite low. The company sold $62.4 million of common stock in 1977.

Capital expenditures in 1978 were at a historically high rate, due in part to the completion of Borg-Warner Chemical's MBS plant in Scotland. The company spent approximately $131 million for new plant and equipment in 1979 and financed this with internally generated funds.

## 4.6 RESEARCH AND DEVELOPMENT

More than 2,000 scientists, engineers and technicians are engaged in research at Borg-Warner. In 1978 the company invested 2½ cents of each sales dollar in product research, development and engineering programs. These R&D expenditures totaled $59.1 million, a 17 percent increase over the 1977 figure of $50.5 million, which reflects an increase in the company's research efforts. In 1979, Borg-Warner invested $56 million in research and development.

## 4.7 LABOR AND GOVERNMENT RELATIONS

Borg-Warner had three significant strikes in the final quarter of 1978, but had few major labor contracts expiring in 1979.

On the environmental front, Borg-Warner has recently completed an $8 million waste treatment facility at its Washington, West Virginia, plant. The facility is designed to treat 4.5 million gallons a day of waste water generated during production of ABS thermoplastic. According to Borg-Warner Chemicals' president, Leonard A. Harvey, the facility "demonstrates our commitment to maintaining strong environmental standards." The facility reportedly outperforms existing water treatment requirements and will enable Borg-Warner to meet federal regulations through 1989.

# 5. UNION CARBIDE

Union Carbide is a very large and diversified corporation. It is the leading producer of urethane intermediates which are used in automotive seat foam, bumpers, and carpeting. Structural urethane foam also has potential uses in many other automotive body parts such as fenders. Union Carbide has identified its urethane products as strengths of the company and will continue to invest in and promote this business. The company is also a major supplier and researcher in graphite fiber composites and hopes to develop a large market for these in the automotive industry. Union Carbide is the premier supplier of low-density polyethylene and the company plans to continue to expand in this area. Low-density polyethylene is used in a few automotive parts, such as insulation of electrical wiring and seat belt casings.

## 5.1 CORPORATE SIZE AND STRUCTURE

Union Carbide is one of the top five largest U.S. companies in terms of plastic sales and chemical sales. The company is the largest domestic producer of low-density polyethylene. Major automotive plastics produced by Union Carbide include urethanes, PVC, and phenolics. The company also makes polysulfone, an engineering thermoplastic.

### 5.1.1 Revenue, Profit and Employment

In 1979 Union Carbide earned $556 million on sales of $9,177 million. Earnings were over 40 percent higher than those in 1978. (See Table 5-1.) Chemicals and plastics accounted for about 37 percent of sales and 37 percent of operating profits. In 1978 Union Carbide employed 63,838 employees in the United States and 49,533 overseas.

TABLE 5-1. UNION CARBIDE REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $9,177 | $556 |
| 1978 | $7,870 | $394 |
| Average Number of Employees: 113,371 (1978) | | |

### 5.1.2 Corporate Organization

The various divisions of Union Carbide are shown in Figure 5-1. The Carbon Products Division manufactures and sells carbon and graphite products, including graphite fibers. The Home and Automotive Products Division makes PRESTONE and UNION CARBIDE commercial products such as antifreeze. The Metals Division produces ferroalloys of chromium, manganese, silicon, calcium, vanadium, tungsten and zirconium in addition to steel, iron and nonferrous metals. Electronic components are made by the Electronic Materials Department; industrial gases are produced by the Linde Division, and plastic production and marketing are directed by the Chemicals and Plastics Division. Union Carbide also has operating companies located in Canada, South America, Puerto Rico, Europe, the Far East, and Africa.

Other company divisions include the Battery Products Division, the Films-Packaging Division, and the Medical Products Division. To improve overall business management, Union Carbide's businesses have also been organized into Strategic Planning Units (SPU's). After thorough analyses of each of the more than 150 SPU's, the units are categorized and appropriate business strategies for each are developed.

## 5.2 MAJOR MARKETS AND PRODUCTS

Figure 5-2 summarizes the major market information for Union Carbide.

MARKET DATA

Major Markets: Agriculture, Transportation, Chemicals, Plastics, Steel, Construction

Major Automotive Products: Urethane intermediates used for flexible foam, carpet backing, bumpers, and other parts; phenolics used in brake and clutch friction material; low- and high-density polyethylene used in electrical insulation and overflow tanks.

FIGURE 5-2. MARKET DATA FOR UNION CARBIDE

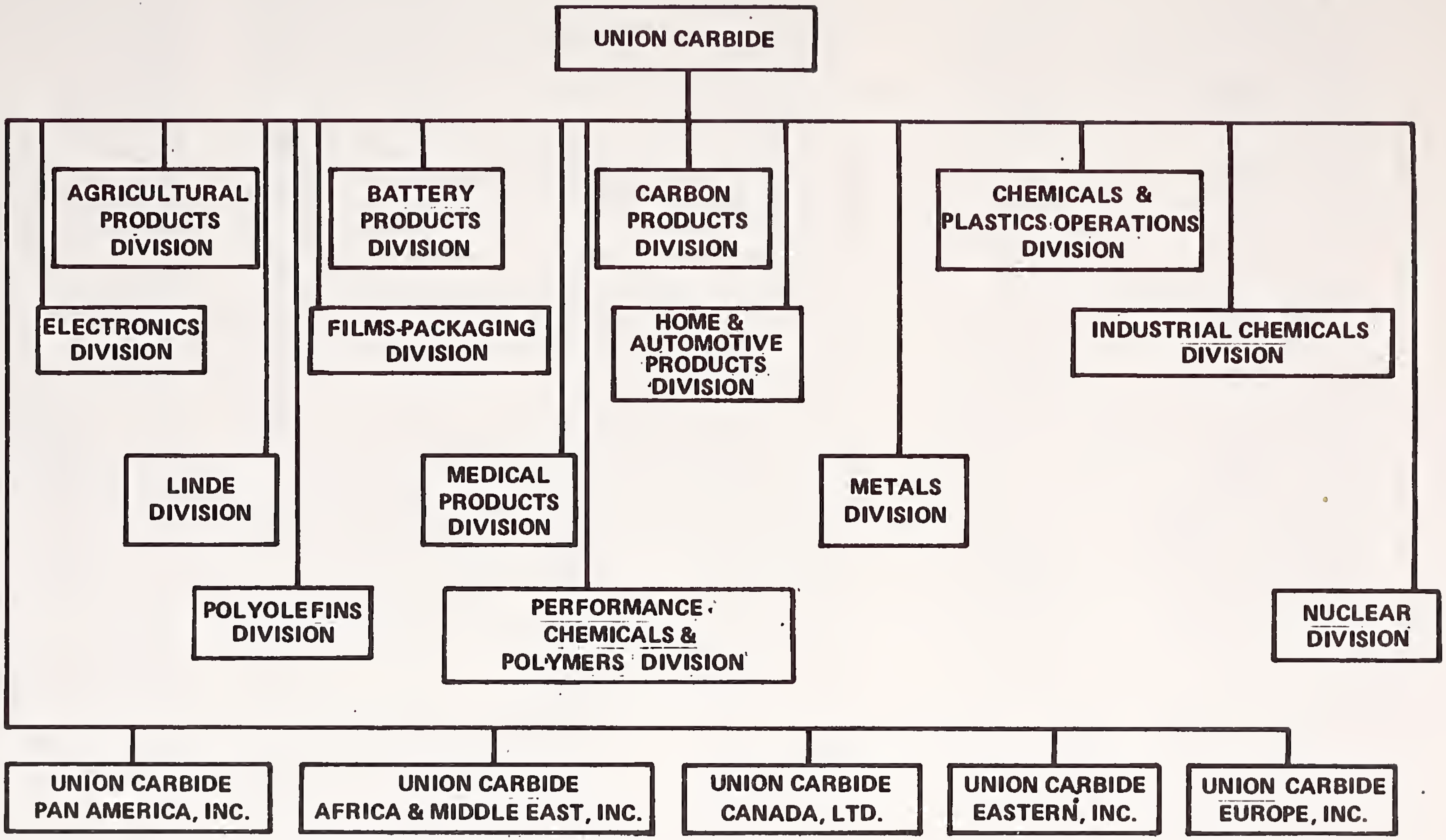


FIGURE 5-1. UNION CARBIDE DIVISIONS

### 5.2.1 Major Markets

Union Carbide sells to a very diverse set of industrial markets such as construction, transportation, agricultural, chemical, coating, plastics, steel, pharmaceutical, and communications markets. The company also sells directly to consumers its antifreeze, plastic wraps, and Eveready battery products, and is also important to the U.S. space and atomic energy programs.

### 5.2.2 Products

Union Carbide segments its products into chemicals and plastics; gases and related products; metals and carbons; batteries, home and automotive products; and specialty products. Table 5-2 shows sales by segment.

TABLE 5-2. SALES BY PRODUCT SEGMENT

| Sales | Millions of Dollars | | | | | |
|---|---|---|---|---|---|---|
| | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 |
| Sales | | | | | | |
| Chemicals | | $1,969 | $1,824 | $1,664 | $1,482 | $1,341 |
| Plastics | N.A. | 939 | 963 | 907 | 701 | 879 |
| Chemicals and plastics | 3,395 | 2,908 | 2,787 | 2,571 | 2,183 | 2,220 |
| Gases and related prod. | 1,468 | 1,263 | 1,104 | 987 | 885 | 766 |
| Metals and carbons | 1,744 | 1,416 | 1,243 | 1,151 | 1,088 | 1,069 |
| Batteries; home and auto products | 1,560 | 1,356 | 1,196 | 1,052 | 1,036 | 852 |
| Specialty products | 1,009 | 927 | 706 | 585 | 473 | 413 |
| TOTAL | $9,177 | $7,870 | $7,036 | $6,346 | $5,665 | $5,320 |

Union Carbide sells products from many of these categories to the auto industry. The company makes ethylene glycol (used as antifreeze), coatings for car bodies, adhesives for sealing and joining, and braking system fluids.

There are also many products in the plastics area that are sold to the auto industry. The major products are:

- Urethane intermediates for flexible foam
- Urethane carpet backing
- Urethane for rigid and semirigid foam
- Phenolics
- Polyethylene.

*Urethane Intermediates for Flexible Foam*

Union Carbide urethane intermediates have been used for many years to form flexible foam for furniture, mattresses, etc. In the automotive industry these intermediates react to give high resilience, deep foam seating; energy-absorbing padding; moisture resistant foam inside door panels; and grip-enhancing steering wheel covers. Each application requires the proper selection of urethane intermediates for the correct density, resilience, compression set and firmness. Advantages of urethane foam seating over conventional systems using steel springs plus padding include cost, less weight, and easier, faster installation of the one-piece cushioning. Urethane foam is well adapted for padding head restraints and dash paneling.

*Urethane Carpet Backing*

A recent development of Union Carbide's urethane laboratory is the frothed foam system which allows the production of foam-laminated fabrics without the use of an adhesive. The urethane intermediates are mixed, frothed with air, and applied to the fabric with conventional latex frothing machines. The foam penetrates into the fabric and sets to form an extremely strong bond.

Union Carbide's frothed foam system is gaining popularity for carpet padding. The company announced last August that General Motors had completed testing Union Carbide's Niaz frothed foam carpet backing system for automotive carpeting and is using the product in GM "A" model automobiles. Major considerations in GM's selection of Union Carbide's system included the weight reduction achieved through use of the carpeting, and the cushioning and acoustical advantages which reduce the need for additional noise suppression material and contribute to weight savings. In addition the foam can be heat-shaped into the exact contour of the auto interior, thus allowing it to be stored as rolled goods and improving inventory control.

The first contract for production of the new carpet in GM "A" model cars was awarded to C.H. Masland & Sons, Carlisle, Pennsylvania. The company worked closely with Union Carbide's engineers in refining applications of the polyurethane frothed foam system.

*Urethane for Rigid and Semirigid Foam*

Union Carbide is not only a leading supplier of the major ingredients for making urethane foam, but also a recognized innovator. The company helped commercialize reaction injection molding technology, and participated with the auto industry in the development of energy absorbing bumpers. Union Carbide helped develop the urethane intermediates for use with reaction injection molding to form a bumper ready for finishing operations. The urethane intermediates also provide soft urethane fascias to give a cosmetic shield hiding the bumpers. The fascia deforms and recovers quickly under impact.

Union Carbide also has high modulus urethane formulations available for potential use in large parts such as fenders, hoods, deck lids, and body panels; and small parts such as fender extenders and bezels.

*Phenolics*

Union Carbide provides a variety of phenolics used to bind fibers for use in friction elements of brakes and clutches, filters for oil and air, battery separators and sound insulating mats. The company makes 18 different laminating resins and 26 powdered and liquid phenolics in the friction field. In addition, substrates for printed circuits in radios and electronic ignition systems use industrial grades of Union Carbide phenolics.

*Polyethylene*

Although polyethylene is not one of the major plastics used in cars, Union Carbide is such an important producer of the plastic that sales of it to the auto industry are considerable. Low-density polyethylene and ethylene copolymers are used in rub strips on bodies, seat belt casings, insulation of electrical wiring, and ducts protecting electrical wiring.

High-density polyethylene is gaining popularity as a potential material for gasoline tanks, windshield washer fluid reservoirs, radiator surge tanks, and mud flaps.

### 5.2.3 New Products

Union Carbide has developed some new products that may be useful in developing reinforced plastics for cars.

*BAKELITE Additives*

Two of the problems with glass-reinforced epoxy or polyester products for automobiles include the difficulty of obtaining a smooth surface on these parts and shrinkage during molding. Union Carbide has developed "BAKELITE" additives that are blended into molding compounds. The resulting system yields molded objects with smooth surfaces and uniform pigments. The material is also supposed to have low shrinkage during polymerization in the mold.

*Graphite Fibers*

Union Carbide is the nation's largest supplier of graphite fibers. The company supplied fibers used in Ford's carbon fiber car and has developed carbon fiber products such as drive shafts, transmission supports, primary and secondary springs, and push rods.

Union Carbide is committed to work with automotive makers and their suppliers on the continual development of new products and new uses of carbon fibers composite products. The company is also committed to reducing the price of graphite fibers, foreseeing a price of $10.00 per pound for some varieties in the 1980's.

### 5.2.4 Sales Strategy

In order to promote its chemicals and plastic products Union Carbide has been publishing some corporate advertising in automotive journals. The advertisements do not stress the qualities of specific products, but emphasize the wide range of automotive or plastic products offered by Union Carbide. The advertisements also stress the research technological capabilities of Union Carbide.

## 5.3 CORPORATE STRATEGY

Union Carbide has recently done an extensive strategic analysis of its business and has established new operating and management rules for the organization. An integrated system of long-range planning for all businesses and departments has been developed and applied and a formal program has been established for evaluating the performance of management at all levels against agreed-upon standards.

The corporation is now following three basic strategies:

- To strengthen its position in those already superior businesses that involve products expected to be in strong demand in the future and perhaps in short supply over the next five to ten years.

- To withdraw from businesses having little potential of meeting long-term corporate objectives.

- To shift the business mix over the long term to include a greater proportion of "performance products"—products with special characteristics offering superior performance and value to the user as well as good profit potential for Union Carbide. Examples include the proprietary Sevin carbaryl and Temik adicarb pesticides, Linde molecular sieves, Ucar latexes, Thormel carbon fibers, and medical diagnostic systems.

Union Carbide considers itself to already be the world's leading producer of:

- Ethylene oxide and derivatives—used for fibers, antifreeze, and detergents

- Low-density polyethylene—the world's most popular plastic

- Ethanol—used for solvents, pharmaceuticals, and cosmetics

- Urethane intermediates—used for foam cushioning for autos, furniture, and carpets

- Oxygen—used in steelmaking

- Graphite electrodes—used in steelmaking

- Ferroalloys, tungsten, and vanadium—used in steelmaking
- Dry cell batteries
- Casings for processed foods
- Plastic wrap and bags for home use
- Antifreeze for automotive use.

Thus, two of Union Carbide's automotive plastic products—urethane intermediates and polyethylene—are considered by the company to be superior products of the business. One can therefore expect the production and marketing of these products to be strengthened in the future.

## 5.4 PRODUCTION AND OPERATIONS

Union Carbide and its affiliated companies operate approximately 500 plants, factories, laboratories, mines, and mills around the world.

### 5.4.1 Major Automotive Facilities

Union Carbide's key automotive products are urethane intermediates, phenolics, and polyethylene. Urethane intermediates are made at South Charleston, Institute, and Sistersville, West Virginia; and Seadrift, Texas. Phenolics are made at Bound Brook, New Jersey, and Marietta, Ohio. Polyethylene is made at Seadrift, Texas, and Ponce, Puerto Rico. Information on these plants is presented in Figures 5-3 through 5-9.

*South Charleston Plant*

The South Charleston, West Virginia, plant makes hundreds of chemicals, including polyols which are urethane intermediates. It is one of the larger petrochemical plants in the world and produces chemicals, plastics, and fibers from the derivatives of natural gas and petroleum. Most of the materials produced in the plant are intermediates and are either used in other processes or sold to customers who in turn use them to make finished products.

Company Union Carbide

County

Plant Size 230 acres developed

Plant South Charleston Plant

Congressional District

Address P.O. Box 8004
South Charleston,
West Virginia 25303

Standard Metropolitan Statistical Area

No. of Employees 2,000

Telephone (304) 747-0001

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Urethane intermediates (Polyols) | N.C.A. | N.C.A. | N.C.A. |

FIGURE 5-3. SOUTH CHARLESTON PLANT

Company Union Carbide

County ____

Plant Size 500 acres developed

Plant Institute Plant

Congressional District ____

Address P.O. Box 2831
Charleston,
West Virginia 25330

Standard Metropolitan Statistical Area ____

No. of Employees 2,000

Telephone (304) 747-0001

Primary SIC Code(s) ____

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Urethane intermediates (Polyols and isocyanates) | N.C.A. | N.C.A. | N.C.A. |

FIGURE 5-4. INSTITUTE PLANT

Company Union Carbide

County

Plant Size 40 acres developed

Plant Sistersville Plant

Congressional District

Address P.O. Box 180
Sistersville,
West Virginia 26175

Standard Metropolitan Statistical Area

No. of Employees 600

Telephone (304) 652-3211

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
| --- | --- | --- | --- |
| Silicones used in manufacture of urethane foams | N.C.A. | N.C.A. | N.C.A. |

FIGURE 5-5. SISTERSVILLE PLANT

Company: Union Carbide

County:

Plant Size: 1,450 acres developed

Plant: Seadrift Plant

Congressional District:

Address: P.O. Box 186
Port Lavaca,
Texas 77979

Standard Metropolitan Statistical Area:

No. of Employees: More than 1,400

Telephone: (512) 552-9711

Primary SIC Code(s):

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Urethane intermediates<br>Polyethylene | N.C.A. | N.C.A. | N.C.A. |

FIGURE 5-6. SEADRIFT PLANT

Company Union Carbide

County

Plant Size 125 acres developed

Plant Bound Brook Plant

Congressional District

(Plant) River Road
Piscataway, NJ

(Mail) Address P.O. Box 670
Bound Brook,
New Jersey 08805

Standard Metropolitan Statistical Area

No. of Employees More than 1,400

Telephone (201) 356-8000

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Phenolic resins (used in automotive clutch and brake linings) | More than 1 million pounds of products per day | N.C.A. | N.C.A. |

FIGURE 5-7. BOUND BROOK PLANT

Company Union Carbide

County

Plant Size 56 acres

Plant Marietta Plant

Congressional District

Address P.O. Box 299
Marietta, Ohio
45750

Standard Metropolitan Statistical Area

No. of Employees

Telephone (614) 373-1131

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Phenolics (used in automotive clutch and brake linings) | N.C.A. | N.C.A. | N.C.A. |

FIGURE 5-8. MARIETTA PLANT

Company Union Carbide

County

Plant Size

Plant Ponce Plant

Congressional District

Address Union Carbide
Ponce, Puerto Rico

Standard Metropolitan Statistical Area

No. of Employees

Telephone (809) 843-2626

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polyethylene | N.C.A. | N.C.A. | N.C.A. |

FIGURE 5-9. PONCE PLANT

The plant is situated on 230 acres and includes a ten-story office building, laboratory, two power plants, and numerous chemical production facilities. Roughly 2,000 employees work at the plant.

*Institute Plant*

The Institute, West Virginia, plant makes both the polyols and isocyanates used to make polyurethane. The plant, ten miles west of South Charleston, was designed by Union Carbide for the Government in World War II as part of the nation's synthetic rubber program. The company purchased the plant from the Government in 1974 and has expanded the facility many times. The plant covers about 500 acres and employs roughly 2,000 people. The plant produces over 200 different chemicals, and includes chemical production units, power plants, laboratories, main office, and warehouses.

*Sistersville Plant*

The Sistersville plant, also located in West Virginia, is devoted entirely to the production of silicones. An important use for silicones is in the manufacture of urethane foams. They are also used as water repellents, surfactants, lubricants, antifoam agents, elastomers, release agents, and raw material in the production of high purity polycrystalline silicon for the electronics industry.

The plant covers 40 acres and includes an administration building, three production units, and support facilities. The plant employs approximately 600 workers.

*Seadrift Plant*

The Seadrift plant near Port Lavaca, Texas, is Union Carbide's second largest plant. The major automotive products of the plant are urethane intermediates. Production units spread over 1,450 acres and there are ten large process units. The plant employs more than 1,400 people. Texas-produced hydrocarbons are the basic raw materials for the plant, which is also a major producer of polyethylene. In 1977, a new 400 million pound per year low-density polyethylene unit at Seadrift was completed. The unit uses an improved process developed by Union Carbide.

*Bound Brook Plant*

The Bound Brook, New Jersey, plant manufactures phenolic resins for automotive clutch and brake linings as well as many other products. It is one of Union Carbide's major chemicals and plastics manufacturing facilities and over a million pounds of plastic resins, compounds, sheeting and chemicals are produced daily. The plant consists of more than 21 major buildings and covers 125 acres. The bulk of the raw materials for the plant comes from other Union Carbide plants on the Gulf Coast and Puerto Rico. More than 1,400 people work at Bound Brook.

*Marietta Plant*

The Marietta, Ohio, plant is also a major manufacturer of phenolic resins. The plant, which covers 56 acres, also makes polystyrene and polysufone plastics. The phenol unit at Marietta began production in 1951.

### 5.4.2 New Plants and Expansions

Union Carbide has not announced plans to expand its automotive plastic production except for polyethylene. The company has been expanding its ethylene glycol business, carbon products, industrial gases, and battery products business, but these are largely not connected with automotive plastics.

In 1979 Union Carbide announced that it will build a second new polyethylene plant based on its new low-cost polyethylene technology. The plant will be located in Taft, Louisiana, and have an annual capacity of 500 million pounds of low-density polyethylene when completed in 1982. The company is also building a 300 million pound per year polyethylene plant at Seadrift, Texas.

By 1982 Union Carbide should have a billion pounds per year capacity to produce polyethylene by its new process, which is supposed to require only a quarter of the energy of existing technologies.

## 5.5 FINANCIAL ANALYSIS

Union Carbide has had marginal earnings in the past few years. An ambitious capital spending program begun in 1975 has been somewhat cut back.

### 5.5.1 Operations

Union Carbide had record earnings in 1974, but only matched that record again in 1979. (See Figure 5-10.) The company has been faced with lower sales as a percentage of assets as well as lower operating ratios since 1974. Factors contributing to the low profit according to Union Carbide include:

- Sluggish economies in many countries
- Low plant operating rates
- Strong resistance in the marketplace to price increases
- Costs of raw materials and energy.

The chemicals and plastics segment is the largest of Union Carbide's industry segments, comprising 37 percent of sales and 36 percent of operating profits. Sales of urethanes, coating materials, and chemical intermediates to the automotive, housing, and appliance markets were strong during 1978 and the products sustained modest price increases during the year.

Union Carbide's 1979 earnings were up significantly over 1978. The sales and margins benefited from:

- The absence of Union Carbide's European chemicals and plastics business which was sold in late 1978
- A decline in selling, general and administrative expenses as a percent of sales
- High activity in the company's steel-related business.

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | Operating Income*/Sales Percent |
|---|---|---|---|---|
| 79 | 9177 | 556 | 14.4 | 16.0 |
| 78 | 7870 | 394 | 11.2 | 15.0 |
| 77 | 7036 | 385 | 11.9 | 16.0 |
| 76 | 6346 | 441 | 15.2 | 18.0 |
| 75 | 5665 | 382 | 14.5 | 18.8 |
| 74 | 5320 | 525 | 22.8 | 22.5 |

| Year | Earnings/Total Assets Percent | Sales/Assets | Earnings/Sales Percent |
|---|---|---|---|
| 79 | 6.6 | 1.08 | 6.1 |
| 78 | 5.2 | 1.04 | 5.0 |
| 77 | 5.5 | 1.00 | 5.5 |
| 76 | 7.1 | 1.01 | 7.0 |
| 75 | 7.2 | 1.08 | 6.7 |
| 74 | 11.6 | 1.17 | 9.9 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 5-10. OPERATING ANALYSIS OF UNION CARBIDE

### 5.5.2 Capital Analysis

Union Carbide began a major program of capital spending in 1975 to modernize and improve facilities. Long-term debt was significantly increased in 1975, 1976 and 1979. (See Figure 5-11.) Common stock was increased in 1977, mostly in connection with the acquisition of Amchem Products. Capital spending, cut in 1978, was back to normal levels in 1970. Union Carbide's debt to capitalization ratio rose to a high of 29.3 percent in 1976, was down to 23.7 percent at the end of 1978, and is now up to 26 percent.

## 5.6 RESEARCH AND DEVELOPMENT

Part of Union Carbide's new strategic orientation is a new impetus to research. Research expenditures from 1967 to 1973 were close to $80 million per year. During 1976-1978 expenditures were around $145 million per year. In 1979, the company spent $160.8 million on research and development.

About two-thirds of the corporation's research and development expenditures are directed to the support of existing businesses through new and improved products and better production processes. The remaining one-third is directed toward new business opportunities.

Some Union Carbide R&D activities related to automobiles have included:

- Research and testing of a new method for producing polyethylene. The method requires lower pressures and temperatures than older processes and is claimed to require only half the capital investment and a quarter of the energy of the older technologies.

- Development of lightweight carbon fiber composite structures for automobiles.

- Research into stress-free molding and forming of urethane structural foam.

| Year | Sales | P/E Ratio[1] | Sources: Earnings | Sources: Depreciation | Sources: Changes in Long-Term Debt | Sources: Changes in Owners' Equity Other Than Retained Earnings |
|---|---|---|---|---|---|---|
| 79 | 9177 | 4.7 | 556 | 470 | 290 | 43.6 |
| 78 | 7870 | 6.3 | 394 | 417 | (118) | 18.5 |
| 77 | 7036 | 8.4 | 385 | 360 | 27 | 145 |
| 76 | 6346 | 9.3 | 441 | 301 | 277 | 20 |
| 75 | 5665 | 8.6 | 382 | 2.70 | 383 | 11 |
| 74 | 5320 | 4.5 | 525 | 248 | (45) | 9 |

| Year | Change in Working Capital | Uses: Capital Expenditures | Uses: Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ (%) | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ Percent | Current Ratio |
|---|---|---|---|---|---|---|---|
| 79 | 448 | 831 | 194.6 | 26.0 | 9.1 | 10.0 | 2.2 |
| 78 | (24) | 688 | 181 | 23.7 | 7.5 | 8.7 | 2.0 |
| 77 | (18) | 805 | 178 | 26.7 | 7.3 | 10.8 | 2.2 |
| 76 | 9 | 965 | 154 | 29.3 | 9.2 | 14.5 | 2.3 |
| 75 | 307 | 862 | 147 | 27.4 | 10.6 | 15.0 | 2.5 |
| 74 | 142 | 517 | 133 | 23.7 | 17.1 | 10.5 | 2.2 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 5-11. CAPITAL ANALYSIS OF UNION CARBIDE

## 5.7 GOVERNMENT RELATIONS

Union Carbide has had an active public relations campaign in recent years focusing on the company's response to government energy, and environmental issues. The company believes that business has an obligation to participate in the public debate regarding national issues. Some of the company's stands include:

- The company is committed to controlling health and environmental hazards associated with chemicals.
- The risk of cancer from nitrites is not sufficient to ban their use.
- Union Carbide's presence in South Africa is a force for constructive change.
- The company is committed to equal opportunity.
- Nuclear power and coal are essentially the only ways the country will be able to meet its electricity needs over the next 25 years.
- Tax reform and tax cuts are reasonable and important ways to encourage individuals and businesses to save and aid capital formation.
- Cooperation between business and government is far more productive than confrontation, and good communication and mutual understanding are the basis of a good cooperative relationship.

# 6. MOBAY

Mobay Chemical Corporation, whose parent is Bayer AG of Leverkusen, Germany, was formed in 1954 to introduce polyurethanes to America. The venture was formed as a 50-50 partnership with Monsanto Chemical Company (hence the name Mobay). However, in 1964 the Federal government filed civil action against Monsanto and Bayer AG, alleging that their joint ownership of Mobay violated antitrust laws. In 1967 a consent judgment was issued requiring Monsanto to sell its interest in Mobay to Bayer. The company was known as Baychem Corporation starting in 1971, but the name was changed back to Mobay in 1974.

Today Mobay has become the nation's largest manufacturer of polyurethane raw materials and polymers. The company continues to penetrate new markets relying on its technical capability to develop new products and uses. Mobay helped introduce into the United States the Reaction Injection Molding production technique. Demand for polyurethane by the automotive and other industries has led the company into a major expansion program to increase capacity for its polyurethane intermediates.

## 6.1 CORPORATE SIZE AND STRUCTURE

Mobay is the nation's largest and most diversified manufacturer of polyurethane raw materials and has also expanded into agricultural chemicals, dyestuffs, plastics and coatings, industrial chemicals and textile fibers. Mobay is the thirteenth largest plastics company by sales and is among the top 50 chemical companies by sales in the United States.

### 6.1.1 Revenue, Profit and Employment

In 1979 Mobay had sales of $955 million, up 23 percent from 1978. Earnings were up 61 percent from $36 million in 1978 to $58 million in 1979. The company employed about 6,000 persons in 1979. (See Table 6-1.)

TABLE 6-1. MOBAY REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $955 | $58 |
| 1978 | $779 | $36 |
| Average Number of Employees: 6,000 (1979) | | |

### 6.1.2 Corporate Organization

Mobay is organized into six operating divisions. (See Figure 6-1.) The Agricultural Chemicals Division is headquartered in Kansas City and makes herbicides and insecticides. The Industrial Chemicals Division is in Pittsburgh and makes pigments, silicones, dyestuffs, and rubber products. The Plastics and Coatings Division makes coatings and plastic products other than urethanes (such as engineering plastics), and the Polyurethane Division supervises urethane chemicals production as well as urethane parts fabrication and urethane fabrication machinery manufacturing. The two plastics divisions are headquartered in Pittsburgh. The Verona Dyestuff Division is located in Union, New Jersey, and makes dyes for leather, textiles and polyurethane, and the Baytex Fibers Division makes fibers for industrial and consumer uses. Each division generally has its own marketing, production and research staffs. In addition, there are corporate staffs for accounting, administration/personnel, and engineering. Califoam, part of the Polyurethane Division, fabricates urethane flexible and rigid foam. Hennecke Machinery, also part of the Polyurethane Division, makes complete facilities for processing of polyurethane products.

## 6.2 MAJOR MARKETS AND PRODUCTS

Figure 6-2 summarizes the major market information for Mobay.

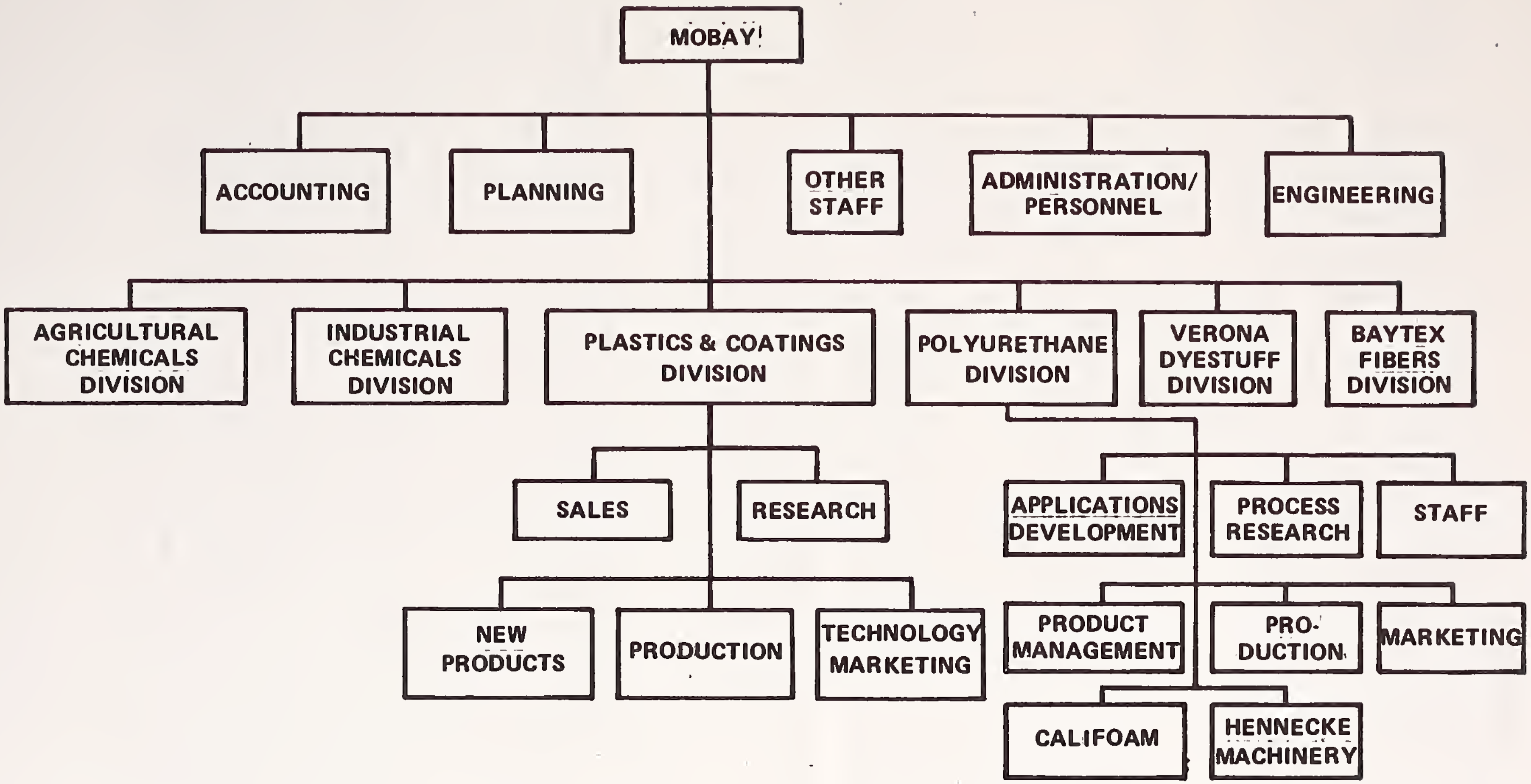


FIGURE 6-1. MOBAY ORGANIZATION

### 6.2.1 Major Markets

Mobay's major markets include the automotive, appliance, textile, construction, farming, home furnishings, electrical/electronics, and recreational/sporting goods industries. Urethane products, in particular, are used by the home furnishings, construction, automotive, packaging, textile and recreation industries. Mobay's engineering plastics are targeted toward the automotive, appliance, machinery, and electronics markets.

| MARKET DATA |
|---|
| Major Markets: Automotive, appliance, farming, home furnishings, electronics markets |
| Major Automotive Products: Polyurethane intermediates (MDI and TDI) for flexible and rigid urethane foam used in bumpers, front-end fascias, fenders, other body parts, and seating cushions |

FIGURE 6-2. MARKET DATA FOR MOBAY

### 6.2.2 Products

Mobay's plastic products fall into three categories: polyurethane products, engineering plastics, and fabricated plastic products.

*Polyurethane Products*

Major urethane intermediates produced by Mobay include toluene disocyanate (TDI), polymeric isocyanate (MDI), polyethers and polyesters. In general, these materials serve three major application categories: flexible urethane foam used in seat cushions and other automotive padding; rigid urethane foam used in bumpers, front-end fascias and body parts; and elastomers. Mobay markets several brand name urethane systems of chemicals, designed to produce urethane parts with properties to meet specific applications. Some of these systems are described below.

- BAYDUR—Rigid structural foam systems (for Reaction Injection Molding) for furniture, electronic, transportation and other industries
- BAYFILL—Semirigid foam systems for automotive instrument panels; other automotive interior parts and energy-absorbing applications
- BAYFIT—Highly resilient flexible foam molding systems for automotive seating, furniture and bedding industries
- BAYFLEX—Elastomeric integral skin reaction injection molding systems for automotive exterior parts, shoe soles, and other elastomeric applications
- BAYMER—Rigid foam systems for thermal insulation
- BAYTHERM—Polyurethane foam thermal insulation systems for construction, refrigerated appliances, transportation and other industries
- TEXIN—Thermoplastic urethanes for automotive exterior parts, mechanical goods, and other applications demanding toughness and resistance to abrasion.

*Engineering Plastics*

Mobay makes engineering plastics out of polycarbonate and ABS. MERLON is a brand name for polycarbonate resins covering a large variety of types. Applications include telecommunications, electrical and electronic parts, food handling equipment, automotive components, lighting diffusers, bottles and containers. Use of this plastic has been growing rapidly in recent years.

BAYBLEND is a polymeric alloy consisting of MERLON polycarbonate and ABS. The material is suitable for injection molding and extrusion and can be used for automotive light housings, tractor grilles, serving trays, airline storage units, pocket calculators, and speaker grilles.

*Plastic Products*

Mobay's Califoam Division manufactures polyurethane foam. Production includes flexible foam, bonded foam, molded rigid foam and structural rigid polyurethane foam. Specific products include:

- BAYDUR—Molded self-skinning structural polyurethane foam for electrical and construction markets

- EVEREST—Highly resilient cushioning foam for furniture and bedding applications

- PYLON—High-density polymeric carpet underlay. Complete line of prime urethane and bonded carpet underlay products.

### 6.2.3 New Products

Mobay has introduced several new products in recent years that are being used in automobiles.

*MULTRANOL-PHD*

During 1978 Mobay introduced a new generation of polyols which are used in the manufacture of urethanes and are specifically designed to increase the applicability of urethanes in cars. The polyols, carrying the trademark MULTRANOL-PHD, were readily accepted by industry for automotive molding, highly resilient slab stock and high-load-bearing conventional flexible foam applications.

*MERLON*

MERLON polycarbonate continued excellent market growth in buildings, components, automotive parts and industrial applications. Mobay successfully introduced in 1978 MERLON polycarbonate one-gallon containers designed especially as a returnable package for milk. Progress was made in getting dairies throughout the country to convert to MERLON and Mobay is speeding up development of smaller containers.

*BAYBLEND*

BAYBLEND polycarbonate/ABS alloys were introduced in 1977. Since that time, marketing efforts have become most promising in the automotive industry.

*Urethanes*

In addition to continued work on automotive front-end fascia and bumpers, Mobay is working on fiber-reinforced urethane to create high modulus reaction injection molding materials for automotive fenders, doors, and trunklids. In addition, the company is working on an automotive spoiler made out of the BAYFLEX reaction injection molding system.

## 6.3 CORPORATE STRATEGY

Mobay believes that the growth for its businesses has come from the company's ability to be a strong technical partner with its customers. This reflects Bayer AG's philosophy that the sophisticated American market demands high technology products for success. Mobay further feels that the company's strong position in the United States was made possible by the pioneering research efforts of its parent company and Mobay's ability to adapt the results of these efforts to the requirements of the U.S. market.

Thus, Mobay hopes to use, where applicable, the strategy that has proven successful in the past. First, establish a market position in the United States supported with products imported from Bayer in Germany. Then, once market strength has been established, domestic production based on transfer of Bayer AG technology is built with smaller risk and shorter payout time.

Mobay also has decided to finance its expansions in the United States with limited use of short-term financing. This is done to maintain flexibility and liquidity to assure ample working capital for ongoing operations.

Mobay, with the full support of its parent, Bayer AG, has a current goal to increase its participation in the U.S. market. The company will rely on its technology, manufacturing capability and marketing skill in engineering plastics, agricultural chemicals, and urethane components to accomplish this task.

## 6.4 PRODUCTION AND OPERATIONS

Mobay operates approximately 16 facilities in the United States. Corporate headquarters are in Pittsburgh. Other major facilities are in Missouri, Kansas, West Virginia, Texas, California, Washington, South Carolina, and New Jersey.

### 6.4.1 Major Automotive Facilities

The Polyurethane Division, Plastics and Coatings Division and the Industrial Chemicals Division all share two major plants, one in New Martinsville, West Virginia, and the other in Baytown, Texas. (See Figures 6-3 and 6-4.)

*New Martinsville*

Production of plastic resins was first started by Mobay in New Martinsville in 1955. The plant now covers 230 acres and produces the urethane intermediates TDI and MDI, as well as the engineering plastic MERLON polycarbonate. The plant currently employs 900 people. Capacity of TDI is 150 million pounds per year and capacity of MDI is also 150 million pounds per year.

*Baytown Plant*

The start of production at Baytown, Texas, in 1972 made Mobay the largest TDI producer in the United States. The facility has since been significantly expanded and now makes MDI and TDI. Current TDI capacity is 100 million pounds per year and MDI capacity is 150 million pounds per year. The plant employs 600 people.

### 6.4.2 New Plants and Expansions

With many products coming out of the development stage, Mobay is beginning a series of major capital investments. Some of these are described below.

Company Mobay Chemical Corp.

County Wetzel

Plant Size 230 acres

Plant New Martinsville

Congressional District

Address Box 500, New Martinsville, WV 26155

Standard Metropolitan Statistical Area

No. of Employees 900

Telephone (304) 455-4400

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| TDI, MDI (raw materials used to make urethane foam)<br><br>MERLON polycarbonate | TDI: 150 million pounds<br><br>MDI: 150 million pounds | N.C.A. | N.C.A. |

FIGURE 6-3. NEW MARTINSVILLE PLANT

Company Mobay Chemical Corp.

County Harris

Plant Size 190 acres

Plant Baytown

Congressional District

Address West Fay Road<br>Baytown, TX 77520

Standard Metropolitan Statistical Area Houston

No. of Employees 600

Telephone (712) 382-4211

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| TDI, MDI (raw materials used to make urethane foam) | TDI: 100 million pounds<br>MDI: 150 million pounds | N.C.A. | N.C.A. |

- Mobay will construct additional facilities at its headquarters in Pittsburgh. A complex will be built to accommodate application development and technical service laboratories, as well as marketing and support personnel for the Industrial Chemicals and Plastics and Coatings Divisions. Research-oriented laboratories will also be built.

- In New Martinsville, Mobay has begun building an extension of the research laboratory for the Polyurethane and Plastics and Coatings Divisions and a new engineering and administration building.

- A new toxicology institute will be built near Kansas City, Missouri.

- Mobay in 1978 completed an addition to MDI capacity at the Baytown, Texas, plant. This was done to support increased sales to the auto industry of systems for reaction injection molding.

- In April, Mobay announced another 100-million-pound-per-year expansion of MDI capacity at Baytown. The increase was needed, according to the company, because of the steadily expanding market for rigid foam insulation in commercial and residential construction and the rapid acceptance of reaction injection molding in the production of exterior automotive parts such as bumpers, fascias, and other body parts.

- Mobay will open a new thermoplastics compounding facility in Newark, Ohio, to make the BAYBLEND combination of polycarbonate and ABS and to make other specialty thermoplastics.

## 6.5 FINANCIAL ANALYSIS

Mobay is owned by Bayer AG of Germany, and financial information on the company is thus rather limited. However, the company seems well prepared for a major capital expenditure program in the United States.

### 6.5.1 Operating Analysis

One can see from Figure 6-5 that sales and earnings for Mobay have been increasing markedly in recent years. Although returns on sales have remained rather steady, sales have increased significantly faster than assets or equity, substantially improving the returns realized by the firm. The recent increases in sales and earnings are attributed by Mobay to strong agricultural chemicals and polyurethane sales.

### 6.5.2 Capital Analysis

Aside from major capital expenditures before 1975, the level of investment by Mobay has been within the internal cash flow capabilities of the firm. (See Figure 6-6.) In 1974 and 1975 the company completed a major $300 million investment program. This spending enlarged Mobay's capacities in many areas including urethane chemicals and engineering plastics. The program was financed in part from $20 million of new equity from Bayer AG and $80 million of long-term debt maturing in 1995.

Mobay has recently announced another large capital expenditure program, and the company forecasts total capital expenditures for 1979 and 1980 of $300 million. To help finance this program Mobay arranged from three of its major lenders a financing package totaling $150 million.

## 6.6 RESEARCH AND DEVELOPMENT

Mobay emphasizes its commitment to technological innovation and the role technological leadership has played in its success. According to the company, the strongest indication of its commitment to retain the initiative in new polyurethane products and applications is found in the company's polyurethane laboratory in Pittsburgh. The laboratory is designed to allow Mobay to thoroughly test new urethane components on actual production equipment. The laboratory runs pilot plant operations to test new products including the following:

- Flexible foam molding
- Rigid foam laminates with flexible and rigid facing materials

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | $\frac{\text{Operating Income*}}{\text{Sales}}$ Percent |
|---|---|---|---|---|
| 79 | 955 | 58 | 18.4 | Not Available |
| 78 | 779 | 36 | 13.5 | |
| 77 | 641 | 23 | 9.6 | |
| 76 | 544 | 20 | 9.5 | |
| 75 | 418 | 17 | - | |
| 74 | 390 | 16 | - | |

| Year | $\frac{\text{Earnings}}{\text{Total Assets}}$ Percent | $\frac{\text{Sales}}{\text{Assets}}$ | $\frac{\text{Earnings}}{\text{Sales}}$ Percent |
|---|---|---|---|
| 79 | 7.1 | 1.16 | 6.1 |
| 78 | 5.1 | 1.11 | 4.6 |
| 77 | 3.5 | 1.03 | 3.6 |
| 76 | 3.2 | .88 | 3.6 |
| 75 | - | - | 4.1 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 6-5. MOBAY OPERATING ANALYSIS

| | | | Sources | | | |
|---|---|---|---|---|---|---|
| Year | Sales | P/E Ratio[1] | Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings |
| 79 | 955 | Not | 58 | 40 | 82 | Not |
| 78 | 779 | Appli- | 36 | 37 | 26.5 | available |
| 77 | 641 | cable | 23 | 36 | (13.5) | |
| 76 | 544 | | 20 | 29 | 74 | |
| 75 | 418 | | 17 | 18 | - | |
| 74 | 390 | | 16 | 17 | - | |

| | | Uses | | | | | |
|---|---|---|---|---|---|---|---|
| Year | Change in Working Capital | Capital Expenditures | Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ (%) | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ Percent | Current Ratio |
| 79 | Not | 148 | Not | Not | Not | 18.2 | Not |
| 78 | Available | 61 | Avail- | Available | Avail- | 8.5 | Avail- |
| 77 | | 38 | able | | able | 5.6 | able |
| 76 | | 31 | | | | 4.8 | |
| 75 | | 159 | | | | 26.8 | |
| 74 | | 78 | | | | - | |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 6-6. MOBAY CAPITAL ANALYSIS

- Automotive reaction injection-molded fascias
- Bumpers
- Fenders and body parts
- Glass reinforced reaction-injection-molded parts
- Integral skin shoe soles
- Rigid structural foams
- Direct foam-backed carpet.

Mobay is also aggressively searching for new uses and products for its MERLON polycarbonate resin. The company feels the plastic has a large unrealized potential.

Considerable research is also devoted toward new formulations and applications of Mobay's urethane coating chemicals.

## 6.7 GOVERNMENT RELATIONS

Government relations have been a great concern to Mobay. The company has expressed its apprehension that duplication and overlapping regulation, as well as the sheer number of regulations in the chemical industry, may hurt the United States' chances of staying competitive in world markets. The company's major concern is with the Toxic Substances Control Act (TSCA) and similar pieces of legislation. The laws have resulted in many manhours of reporting, as well as delays in the introduction of innovative chemicals.

In response to the government regulations, Mobay has greatly expanded its ability in toxicology. The company formed a new Environmental Health Research Department with responsibility for toxicology, government regulatory affairs, and industrial hygiene. To strengthen the company's abilities to conduct toxicology studies within the corporation, Mobay has nearly completed a major toxicology institute at its Stanley Research Center near Kansas City.

# 7. HERCULES

Hercules is the largest domestic producer of polypropylene, one of the major automotive plastics. The company is also a major producer of graphite fibers and composites, mostly for the aerospace industry.

Hercules had some poor years in 1975 and 1977 when polypropylene prices were low. Partly as a result, the company has set a goal of changing its sales mix more toward highly processed polypropylene products than toward basic resins. In addition, the company wishes to reduce its dependence on certain industries, such as the textile industry. The automotive market can be important for Hercules in fulfilling both goals. Hercules hopes to increase its sales of polypropylene to the auto industry and feature higher-valued products such as copolymer and polypropylene-steel car panels. In addition, the company hopes to develop an important market in Detroit for graphite fiber-reinforced parts.

## 7.1 CORPORATE SIZE AND STRUCTURE

Hercules in one of the top ten largest companies in the United States in terms of plastic and chemical sales. The company also has extensive European operations.

### 7.1.1 Revenue, Profit and Employment

In 1979 Hercules had sales of $2.34 billion and earnings of $173 million, 68 percent higher than the 1978 earnings. The plastics group accounted for 28 percent of total sales but contributed 33 percent of net income. Hercules employed about 24,400 persons in 1979, 19,600 of whom are in the United States. (See Table 7-1.)

TABLE 7-1. HERCULES REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $2,345 | $172 |
| 1978 | $1,946 | $103 |
| Average Number of Employees: 24,400 (1979) | | |

Source: Annual Report

### 7.1.2 Corporate Organization

A company-wide reorganization was announced at the end of 1977, following an 18-month study. The reorganization changes Hercules more toward a worldwide business structure and functional organization than the geographic and product-oriented structure that existed before. At the start of 1977, the company consisted of five domestic operating departments and three geographic operating units. (See Figure 7-1.)

The company felt the organization was no longer well suited to meet the complexities of modern business. Problems included the overlapping of sales organizations and the use of the same plant by several departments.

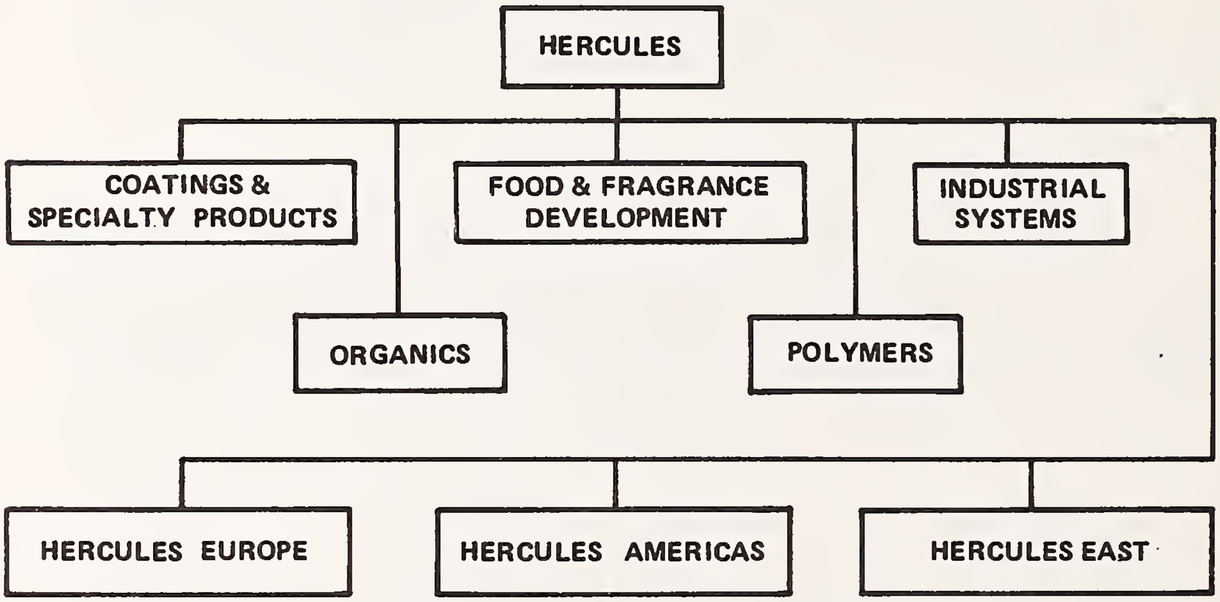


FIGURE 7-1. HERCULES' OPERATING DEPARTMENTS, 1977

The new organization is more centralized. General manager positions in five of the old departments have been eliminated. Overall company operations have been assigned to two new senior vice presidents, one in charge of domestic operations and one in charge of international operations. Reporting to these people are other vice presidents in charge of operations, marketing, production, and sales. The number of top management posts is to shrink from 23 to 14 in the early 1980's. During 1977-78 about 750 administrative and clerical employees left the company.

In 1979, Hercules Chairman A.F. Giacco announced the appointment of five outside scientists and business executives to an advisory council to advise him on complicated company decisions, often involving sophisticated technology. The panel is supposed to provide the kind of advice that the company has been unable to obtain from current management, directors, or consultants who either lack the technical expertise needed to make strategic decisions in the chemical business or who are not sufficiently independent in their thinking.

## 7.2 MAJOR MARKETS AND PRODUCTS

Figure 7-2 summarizes the major market information for Hercules.

MARKET DATA

Major Markets: Plastic and chemical companies, paper and textile industries, fiber and food industries

Major Automotive Products: Polyethylene, Copolymer, Herculon; used in headliners, fender-liners, air conditioning ducts, battery casings, fan shrouds, trunk liners.

Source: Hercules

FIGURE 7-2. MARKET DATA FOR HERCULES

### 7.2.1 Major Markets

Hercules sells much of its products to plastic manufacturers and other chemical companies. In addition, it sells higher value products to the paper, textile, coating, synthetic fiber, food, and detergent industries. Automotive product sales are made to plastic manufacturers and textile manufacturers or directly to the auto companies. Table 7-2 shows the percentage distribution of the corporation's 1977 commercial sales to other manufacturers by principal consuming industries.

Hercules' major competitors for polypropylene plastic sales are principally in the oil industry. The competitors include Amoco, Shell, Exxon, Gulf, Atlantic, and Novamont Corporation.

TABLE 7-2. APPROXIMATE PERCENTAGE OF HERCULES' SALES TO VARIOUS MARKETS

| | | | |
|---|---|---|---|
| Plastics | 13% | Adhesives | 3% |
| Miscellaneous Chemicals | 10 | Agriculture | 3 |
| Paper | 9 | Electrical and Electronics | 3 |
| Textiles* | 8 | Mining and Quarrying | 3 |
| Protective Coatings | 7 | Petroleum | 3 |
| Synthetic Fibers** | 6 | Printing Ink | 2 |
| Food | 5 | Rubber | 2 |
| Soap and Detergents | 4 | Other Industries | 19 |

Source: Hercules

* Primarily home furnishings fibers.
** Primarily polyester raw materials.

### 7.2.2 Products

Hercules separates its product lines into plastics, organics, water-soluble products, explosives and aerospace, pigments and coatings, and other products. Sales by segment are shown in Table 7-3. The company is in the process of selling its pigments business to CIBA-GEIGY.

The plastics business consists overwhelmingly of polypropylene and polypropylene product sales. Hercules is by far the largest domestic producer of polypropylene. (See Table 7-4.)

## TABLE 7-3. NET SALES BY INDUSTRY SEGMENT

| | (Millions of Dollars) 1979 | 1978* | 1977* | 1976*† | 1975*† |
|---|---|---|---|---|---|
| Net Sales | | | | | |
| Plastics | $ 666 | $ 539 | $ 456 | $ 385 | $ 310 |
| Organics | 508 | 447 | 400 | 375 | 310 |
| Water-soluble products | 478 | 405 | 345 | 336 | 283 |
| Explosives and aerospace | 307 | 242 | 202 | 190 | 205 |
| Other products | 410 | 343 | 324 | 354 | 327 |
| | 2,369 | 1,976 | 1,727 | 1,640 | 1,435 |
| Intersegment eliminations | (24) | (30) | (29) | (44) | (22) |
| Total | $2,345 | $1,946 | $1,698 | $1,596 | $1,413 |

Source: Hercules

* 1978, 1977, 1986, and 1975 industry segments have been restated to reflect slae of pigments buisiness.

† Net sales from operations for the years 1976 and 1975 were determined based on information available and include certain estimates necessary to restate these years on a comparable basis. It is not considered practical to give idenifiable asset information for the years 1976 and 1975 without unreasonable effort and expense.

## TABLE 7-4. U.S. PRODUCERS OF POLYPROPYLENE

| Company | Capacity (a) 1977 | 1979 |
|---|---|---|
| Atlantic Richfield Co. | 280 | 400 |
| Dart Industries, Inc. | 300 | 300 |
| Eastman Kodak Co. | 140 | 140 |
| Exxon Corp. | 500 | 550 |
| Gulf Oil Corp. | 0 | 400 |
| Hercules, Inc. | 1,150 | 1,350 (b) |
| Northern Natural Gas Co. | 0 | 200 |
| Novamont Corp. | 160 | 425 |
| Phillips Petroleum Co. | 180 | 180 |
| Shell Chemical Co. | 450 | 600 |
| Soltex Polymer Corp. | 0 | 200 |
| Standard Oil Co., Indiana | 525 | 825 |
| TOTAL | 3,685 | 5,570 |

Source: Chemical Economics Handbook, Stanford Research Institute
(a) In millions of pounds per year at year-end.
(b) Including a 200-million-pound expansion at Lake Charles, Louisiana, scheduled for completion in late 1979 or early 1980.

Polypropylene is sold by Hercules in both bulk and upgraded form, with about 60 percent of the business in upgraded products. There are three main types of upgraded products:

- Film used to package food and cigarettes.
- Herculon olefin fibers used for upholstery on commercial and automotive carpet.
- Copolymers. Copolymers are resins made of polypropylene in combination with ethylene. The plastic is stronger and better able to withstand chemicals. It is thus popular in many automotive applications such as battery cases, and is an important item for Hercules since it is the only producer.

Hercules' automotive sales of polypropylene include basic polypropylene and copolymers used in air conditioning ducts, battery casings, fan shrouds, and other items, usually made by injection molding. Herculon fibers are creeping into interior trim and carpeting and are used in headliners and trunk liners. Polypropylene use in battery cases, automotive carpet, grilles, wheel covers, and overflow tanks is expected to increase over the next few years.

### 7.2.3 <u>New Product Plans in Plastics</u>

Hercules has identified at least three new product markets for polypropylene.

*Synthetic Pulp*

Although synthetic pulp is not directly relevant to auto production, it is a significant new application for Hercules' polypropylene. The paper product developed by the company is 20 to 30 percent propylene and the rest woodpulp. The paper is lighter and more opaque than regular paper and increases paper production efficiency. Hercules feels the market for this will be very promising three to five years from now.

*Polypropylene Fiber*

Hercules sees great growth possibilities in the use of its Herculon fiber by the auto industry. Hercules today has about 40 percent of the 25-million-pound automotive polypropylene fiber market. The company sees the potential for 175 million pounds of polypropylene in this market and hopes to at least double its own sales.

*Polypropylene-Steel Automotive Panels*

Hercules has developed an adhesive that will bond polypropylene to steel. Until now one of polypropylene's key properties has been that it will not stick to anything. The polypropylene-steel panels consist of 16 mil polypropylene bonded to 8 mil steel on either side. The product has the appearance and properties of 30 mil steel but is 40 percent lighter. Costing about the same as 30 mil steel, the product could save 40 percent of the weight of automobile body panels. On the 1980 cars there will be oil pans made of this structure. However, significant sales are not expected to result for three or four years.

## 7.3 CORPORATE STRATEGY

Hercules' overall goal is to become the most profitable and premier investment in the chemical industry. The company seeks to earn the industry's highest rate of return on invested capital. The corporate strategy to reach this goal has three elements which the company terms:

- Balance (which includes pursuing the automotive market)
- Cost-effectiveness
- Value added.

### 7.3.1 Balance

Hercules wants to keep many of the corporate activities in "balance"—such as geographical balance or raw material balance—but most importantly, it wants to achieve "market balance." The company wishes to avoid overdependence on any particular cyclical market, and feels it was too dependent on space and defense in the 1960's and on textiles in the

1970's. Hercules is thus actively seeking greater penetration into the automotive market. The company hopes to use its extensive rocket and space technological capability, including experience with graphite fiber composites, to help it develop new products for the suddenly more demanding needs of the automotive community.

### 7.3.2 Cost-Effectiveness

Hercules wishes to be the lowest cost producer in all of its product lines. The company already feels that its polypropylene plant at Bayport, Texas, is the most efficient plant of its kind in the world.

### 7.3.3 Value Added

Value added refers to the concept of selling more processed and manufactured products than basic resins. Value-added products sell for higher margins and are less susceptible to the cyclical price-cost squeezes that occur in the commodity resin market. In the late 1950's Hercules sold nearly 100 percent of its polypropylene in its basic form. Forty-three percent of the product was in value-added form in 1978, and the company plans to increase this to more than 70 percent by 1985.

## 7.4 PRODUCTION AND OPERATIONS

Hercules has major manufacturing facilities in Georgia, Indiana, Louisiana, Mississippi, Missouri, New Jersey, New York, North Carolina, Texas, and Virginia. The company's largest overseas manufacturing facility is located in Beringen, Belgium.

The plastic group's polypropylene plants are in Lake Charles, Louisiana, and Bayport, Texas. Film is manufactured in Terre Haute, Indiana, and Covington, Virginia. Bottles are also manufactured in Terre Haute. Structural foam is made in Conyers, Georgia, and cups, moldings, and other products are made in Taunton, Massachusetts. Foreign polypropylene plants are in Beringen, Belgium, and Varennes in Canada.

### 7.4.1 Major Automotive Facilities

Information on major Hercules facilities that supply materials to the automotive industry is given in Figures 7-4, 7-5, and 7-6. The three plants of interest are those at Bayport, Texas; Lake Charles, Louisiana; and Magna, Utah.

*Bayport, Texas*

The Bayport, Texas, facility manufactures commodity polypropylene resins. The plant has two production lines and is supposed to be the most efficient polypropylene plant in the world. The plant was completed in 1975 and has a 400 million pounds per year capacity. According to Hercules, this plant is presently working at 100 percent of capacity.

*Lake Charles, Louisiana*

The Lake Charles plant is a large, 750 million pound per year polypropylene plant and is now also operating at capacity. The plant makes copolymer and upgraded polypropylene items using eight production lines. A number of small lines at the Louisiana plant gives management the advantage of being able to individualize production. A 200 million pound expansion at Lake Charles is scheduled for completion in 1979 or early 1980. The expansion facility is a copolymer plant that can make either 120 million pounds of copolymer or 200 million pounds of basic polypropylene (homopolymer). It is the only expansion in polypropylene resins capacity scheduled in the United States.

*Magna, Utah*

This plant makes graphite fibers and composite materials, mostly for use in the aerospace industry (70 percent) and the rest used in sports equipment and other industrial applications. While the auto industry is not presently an important purchaser of graphite fibers and composites, Hercules feels that the auto industry will be a major future market for its products. A third fiber line that will double the capacity of the plant will be added in 1979.

Company Hercules Inc. County Harris Plant Size ____

Plant Bayport Congressional District ____

Address 1201 Bay Area Blvd. Pasadena, TX 77557 Standard Metropolitan Statistical Area ____ No. of Employees ____

Telephone (713) 474-4481 Primary SIC Code(s) ____

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Propylene and Polypropylene 100% Commodity Resins | 400 million pounds per year | N.C.A. | N.C.A. |

FIGURE 7-4. BAYPORT PLANT DATA

Company Hercules Inc.

County Calcasieu Parrish

Plant Size

Plant Lake Charles

Congressional District

Address P. O. Box 1687
Lake Charles, LA
70602

Standard Metropolitan Statistical Area

No. of Employees 600

Telephone (318) 882-1651

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Propylene and Polypropylene Copolymer and upgraded items | 750 million pounds per year | N.C.A. | N.C.A. |

FIGURE 7-5. LAKE CHARLES PLANT DATA

Company Hercules Inc. County Salt Lake Plant Size

Plant Magna Congressional District

Address P. O. Box 98
Magna, UT 84044

Standard Metropolitan Statistical Area

No. of Employees 2,000

Telephone (801) 250-5911 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Graphite fiber | N.C.A. | N.C.A. | N.C.A. |

FIGURE 7-6. MAGNA PLANT DATA

### 7.4.2 New Plants and Expansions

Besides Hercules' expansion of its Lake Charles polypropylene plant and the Utah fiber plant, the company has also announced plans to enlarge its nitrocellulose capability at Parlin, New Jersey, and expand production of Magnox magnetic iron oxide at Pulaski, Virginia. The company will also build a new pectin products plant at Vero Beach, Florida. These plants, however, do not make products connected with the auto industry.

## 7.5 FINANCIAL ANALYSIS

After a difficult period from 1975 through 1977, Hercules now appears to be quite strong and ready to increase its capital spending.

### 7.5.1 Operations

From 1969-1974 Hercules had steadily increasing income. Then the company had some poor years from 1975-1977. (See Figure 7-7.) These poor years were caused by problems with two major polypropylene plant start-ups, one in Varennes, Canada, and the other in Beringen, Belgium, and problems of overcapacity and weak prices. Now profits are rebounding. Prices have risen and most of Hercules' businesses are now operating profitably. Earnings for 1978 reached $103 million, and 1979 earnings were $173 million.

Plastic operations had sales totaling $666 million in 1978 and profits of $57 million, almost double the earnings in 1978. Large sales of copolymers and specialty resins contributed to this change.

### 7.5.2 Capital Analysis

Capital expenditures in 1979 was $186 million, up 60 percent from the 1978 level of $116 million. The 1978 level was the lowest in six years. Hercules has not significantly increased its long-term debt since 1974 and its debt to capitalization ratio has dropped from 33.6 percent in 1974 to 21.1 percent in 1979. (See Figure 7-8.)

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | $\frac{\text{Operating Income*}}{\text{Sales}}$ Percent |
|---|---|---|---|---|
| 79 | 2345 | 173 | 19.6 | 13.6 |
| 78 | 1946 | 103 | 13.1 | 15 |
| 77 | 1698 | 58 | 7.7 | 12.8 |
| 76 | 1596 | 107** | 15.2 | 15.6 |
| 75 | 1413 | 32 | 4.9 | 11.5 |
| 74 | 1525 | 92 | 14.7 | 16.6 |

| Year | $\frac{\text{Earnings}}{\text{Total Assets}}$ Percent | $\frac{\text{Sales}}{\text{Assets}}$ | $\frac{\text{Earnings}}{\text{Sales}}$ Percent |
|---|---|---|---|
| 79 | 10.3 | 1.39 | 7.4 |
| 78 | 6.7 | 1.28 | 5.2 |
| 77 | 4.0 | 1.18 | 3.4 |
| 76 | 7.8 | 1.16 | 6.7 |
| 75 | 2.4 | 1.04 | 2.3 |
| 74 | 7.9 | 1.32 | 6.0 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

** Includes approximately $30 million after taxes from sale of property.

FIGURE 7-7. OPERATING ANALYSIS OF HERCULES

| | | | Sources | | | |
|---|---|---|---|---|---|---|
| Year | Sales | P/E Ratio[1] | Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings |
| 79 | 2345 | 4.9 | 173 | 107 | (15) | 0 |
| 78 | 1946 | 6.5 | 103 | 107 | (33) | 0 |
| 77 | 1698 | 14.4 | 58 | 94 | 3 | 0 |
| 76 | 1596 | 17.4 | 107 | 89 | (8) | 6 |
| 75 | 1413 | 36.5 | 32 | 86 | (14) | 11 |
| 74 | 1525 | 14.7 | 92 | 82 | 172 | 0 |

| | | Uses | | | | | |
|---|---|---|---|---|---|---|---|
| Year | Change in Working Capital | Capital Expenditures | Dividends | Long-Term Debt[2] / Capitalization % | Coverage[3] | Cap. Exp. / Total Assets % | Current Ratio |
| 79 | 46 | 186 | 45.6 | 21.1 | 10 | 11.1 | 1.9 |
| 78 | 5 | 116 | 42 | 24.8 | 9.4 | 7.2 | 1.9 |
| 77 | 14 | 127 | 42 | 28.0 | 6.8 | 8.6 | 2.2 |
| 76 | 68 | 150 | 36 | 28.5 | 8.0 | 10.4 | 2.2 |
| 75 | (30) | 151 | 34 | 32.1 | 4.3 | 11.4 | 2.0 |
| 74 | 74 | 217 | 33 | 33.6 | 8.4 | 16.2 | 2.0 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 7-8. CAPITAL ANALYSIS OF HERCULES

## 7.6 RESEARCH AND DEVELOPMENT

Hercules' research and development is closely connected with some of the new products described earlier. R&D expenditure was $46.7 million in 1979 compared to $40.1 in 1978. The percentage of research expenditures in each segment does not vary greatly from the segment's contribution to total sales. An average of 240 professional employees were engaged in full-time research activity in 1978-1979.

The principal objectives of Hercules' program is to augment, expand, and protect its businesses in water-soluble polymers, organic products, and polypropylene plastics, film, and fiber. Most of the company's R&D activities are at the Hercules Research Center, near Wilmington, Delaware.

## 7.7 GOVERNMENT RELATIONS

Hercules claims to have been sensitive to safety, health, and environmental issues well before they became well-known to the public. In response to regulations and public concern about the safety of chemicals, the company has established a Health, Environment, and Safety Committee charged with ensuring the safety of Hercules' products and environment.

In the energy area, Hercules has had a conservation program for a number of years. In 1978 Hercules used 21.5 percent less energy per pound of output than in 1972. The company has also recently begun operation of a powerplant at the Lake Charles, Louisiana, polypropylene plant. The plant is a cogeneration, steam-electricity plant and is thus an efficient user of energy.

# 8. AMOCO (STANDARD OIL COMPANY OF INDIANA)

Amoco (Standard Oil of Indiana) is the tenth largest industrial corporation in this country in terms of assets, and eighth largest in net income. Among major petroleum producers, Amoco ranks sixth in assets and fourth in earnings. Domestically, Amoco ranks fourth in crude oil production, third in natural gas production, third in refinery runs, and second in gasoline sales.

Amoco considers its chemical operations—from which emanate all of its plastics products—as a small but up and coming segment of its overall business operations. Amoco is spending heavily to improve its profitability and competitive posture in the chemicals and plastics markets. Amoco's overall plastics capacity is approximately 350 million pounds of high-density polyethylene (HDPE) annually, 550 million pounds of polypropylene (PP) annually, and 380 million pounds of polystyrene annually.

## 8.1 CORPORATE SIZE AND STRUCTURE

### 8.1.1 Revenue, Profit and Employment

Amoco's sales in 1979 were $20.2 billion, up from $16.3 billion in 1978. Net income was $1.5 billion, up from 1978's $1.5 billion. Amoco employs approximately 46,000 domestically, and 52,000 worldwide. (See Tables 8-1 and 8-2.)

Chemical revenues and earnings rose to record levels in 1979 due to increased demand and higher prices for all product lines. Revenues increased 45 percent over 1978, and earnings were up 349 percent.

TABLE 8-1. AMOCO (STANDARD OIL COMPANY OF INDIANA) REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $20,197,390 | $1,506,618 |
| 1978 | $16,349,754 | $1,076,412 |
| Total Employment: | 52,000 worldwide<br>46,000 domestic | (1979) |

TABLE 8-2. AMOCO CHEMICAL CORPORATION REVENUES AND PROFITS

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $2,555 | $202 |
| 1978 | $1,766 | $ 45 |

### 8.1.2 Corporate Organization

Amoco is organized into subsidiary companies, rather than operating divisions. Amoco and its consolidated subsidiaries make up a large and integrated petroleum and chemical company with worldwide interests and operations.

The principal operating entities are shown in Figure 8-1.

- Amoco Oil Company—Refining, transporting, and marketing of petroleum products and sale of fertilizers domestically
- Amoco Pipeline Company—Pipeline transportation within the U.S.
- Amoco Production Company—Exploration, development, and production of crude oil and natural gas in the U.S.
- Amoco Canada Petroleum Company, Ltd.—Exploration, development and production of crude oil and natural gas in Canada

- Amoco International Oil Company—Direction of overseas petroleum operations

- Amoco Minerals Company—Exploration for mineral deposits

- Amoco Chemical Corporation—Manufacture and sale of chemical and plastics products worldwide.

- Cyprus Mines Corporation—A diversified natural resources company engaged mainly in exploring for mining, processing, and marketing nonferrous and industrial minerals, and in developing uranium, molybdenum and gold properties.

The Amoco Chemical Corporation produces all of Amoco's plastics. In 1978, plastics (fiber and film intermediates, polymers and fabricated plastic products) accounted for roughly 38 percent of chemical operation sales.

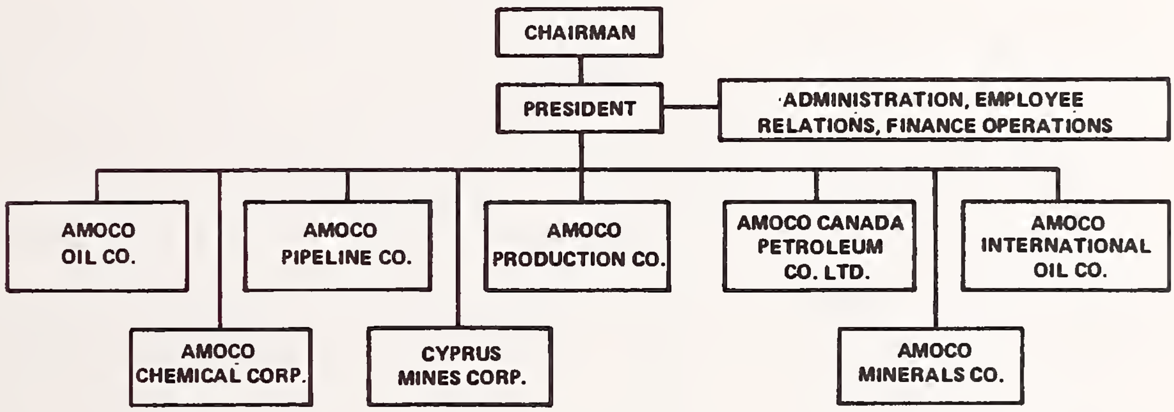


FIGURE 8-1. AMOCO (STANDARD OIL COMPANY OF INDIANA)

## 8.2 MAJOR MARKETS AND PRODUCTS

Amoco Chemical's major markets and products are detailed and summarized in Figure 8-2.

### 8.2.1 Major Markets

Amoco Chemical's major markets include automotive and other transportation, agricultural, furniture and carpet manufacturing, paint manufacturers, and packaging.

**MARKET DATA**

Major Markets: Automotive and other transportation, agricultural, furniture and carpet manufacturing, paint manufacturing, and packaging.

Percent of Sales to the Auto Industry: 10-15 percent of resin sales are automotive.

Supplies to the Following Automotive Companies: Information unavailable.

Major Products: Aromatic acids, olefins, polystyrene and styrene monomer, polyethylene and polypropylene resins and fibers, fabricated plastic packaging materials, lubricating oil additives, polybutenes, anhydrous ammonia, and sulfur.

FIGURE 8-2. AMOCO CHEMICAL CORPORATION CHEMICAL MARKET DATA

### 8.2.2 Products

Major automotive plastic products produced by Amoco Chemical are polypropylene resins and fibers, and structural foam styrene.

Amoco markets its basic polypropylene and foam styrene to the major automakers themselves, as well as various parts and component suppliers, who then fabricate plastic components from this material (often mixed with other basic materials). This past year Amoco introduced a new, lightweight polystyrene substrate intended for use as inner liners (headliners) for automobile roofs. The most common automotive applications for Amoco's polypropylene are fan shrouds, battery cases, glove boxes, fender liners, air conditioner ducts, rear lamp housings, and battery trays. The firm's structural foam styrene is utilized by Detroit as an insulating backing for automobile headliners.

## 8.3 MARKETING STRATEGY

Amoco Chemical's overall marketing strategy for plastics is to continue improving its penetration into "higher margin" specialty market areas such as the automotive market. Within that framework, Amoco's new polypropylene plant at Chocolate Bayou, Texas, began operations in mid-December 1979. This plant, which also produces high-density polyethylene and butadiene, gives Amoco considerably increased capacity in these resins, which are utilized extensively by the automotive community. In addition to attempting to propel its raw materials into existing product areas, Amoco is constantly attempting to develop new product concepts and applications for its materials. This includes such applications as the newly developed structural foam styrene automotive headliner, introduced last year by the firm.

Amoco Chemical's marketing strategies must fit into overall corporate goals. Amoco's overall goal is to sustain a minimum 10 percent annual earnings growth rate, an accomplishment the corporation as a whole is achieving but chemical operations are not. This is due to an extreme level of competition in the chemicals market plus extensive capital investment, Amoco reports. To counteract this, Amoco is spending heavily to upgrade and improve its operations producing higher-value products. Amoco notes however that this will become increasingly difficult as other companies—notably Phillips and Gulf—begin manufacturing and marketing polypropylene for automotive consumption. Amoco is aware that its chief competitor for automotive polypropylene sales, Hercules, is well known for its "rock bottom" prices/high-volume sales strategy, especially in the automotive area. Amoco would prefer to seek other markets for polypropylene before they would enter into a price war with Hercules or anyone else.

## 8.4 PRODUCTION AND OPERATIONS

Amoco Chemical operates plastics manufacturing facilities domestically at New Castle, Delaware; Chocolate Bayou, Texas; Decatur, Alabama; Berkeley County, South Carolina; Texas City, Texas; Hazlehurst, Georgia; Atlanta, Georgia; Los Angeles, California; Philadelphia, Pennsylvania; and Nashville, Tennessee.

### 8.4.1 Major Automotive Facilities

Two of Amoco's facilities—New Castle, Delaware, and Chocolate Bayou, Texas—produce nearly all of the polypropylene and polystyrene that the firm ships to the auto makers and their suppliers. New Castle produces polypropylene only, while Chocolate Bayou produces ethylene, polypropylene, polystyrene and butadiene.

*New Castle, Delaware*

Amoco's New Castle facility employs a work force of 260 and has an absolute capacity of approximately 200 million pounds of polypropylene resins annually. Approximately 10 to 15 percent of this facility's total production is shipped to domestic automakers or to various automotive suppliers. (See Figure 8-3.)

*Chocolate Bayou, Texas*

Amoco's Chocolate Bayou facility (actually located at Alvin, Texas) employs 900, and has annual capacities of approximately 400 million pounds of polypropylene, 500 million pounds of butadiene, 2 billion pounds of ethylene, and unknown quantities of high-density polyethylene from a newly operational gas-phase HDPE production unit. Chocolate Bayou's polypropylene production unit is also newly operational in 1979. As in New Castle, approximately 10 to 15 percent of plastics production at Chocolate Bayou is shipped to the automotive community. (See Figure 8-4.)

Company Amoco

County New Castle

Plant Size

Plant New Castle

Congressional District

Address P.O Box 312
New Castle, DE
19720

Standard Metropolitan Statistical Area Wilmington

No. of Employees 260

Telephone (302) 328-4153

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polypropylene | 200 million lbs. | N.C.A. | 10 to 15 percent of total sales are to automotive industry |

FIGURE 8-3. NEW CASTLE PLANT

Company Amoco

County Brazori

Plant Size

Plant Chocolate Bayou

Congressional District

Address P.O. Box 1488
Alvin, TX 77511

Standard Metropolitan Statistical Area Houston

No. of Employees 900

Telephone (713) 581-2121

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polypropylene | 400 million lb | N.C.A. | 10 to 15 percent of total sales are to automotive industry |
| Butadiene | 500 million lb | | |
| Ethylene | 2 billion lb | | |

FIGURE 8-4. CHOCOLATE BAYOU PLANT

New Plants and Expansions

Amoco's capital expenditures were $247 million in 1979. Included in the program were profit-improving, cost-reduction modifications to existing facilities. No new plants are planned for the near future.

## 8.5 FINANCIAL STATUS

Amoco is very strong financially. Its primary business is in the petroleum industry, and thus the company has had good margins and very steady profitable performance over the last five years.

### 8.5.1 Operations

Amoco has set the following financial objectives for operations:

- 10 percent annual earnings growth
- 13 to 15 percent return on equity.

The company has come close to achieving these targets over the last several years.

Earnings from Amoco Chemical Corporation have fluctuated with the chemical industry. Chemical earnings in 1978 were $45.5 million, less than half the earnings in 1974, although 15 percent above the 1977 level. The low earnings reflected excess capacity and low prices in the industry. Polypropylene plants, however, were working at capacity.

Earnings in 1979 for the entire company were up 40 percent on a 24 percent sales increase. Chemical volumes and prices were considerably better than those in 1978 and income was up to $202 million. The stock has been recommended strongly by some analysts, especially due to the prospect of decontrolled oil. (See Figure 8-5.)

### 8.5.2 Capital Analysis

Amoco has the following financial goals:

- 35 to 45 percent dividend payout

- Prudent financial structure (debt to capitalization no more than 30 percent).

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | Operating Income*/Sales, Percent |
|---|---|---|---|---|
| 79 | 18610 | 1507 | 19.2 | 23.5 |
| 78 | 14962 | 1076 | 15.5 | 25.5 |
| 77 | 13020 | 1032 | 15.7 | 27.9 |
| 76 | 11532 | 891 | 15.2 | 27.1 |
| 75 | 9955 | 787 | 14.7 | 28.0 |
| 74 | 9085 | 970 | 20.5 | 26.9 |

| Year | Earnings/Total Assets, Percent | Sales/Assets | Earnings/Sales, Percent |
|---|---|---|---|
| 79 | 9.6 | 1.19 | 8.1 |
| 78 | 8.0 | 1.11 | 7.2 |
| 77 | 8.4 | 1.08 | 7.8 |
| 76 | 8.5 | 1.11 | 7.7 |
| 75 | 8.4 | 1.06 | 7.9 |
| 74 | 11.9 | 1.11 | 10.7 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 8-5. OPERATING ANALYSIS OF AMOCO

A substantial part of Amoco's growth has been financed through internal cash generation with use of debt control to maintain a strong balance sheet. (See Figure 8-6.) The increases in long-term debt have helped finance Amoco's large capital expenditures and the working capital needed to support its increasing sales. The equity increase in 1979 was associated with an acquisition.

## 8.6 RESEARCH AND DEVELOPMENT PLANS

Research and development expenditures for Amoco were $80.3 million in 1978; approximately $90 million will be spent in 1979. Research operations are centered at Tulsa, Oklahoma, and Naperville, Illinois. At Naperville, extensive research is directed at the development of new and improved chemical and petroleum products. Overall chemical and plastic research and development goals are tied in closely with marketing goals, which are to penetrate more effectively into the automotive and other higher-margin markets.

The firm's R&D efforts in the recent past have produced the newly introduced structural foam headliner backing. Automotive research and development efforts are currently directed at helping the automakers develop techniques and optimum formulation of polypropylene to allow economical cold stamping of fender liners from polypropylene.

## 8.7 LABOR AND GOVERNMENT RELATIONS

Approximately 27 percent of Amoco's 41,000 domestic employees are represented by various labor organizations, with no major contract difficulties currently reported. Amoco is affected significantly by a broad range of Federal, state and local regulations, with environmental constraints having the most impact on plastics manufacturing.

The firm's environmental conservation-related expenditures in 1978 were approximately $58 million, with 1979 and 1980 expenditures expected to be between $80 and $100 million each year.

| Year | Sales | P/E Ratio[1] | Sources: Earnings | Sources: Depreciation | Sources: Changes in Long-Term Debt | Sources: Changes in Owners' Equity Other Than Retained Earnings |
|---|---|---|---|---|---|---|
| 79 | 18610 | 6.8 | 1507 | 1322 | 88 | 158 |
| 78 | 14962 | 6.9 | 1076 | 912 | (68) | 6 |
| 77 | 13020 | 7.6 | 1032 | 811 | 222 | (17) |
| 76 | 11532 | 8.7 | 981 | 731 | 95 | 8 |
| 75 | 9955 | 8.3 | 799 | 621 | 503 | (20) |
| 74 | 9085 | 6.6 | 972 | 563 | 192 | 247 |

| Year | Change in Working Capital | Uses: Capital Expenditures | Uses: Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ % | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ % | Current Ratio |
|---|---|---|---|---|---|---|---|
| 79 | (136) | 2439 | 443 | 21 | 18.0 | 15.6 | 1.30 |
| 78 | 49 | 1744 | 410 | 26 | 16.9 | 12.4 | 1.47 |
| 77 | 433 | 1452 | 381 | 29 | 18.5 | 11.3 | 1.50 |
| 76 | 45 | 1361 | 338 | 29 | 21.6 | 12.1 | 1.39 |
| 75 | (16) | 1525 | 294 | 30 | 21.3 | 15.5 | 1.48 |
| 74 | 275 | 1511 | 234 | 27 | 30.9 | 16.9 | 1.51 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 8-6. CAPITAL ANALYSIS OF AMOCO

# 9. B.F. GOODRICH

B.F. Goodrich is the largest domestic manufacturer of polyvinyl chloride. The company sells much of this product in resin form and only upgrades a portion of it. Nevertheless, the company's dominance as a volume manufacturer of PVC gives it a solid position in the market. In addition, vinyl is used in a wide variety of products—from car upholstery to vinyl siding to toys—and Goodrich sees great growth in these markets, leading to a doubling of the PVC demand in the next six years. In response to this, the company is planning to double its own PVC capacity in that time period, and has already announced several major expansion plans.

## 9.1 CORPORATE SIZE AND STRUCTURE

B.F. Goodrich (BFG) is one of the top ten largest U.S. plastics companies by plastic sales and is in the top 50 of domestic chemical companies. The company is a major factor in both the tire market and the chemical/plastic market.

### 9.1.1 Revenues, Profit and Employment

In 1979 Goodrich has sales of $2,988 million, higher by 15 percent over 1978. Earnings in 1979 were $82.6 million, up 18 percent over 1978. Chemicals accounted for 35 percent of sales, and tires accounted for 43 percent of sales. This contrasts to 1974 when chemicals were 14 percent of sales and tires were 50 percent of sales. In 1978 the company employed 40,609 people. (See Table 9-1.)

TABLE 9-1. B.F. GOODRICH REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $2,988 | $82.6 |
| 1978 | $2,593 | $70.1 |
| Average Number of Employees: 40,609 (1978) | | |

### 9.1.2 Corporate Organization

B.F. Goodrich is divided into six operating divisions. These are the Tire Division, which manufactures and sells a wide range of tires for the transportation industry; the Chemical Division, which produces and sells chemical and plastic products and related technology throughout the world; the Engineered Systems Division, which manufactures and sells rubber products throughout industry; the General Products Division; which uses BFG's hydrocarbon polymer technology to make vinyl and rubber products; the International Division, which markets all BFG nonchemical products and technology sold outside the United States and Canada; and B.F. Goodrich Canada Ltd., which manufactures for the Canadian market many of the industrial, chemical and tire products produced by U.S.-based divisions of the company. (See Figure 9-1.) There are also corporate areas of administration, treasury, research and development, and controllership.

## 9.2 MAJOR MARKETS AND PRODUCTS

Figure 9-2 summarizes the major market information for B.F. Goodrich.

### 9.2.1 Major Markets

B.F Goodrich sells tires to vehicle manufacturers and to the aftermarket through BFG Tire Centers and other tire dealers throughout the world. The company's polyvinyl chloride and products are used by the construction, automotive, appliance, and manufacturing industries. Goodrich's chemical products are sold either directly, through wholly-owned selling subsidiaries or by commercial agents and distributors in most world markets.

MARKET DATA

Major Markets: OEM and aftermarket vehicles, construction, automotive, appliance and manufacturing industries

Major Automotive Products: Polyvinyl chloride (PVC) and PVC products used in seat covers, interior trim and molded automobile parts; polyurethanes used in molded exterior automotive body parts.

FIGURE 9-2. B.F. GOODRICH MARKET DATA

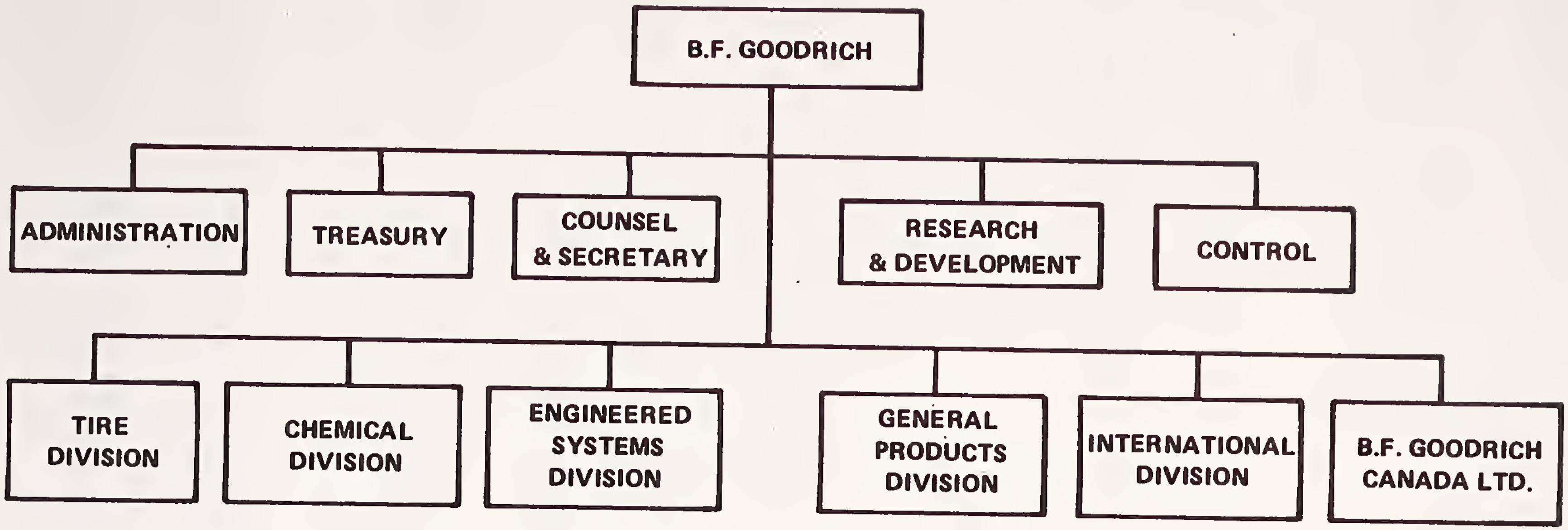


FIGURE 9-1. B.F. GOODRICH ORGANIZATION

Table 9-2 shows distribution of sales and profits by business segment. In 1979 tires and related products accounted for 43 percent of sales but represented only 25 percent of company profits. The largest profit contribution was chemicals (57 percent).

TABLE 9-2. DISTRIBUTION OF BUSINESS SEGMENTS

| Segment | Sales | Profit |
|---|---|---|
| Tires | 43% | 25% |
| Chemicals | 35 | 57 |
| Industrial | 22 | 18 |

### 9.2.2 Products

Goodrich's plastic sales to the auto industry fall into three major categories, PVC resins and products, polyurethane products, and elastomers.

*Polyvinyl Chloride (PVC) Resins and Products*

Goodrich's Geon polyvinyl chloride materials are available as resins, compounds, and latexes. They are thermoplastic, strong, and abrasion resistant, and resist attack by chemicals, water, oil and most solvents. The vinyl compounds are available in many colors and have a broad range of impact strength, flexural strength, hardness and chemical resistance.

Vinyls can be processed using extruding, molding, dipping and calendering. Typical automotive use of vinyl is in calendered vinyl fabrics used in upholstery, door panels, headlining, trunk linings and armrests.

Other vinyl applications include house siding, piping, rigid cellular trim and molding, floor tile, hospital equipment components, weatherproof clothing, wire insulation, wallcovering, floats and toys.

*Polyurethane Products*

B.F. Goodrich's Estane polyurethanes include both polyester- and polyether-based products. They offer outstanding resistance to abrasion, cutting and tearing, and outstanding physical properties and resistance to grease, oils and chemicals. Auto parts of Estane polyurethanes, such as bumper parts, pass barrier impact tests and return to their original shape. No curing or priming is needed.

*Elastomers*

Goodrich is also an important supplier of elastomers for cars. The company makes EPM and EPDM (ethylene-propylene) rubbers and other elastomers used for such parts as radiator hoses, electrical insulation, O-rings and gaskets, brake components, tire flaps, hose tubes, hose covers, matting and automobile weatherstripping.

### 9.2.3 New Products

Goodrich has formed a joint venture with Cosden Oil and Chemical Company for the manufacturing and marketing of Abson ABS thermoplastics. The new company, called Abtec Chemical Company, is headquartered in Louisville, Kentucky. It combines the strengths of Goodrich in the production and marketing of ABS with Cosden's strengths as a major producer of styrene monomers and polymers that are basic raw materials in ABS production. ABS plastic is used in appliance housings, safety and sports equipment, automotive products, pipe and other products requiring high impact resistance.

## 9.3 CORPORATE STRATEGY

Goodrich has admitted that in the early 1970's it was not a strong company. Although sales were increasing, Goodrich was losing market share in its largest business segments, particularly tires. Return on stockholders' equity had fallen to less than 4 percent and the company was heavily in debt, with debt to capitalization nearly 50 percent.

In 1971 Goodrich instituted plans to reverse its decline and prepare itself to maximize earnings over the long term.

Key goals were to:

- Emphasize management development
- Eliminate financially unsatisfactory business segments
- Improve the financial condition of the corporation through better financial management.
- Restructure and expand continuing businesses to improve earnings and to maximize cash flow and financial return within an overall strategic plan.

Since that time the company has sold 75 marginal businesses that generated over a half-billion dollars in sales but made little or no profit. Goodrich put special emphasis on financial controls and reduced selling and administrative ratios as a percentage of sales significantly. The debt ratio was reduced 13 points. The company upgraded the quality of its management by bringing in people from outside and increasing career training programs.

Goodrich's program helped improve company performance in recent years in all of its major business—tires, chemicals, and engineered products.

Goodrich now feels it has significant opportunities in the chemical business. The company has emphasized its strength in research and development and its growing line of specialty chemical products. In addition the company sees long-term growth in polyvinyl chloride demand. To take advantage of this growth Goodrich plans to double its current PVC capacity of 1.1 billion to 2.3 billion pounds a year to match a projected doubling of PVC demand. The company has also embarked on a joint-venture chlorine and ethylene dichloride facility with Bechtel Incorporated that will help ensure continuous supplies of the raw materials needed to produce PVC.

Goodrich feels the chemical business is strong and that market conditions will permit a more aggressive pricing policy. Therefore, promising operating income gains will result through productivity increases and internal cost control measures.

## 9.4 PRODUCTION AND OPERATIONS

Goodrich has five domestic PVC facilities. They are in Long Beach, California; Henry, Illinois; Louisville, Kentucky; Pedricktown, New Jersey; and Avon Lake, Ohio. (See Figures 9-3 to 9-8.) The largest plants are in Louisville, Kentucky, and Avon Lake, Ohio. The Louisville plant makes polyvinyl chloride resins, synthetic rubber and latex, and employs 1,100 to 1,200 people. The Avon Lake plant makes polyvinyl chloride resins and polyurethane and employs 725 people. The Long Beach plant employs 200 to 300 people and the Henry plant, 500 people.

## 9.5 NEW PLANTS AND EXPANSIONS

B.F. Goodrich has announced that it plans to double its overall PVC capacity in the next six years. Such a plan would require an increase in annual capacity from 1.1 billion to 2.2 billion pounds. This plan includes construction of a 1 billion pound PVC plant, the details of which have not been announced. Several expansions, however, have been announced and are described below.

Company B.F. Goodrich

County Orange

Plant Size

Plant Long Beach

Congressional District

Address P.O. Box 9077
Long Beach, CA
90810

Standard Metropolitan Statistical Area Anaheim-Santa Ana Garden Grove

No. of Employees 200-300

Telephone (213) 549-8210

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polyvinyl chloride resins | N.C.A. | N.C.A. | N.C.A. |

FIGURE 9-3. LONG BEACH PLANT

Company B.F. Goodrich | County Marshall | Plant Size

Plant Henry | Congressional District

Address Box 15
Henry, IL
61537 | Standard Metropolitan Statistical Area None | No. of Employees 500

Telephone (309) 364-2311 | Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| PVC (Polyvinyl chloride) | N.C.A. | N.C.A. | N.C.A. |

FIGURE 9-4. HENRY PLANT

Company B.F. Goodrich | County Jefferson | Plant Size

Plant Louisville | Congressional District

Address Box 32950<br>Louisville, KY<br>40232 | Standard Metropolitan Statistical Area Louisville-KY-IN | No. of Employees 1,100-1,200

Telephone (502) 778-6631 | Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| PVC (Polyvinyl chloride) | N.C.A. | N.C.A. | N.C.A. |
| Synthetic rubber latex | | | |

FIGURE 9-5. LOUISVILLE PLANT

Company B.F. Goodrich County Glouster Plant Size

Plant Pedricktown Congressional District

Address Box 400
Pedricktown, NJ
Standard Metropolitan Statistical Area None
No. of Employees

Telephone Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| PVC (Polyvinyl chloride) | 159 million lbs.<br>350 million lbs. in 1982 | N.C.A. | N.C.A. |

FIGURE 9-6. PEDRICKTOWN PLANT

Company B.F. Goodrich

County Cuyahoga

Plant Size

Plant Avon Lake

Congressional District

Address Box 134; Moore & Walker
Avon Lake, OH
44012

Standard Metropolitan Statistical Area Cleveland

No. of Employees 725

Telephone

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| PVC (Polyvinyl chloride) | N.C.A. | N.C.A. | N.C.A. |
| Polyurethane | | | |

FIGURE 9-7. AVON LAKE PLANT

Company B.F. Goodrich

County Iberville

Plant Size

Plant Plaquemine

Congressional District

Address P.O. Box 578
Plaquemine, LA
70764

Standard Metropolitan Statistical Area None

No. of Employees 130

Telephone (504) 687-2041

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| PVC (Polyvinyl chloride) | 165 million lbs. | N.C.A. | N.C.A. |

FIGURE 9-8. PLAQUEMINE PLANT

Pedricktown, New Jersey

Goodrich said in September that it will more than double PVC production at its Pedricktown, New Jersey, plant by late 1981. The expansion would raise PVC capacity from 159 million pounds per year to 350 million pounds per year, adding about 200 million pounds of new suspension resin capacity.

Niagara Falls, Canada

Goodrich is completing this year an expansion of its Niagara Falls plant in Canada that will double the volume of the company's existing chemical facilities in Canada. The enlarged facility will provide new sales opportunities for the chemicals group of the company in Canada and also help meet U.S. production requirements.

Plaquemine, Louisiana

Goodrich is purchasing an existing PVC plant in Plaquemine, Louisiana. This facility will increase production capacity of general purpose resins by approximately 165 million pounds. (See Figure 9-8.) The plant presently employs 150 people.

Avon Lake, Ohio

In 1977 a major dispersion grade PVC resin facility was completed at Avon Lake. The expansion substantially increased Goodrich's PVC capacity.

## 9.6 FINANCIAL ANALYSIS

B.F. Goodrich is recovering from its low profit situation of the early 1970's.

### 9.6.1 Operations

Like many other tire companies, B.F. Goodrich has had low profits in recent years. However, the general trend of earnings has been up. (See Figure 9-9.) In the early 1970's, Goodrich was losing market share in the tire industry and its return on stockholders' equity was less than 4 percent. The company made many changes in the next few years, including

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | Operating Income*/Sales Percent |
|---|---|---|---|---|
| 79 | 2988 | 82.6 | 9.2 | 8.2 |
| 78 | 2594 | 70.1 | 8.0 | 9.2 |
| 77 | 2367 | 60.1 | 7.8 | 10.0 |
| 76 | 2124 | 15.8** | 1.9 | 8.2 |
| 75 | 2041 | 25.6 | 3.2 | 7.6 |
| 74 | 2113 | 53.8 | 7.3 | 9.8 |

| Year | Earnings/Total Assets Percent | Sales/Assets | Earnings/Sales Percent |
|---|---|---|---|
| 79 | 4.1 | 1.46 | 2.8 |
| 78 | 3.7 | 1.37 | 2.7 |
| 77 | 3.7 | 1.37 | 2.7 |
| 76 | 1.0 | 1.25 | 0.8 |
| 75 | 1.6 | 1.23 | 1.3 |
| 74 | 3.4 | 1.27 | 2.7 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

** Earnings for 1976 show the effect of a $12.1 billion write-off.

FIGURE 9-9. OPERATING ANALYSIS OF B. F. GOODRICH new management, divestiture of unprofitable businesses, and greater financial controls. Margins have improved and the major business segments—tires, chemicals and engineered products—are all contributing to the operating profit. Demand for PVC was quite strong in 1978.

Earnings in 1979 were up by about 18 percent over 1978. Sales in 1980 have suffered from poor tire sales and reduced demand for engineered products.

### 9.6.2 Capital Analysis

B.F. Goodrich has been generally decreasing its debt and improving its debt to capitalization figure since 1975. (See Figure 9-10.) Capital expenditures have been moderate and increasing and the company has slightly increased its dividend. The company has announced plans to spend more than $200 million a year and up to $300 million in some years on capital expenditures for the next five years. In 1979 capital expenditures totaled $263.4 million.

## 9.7 RESEARCH AND DEVELOPMENT

Research and product development were identified as key ingredients in the new B.F. Goodrich approach to diversification into profitable new product lines and the development of unique equipment and more efficient processes. Emphasis is placed on product specialization, in anticipation of consumer needs, and on ways to shorten the time span between product conception and introduction. The objective is to win new markets with premium products offering high growth potential. The company spent $43.6 million on research and development in 1979.

In line with this concept, research and product development are done in individual operating divisions, since they are best able to supervise the technology development required to fulfill their own product and marketing goals.

| | | | Sources | | | |
|---|---|---|---|---|---|---|
| Year | Sales | P/E Ratio[1] | Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings |
| 79 | 2988 | 4.2 | 82.6 | 83.6 | 37 | N.A. |
| 78 | 2594 | 4.5 | 70.1 | 79 | 4 | 37[4] |
| 77 | 2367 | 6.6 | 60.1 | 77 | 21 | 2.5 |
| 76 | 2124 | 25.1 | 15.8 | 68 | (38) | 6.8 |
| 75 | 2041 | 10.3 | 25.6 | 74 | (34) | 0 |
| 74 | 2113 | 5.3 | 53.8 | 64 | 109 | 0 |

| | | Uses | | | | | |
|---|---|---|---|---|---|---|---|
| Year | Change in Working Capital | Capital Expenditures | Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ % | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ % | Current Ratio |
| 79 | 96 | 146 | 24 | 29.6 | 3.9 | 7.3 | 1.9 |
| 78 | 39 | 115 | 21 | 32.8 | 4.2 | 5.9 | 2.4 |
| 77 | 81 | 105 | 18.6 | 32.4 | 4.6 | 6.2 | 2.5 |
| 76 | 26 | 71 | 18.6 | 32.9 | 3.6 | 4.5 | 2.5 |
| 75 | (43) | 98 | 17.4 | 35.2 | 2.9 | 6.1 | 2.4 |
| 74 | 56 | 146 | 16.7 | 37.7 | 4.1 | 8.8 | 2.4 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

[4] Mostly from shares associated with the acquisition of Continental Conveyor and Equipment Co., Inc.

FIGURE 9-10. CAPITAL ANALYSIS OF B.F. GOODRICH

Marketing of technology is also an important source of earnings for B.F. Goodrich. Companies in 20 countries where Goodrich has no manufacturing operations have agreements with the company for patent and technical assistance. For example, Goodrich-developed technology for a vinyl chloride monomer stripping process is used in the United States, England, Sweden, Holland, Australia, and other countries. The process reduces worker exposure to vinyl chloride monomer and helps protect the environment.

## 9.8 LABOR RELATIONS

Goodrich had a debilitating strike by the United Rubber Workers Union in 1976. Since that time the company has been trying very hard to improve employee relations. The company has

- Increased communications with employees in an attempt to give them an understanding of the company's economic condition

- Expanded Foremen's Institutes aimed primarily at improving the professional and interpersonal skills of foremen who supervise production employees

- Continued emphasis on the selection and development of superior employees for management positions.

In 1979 Goodrich promised to accept a pattern agreement which could be reached with three other companies during spring negotiations, but the union rejected the offer. As it turned out, the union settled with Goodrich first. The agreement terms included a total worth of 36 percent over three years and pension improvements.

# 10. E.I. DUPONT DE NEMOURS & COMPANY

One of the oldest business organizations in this country and one of the largest chemical companies in the world, DuPont is a major supplier of plastics to Detroit itself and to Detroit's suppliers as well. The firm has built virtually its entire business empire by developing new and innovative products and then finding a wide variety of applications for them. This is the major thrust of their long involvement with the automobile through plastics.

## 10.1 CORPORATE SIZE AND STRUCTURE

With sales in excess of $12 billion and a work force of more than 130,000, DuPont is one of the country's largest and most significant businesses. The corporation's manufacturing operations are divided into two basic groupings: CPS businesses (chemicals, plastics and specialty products), and Fibers. In 1979 total CPS sales were $8.4 billion, which is over 65 percent of the firm's overall gross.

### 10.1.1 Revenue, Profit and Employment

DuPont's 1979 revenues were $12.6 billion, up more than 19 percent from 1978's $10.6 billion. Earnings for 1979 were $939 million, up 19 percent from the previous year. Plastics sales accounted for more than 20 percent of DuPont's gross, and reached an all-time high of $2.8 billion, versus $2.3 billion in 1978. Plastics profits for 1979 were $237 million, while 1978 profits were $165 million. The firm employed a work force of approximately 134,000 persons in 1979. (See Table 10-1.)

TABLE 10-1. E.I. DUPONT DE NEMOURS & COMPANY
REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $12,572 | $939 |
| 1978 | $10,584 | $787 |
| Average Number of Employees: 134,200 (1979) | | |

### 10.1.2 Corporate Organization

Although DuPont divides its operations into two basic groupings for accounting and reporting purposes, actual industrial manufacturing operations are segregated into nine industrial groupings: Biochemicals; Chemicals, Dyes and Pigments; Polymer Products; Fabrics and Finishes; International; Petrochemical; Photo Products; and Textile Fibers. Each of these industrial departments is headed by a corporate vice president who is also a member of the executive committee. (See Figure 10-1.)

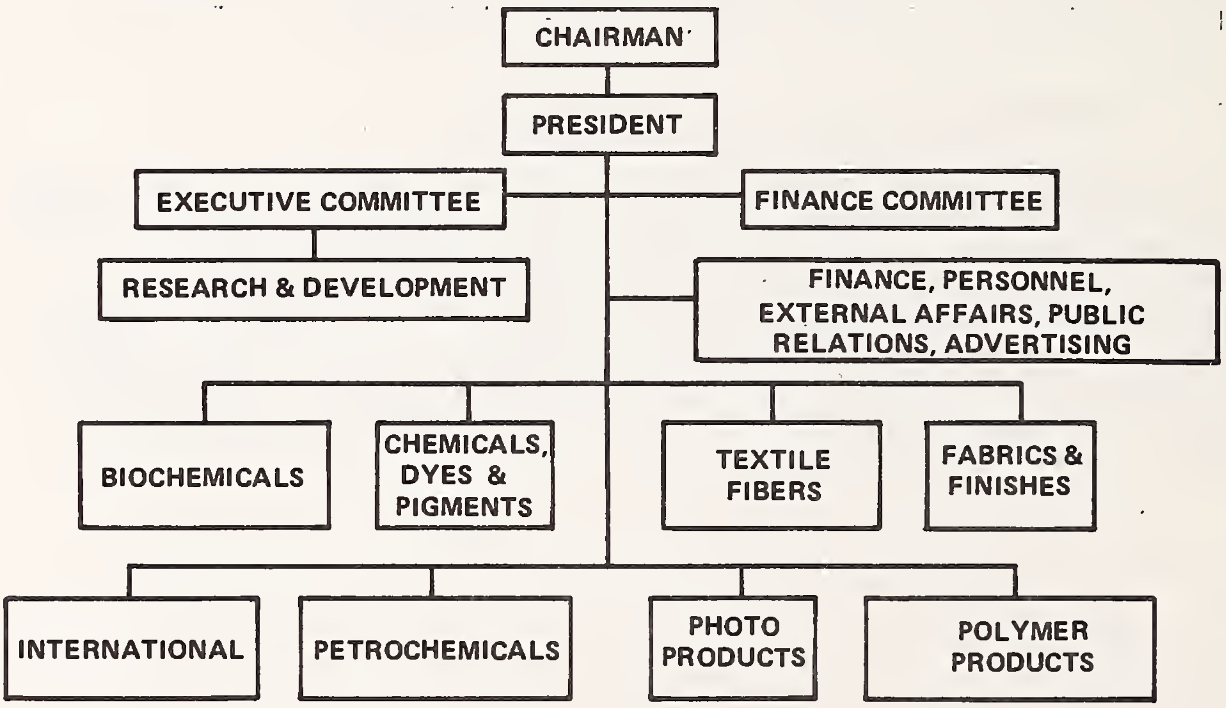


FIGURE 10-1. E.I. DUPONT DE NEMOURS & COMPANY CORPORATE STRUCTURE

DuPont reorganized its operations somewhat in early 1978 to bring about the industrial department groupings discussed above, and to elevate the importance of its research and development and external affairs. The firm's research and development group is now the direct responsibility of a corporate vice president who sits on the executive committee. "Changing market conditions, government regulations, changes in availability and cost of energy and raw materials, and environmental considerations have made top management direction essential to the effective deployment of research and development effort and the coordination of business diversification programs," DuPont management notes in its annual report.

In another reorganizational move, the firm created the position of the vice president of external affairs reflecting DuPont's awareness of the importance of the company's relations with government, the public, special interest groups, and the communities in which the firm's plants are located.

In 1979, DuPont merged the Elastomer Chemicals and the Plastics Products and Resins departments into the new Polymer Products Department. This reorganization was conducted in an attempt to strengthen its competitive position in this product line.

## 10.2 MAJOR MARKETS AND PRODUCTS

DuPont's varied product line is marketed to a broad range of customers throughout American industry, as well as the consuming public.

### 10.2.1 Major Markets

Major industrial markets for chemicals include the rubber, paper, printing, textile, fuel additive, coatings, plastic and agricultural industries. Plastics markets include packaging, automotive, electrical, and construction. Markets for specialty products include agricultural, electronics and medical products manufacturers, while markets for the firm's fibers include carpet and apparel manufacturers, tire manufacturers and home fabric manufacturers. (See Figure 10-2.)

### 10.2.2 Products

DuPont offers a broad range of basic plastic products to the automotive community, intended for application in virtually every area of the automobile from body through the engine, transmission, chassis and electrical system.

## MARKET DATA

Major Markets: Rubber, paper, printing, textile, and agricultural industries; automotive manufacturers and suppliers; packaging, construction, and electrical industries; carpet and apparel manufacturers; tire manufacturers.

Percent of Sales to the Auto Industry: 20 percent.

Supplies to the Following Automotive Companies:

General Motors, Ford, Chrysler, and various parts and components suppliers.

Major Automotive Products: Zytel nylon resin, Delrin acetal resin, Lucite acrylic resin, Surlyn ionomer resin, Nylon and Dacron fibers, Tedlar PVF film, Teflon resin, Kevlar aramid fiber.

FIGURE 10-2. MARKET DATA FOR DUPONT

The major plastics products are Zytel nylon resin, Delrin acetal resin, Lucite acrylic resin, Surlyn ionomer resin, Nylon fibers, Nordel elastomer, Tedlar PVF film, Teflon resin and Kevlar aramid fibers. Following is a brief description of each of these products and their principal automotive applications:

- Zytel nylon resin—Billed as "the world's toughest engineering thermoplastic," Zytel is utilized in a wide variety of body applications, including door glass rollers and slides, door handles, locking rod connectors and dome lamp lenses.

- Delrin acetal resin—This material is already in extensive use in brake and clutch pedal bushings, gas tank caps and filler housings, rollover valves for fuel lines, and steering column centering spheres.

- Lucite acrylic resin—This long-available material is utilized for automotive exterior lamp lenses, plates and reflectors.

- Surlyn ionomer resin—Currently in use for bumper guard pads and rub strips, fender stone guards, window regulators, and foamed bumper guards.

- Nylon fibers—Available in more than 80 variations, this versatile fiber is used in automotive carpet, upholstery, headliners and tire cord.

- Nordel elastomer—This elastomer is used as a modifier for both rubber and plastic, and is used in lightweight bumpers incorporating grille and spoiler, disc brake dust boots and piston seals, drum brake wheel cylinder boots, master cylinder reservoir diaphragms, windshield washer tubing, grommets and ignition harness insulation.

- Tedlar PVF film—This vinyl film is used in woodgrain trim rails on station wagons and as a substrate for metallized polyester films to replace metallic chrome in body side trim moldings.

- <u>Teflon fluorocarbon resins</u>—The first of the fluorocarbon resins, Teflon is used in disc brake pin insulators, parking brake cable liners, push-pull mechanical control cable liners, steering gear seals and rings, and transmission seals and rings.

- <u>Butacite</u>—Butacite, or polyvinyl butyral, is used as an interlayer film for automotive windshields.

- <u>Kevlar aramid fibers</u>—This relatively new fiber represents DuPont's largest new product commitment of recent times, and has been used extensively to replace steel in radial tires. DuPont is stressing possible applications in transmission supports, driveshafts, truck leaf springs and brake shoe linings.

Two new products, Rynite and Minlon, have recently been commercialized. Rynite is an engineering thermoplastic, while Minlon is a mineral-reinforced nylon resin developed for use in fender extensions and window bezels.

General Motor's new X-cars are using a DuPont-developed elastomeric polyester tape for a tape-driven window regulator mechanism that replaces the normal steel mechanism and saves 11 pounds per car.

### 10.2.3 <u>Marketing Strategy</u>

DuPont's marketing strategy vis-a-vis the automotive industry is to assist the automotive community in its downsizing and weight reduction efforts, while of course taking maximum advantage of the situation. The firm is "marshalling its vast resources" in support of the automakers' objectives of lighter weight, better performance and durability, superior aesthetics and acceptable cost. Although many of the firm's plastics products aimed at the automotive community are sold to other suppliers who fabricate the final part, it has long been DuPont's overall corporate goal to market a product line well downstream from raw materials—products where the value added is high. A parallel strategy is to maintain a highly diversified portfolio of businesses.

The firm feels "a continuing challenge" is to keep its many product lines attuned to changing needs by continual modification and updating. As noted earlier, corporate R&D is now directly under the executive committee, a move company management feels will help keep product development closely attuned to overall corporate marketing and management strategy.

### 10.2.4 Sales Strategy

The firm's sales thrust for automotive plastics is to stress their various products' comparative strength and durability under a wide range of conditions. "New DuPont VAMAC is tougher than silicones in many under-the-hood parts," the firm asserts in one of its many advertisements in automotive industry publications. An advertisement for the firm's Hytrel tells a similar story: "Resilient yet tough. That's DuPont HYTREL for lasting performance at competitive costs." Throughout their sales messages, the advertisements stress how automakers have already used the product for a particular application, and how this experience could be transferred to other applications.

## 10.3 PRODUCTION AND OPERATIONS

DuPont operates more than 50 plants in all parts of the country. Nineteen of them are plastics and resins manufacturing facilities, and 11 of these supply a variety of plastics to the automotive community.

### 10.3.1 Automotive Facilities

The DuPont plastics and resins plants which ship to the automotive community are Yerkes (Buffalo), New York; Fayetteville, North Carolina; Memphis, Tennessee; Newport, Delaware; Orange, Texas; and Parkersburg, West Virginia. (See Figures 10-3 to 10-8.)

*Buffalo, New York*

DuPont's Yerkes plant in Buffalo employs nearly 1,000 and occupies approximately 120 acres. Its principal automotive product is Tedlar PVF film.

*Fayetteville, North Carolina*

The Fayetteville plant produces Butacite polyvinyl butyral, an interlayer film for automotive windshields and safety glass. Occupying approximately 180 acres, Fayetteville employs a work force of approximately 1,100.

Company E.I. DuPont de Nemours

County Erie

Plant Size 120 acres

Plant Yerkes

Congressional District

Address Station B<br>Drawer L<br>Buffalo, NY 14201

Standard Metropolitan Statistical Area Buffalo

No. of Employees 975

Telephone (716) 876-4420

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Tedlar for Woodgrain trim | N.C.A. | N.C.A. | N.C.A. |

FIGURE 10-3. YERKES PLANT

Company E.I. DuPont de Nemours

County Cumberland

Plant Size 180 acres

Plant Fayetteville

Congressional District

Address Drawer Z
Fayetteville, NC 28302

Standard Metropolitan Statistical Area Fayetteville

No. of Employees 1,100

Telephone (919) 483-4681

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Butacite, used as interlayer for windshields | N.C.A. | N.C.A. | N.C.A. |

FIGURE 10-4. FAYETTEVILLE PLANT

Company E.I. DuPont de Nemours

County Shelby

Plant Size 200 acres

Plant Memphis

Congressional District

Address P.O. Box 27038
Memphis, TN
38127

Standard Metropolitan Statistical Area Memphis, TN-AK-MS

No. of Employees 1,200

Telephone (901) 353-6800

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Lucite (acrylic) for lamp lenses, reflectors | N.C.A. | N.C.A. | N.C.A. |

FIGURE 10-5. MEMPHIS PLANT

Company E.I. DuPont de Nemours

County New Castle

Plant Size 110 acres

Plant Newport, Delaware

Congressional District

Address 1007 Market Street, Wilmington, DE 19898

Standard Metropolitan Statistical Area Wilmington, DE-NJ-MD

No. of Employees 700

Telephone (302) 774-1000

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Lucite SAR, for windows for mass transit vehicles (being evaluated for passenger car glazing) | N.C.A. | N.C.A. | N.C.A. |

FIGURE 10-6. NEWPORT PLANT

| | | | | | |
|---|---|---|---|---|---|
| Company | E.I. DuPont de Nemours | County | Orange | Plant Size | 250 acres |
| Plant | Orange, Texas | Congressional District | | | |
| Address | P.O. Box 1089<br>Orange, Texas<br>77630 | Standard Metropolitan Statistical Area | Beaumont-Port Arthur-Orange, TX | No. of Employees | 1,300 |
| Telephone | (713) 883-8411 | Primary SIC Code(s) | | | |

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Surlyn (ionomer) for bumper guards, fender stone guards, regulators, foamed bumper guards<br><br>Elvax (vinyl acetate) for carpet backings | N.C.A. | N.C.A. | N.C.A. |

FIGURE 10-7. ORANGE PLANT

Company E.I. DuPont de Nemours

County Wood

Plant Size 310 acres

Plant Washington Works

Congressional District

Address Box 1217 Parkersburg, WV 26101

Standard Metropolitan Statistical Area Parkersburg-Marietta WV-OH

No. of Employees 2,500

Telephone (304) 863-2000

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Zytel (Nylon) for roof rack pillars & sides; door glass rollers & slides; door handles; locking rod connectors; dome lamp lenses, buses, and bezels; headlamp adjusting nuts; steering column; stone shields; brake booster check valves; and brake pedal bushing | N.C.A. | N.C.A. | N.C.A. |
| Teflon for disc brake pin insulators, parking brake cable liners, steering gear seals, transmission seals, head gaskets | | | |
| Butacite, used as interlayer for windshields | | | |

FIGURE 10-8. WASHINGTON WORKS PLANT

Company E.I. DuPont de Nemours

County

Plant Size

Plant Washington Works Continued

Congressional District

Address

Standard Metropolitan Statistical Area

No. of Employees

Telephone

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Delrin (acetal) for door glass brackets & latch buttons<br><br>Minlon (reinforced nylon) for fender extension, window bezels, air intake ducts, valve assemblies, timing belt covers, heater control brackets<br><br>Crofon for fiber optics illumination<br><br>Lucite (acrylic) for exterior lamp lenses & reflectors<br><br>Rynite - being evaluated for body parts | N.C.A. | N.C.A. | N.C.A. |

FIGURE 10-8. (CONTINUED)

*Memphis, Tennessee*

The Memphis plant, with nearly 1,200 employees and spread over nearly 200 acres, produces Lucite cast acrylic sheet for automotive lamp lenses and reflectors.

*Newport, Delaware*

DuPont's Newport, Delaware, facilities produce Lucite SAR super abrasion resistant sheet for automotive use. The facilities occupy approximately 110 acres, and employ approximately 700.

*Orange, Texas*

The Orange, Texas, plant employs nearly 1,300 employees and occupies approximately 250 acres. Its primary automotive products are Surlyn ionomer resins, and Elvax ethylene vinyl acetate resins (used in automotive carpets as a backing).

*Parkersburg, West Virginia*

DuPont's huge Parkersburg, West Virginia, plant, sprawled over more than 300 acres, employs a work force of approximately 2,500. This plant produces varying amounts of many of the products DuPont offers to the automotive community. The primary products shipped to automotive consumers from Parkersburg are Zytel nylon resins, Teflon fluorocarbon resins, Butacite polyvinyl butyral sheeting, Delrin acetal resins, Minlon engineering thermoplastic resins, Crofon fiber optics, Lucite acrylic resins, and Rynite thermoplastic polyester. Rynite is currently under evaluation for a wide variety of automotive body applications.

### 10.3.2 New Plants and Expansions

DuPont has completed the first half of a major capacity expansion program for Teflon fluorocarbon resin production at Parkersburg. In 1979, new facilities were completed becoming operational for the production of Nafion perfluorosulfonic acid membranes and chemical intermediates at the Fayetteville, North Carolina, plant.

The firm announced in 1979 that it intended to spend $200 million to expand its Kevlar aramid fibers manufacturing facilities at the Richmond plant, and construct a new plant near Laplace, Louisiana. Part of the firm's Ponchartrain plant, the Laplace facilities will produce ingredients used to manufacture aramid fibers. Both projects are set to be completed by 1982.

Total corporate capital expenditures exceeded $785 million in 1978, and $929 million in 1979.

## 10.4 FINANCIAL ANALYSIS

DuPont is currently enjoying very good earnings. The company plans to have $3 billion in capital expenditures over the next three years and hopes to raise this money internally.

### 10.4.1 Operations

DuPont exhibited fluctuating earnings during the 1974 to 1976 period but has recently had strong gains. (See Figure 10-9.) Revenues were up 19 percent in 1978 and earnings increased by 38 percent. The strongest increases occurred in the specialty products and the fibers divisions of the company. Plastic sales reached an all-time high of $2.3 billion dollars and net income was up 9 percent, after nonrecurring charges due to explosions in two plants in Texas and the decision to discontinue the manufacture of the powder form of "Surlyn." Engineering plastics showed strong gains while prices were weak for polyethylene.

In 1979 results showed a 19 percent income gain on a 19 percent sales increase.

Stock analysts are optimistic about DuPont's long-term prospects due to its quality product lines, research, capital expansion programs, and its efforts to ensure sources of supply.

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | Operating Income* / Sales Percent |
|---|---|---|---|---|
| 79 | 12572 | 939 | 19.3 | 18.5 |
| 78 | 10584 | 787 | 18 | 20.4 |
| 77 | 9435 | 545 | 13.6 | 19.1 |
| 76 | 8361 | 459 | 12.1 | 18.5 |
| 75 | 7222 | 272 | 7.3 | 15.3 |
| 74 | 6910 | 404 | 11.4 | 17.1 |

| Year | Earnings / Total Assets Percent | Sales / Assets | Earnings / Sales Percent |
|---|---|---|---|
| 79 | 11.0 | 1.47 | 7.5 |
| 78 | 10.1 | 1.37 | 7.4 |
| 77 | 7.6 | 1.32 | 5.8 |
| 76 | 6.8 | 1.25 | 5.5 |
| 75 | 4.4 | 1.16 | 3.8 |
| 74 | 7.4 | 1.28 | 5.8 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 10-9. OPERATING ANALYSIS OF DUPONT

### 10.4.2 Capital Analysis

DuPont had very large capital expenditures in 1975 and 1976 at the same time earnings were falling. To meet these needs the company borrowed heavily during this period. (See Figure 10-10.) In the past two years the situation has reversed dramatically, and in 1978 DuPont had sufficient cash surplus to pay off some of its debt early. Capital expenditures are expected to be a billion dollars in each of the next three years and DuPont plans to fund these through internally generated cash. In addition, DuPont is in one of the strongest financial positions of any company in the chemical industry. Long-term debt to capitalization is only 15.6 percent.

## 10.5 RESEARCH AND DEVELOPMENT

DuPont's Wilmington Experimental Station, established at the turn of the century, is one of the largest industrial research laboratories in the world. Most of the firm's automotive-oriented research programs are carried out at the Wilmington research facilities or at the nearby Chestnut Run Laboratories. Activities at the Wilmington center are oriented around fundamental research, new product and process exploratory work, and applied research. At Chestnut Run, researchers are concerned primarily with end-use performance of DuPont products.

DuPont makes its research and design services available to many of its customers, who take the firm's raw materials and convert them into finished products. Final development of product and process commercialization is normally carried out at plant-site laboratories.

Overall R&D expenditures were $415 million in 1979, up 10 percent from 1978. The firm's R&D activities utilize a work force of 4,000.

Current automotive-oriented R&D activities center around increasing automotive applications for existing or newly developed products such as its new Rynite engineering thermoplastic (which DuPont touts as ideal for auto body applications). The firm's R&D staff helped develop General Motors' new window regulator mechanism utilizing a DuPont elastomeric polyester tape, as well as a sprocket wheel drive made from Rynite, clutch and drive mechanism housing made from

| | | | Sources | | | |
|---|---|---|---|---|---|---|
| Year | Sales | P/E Ratio[1] | Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings |
| 79 | 12572 | 6.7 | 939 | 787 | 5 | 20.7 |
| 78 | 10584 | 7.3 | 787 | 776 | (191) | 10 |
| 77 | 9435 | 10.9 | 545 | 724 | 8 | 26 |
| 76 | 8361 | 15 | 459 | 632 | 393 | 3 |
| 75 | 7222 | 20.3 | 272 | 580 | 96 | 23 |
| 74 | 6910 | 16.1 | 404 | 506 | 555 | 26 |

| | | Uses | | | | | |
|---|---|---|---|---|---|---|---|
| Year | Change in Working Capital | Capital Expenditures | Dividends | Long-Term Debt[2] / Capitalization % | Coverage[3] | Cap. Exp. / Total Assets % | Current Ratio |
| 79 | 359 | 864 | 410 | 15.6 | 16.3 | 10.2 | 2.6 |
| 78 | 338 | 714 | 354 | 17.2 | 15.6 | 8.8 | 2.5 |
| 77 | 245 | 704 | 283 | 21.1 | 10.7 | 9.4 | 2.6 |
| 76 | 428 | 876 | 257 | 22.2 | 10.7 | 12.4 | 2.4 |
| 75 | (311) | 1036 | 212 | 17.5 | 8.7 | 16.1 | 2 |
| 74 | 172 | 1008 | 271 | 16.3 | 19.1 | 16.8 | 2.6 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 10-10. CAPITAL ANALYSIS OF DUPONT the firm's Zytel nylon resin, and a drive block and sash molded from the firm's Delrin acetal resin.

The firm's R&D efforts have helped European automakers engineer a wholesale shift to bumpers made from Nordel fortified polypropylene bumpers.

## 10.6 GOVERNMENT AND LABOR RELATIONS

DuPont has long been known for its progressive employee health and benefits program, and is currently in the process of upgrading its operations from a safety standpoint. The firm reports that it has recently expanded and improved its medical surveillance and epidemological programs, and helps support the nonprofit Chemical Industry Institute of Toxicology. The company also reports successful affirmative action programs for minorities, females, the handicapped, and Vietnam veterans.

The company is also continuing extensive energy conservation programs throughout its manufacturing operations. This has resulted in a 20 percent reduction in energy consumption per unit of production since 1972, which exceeds Federal energy conservation goals.

# 11. GENERAL ELECTRIC

General Electric began its plastics business as a search for insulating materials that could meet the demand for new electrical applications. From that start General Electric (GE) has become a pioneer in the area of engineering plastics. The company has had significant growth in its plastics business in recent years, and plastics and other materials have been important in GE's attempts to diversify and invest in significant new growth areas. All of General Electric's engineering plastics are used in automobiles. The company is aggressively pursuing the automotive market and has introduced a new plastic this year, Arnox, that is specifically targeted toward cars. GE has also begun a program to increase the capacity for its successful Lexan polycarbonate by 35 percent.

## 11.1 CORPORATE SIZE AND STRUCTURE

General Electric is generally known as an electrical equipment manufacturer. Nevertheless, it is also a significant producer of plastics and is among the top 35 plastics companies in terms of total plastic and plastic product sales and is in the top ten plastic companies in terms of dollar sales in resins. In addition, General Electric has the largest sales of engineering resins in the plastics industry and also has the largest sales of automotive engineering resins.

### 11.1.1 Revenue, Profit, and Employment

In 1979 General Electric had sales of $22.5 billion and earnings of $1.4 billion, an increase of 17 percent over 1978 earnings of $1.2 billion. The plastics business accounts for an estimated 2 percent of corporate sales. GE employed about 405,000 persons worldwide in 1979. (See Table 11-1.)

TABLE 11-1. GENERAL ELECTRIC REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $22,461 | $1,409 |
| 1978 | $19,654 | $1,230 |
| Average Number of Employees: 405,000 (1979) | | |

### 11.1.2 Corporate Organization

General Electric was reorganized at the end of 1977 after a four-year study to determine what evolutionary changes would be needed in the company's organization to prepare it for the 1980's. Key executives were assigned to new areas to broaden their experience base and provide General Electric with managerial talent to lead the company in the next decade.

The reorganization consolidated many of the former groups into six broad market segment sectors. (See Figure 11-1.) The sectors are:

- Consumer Products and Services, which makes major appliances, air conditioners, television and other products
- Industrial Products and Components, which makes locomotives, motors, controls and generators
- Power Systems, which makes gas turbines, steam generator equipment, and nuclear equipment
- Technical Systems and Materials, which includes GE's engineering plastics business, GE aircraft engine businesses, and the aerospace and medical systems businesses
- Utah International, GE's wholly-owned natural resources affiliate, which mines coal, uranium, iron ore and copper
- The International Sector, which manages much of GE's international business.

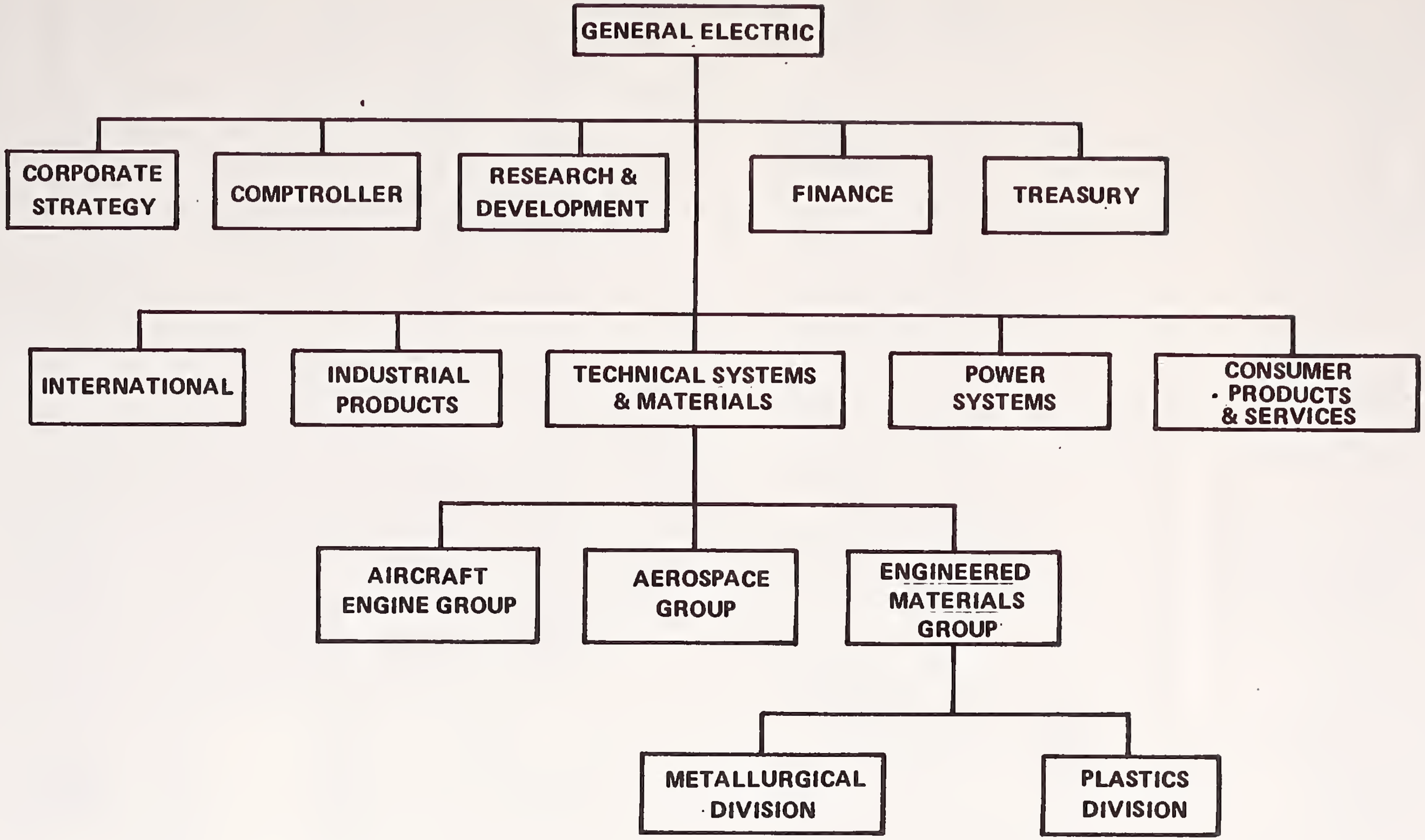


FIGURE 11-1. GENERAL ELECTRIC ORGANIZATION

The Technical Systems and Materials Sector is further broken down into various groups including a materials group, an aerospace group and an aircraft engine group. The materials group consists of the Plastics Division and a Metallurgical Division. Several corporate staff departments also exist as shown in Figure 11-1.

## 11.2 MAJOR MARKETS AND PRODUCTS

Figure 11-2 presents the major market information for General Electric's Plastics Division.

### 11.2.1 Major Markets

The Plastics Division markets its engineering plastics throughout the United States and in over 25 countries throughout Western and Eastern Europe. Markets include the automotive, appliance, electrical and communications industries. General Electric's major competitors for the plastics it sells are Mobay and Celanese. However, in some cases General Electric is the sole supplier of the plastics it makes and actually competes against other plastics and materials based on product performance and price.

MARKET DATA

| | |
|---|---|
| Major Markets: | Automotive, electrical/electronics, communications, and specialty markets. |
| Supplies to the | Following Automotive Companies: Ford, Chrysler, Fiat, Citroen, British Leyland, and many independent automotive suppliers. |
| Major Products: | Lexan (polycarbonate), Noryl (phenylene oxide based resin), Valox (PBT or polybutylene terephthalate), Genal (phenolic molding compound), Arnox (processable epoxide). |

FIGURE 11-2. MARKET DATA PLASTICS DIVISION OF GENERAL ELECTRIC

### 11.2.2 Products

General Electric has a unique set of plastic products which are given the brand names Lexan, Noryl, Valox, and Genal. All are used in the automotive market. Of the four major engineering plastics used in automobiles, GE manufactures three of them (all except nylon) and is the sole supplier of one of them (Noryl).

*Lexan*

Lexan resin is a tough and transparent polycarbonate with excellent impact strength and light weight. It is used throughout the world in the appliance, automotive, electrical/ electronic and specialty markets. Lexan is currently used on the Dodge St. Regis for headlamp covers, glove box/center panel bezels, ash tray bezels, parking/turning lamp lenses and housings. It is used on the rear lens of the Mercury station wagon, and Fiat and Citroen have Lexan bumpers on 1978 models. General Electric supplies roughly 75 percent of the polycarbonate market and Mobay supplies the remainder.

*Noryl*

Noryl is a phenylene oxide based resin and is fire, heat and moisture resistant. According to General Electric, the plastic has a reputation for quality and dependability in such key markets as the automotive, business machines, electrical/construction and communications industries. Noryl was originally introduced as a high temperature specialty material by GE in 1966. Now Noryl can be tailored to a variety of market requirements with increasing standards for improved flame retardancy and higher impact resistance combined with economy and ease of processing. Noryl is used in the Mustang,Capri, LTD, and Marquis windshield wiper blade carriers and in deluxe Ford wheel covers. General Electric is still the sole source for Noryl.

*Valox*

Valox resin (PBT or polybutylene terephthalate) is the fastest growing thermoplastic polyester in the industry with superior moldability and heat and chemical resistance. It is used in a wide range of markets including automotive, appliance, hardware and electrical/electronics. It is used in the automotive electronic ignition and in backup lights. Other suppliers of this type of plastic include Celanese and Diamond Shamrock.

*Genal*

Genal is a phenolic molding compound and is known for superior heat and chemical resistance and excellent dimensional stability. The plastic is not considered an engineering plastic and is made by many other companies such as Clark Chemical and Reichhold Chemicals. Automotive uses include electrical housings and wiring.

### 11.2.3 New Products

For General Electric's Plastics Division, new product development is an important part of marketing its plastics. General Electric has recently introduced a new resin, Arnox, and has also been developing new applications for Lexan and Noryl.

*Arnox*

Introduced in 1979, this plastic is aimed directly at Detroit. Arnox resins are a series of processable epoxides, a plastic family known for high strength and durability. The plastic has been used to only a limited extent in the past because of difficult processing requirements, poor shelf life and slow curing times. However, after five years of research, General Electric has developed a rapid-cure, highly moldable, high strength series of epoxides. General Electric feels that auto manufacturers will find the plastic useful, despite its expense, for parts like engine and transmission components, fuel pumps, firewalls, radiator and transmission supports, leaf springs, valve push rods, connecting rods, and even the entire automobile body. The plastic reportedly has many times the strength of steel at a fraction of its weight.

The Arnox resin family consists of three series: 1000, for compression molding; 2000, designed for metal replacement and injection molding; and 3000, for large structural components using reinforced reaction injection molding.

*New Lexan and Noryl Parts*

Many new products are being developed out of Lexan and Noryl.

- Bumpers—General Electric's Auto Polymer Center is presently prototyping a Lexan bumper system for 1981 introduction on a subcompact. The complete bumper system, front and rear, weighs 80 pounds. The system is similar to polycarbonate bumper systems on the Triumph TR-7 and has been developed in two versions. The first version uses the original bumper on the car but replaces the aluminum face bar with Lexan, saving $2 in cost and 5 pounds. The second version replaces the hydraulic energy absorbers with energy managing foam, saving about $14 and another 12 pounds.

- Dashboards—Lexan and Noryl are also being considered for automobile dashboards or instrument panels. The use of these plastics would simplify design and reduce the number of parts required. General Electric says there has been resistance in Detroit so far but expects an eventual acceptance of the idea. The Fiesta, Rabbit and Triumph TR-7 have already moved toward plastic dashboards.

- Windows—General Electric claims tremendous weight savings is possible by using Lexan to replace automotive glass. By coating Lexan with silicone glazing material, the company has made a Lexan product that nearly matches the abrasion resistance of glass. However, abrasion standards would have to be changed to allow the plastic to substitute for glass. In addition, the material is quite expensive, although if trim or attachment detail were molded into the Lexan window, the product could be more cost-competitive.

- Headlamps—Automotive headlamps are also viewed as having great potential for glazed Lexan, allowing a saving of 3 pounds per car. However, development work is still needed to ensure meeting safety and performance requirements.

### 11.2.4 Marketing Strategy

The specialized nature of General Electric plastics requires a service-oriented marketing and sales strategy. According to General Electric, the company has the largest team of technical marketing and development specialists in the industry to work with molders and end users at their facilities and to aid product development.

General Electric has technical centers in the U.S. and around the world. These centers are a meeting ground for General Electric customers to experiment with materials, to test new ideas, to exchange technical information on needs and resources, and to try out new applications.

## 11.3 CORPORATE STRATEGY

General Electric views itself primarily as a technical company. The company's strategic planning for the future is targeted on profitable growth based on new and improved products and services. General Electric thus has a strong commitment to research and development. The company has a large and diverse group of technically trained people, about half of them in marketing, management and other business functions not directly related to product engineering or research. Research and development expenses are high compared to other companies and industries. R&D expenditures were $1,440 million in 1979 compared with $1,270 million in 1978. About $640 million in 1979 was company funded and $800 million was funded by others principally the U.S. Government. In recent years, on the average between 12,000 and 13,000 scientists and engineers have been engaged in research and development activities.

In addition, in recent years General Electric has been restructuring its business according to an ongoing strategic analysis used to identify strong growth areas for the company. The growth of General Electric's materials business has been an important part of this overall strategy. The strategy has included the following points:

- Decentralization of organization
- Diversification of products and services
- Identification of real growth opportunities and containment of risks.

Thus, although General Electric is a leading producer of electrical equipment, materials and services now provide some 10 percent of earnings. Plastics have been and continue to be an important part of General Electric's growth. General Electric has also expanded selectively in international markets.

## 11.4 PRODUCTION AND OPERATIONS

The headquarters of GE's Plastics Division are in Pittsfield, Massachusetts. The Division has a plant there as well as facilities in Mount Vernon, Indiana, and Selkirk New York. These plants serve both the domestic and foreign markets. GE exports basic resins to worldwide compounding facilities that transform the resins and basic materials into locally marketable products.

### 11.4.1 Major Automotive Facilities

Since all of GE's plastic products are sold to the auto industry, each of its three plastic plants serves auto manufacturers. (See Figures 11-3 to 11-5.)

*Mount Vernon Plant*

This plant in Indiana is the largest polycarbonate (Lexan) plant in the world and also has the largest capacity of PBT (polybutylene terephthalate or Valox). The 1976 polycarbonate production of the plant was an estimated 11 million pounds. One thousand people are employed at Mount Vernon.

*Selkirk Plant*

This plant in New York makes GE's Noryl phenylene oxide based resins and employs 400 people.

*Pittsfield Plant*

The Pittsfield, Massachusetts, plant is GE's Genal phenolic molding compound plant. The plant, which employs 250 people, is also GE's Plastics Division headquarters.

### 11.4.2 New Plants and Expansions

GE now has two major capital programs in its Plastics Division.

*Phenol Plant*

To assure future supply of raw materials and maintain product quality, the Plastics Division received corporate approval in 1977 for construction of a phenol plant to be located in Mount Vernon, Illinois. The plant is scheduled to be onstream by 1980 and will include capacity for 400 million pounds per year of phenol and approximately 240 million pounds per year of acetone.

Company: General Electric Company | County: Posey | Plant Size: ______

Plant: Mount Vernon | Congressional District: ______

Address: Lexan Lane, Mount Vernon, IN 47620 | Standard Metropolitan Statistical Area: Evansville, IN-KY | No. of Employees: 1,000

Telephone: (812) 838-4311 | Primary SIC Code(s): ______

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polycarbonate (Lexan) | Polycarbonate consumption: about 11 million pounds (1976) | N.C.A. | N.C.A. |
| Polybutylene terephthalate (Valox) | | | |

FIGURE 11-3. MOUNT VERNON PLANT

Company General Electric Company

County Albany

Plant Size

Plant Selkirk

Congressional District

Address Noryl Avenue Selkirk, NY 12158

Standard Metropolitan Statistical Area Albany-Schenectady-Troy, NY

No. of Employees 400

Telephone (518) 439-9371

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Noryl (Phenylene oxide) | N.C.A. | N.C.A. | N.C.A. |

FIGURE 11-4. SELKIRK PLANT

Company General Electric Company

County Berkshire County

Plant Size

Plant Pittsfield

Congressional District

Address 1 Plastic Avenue
100 North Street
Pittsfield, MA
01201

Standard Metropolitan Statistical Area Pittsfield, MA

No. of Employees 250

Telephone (413) 494-5449
(413) 494-1110

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Genal (Phenolic molding compound) | N.C.A. | N.C.A. | N.C.A. |

FIGURE 11-5. PITTSFIELD PLANT

*Lexan Expansion*

To serve automotive and other customers of Lexan polycarbonate, GE is investing $80 million in incremental stages at its Mount Vernon, Indiana, plant to increase polycarbonate capacity by 35 percent.

## 11.5 FINANCIAL ANALYSIS

General Electric is very strong financially.

### 11.5.1 Operations

General Electric is currently earning consistently good profits. (See Figure 11-6.) Sales in recent years have been approximately constant as a percentage of assets, but margins have been improving slightly. The Technical Systems and Materials Sector, of which GE's plastics business is a part, had a 12 percent gain in earnings in 1978 compared to 13 percent for the corporation. The sector contributed 22 percent of total GE revenues and 23 percent of earnings. GE is in a good position with its plastics business because it makes specialty plastics that are not subject to the periodic low margins found in much of the bulk plastics industry.

Earnings for 1979 for the entire company were up 15 percent and gains are expected to continue due to heavy capital spending, nonresidential construction increases, and increased use of engineered materials.

### 11.5.2 Capital Analysis

General Electric is in a good financial position with $2.6 billion in cash and marketable securities and a debt to capitalization ratio of 11.2 percent. Capital expenditures were easily covered from 1975 through 1978 and the company used excess cash to reduce long-term debt. The company is conservative in its financing, maintaining large cash reserves and only limited debt. In general, the company's industry segments are not as capital-intensive as other chemical and plastic companies. (The sales to asset ratio is in the 1.4 range). The company is able to have a payout ratio around 50 percent and has a P/E ratio considerably higher than the other plastic companies.

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | $\frac{\text{Operating Income*}}{\text{Sales}}$ Percent |
|---|---|---|---|---|
| 79 | 22461 | 1409 | 20.2 | 12.3 |
| 78 | 19654 | 1230 | 19.6 | 12.9 |
| 77 | 17519 | 1088 | 19.4 | 12.7 |
| 76 | 15697 | 931 | 18.1 | 12.8 |
| 75 | 11339 | 581 | 14.9 | 10 |
| 74 | 13413 | 608 | 17.2 | 10.2 |

| Year | $\frac{\text{Earnings}}{\text{Total Assets}}$ Percent | $\frac{\text{Sales}}{\text{Assets}}$ | $\frac{\text{Earnings}}{\text{Sales}}$ Percent |
|---|---|---|---|
| 79 | 8.9 | 1.41 | 6.3 |
| 78 | 8.6 | 1.37 | 6.3 |
| 77 | 8.4 | 1.35 | 6.2 |
| 76 | 7.7 | 1.30 | 5.9 |
| 75 | 6.0 | 1.39 | 4.3 |
| 74 | 6.9 | 1.54 | 4.5 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 11-6. OPERATING ANALYSIS OF GENERAL ELECTRIC

(See Figure 11-7.) These characteristics of General Electric indicate that funding constraints will not be a problem with any contemplated capital investments, even with an economic slowdown.

## 11.6 RESEARCH AND DEVELOPMENT

As stated earlier, research and development is a very significant part of General Electric's overall corporate strategy. A company research facility is provided by the GE Research and Development Center in Schenectady, New York, employing some 800 scientists and engineers. In addition, the company conducts development projects at more than 100 laboratories associated with operating components.

GE Plastics is known around the world for its technical achievements and holds and issues more patents each year than any other operation component of General Electric Company. According to the company, new proprietary systems are already emerging from the Plastics Division's laboratories. The company claims it has some outstanding new product ideas, such as the recently introduced Arnox, for its fast-growing engineering plastics businesses. GE is working on its own equivalent of DuPont's Super Tough (ST) technology, and expects to introduce polycarbonate grades with higher heat resistance plus toughness matching that of ST nylons. GE is also developing a high-temperature amorphous resin with outstanding flame retardance properties.

## 11.7 GOVERNMENT AND LABOR RELATIONS

GE has expressed concern in recent years over the issue of corporate governance and the role of corporate directors in the affairs of the company. To increase the ability of the board of directors to effectively audit and evaluate the company, the board set up a series of committees in 1972. These committees, such as the Operations Committee and the Technology and Science Committee, are able to become more directly aware of specific parts of GE's business and report their results to the whole board.

In the environmental area, the GE Plastics Division received special recognition in 1978. The Izaak Walton League, a national conservation organization, presented its National Clean Water Award to GE officials at the Plastics Division's Mount Vernon plant. The facility was nominated

| | | | Sources | | | |
|---|---|---|---|---|---|---|
| Year | Sales | P/E Ratio[1] | Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings |
| 79 | 22461 | 8.1 | 1409 | 624 | 47 | (9.6) |
| 78 | 19654 | 9.2 | 1230 | 576 | (290) | (20) |
| 77 | 17519 | 10.9 | 1088 | 522 | (38) | 81 |
| 76 | 15697 | 12.7 | 931 | 486 | 83 | 87 |
| 75 | 13399 | 13.4 | 581 | 419 | (163) | 160 |
| 74 | 13413 | 14.2 | 608 | 376 | 235 | 83 |

| | | Uses | | | | | |
|---|---|---|---|---|---|---|---|
| Year | Change in Working Capital | Capital Expenditures | Dividends | Long-Term Debt[2] / Capitalization % | Coverage[3] | Cap. Exp. / Total Assets % | Current Ratio |
| 79 | (67) | 1262 | 624 | 11.2 | 10.6 | 8.0 | 1.4 |
| 78 | 131 | 1055 | 566 | 12.9 | 11.3 | 7.0 | 1.4 |
| 77 | 368 | 823 | 479 | 17.5 | 11.1 | 6.0 | 1.5 |
| 76 | 493 | 740 | 382 | 19.8 | 11.5 | 6.1 | 1.5 |
| 75 | 285 | 448 | 296 | 20.0 | 7.9 | 4.6 | 1.4 |
| 74 | 293 | 672 | 292 | 24.0 | 7.6 | 7.2 | 1.3 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 11-7. CAPITAL ANALYSIS OF GENERAL ELECTRIC by the Indiana State Stream Control Board and the Environmental Protection Agency, Region V. GE won the award for the design and construction, at a cost of $20 million, of an industrial waste brine recycling operation at their newest, $12.9 million water pollution control facility.

General Electric is aggressively pursuing affirmative action and apprenticeship programs. The company has emphasized its support of education and training to increase the number of minority engineers. GE reached a settlement with the Equal Employment Opportunity Commission in 1978. It was agreed that the company will expand training programs for hourly employees, create an open promotion system, establish a promotion incentive program for women and minorities, and restructure some of its wage scales.

# 12. GENERAL TIRE & RUBBER COMPANY

General Tire is a leading supplier of processed plastic parts to the auto industry. To pursue the growing automotive plastics market, General Tire has recently formed separate reinforced plastic, vinyl fabric and foam products companies. The separation will hopefully aid expansion and increase market awareness. The company has also recently added reaction injection molding to its capabilities.

General Tire (GTR) continues to devote research to finding new products to lighten cars. An example of this is GTR's new million dollar development center which is devoting much of its time to finding methods to make new lightweight vinyl fabrics for cars.

## 12.1 CORPORATE SIZE AND STRUCTURE

General Tire is one of the country's largest tire companies and is also a major chemical and plastic product supplier. The company is one of the nation's leading suppliers of vinyl fabric materials for automobiles and other vehicles, the largest producer of custom-molded fiberglass-reinforced plastic components for cars and trucks, and a leading supplier of polyurethane foam and flexible molded foam for automotive seating and padding applications.

### 12.1.1 Revenue, Profit and Employment

In 1979 General Tire had sales of $2.3 billion and earnings of $81.7 million, about 30 percent below 1978 earnings. Chemicals and plastics sales accounted for about 20 percent of total sales and 30 percent of operating income in 1978. General Tire employed about 42,000 persons in 1979, 7,000 of whom worked for the Chemicals/Plastics Division. (See Table 12-1.)

TABLE 12-1. GENERAL TIRE REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $2,295 | $81.7 |
| 1978 | $2,199 | $115.5 |
| Average Number of Employees: 42,000 (1979) | | |

### 12.1.2 Corporate Organization

General Tire is organized into a Tire Division which supervises the company's tire business, a Chemical/Plastics Division which covers plastic operations, and an Industrial Products Division which molds many rubber products for the auto industry. Aerojet-General Corporation is a subsidiary which makes industrial equipment, aerospace and defense products, and RKO General is a subsidiary which mainly operates radio and television stations. General Tire also divides its divisions into various operating companies which help the company focus on certain markets. (See Figure 12-1.) In the plastics division, General Tire has several companies that serve the auto industry. These include the GTR Foam Products Company which makes urethane foam products, the GTR Coated Fabrics Company which makes vinyl fabrics, and the GTR Reinforced Plastics Company which makes reinforced plastic parts for the auto industry. In addition, the GT Diversified Plastic Products Company, part of the Industrial Products Division, supplies plastic components to the auto industry.

## 12.2 MAJOR MARKETS AND PRODUCTS

Figure 12-2 summarizes the major market information for General Tire.

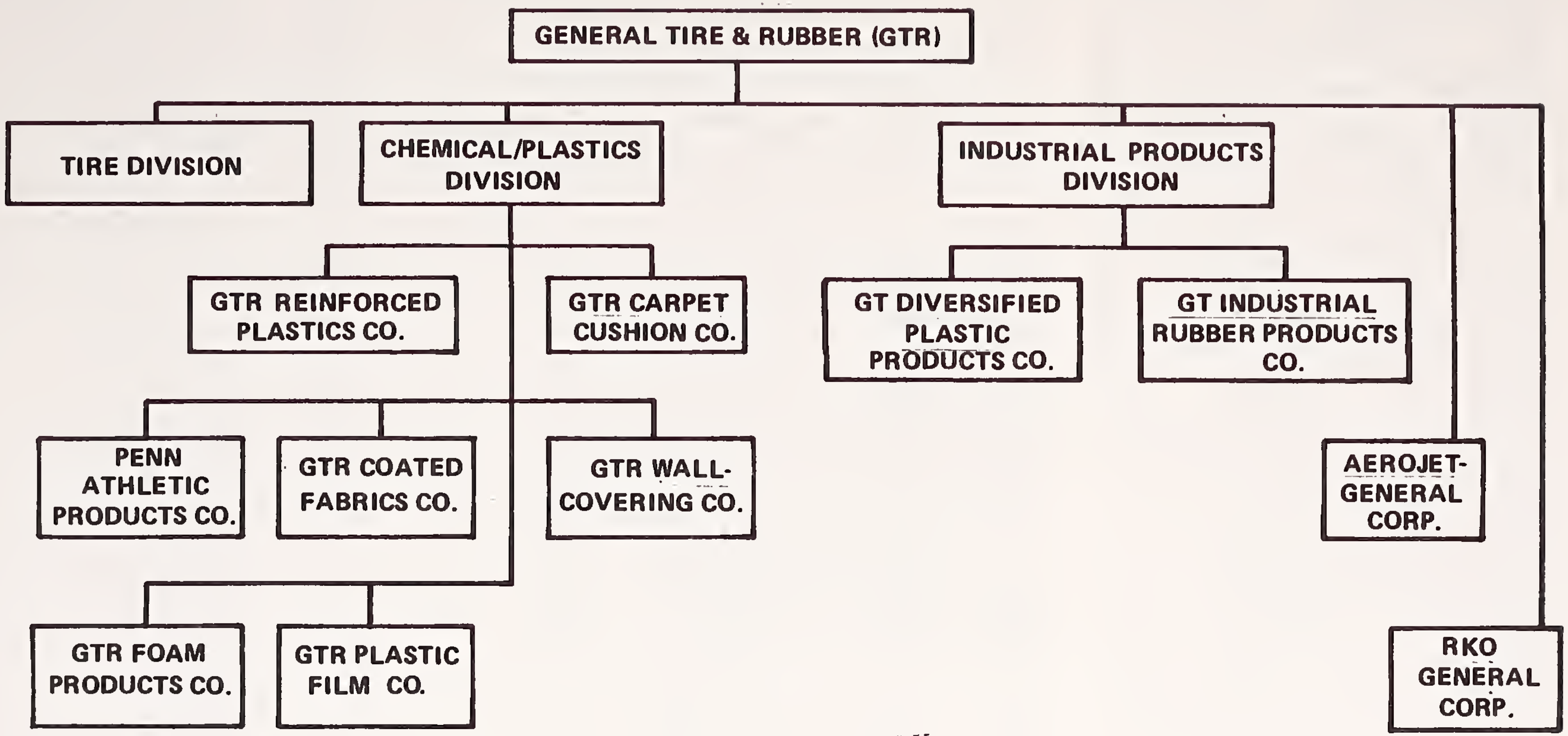


FIGURE 12-1. GENERAL TIRE CORPORATE ORGANIZATION

### 12.2.1 Major Markets

General Tire's major market for each of its nonsubsidiary divisions is the automotive, truck and heavy equipment industries. In addition, the company serves the appliance, construction, defense, electronics, marine, home furnishings, petroleum, chemical, aerospace and communications industries. General Tire sells tires to both the auto manufacturers and the aftermarket. The plastics division claims to sell to 38 different end-use markets with the auto industry being by far the largest. The others include the following markets: furniture, wearing apparel, footwear, home furnishings and decorating, bookbinding, luggage, transportation, paper and paint manufacturing, marine products, mobile homes, construction, agricultural equipment and leisure-time activities. All four of the major automobile companies in the United States buy products from General Tire's plastics division.

<u>MARKET DATA</u>

Major markets: Automotive, truck, heavy equipment industries; construction, defense.

Major automotive products: Vinyl fabrics used in seats and interior trim; fiberglass-reinforced parts used in header panels, grilles, spoilers and hoods; polyurethane products for seats and padding and reaction-injection-molded parts; EPDM parts for front-end fascias.

FIGURE 12-2. MARKET DATA FOR GENERAL TIRE

### 12.2.2 Products

General Tire sells plastic products to the auto industry that are manufactured by two divisions, plastics and industrial products. The major product areas manufactured include:

- Vinyl fabrics
- Fiberglass-reinforced plastics
- Urethane products
- EPDM (ethylene propylene diene monomer) parts

*Vinyl Fabrics*

According to the company, General Tire's Chemicals/ Plastics Division is the world's largest manufacturer of supported and unsupported vinyl fabric materials. Each day the company produces hundreds of thousands of yards of vinyl materials. Much of the material is used in cars, trucks and buses for upholstery, door panels, heel kick pads, headlining, sun visor coverings, trunk linings, bindings, armrests, headrests and Landau tops. The vinyl is also used in recreational vehicles and mobile homes for flooring, camper tops, roofing, upholstery, headlining and trim items.

*Fiberglass-Reinforced Plastics (FRP)*

General Tire claims to be the largest supplier of FRP parts for the automotive industry. The company stresses the parts' lighter weight, comparable strength and, in some cases, lower cost when compared with metal components. FRP parts currently in production include most of the body parts for the Corvette, utility vehicle roofs, header panels, grille opening panels, rear spoilers, hoods, rear air deflectors, fender skirts, side rails and taillight assemblies.

The GTR Reinforced Plastics Company also has the capability to produce such parts as instrument panel components, air conditioner housings, lamp covers, bumper closures, inner wheel skirts, reinforcing strips, fender panels, dash panels, underbody panels, interior garnish moldings, door sill panels, armrest foundations, window frame assemblies, trim panels, lamp bases, headlight and taillight extensions, battery jars, engine shrouds and face panels.

The company also manufactures FRP hoods and fenders for heavy-duty trucks.

*Urethane Products*

Urethane products include conventional, filled and high resiliency types of foam with varying degrees of density and firmness. The foam is used for custom molded seating and protective cushioning. General Tire also can make reaction-injection-molded rigid urethane products since the addition of the necessary equipment at its plant in Ada, Oklahoma.

*EPDM Products*

General Tire also makes front-end fascias out of EPDM (ethylene propylene diene monomer) at its Ada, Oklahoma, plant. These fascia include grilles and headlight frames.

### 12.2.3 Market Strategy

General Tire presently sees the automotive fiberglass-reinforced plastic market as a prime area for market growth. This is especially important since the tire industry has been declining in recent years due to the introduction of radials. Anticipating a demand for durable, lightweight materials, the Chemical/Plastics Division formed the new company, GTR Reinforced Plastics Company, in 1978. The company was formed to help strengthen General's position as a major producer of FRP parts, and to enable the company to more efficiently serve its customers and their increasing product requirements. In addition, the company is making the necessary capital expenditures to provide a broad capability in FRP molding.

General Tire has also formed a new company in its Industrial Products Division to promote plastics: the GT Diversified Plastics Products Company. This company now controls three plants and separates the plastics business from the rubber business in the Industrial Products Division.

## 12.3 PRODUCTION AND OPERATIONS

The Chemical/Plastics Division has 20 facilities, many of which serve the auto industry. The fiberglass company operates two plants, one in Ionia, Michigan, and one in Marion, Indiana. Vinyl fabric is made in Toledo, Ohio; Columbus, Mississippi; and Lawrence and Reading, Massachusetts. Polyurethane is processed in Marion, Indiana; Newnan, Georgia; and Orange, California. Reaction-injection-molded urethane and EPDM parts are made in Ada, Oklahoma.

### 12.3.1 Major Automotive Facilities

The most important plants that serve the auto industry are described below with more information in Figures 12-3 to 12-8.

*Ionia and Marion Plants*

These two plants make fiberglass-reinforced parts for the auto industry. Together, the two facilities have more

Company GTR Chemical/ Plastics Division | County Ionia | Plant Size 1 million sq. ft.

Plant Ionia | Congressional District

Address P.O. Box 510, Ionia, MI 48846 | Standard Metropolitan Statistical Area Lansing | No. of Employees 1,500

Telephone (616) 527-1000 | Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Truck and car parts<br>Front body parts<br>Fiberglass-reinforced parts<br>Fascias | N.C.A. | Hydraulic presses<br>Compression molding | GM |

FIGURE 12-3. IONIA PLANT

Company GTR Chemical/ Plastics Division

County Grant

Plant Size

Plant Marion

Congressional District

Address 1700 Factory Ave. Marion, IN 46952

Standard Metropolitan Statistical Area None

No. of Employees 1,000

Telephone (317) 662-2511

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Fiberglass-reinforced parts<br><br>Exterior body panels | N.C.A. | Hydraulic presses<br><br>Compression molding | GM N.C.A. |

FIGURE 12-4. MARION PLANT

Company GTR Chemical/ Plastics Division

County Lucas

Plant Size

Plant Toledo

Congressional District

Address 3729 Twining Street Toledo, Ohio 43608

Standard Metropolitan Statistical Area Toledo

No. of Employees 800

Telephone (419) 729-3731

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Vinyl seatcovers<br>Door panels<br>Carpet bindings | Consumption:<br>20 million to 30 million pounds of resin per year. | Calendering (PVC) | N.C.A. |

FIGURE 12-5. TOLEDO PLANT

Company GTR Chemical/ Plastics Division

County Essex

Plant Size

Plant Lawrence

Congressional District

Address 70 General Road, Lawrence, MA 01842

Standard Metropolitan Statistical Area Boston

No. of Employees 300

Telephone (617) 683-7121

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Vinyl Fabrics | N.C.A. | Calendering (PVC) | N.C.A. |

FIGURE 12-6. LAWRENCE PLANT

Company General Tire & Rubber Coated Fabric Co.

County Middlesex

Plant Size

Plant Reading

Congressional District

Address One General Street
Reading, MA 01867

Standard Metropolitan Statistical Area Boston, MA

No. of Employees

Telephone (617) 944-1540

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Vinyl coated fabrics | N.C.A. | Calendering (PVC) | N.C.A. |

FIGURE 12-7. READING PLANT

Company GT Diversified Plastic Products Company

County ______

Plant Size ______

Plant Ada

Congressional District ______

Address P.O. Box 1484
Ada, OK 74820

Standard Metropolitan Statistical Area ______

No. of Employees ______

Telephone (405) 436-0571

Primary SIC Code(s) ______

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| EPDM fascia front-end parts<br>Polyurethane front-end parts | More than 100 million pounds of resins consumed per year. | Reaction injection molding<br>Injection molding<br>Extrusion | N.C.A. |

FIGURE 12-8. ADA PLANT

than 70 modern hydraulic presses ranging in capacity from 50 tons to the world's largest compression molding press, a 4,000-ton model at the Ionia plant. This tremendous press is used to make large hood and fender units for trucks. Other products at the two plants include Corvette body parts, front fascias for many models, rear spoilers, hoods, grilles and roof assemblies.

The Ionia plant is in Ionia, Michigan, and makes the larger front body fiberglass parts and fascias for automobiles and trucks. The plant contains over a million square feet and employs 1,500 people.

The Marion, Indiana, plant makes automotive exterior body panels and grilles. Approximately 1,000 people work at the facility. Flexible polyurethane foam is also made at this facility. Capabilities include the manufacture of custom-molded automotive seat cushions and backs and both bench and bucket seat configurations can be made.

*Toledo, Lawrence and Reading Plants*

These plants make hundreds of thousands of yards of vinyl materials each day for the auto industry. They use batteries of "calenders"* which produce wide rolls of vinyl fabric. General Tire has a total of 12 calenders at its plants (including the one at Columbus, Mississippi). Each calender is supplemented with a full complement of embossing, printing and laminating equipment, and every yard of vinyl is given a close visual inspection before shipment to automakers.

The Toledo, Ohio, plant makes vinyl seatcovers, door panels, and carpet bindings and employs 800 people. The plant consumes between 20 million and 30 million pounds of resin per year. The Reading and Lawrence plants are both in Massachusetts. The Reading plant employs 300 people.

*Ada Plant*

The Ada plant is a large injection molding facility that processes over 100 million pounds of resins each year. Major plastics include polyurethane and polyvinyl chloride. The plant is part of the new GT Diversified Plastic Products Company under the Industrial Products Division.

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* The calendering process applies vinyl to a backing by passing the plastic through large revolving rollers.

The Ada plant was specifically designed and equipped to manufacture injection-molded and extruded rubber and plastic parts for the automotive industry and to paint the finished components.

The plant has molding presses ranging from 1,500 to 2,500 tons, capable of producing both EPDM and thermoplastic automobile front and rear end fascias and exterior panels. The plant has the capability to produce large precision parts 90 inches in length and weighing 27 pounds in a single injection cycle. The Ada facility also has the capability to produce urethane parts by reaction injection molding.

The Ada facility also includes a large electrostatic painting system for the priming and finish coating of elastomeric automotive parts and assemblies.

### 12.3.2 New Plants and Expansions

Current General Tire plant expansions and new plant starts are discussed below:

- The Reinforced Plastics Company has spent $2.7 million for expansion and new equipment at the Ionia Plant. This will enable the company to meet requirements of a new contract with a major manufacturer of heavy-duty trucks for production of FRP hood and fender units.

- GTR Foam Products Company has opened a new fabricating plant in Conover, North Carolina.

- A new million-dollar development center has been opened by GTR Coated Fabrics Company at its headquarters in Toledo, Ohio. The center is a 40,000 square foot facility adjacent to the existing Toledo plant and houses the firm's advanced development group, comprised of chemists, engineers and technicians. The center investigates new products and manufacturing techniques and supplements technical and development programs at each of the company's four manufacturing facilities.

- In late December 1978, General Tire announced a program to build a new $100 million truck tire facility to replace the existing Akron, Ohio, plant. Building the factory was contingent upon the approval by the employees' union of the elimination of many restrictive work rules. General said that otherwise the Akron plant could not be competitive with other tire facilities. In spring 1979 the company and the union (United Rubber Workers Local 9) came to a pathbreaking agreement eliminating the work rules. This will likely lead to the construction of the new tire facility in two years and save 2,000 jobs.

## 12.4 FINANCIAL ANALYSIS

General Tire has had large increases in sales in recent years, but operating margins have fallen.

### 12.4.1 Operations

General Tire has had some success in increasing its earnings through diversification. Tires and related products account for 44 percent of sales and only 35 percent of earnings. In addition, RKO General accounts for 27 percent of total income. Tire income was down both in 1977 and 1978. Aerojet-General and Industrial Products were steady in those years, while plastic products showed some gains. (See Figure 12-9.)

In 1979, the company had a sales increase of 4 percent but an earnings decline of about 29 percent. Profits were hurt by a cost-price squeeze in the tire and in the engineering and construction businesses, plant start-up expenses, and a lower contribution from plastic products. One analyst has suggested a turnaround but not till the second half of 1980. The loss of television licenses by RKO could significantly hurt operating results in the future.

### 12.4.2 Capital Analysis

General Tire had the greatest capital outlays of the last six years in 1974 and 1979. Expenditures have been around 4.5 to 7 percent of sales. (See Figure 12-10.) The company's

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | $\frac{\text{Operating Income*}}{\text{Sales}}$ Percent |
|---|---|---|---|---|
| 79 | 2295 | 82 | 8.4 | 6.7 |
| 78 | 2199 | 116 | 12.7 | 9.6 |
| 77 | 2110 | 116 | 14.1 | 11.3 |
| 76 | 2033 | 105 | 14.2 | 11.1 |
| 75 | 1752 | 62 | 9.1 | 8.9 |
| 74 | 1726 | 78 | 12.3 | 11.2 |

| Year | $\frac{\text{Earnings}}{\text{Total Assets}}$ Percent | $\frac{\text{Sales}}{\text{Assets}}$ | $\frac{\text{Earnings}}{\text{Sales}}$ Percent |
|---|---|---|---|
| 79 | 4.7 | 1.31 | 3.6 |
| 78 | 7.0 | 1.32 | 5.3 |
| 77 | 7.4 | 1.35 | 5.5 |
| 76 | 7.1 | 1.37 | 5.2 |
| 75 | 4.3 | 1.19 | 3.6 |
| 74 | 5.8 | 1.28 | 4.5 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 12-9. OPERATING ANALYSIS OF GENERAL TIRE

| Year | Sales | P/E Ratio[1] | Sources: Earnings | Sources: Depreciation | Sources: Changes in Long-Term Debt | Sources: Changes in Owners' Equity Other Than Retained Earnings |
|---|---|---|---|---|---|---|
| 79 | 2295 | 6.6 | 82 | 67.3 | 3 | (0.8) |
| 78 | 2199 | 5.3 | 116 | 61.5 | (33) | (2) |
| 77 | 2110 | 5.0 | 116 | 56.4 | (29) | (1) |
| 76 | 2023 | 4.2 | 105 | 53.6 | (31) | (6) |
| 75 | 1752 | 5.0 | 62 | 49.2 | 13 | 1 |
| 74 | 1726 | 3.8 | 78 | 43.3 | 48 | 0 |

| Year | Change in Working Capital | Uses: Capital Expenditures | Uses: Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ % | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ % | Current Ratio |
|---|---|---|---|---|---|---|---|
| 79 | (24) | 121 | 35 | 19.7 | 5.4 | 6.9 | 2.0 |
| 78 | 5.7 | 87 | 30 | 20.3 | 7.7 | 5.1 | 2.2 |
| 77 | 35 | 69 | 27 | 24.3 | 8.2 | 4.3 | 2.4 |
| 76 | 36 | 73 | 24 | 28.2 | 6.9 | 4.7 | 2.2 |
| 75 | 36 | 65 | 24 | 32.5 | 4.5 | 4.6 | 2.3 |
| 74 | 59 | 109 | 23 | 33.2 | 4.5 | 7.3 | 1.8 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 12-10. CAPITAL ANALYSIS OF GENERAL TIRE cash flow has been more than adequate to cover this and thus long-term debt has been reduced over the last four years. As a result, the company's debt to capitalization ratio has fallen from 33.2 percent in 1974 to 19.7 percent in 1979. However, due to fluctuating operating revenues, General Tire's coverage ratio has not increased substantially. Capital expenditures for tire products have decreased from $60.4 million (58 percent of total capital expenditures) in 1974 to $29.4 million (about one-third of total capital expenditures) to $29.4 million (about one-third of total capital expenditures) in 1978. Expenditures in plastics and other General Tire businesses have remained relatively constant, with some increases in expenditures for the Aerojet-General segment of the business.

## 12.5 RESEARCH AND DEVELOPMENT

General Tire has a Corporate Research Division with primary responsibilities for product and process innovation, quality improvement and cost reduction. The plastics work includes polymer and analytical chemistry polymer processing and surface chemistry. The Research Division also assists the operating divisions in complying with governmental regulations including OSHA and EPA rules. Current research of particular interest includes the following:

- The development of new, lightweight upholstery and trim materials for the automotive industry. In order to lighten vehicles, the automotive manufacturers are not overlooking anything. This is one of the most urgent R&D projects of GTR coated fabrics.

- The development of improved highway vehicle tires used in the earthmoving field. Caterpillar Tractor Company and General Tire have entered into an agreement to work together on this project. The tire concept, originating at Caterpillar, is based on a new carcass configuration. The cross section of conventional tires is horseshoe shaped with the plies anchored individually into two bead sections. The cross section of the Caterpillar tire is oval with the radial reinforcement wrapped around the tire. The tire is supposed to reduce rolling resistance, have better control in the event of sudden air loss, and be adaptable to a wide range of vehicle loads.

## 12.6 LABOR RELATIONS

The new contract agreement between General Tire and the United Rubber Workers Local 9 in Akron is very significant. Management succeeded in obtaining numerous concessions from the union. The contract was praised by both union and company officials and Nater Trachsel, President of Local 9 said, "Our relationship with General Tire has always been an amicable one. This is just another step in proving we are desirous of working together toward a common goal."

Major provisions of the new contract provide for:

- A seven-day operation utilizing a weekend work crew concept if a new facility is built in the Akron area.
- A temporary layoff procedure whereby disruption to the plant is minimized.
- A revised rate structure reinstituting the incentive system. Wage differentials based upon skill levels are increased, thereby providing a greater incentive to perform more difficult jobs. Wage allowances have been adjusted, thereby creating an incentive to improve productivity. In addition, a wage reduction of 36¢ per hour over the next nine months was agreed upon.
- A more flexible utilization of craft personnel by reducing craft classifications.
- The removal of other restrictive practices in the plant as regards scheduling, utilization of employees and application of rates.

## 12.7 GOVERNMENT RELATIONS

General Tire is currently having difficulty with its subsidiary, RKO General. Licenses to operate three of RKO General's television stations are subject to comparative renewal proceedings before the Federal Communications Commission. An initial decision by the FCC in 1974 to renew RKO's license for WNAC-TV in Boston has been appealed to the FCC by two competing applicants for the Boston station. The character of RKO is being challenged based on a Securities and Exchange Commission complaint against General Tire. The complaint alleges that the company used corporate funds for political contributions, maintained unrecorded or secret funds, and used agents or consultants to bribe foreign government officials. Initial indications from the FCC have not been too favorable toward RKO. Loss of TV licenses would significantly harm the company.

In the meantime RKO has agreed to sell WNAC-TV to the appellants for $54 million, but this is subject to FCC approval of RKO's license. Also, General is trying to make RKO a separate, independent company, but this is being held up by the current controversies.

# 13. DAVIDSON RUBBER DIVISION OF EX-CELL-O CORPORATION

A well-established manufacturer of machine tools and other industrial equipment, jet engine components, and armored vehicle components, Ex-Cell-O merged with McCord Corporation in 1978, thereby greatly diversifying its operations into the automotive supply community.

Davidson Rubber Division of McCord is Ex-Cell-O's largest automotive products division. Davidson is a major supplier of flexible urethane automotive bumpers, soft front and rear fascias, padded instrument panels and arm-rests, headrests, and other flexible interior trim parts. Davidson, it should be noted, is a fabricator, not a supplier of raw materials.

## 13.1 CORPORATE SIZE AND STRUCTURE

Compared to some of the suppliers of basic plastics, Ex-Cell-O's annual sales of less than $1 billion make it a relatively small corporation. The addition of McCord's income to Ex-Cell-O's significantly increased Ex-Cell-O's income, as well as broadened its markets significantly.

### 13.1.1 Revenues, Profits and Employment

Ex-Cell-O's revenue in 1979 was $962 million, up from $730 million in 1978. Net profit was $54 million, up from 1978's $39 million. Ex-Cell-O's average employment was about 14,200 in 1978. (See Table 13-1.)

TABLE 13-1. EX-CELL-O CORPORATION REVENUE, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $962.0 | $54.2 |
| 1978 | $729.8 | $39.4 |
| Average Number of Employees: 14,200 (1978) | | |

Sales in 1978 for the Davidson Rubber Division of McCord were $188 million, and profits were $17.5 million. Ex-Cell-O's Automotive Components segment, of which Davidson Rubber is a division, accounted for about one-quarter of sales and operating profits of the corporation in 1978. (See Table 13-2.)

TABLE 13-2. DAVIDSON RUBBER DIVISION REVENUES, PROFITS AND EMPLOYMENT

| Revenues (000) | Profits (000) |
|---|---|
| 1977: (was part of McCord Corp.)<br>1978: $187,214 | 1977: (was part of McCord Corp.)<br>1978: $17,546 |
| Total Number of Employees: 3,400 | |

### 13.1.2 Corporate Organization

Until 1978 Ex-Cell-O Corporation's products were separated into three major categories, plus a potpourri of other products under a "general" umbrella.

- Industrial Equipment—Metal-cutting and forming equipment and tools, and packaging and materials handling equipment
- Aerospace—Jet engine blades and components, and fuel metering devices
- Ordnance—Armored vehicles and turret and gun-control devices
- Other Products—Precision metal and plastic parts, computer peripherals, contractors' tools and farm equipment.

The 1978 merger with the McCord Corporation, supplier of a wide range of products to passenger car, truck and other vehicle manufacturers, added a fourth major division. (See Figure 13-1.)

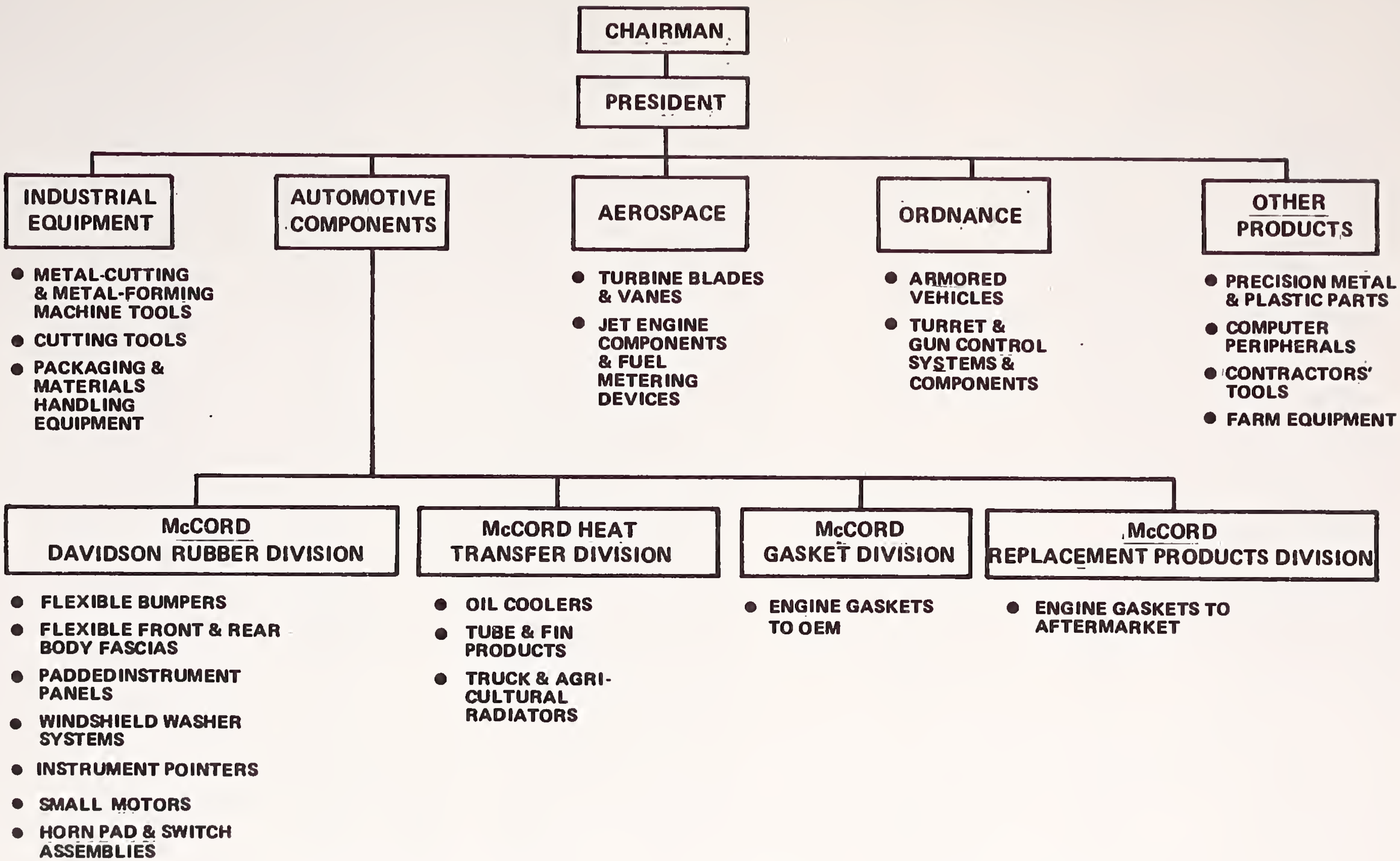


FIGURE 13-1. EX-CELL-O CORPORATION CORPORATE ORGANIZATION

The merger of McCord Corporation with Ex-Cell-O was completed by the end of fiscal 1978. Following this merger, duplicate physical facilities were eliminated and staff functions were combined. Also, a comprehensive strategic business planning system was developed to coordinate the commitments of 19 division management teams with those of corporate management. One result of this effort was the establishment of long-range financial performance objectives which formed the basis of a new management incentive compensation program. Among Ex-Cell-O management objectives is that of achieving sustainable growth averaging at least 10 to 12 percent annually.

## 13.2 MAJOR MARKETS AND PRODUCTS

Figure 13-2 presents the major market information for McCord's Davidson Rubber Division.

### 13.2.1 Major Markets

The major orientation of the Davidson Rubber Division is to the automotive market, where urethane bumpers and fascias, and substantial portions of front ends made of urethane have been replacing steel systems in recent years. In 1977, 6 percent of domestic automotive front ends were soft; in 1978, 12 percent; in 1979, 18 percent; in 1980, 24 percent. Accordingly, Davidson management predicts more than 33 percent of 1981 cars will feature soft front-end systems and that this will increase to 50 percent in five years. More than 75 percent of Davidson's total sales are automotive.

### 13.2.2 Products

Major automotive products include urethane soft bumpers, reaction-injection-molded urethane front and rear fascias, padded instrument panels and armrests, and interior and exterior trim.

Davidson will supply 45 percent of all soft bumpers used in 1980 model cars, with the car companies manufacturing about 42 percent. Davidson's share will amount to about $65 million worth of business, and includes soft bumpers on such cars as Ford's Thunderbird and Mustang; GM's Pontiac Firebird, Chevrolet Camaro and Pontiac Phoenix; and Chrysler's Omni/Horizon.

MARKET DATA

| | |
|---|---|
| Major Markets: | Flexible urethane automotive parts used for reducing weight and impact damage, resisting corrosion, and boosting decorative appearance and safety. |
| Supplies to: | GM, Ford, Chrysler. |

Percent of Sales to Automotive: Approximately 75 percent.

Major Automotive Products: Urethane, soft bumpers, front and rear fascias, padded instrument panels and armrests, interior and exterior trim, and station wagon side rails.

FIGURE 13-2. DAVIDSON RUBBER DIVISION MARKET DATA

### 13.2.3 Marketing Strategies

Overall corporate strategy, as well as Davidson's individual strategy, is oriented around making the most of the push to make Detroit's automobiles smaller and lighter. Assuming that downsizing has a tendency to reduce each make's appearance of individuality, the automakers will seek to achieve distinction through interior and exterior trim style. Davidson is touting its proprietary vinyl plastisol techniques as applicable to producing stylized instrument panels. On the outside of the car, the relatively low-cost tooling associated with Davidson's urethane technology (compared with tooling for steel) would give the stylist greater freedom of design and help him introduce frequent face lifts. In support of this latter concept, Davidson management cite the case of the 1979 Firebird, which is basically a ten-year-old car, they say; but for each of the past seven years it has been sold as a new car because of the completely redesigned soft front end made by Davidson. Presently, Davidson supplies an average of $14.50 on every car built in North America. Davidson expects their growth to continue, increasing on the average to over $30 per car within the next few years.

An important part of Ex-Cell-O's overall corporate strategy for growth has been to create proprietary products or processes to provide a competitive edge and a defensive market position for extended periods. This has been done by concentrating on products that can be made using their specialized technologies and on markets that are already familiar.

Ex-Cell-O's efforts to broaden the corporation's product mix beyond its traditional markets were made—largely through McCord—in hope of minimizing the effect of future business cycles. The principal customers of the automotive components segment also manufacture some of the products supplied to them by this segment, and these customers may at any time decide to satisfy all or a large portion of their requirements for such products from their own facilities.

## 13.3 PRODUCTION AND OPERATIONS

Davidson Rubber Division operates four plants: Dover and Farmington, New Hampshire; Americus, Georgia; and Port Hope, Ontario, Canada.

### 13.3.1 Major Automotive Facilities

All the plants are involved in the production of high technology plastics parts for the automotive community. These plants together employ some 3,400 people and process 60 to 70 million pounds of polyurethane per year. (See Figures 13-3 to 13-6.)

*Dover, New Hampshire*

Davidson's Dover facilities occupy 200,000 square feet, employ a work force of 800, and supply Ford, General Motors and Chrysler with armrests, headrests and exterior side rails.

*Farmington, New Hampshire*

The Farmington plant, with a work force of 1,200, is spread over 220,000 square feet. Farmington's major automotive products (also supplied to Ford, General Motors and Chrysler) are polyurethane soft bumpers and padded dashboards.

Company Davidson

County Strafford

Plant Size 200,000 sq. ft.

Plant Dover, NH

Congressional District

Address Industrial Park
Dover, NH 03820

Standard Metropolitan Statistical Area

No. of Employees 800

Telephone (603) 742-0721

Primary SIC Code(s) 3069

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Armrests,<br>headrests,<br>exterior side-rails | Entire division:<br>60-70 million lbs. | Molding<br>Extrusion | Chrysler<br>Ford<br>GM |

FIGURE 13-3. DOVER PLANT

Company Davidson

County Strafford

Plant Size 220,000 sq. ft.

Plant Farmington, NH

Congressional District

Address Route 11
Farmington, NH
03835

Standard Metropolitan Statistical Area

No. of Employees 1,200

Telephone (603) 755-3521

Primary SIC Code(s) 3069

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polyurethane soft bumpers and padded dashboards | N.C.A. | Reaction injection molding | Chrysler<br>Ford<br>GM<br>: |

FIGURE 13-4. FARMINGTON PLANT

Company Davidson

County Sumter

Plant Size 200,000 sq. ft.

Plant Americus, Georgia

Congressional District

Address Brady Road
Americus, GA
31709

Standard Metropolitan Statistical Area

No. of Employees 1,000

Telephone (912) 924-6111

Primary SIC Code(s) 3069

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polyurethane soft bumpers and flexible fascias | N.C.A. | Reaction injection molding | Chrysler<br>Ford<br>GM |

FIGURE 13-5. AMERICUS PLANT

Company Davidson

County

Plant Size 110,000 sq. ft.

Plant Port Hope, Ont.

Congressional District

Address 128 Peter Street
Port Hope, Ont.
L1A31414

Standard Metropolitan Statistical Area

No. of Employees 400

Telephone (416) 885-6317

Primary SIC Code(s) 3069

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polyurethane arm rests, flexible fascias, and padded instrument panels | N.C.A. | Injection molding<br>Slush molding | GM<br>Chrysler<br>Ford<br>Volkswagen, USA |

FIGURE 13-6. PORT HOPE PLANT

*Americus, Georgia*

Davidson's Americus plant, located on 200,000 square feet, has 1,000 employees and produces soft polyurethane bumpers and reaction-injection-molded (RIM) flexible fascias for General Motors, Ford and Chrysler.

*Port Hope, Ontario*

Davidson's Canadian plant produces polyurethane armrests, flexible reaction-injection-molded fascias, and padded instrument panels. The facilities occupy 110,000 square feet and employ a work force of 400.

### 13.3.2 New Plants and Expansions

To meet the growing demand for flexible fascias, a new reaction-injection-molding line and a new paint line were installed at the Americus, Georgia, plant in 1978.

The Port Hope, Ontario, facility broke ground in 1978 for a major plant expansion to fill substantial order backlogs for plastic parts for the new VW production plant in New Stanton, Pennsylvania. Using its slush molding know-how, new padded instrument panels were designed and developed for Chrysler's downsized 1979 line and for the restyled 1979 GM Toronado. Capital expenditure figures specifically for the Davidson Rubber Division are not available for 1979. For the Ex-Cell-O Corporation as a whole, capital expenditures totaled $41.9 million in fiscal 1979, up $13.8 million from those of 1978.

## 13.4 FINANCIAL ANALYSIS

Ex-Cell-O as a whole did quite well in 1979.

### 13.4.1 Operations

Ex-Cell-O has had strong sales and increasing margins in all of the last five years. The company experienced steady growth in earnings despite the changes in the general economy (see Figure 13-7). Starting in 1971 the company made

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity; Percent | Operating Income* / Sales Percent |
|---|---|---|---|---|
| 79 | 962 | 54.2 | 16.2 | 11.7 |
| 78** | 730 | 39.4 | 12.8 | 12.6 |
| 77 | 447 | 29.1 | 12.7 | 13.0 |
| 76 | 416 | 25.5 | 12.0 | 12.4 |
| 75 | 424 | 20.0 | 10.1 | 10.1 |
| 74 | 387 | 18.8 | 10.1 | 11.3 |

| Year | Earnings / Total Assets Percent | Sales / Assets | Earnings / Sales Percent |
|---|---|---|---|
| 79 | 9.3 | 1.66 | 5.6 |
| 78 | 7.9 | 1.47 | 5.4 |
| 77 | 8.3 | 1.28 | 6.5 |
| 76 | 7.9 | 1.30 | 6.1 |
| 75 | 6.4 | 1.37 | 4.7 |
| 74 | 6.4 | 1.28 | 4.9 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

** Reflects merger

FIGURE 13-7. OPERATING ANALYSIS OF EX-CELL-O some intensive efforts to increase profitability such as replacing old plants with new, more efficient facilities, improving operating procedures, and introducing new products. These changes, along with heavy orders and expansion, have resulted in constant earnings growth for the company.

During 1978 Ex-Cell-O's incoming orders reached an all-time high and far exceeded annual shipments. Davidson Rubber's flexible bumpers and exterior body fascias were produced in record numbers in 1978 due to higher market penetration and overall market growth.

In 1979 earnings were up 38 percent and sales increased by 32 percent. Lower car production is not likely to affect Davidson as much as other automotive suppliers since the company continues to increase its production of components previously made of steel.

### 13.4.2 Capital Analysis

Ex-Cell-O has been funding its capital expenditures from internally generated funds. Changes in long-term debt and common stock in 1978 reflect the merger of Ex-Cell-O with McCord Corporation (see Figure 13-8).

Ex-Cell-O has a conservative debt to capitalization ratio of 14.4 even with the increased debt in 1978. Capital expenditures were down $3 million in 1978. Expenditures for plant and equipment were actually up 60 percent, but expenditures for packaging machines were down 75 percent as a result of a decision to phase out existing models. In 1979 capital expenditures were up to 42 million dollars.

Ex-Cell-O's cash flow seems adequate to cover near-term capital expenditures, and its financial position would make it relatively easy for the company to borrow money.

## 13.5 RESEARCH AND DEVELOPMENT

Davidson relies heavily on a forward thinking research and development program to keep its automotive products innovative and low-cost by utilizing efficient production techniques. Davidson's R&D work includes programs to improve production techniques for urethane materials suitable for

| | | | Sources | | | |
|---|---|---|---|---|---|---|
| Year | Sales | P/E Ratio[1] | Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings |
| 79 | 962 | 6.2 | 54.2 | 27.5 | 10 | 2.7 |
| 78 | 730 | 6.9 | 39.4 | 27.6 | 33 | 51.0 |
| 77 | 447 | 7.2 | 29.1 | 15.6 | (1) | (0.5) |
| 76 | 416 | 6.5 | 25.5 | 14.6 | (1) | 0.2 |
| 75 | 424 | 5.4 | 20 | 14.5 | (2) | (1.0) |
| 74 | 387 | 6 | 18.8 | 15.2 | (3) | (4.3) |

| | | Uses | | | | | |
|---|---|---|---|---|---|---|---|
| Year | Change in Working Capital | Capital Expenditures | Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ % | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ % | Current Ratio |
| 79 | 29 | 41.9 | 17.9 | 14.4 | 19.6 | 9.3 | 2.3 |
| 78 | 58.0 | 28.1 | 14.6 | 13.6 | 19.6 | 5.3 | 2.4 |
| 77 | (10.0) | 31.3 | 10.5 | 7 | 30 | 8.6 | 2.7 |
| 76 | 16.7 | 21.1 | 8.7 | 7.8 | 25 | 6.3 | 3.1 |
| 75 | 14.0 | 18.6 | 8 | 9 | 11.4 | 6 | 3 |
| 74 | 5.3 | 23.3 | 7.5 | 10.2 | 14.6 | 7.4 | 2.4 |

Dollar figures are in millions

[1]Average for the Year

[2]Capitalization Defined as Total Liabilities – Current Liabilities

[3]Operating Profit/Interest

FIGURE 13-8. CAPITAL ANALYSIS OF EX-CELL-O larger automotive exterior body components such as doors, decklids and fenders. Davidson reports continued progress on the development of its "Davibrite," a urethane finish Davidson hopes will offer the appearance of chrome and the flexibility and durability of urethane. Success in this ambitious program would accelerate the growth in the demand for flexible exterior parts because it would allow the auto stylist virtually unlimited choice of color and finish, Davidson feels.

## 13.6 GOVERNMENT AND LABOR RELATIONS

Eight labor agreements covering about 1,700 employees were reached during 1978. By the end of 1979, labor agreements were concluded covering some 1,650 employees, without serious work interruption. Ex-Cell-O Corporation has already notified the President of its agreement to comply with the Government's voluntary program of wage-price guidelines to fight inflation, which it considers as the nation's single most serious economic problem. Ex-Cell-O's divisional programs bearing on labor relations, employee safety and environmental conservation reside under the leadership of a corporate staff executive with the title of assistant vice president for Human Resources.

# 14. THE GLASS AND FIBERGLASS INDUSTRY

The glass industry is usually divided into at least two sections: flat glass, which is used in mirrors and windows; and glass bottles and decorative glass, used for packaging and decoration. The automotive industry is not important in the latter market, but extremely important in the flat glass market. Automobiles consume nearly 30 percent of domestic flat glass production and have a tremendous influence on the business of their major suppliers.

Fiberglass is a relatively new product, first produced on a large scale about 40 years ago. It is basically glass drawn into tiny, hairlike fibers. The major uses of fiberglass are for textile products, thermal insulation and reinforcements. In the automobile, fiberglass is used as reinforcing material usually for thermosetting polyester resin, the combination called fiberglass-reinforced plastic or FRP. Major fiberglass companies also produce polyester resin and they use the two products to market FRP materials under such names as sheet molding compound (SMC). Automobiles presently consume approximately 10 percent of U.S. fiberglass production.

## 14.1 THE GLASSMAKING PROCESS

Glass is basically the result of fusing together, under great heat, silica sand, soda ash, limestone, salt cake, and certain other ingredients. As shown in Figure 14-1, three basic steps are involved in manufacturing finished glass products:

- Mining—This step involves extracting from the earth those raw materials needed to make glass. In most cases, the nation's glass makers obtain their sand, soda, ash, limestone, dolomite and salt cake from outside suppliers, who normally ship these materials to the glass makers' manufacturing plants.

- Processing (Glassmaking)—This step involves converting the raw materials, plus scrap, into the primary product, which is either flat glass or glass fiber.

- <u>Fabricating</u>—This step involves converting the primary product into various finished configurations such as laminated safety glass, industrial and residential window glass, and glass fibers in finished form or woven into insulation batting.

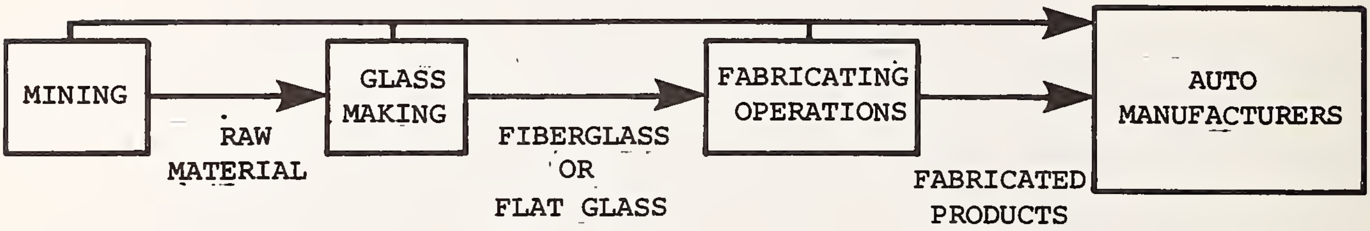


FIGURE 14-1. STEPS IN GLASSMAKING

The following two sections describe the methods used to process (manufacture) flat glass and fiberglass.

### 14.1.1 <u>Manufacturing Flat Glass</u>

Today, flat glass manufacture is highly mechanized and automated, and far from the laborious, time-consuming and expensive glassmaking processes that prevailed until modern manufacturing procedures began to be utilized around 1920.

*Sheet and Plate Glass Process*

Around 1920, processes were developed to mix the molten glassmaking materials in a giant furnace, then pull the mixture along a series of rollers to produce glass. This process vastly improved the consistency and quality of glass produced, reduced the cost dramatically, and prevailed for more than 30 years. The product that resulted from this manufacturing process, called <u>sheet glass</u>, was clear and smooth, but the surface was not perfectly level. Thus, sheet glass was useful for windows but the product could not be used for good mirrors or display cases where a high quality surface was mandatory. High quality glass, called <u>plate glass</u>, was made by taking sheet glass and putting it through a lengthy and expensive grinding process that yielded a polished, level surface. Plate glass was expensive and used only where clarity was essential.

*Float Glass Process*

Approximately two decades ago, the float glass process was perfected and quickly began replacing the sheet-rolled glassmaking process throughout the industry. Today the float glass process is used for making almost all automotive glass. Instead of rolling the molten glass, which resulted in the need for extensive grinding and polishing to produce a bright, clear surface, the float process feeds molten glass onto the top of a bath of molten tin. Controlled heating permits the glass to flow to form a flat ribbon of uniformly thick glass. Near the end of the bath, the glass is slowly cooled or annealed. Because glass becomes stiff enough to be transported onto rollers at a temperature above the melting point of tin, the glass can be fed off the still-molten tin in a continuous sheet. The thickness of the glass is controlled by changing the speed at which the ribbon of glass is moved into the annealing "lehr" (cooling area). The glass that comes off the line in this process requires no grinding or polishing. Thus, float glass has the quality of plate glass at much less cost.

### 14.1.2 Manufacturing Fiberglass

To make fiberglass, the basic ingredients for making glass are mixed and melted at a high temperature. Fine, precisely controlled filaments are drawn rapidly from streams of molten glass. These filaments may be sized and then wound on packages for further fabrication.

There are two basic forms of glass fiber:

- Continuous filament fiberglass, which is composed of very long, continuous fibers drawn from molten glass at speeds in excess of two miles per minute

- Staple filament fiberglass, which is an individual fiber 8 to 15 inches long. It is formed by jets of air which pull the glass filaments from the molten glass streams onto a revolving vacuum drum.

Both continuous filaments and staple filaments are wound into lengths of fiberglass called strands.

## SIZE AND STRUCTURE OF THE DOMESTIC FLAT GLASS AND FIBERGLASS INDUSTRY

The domestic flat glass and fiberglass industry is made up of less than 20 companies and dominated by three—PPG, Libbey-Owens-Ford (LOF), and Owens-Corning.

### 14.1.3 Size of the Industry

The domestic flat glass industry employed more than 24,500 workers in 1979, and recorded overall sales of $2.1 billion. The fiberglass segment of the industry employed an additional 25,000 and recorded sales of over $2.0 billion in 1978.

### 14.1.4 Industry Structure

In general, glass and fiberglass companies perform both glass manufacturing and glass fabrication, even though the facilities for the two processes are often separate. The companies, however, are not generally integrated into mining. The total glass industry is separated to a large extent in terms of glass product. Companies that make jars and glasses use a different manufacturing process than flat glass manufacturers and they usually do not make flat glass. The flat glass industry is also separate from the fiberglass industry, although in certain cases companies make both products.

*Flat Glass Segment*

More than 90 percent of all flat glass manufactured in this country is produced by six companies: PPG, Libbey-Owens-Ford; ASG Industries, Inc.; Ford Motor Company; Guardian Industries, Inc.; and Combustion Engineering Corporation. As shown in Table 14-1, PPG (formerly Pittsburgh Plate Glass) is the country's largest flat glass maker. Libbey-Owens-Ford is second largest, and Ford is third. Together these three companies account for about 81 percent of flat glass production.

As can be seen from the table, considerable changes in market share have been taking place in recent years. This has been largely due to the complete replacement of sheet and plate facilities with float glass plants. Since PPG introduced float glass into the United States in 1963 under a Pilkington license, the flat glass industry has rebuilt nearly its entire productive capacity. PPG's market share has declined from 41 percent in 1971 to 34 percent in 1978, whereas Ford's has risen from 13 percent to 19 percent as old plants were closed and expansion by smaller companies became possible.

TABLE 14-1. FLAT GLASS MARKET SHARES (PERCENTAGE BASED ON CAPACITY)

| Company | 1971 | 1973 | 1975 | 1977 | 1979E |
|---|---|---|---|---|---|
| PPG Industries | 41% | 38% | 36% | 34% | 34% |
| Libbey-Owens-Ford | 30 | 29 | 28 | 28 | 28 |
| Ford | 13 | 14 | 18 | 19 | 19 |
| Guardian Industries | 3 | 5 | 6 | 7 | 9 |
| ASG Industries | 8 | 8 | 6 | 6 | 5 |
| C-E Glass | 1 | 3 | 3 | 3 | 3 |
| Fourco | 4 | 3 | 3 | 3 | 3* |
| TOTAL | 100% | 100% | 100% | 100% | 100% |

* Includes operations sold in 1977.

Source: U.S. Glass, Metal & Glazing, January 1978.

*Fiberglass Segment*

The fiberglass segment of the industry operates nearly 100 plants and shipped approximately two billion pounds of glass fibers in 1978. This segment is dominated by one firm, Owens-Corning Fiberglas Corporation. Other major firms in this industry are PPG, Certainteed Corporation and Johns-Manville Corporation. Owens-Corning and PPG are the predominant suppliers of automotive fiberglass reinforcement. Owens-Corning is also the largest producer of fiberglass insulation, with Certainteed and Johns-Manville the other major producers of this product.

## 14.2 GLASS AND THE AUTOMOTIVE INDUSTRY

As shown in Table 14-2, automotive sales are highly important to domestic flat glass makers, accounting for approximately 30 percent of their total sales. Automotive applications consume approximately 10 percent of fiberglass sales, but this percentage is growing.

Libbey-Owens-Ford (LOF) is the largest automotive glass producer and PPG is the second largest. Typically, GM's business is divided 72 percent-28 percent between Libbey-Owens-Ford and PPG, respectively. Ford supplies much of its needs internally, and Chrysler obtains its raw glass requirements from PPG and LOF. Libbey-Owens-Ford currently supplies two-thirds of all glass consumed by General Motors—the firm formerly supplied all of GM's glass. Libbey-Owens-Ford is thus highly vulnerable to the uncertainties of GM's automotive production.

Detailed information is not available on the fiberglass industry. However, both PPG and Owens-Corning are known to be major suppliers of fiberglass for automotive products.

Principal automotive glass products are laminated safety glass, tempered safety glass and various fiberglass reinforcing products.

TABLE 14-2. ESTIMATED FLAT GLASS CONSUMPTION BY MARKET* (ESTIMATED FOR 1979)

| Market | Millions of Square Feet | Percent of Total |
|---|---|---|
| Cars | 640 | 20.0 |
| Trucks | 210 | 6.5 |
| Total Automotive | 850 | 26.5 |
| Automotive Replacement | 210 | 6.6 |
| Residential Construction | 1,250 | 39.1 |
| Nonresidential Construction | 410 | 12.8 |
| Other** | 480 | 15.0 |
| Total | 3,200 | 100.0 |

Source: U.S. Glass, Metal & Glazing, January, 1978.

* Excludes imports.
** Includes mirrors, industrial, export, manufactured inventories, etc.

### 14.2.1 Laminated Safety Glass

Laminated safety glass is used in automobile windshields. The product, introduced in the late twenties, is basically composed of two plies of float glass with a layer of plastic between them. Large "autoclaves," which operate much like massive pressure cookers, permanently bond the two plies of glass to the plastic interlayer. The interlayer conforms to the surfaces of the glass under heat and pressure, and becomes transparent in the process.

Various types of interlayer are currently in use, with highly penetration-resistant plastics in use throughout the industry for windshields. This gives the windshield greater "stretch" potential and reduces the chance of serious injury in accidents.

### 14.2.2 Tempered Safety Glass

Tempered glass is widely used for automotive side and back windows. The basic product is made by heating float glass until it is almost plastic and cooling it suddenly by subjecting the surfaces to jets of air. Both outer surfaces, cooling more rapidly, are in a state of compression while the inner portion of the glass is in tension. This makes the glass three to five times as strong as regular annealed glass and also more resistant to impact shock from blunt objects. It offers a high degree of resistance to breakage and when fractured disintegrates into small fragments.

### 14.2.3 Fiberglass Products

Fiberglass for reinforcing is available in several forms. Continuous strand glass gives unidirectional reinforcement whereas glass woven into fabric reinforces the object in two directions. Chopped glass strands and reinforcing glass mats give random reinforcement. Fiberglass is often marketed in the form of compounds with thermosetting polyester for the molding of plastic parts.

Basic automotive fiberglass applications include tire cord and belts; and reinforcement for numerous plastics utilized in everything from the Corvette body to various front-end, engine, and drive train components.

## 14.3 MAJOR ISSUES AFFECTING THE GLASS INDUSTRY

Although the country's major glass and fiberglass producers are basically healthy, several key issues are causing the exertion of considerable effort in these corporations' marketing, product planning and production departments. The major issues impacting the glass makers and fiberglass producers are:

- The downsizing of the American automobile and resultant use of less glass per car
- Cyclical nature of the housing and construction industry, as well as the automotive industry
- The impact of the energy crisis on production and markets.

### 14.3.1 Downsizing

As Detroit struggles to make cars which are smaller and weigh less, glass is inevitably affected. Smaller cars theoretically use less glass, and lighter cars need lighter glass. The result has been a scramble by the glassmakers to produce lighter and stronger glass, which often requires extra fabricating and finishing to produce. The net effect has been a healthy one—at least so far—with the glassmakers realizing greater profits from the value-added effort they exert before shipping their product to the automotive community.

The future of automotive glass usage, however, is still a potential problem for the glass industry. The use of value-added and highly styled glass has already occurred and cars are still getting smaller. Glass makers hope that automotive designers may resort more to styled glass products as they attempt to differentiate small cars that are otherwise restricted in design, weight and roominess. This trend could increase profits per square foot of glass.

Fiberglass companies should continue to benefit from automotive downsizing. The future of fiberglass use in cars is still dependent on the successful introduction of products that can reduce the cost of fiberglass parts and improve their surface finish.

### 14.3.2 Cyclical Nature of Major Markets

Since the glass companies negotiate automotive glass production contracts before the model year begins, if auto sales are poor the glass companies have no capability of changing their share of the auto market. Thus, unused capacity must be shifted to other markets, primarily the residential glass market. Drops in auto production lead to a significant impact on supply and prices in the construction market.

In addition, construction is also a highly cyclical market. Glass sales are dependent on both residential housing completions and nonresidential construction. Therefore, the flat glass industry is particularly cyclical, and as a result certain companies have attempted to diversify their product base.

### 14.3.3 Impact of the Energy Crisis

Rapidly increasing costs of energy—especially natural gas and fuel oil—have been felt acutely by the nation's glassmakers, and are a cause of continuing concern. The industry as a whole has attacked the problem vigorously by instituting energy-conserving production procedures. (The float glass process is more energy-efficient than the sheet glass roller process.) The industry is concerned as much with the availability of sufficient energy resources as with the cost. Several companies have modified their production equipment for dual-fuel capability, and several are actively pursuing the development of company-owned natural gas and oil reserves. The nature of the glassmaking process does not lend itself to the use of coal for fueling its furnaces, precluding a shift to this abundant national energy resource.

In addition, the energy crisis has stimulated demand for glass. The use of insulated glass has increased dramatically over the past five years, as has the use of reflective glass and other coated glass products.

The growing demand for fiberglass insulation is straining the insulation manufacturing capacities of the entire fiberglass industry—both a blessing and a dilemma. If the industry expands its insulation capacity significantly to meet the booming demand (much of which is for insulating existing homes), it fears heavy overcapacity within five years or so when most of the nation's homeowners will have insulated their homes as much as they are going to. So the industry will probably struggle to meet current demand without extensive insulation capacity expansion.

*     *     *     *     *

The following sections profile the three dominant glass and fiberglass suppliers—PPG, Libbey-Owens-Ford, and Owens-Corning.

# 15. PPG INDUSTRIES, INC.

Pittsburgh-based PPG Industries, Inc., derives approximately 20 percent of its annual revenues from sales to the transportation industry. Each of the company's four major business segments—glass, coatings and resins, chemicals and fiberglass—have strong ties to the auto industry through their products. Company management maintains that much of PPG's success over the past decade stems from its ability to achieve and maintain positions of leadership in each of its four major areas of business.

PPG is the largest supplier of flat glass in the country, the second largest supplier of glass to the automotive industry, and a major supplier of fiberglass.

## 15.1 CORPORATE SIZE AND STRUCTURE

As the largest U.S. supplier of flat glass, PPG has 17 glass plants in ten states employing a work force in excess of 18,000. The company's two fiberglass plants produce 400 million pounds of glass fiber annually, with more than 3,000 employees. The firm's coatings and resins group employs 7,800 at 16 plants in nine states.

### 15.1.1 <u>Revenue, Profit and Employment</u>

PPG's sales in 1979 were $3.0 billion, up from $2.7 billion in 1978. Profits were $219 million, up from $132 million in 1978. The company employed a work force of about 38,200 persons in 1979. (See Table 15-1.)

TABLE 15-1. PPG INDUSTRIES, INC., REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $3,093 | $219 |
| 1978 | $2,794 | $132 |
| Average Number of Employees: 38,200 (1979) | | |

### 15.1.2 Corporate Organization

PPG's operating divisions, under the chairman (and chief executive officer) and president (who is chief operating officer), are divided into two large groups—the Glass Group and the Chemicals Group. These two groups are composed of several divisions as follows (see Figure 15-1):

- Glass Group
  - Flat Glass Division
  - Automotive and Aircraft Glass Division
  - Plastic Fabricating Division
- Chemicals Group
  - Chemicals Division (U.S.)
  - Chemicals Division (International)
  - Coatings and Resins Division
  - Fiberglass Division.

The heads of the company's two major groups (Glass and Chemicals), the company's marketing vice president, and the executive and operating officers comprise PPG's Management Committee. The committee meets weekly to review divisional results, determine corporate policies and make recommendations for approval by the board of directors.

## 15.2 MAJOR MARKETS AND PRODUCTS

The two largest single markets for PPG's products are transportation and construction. Each contributed approximately 20 percent of PPG sales in 1979. The chemical processing, petroleum refining and plastics market as a group accounted for about 25 percent of sales. Foreign markets, chiefly Canadian, contributed 20 percent to sales, and the balance of 1979 sales was distributed among several other industrial and agricultural market areas.

### 15.2.1 Major Markets

Within its transportation sales, PPG's sales to the automotive market are derived largely from its production of glass, plastic composite components and resins, and coatings and finishes. PPG produces about one-fourth of the glass used by the domestic automotive industry.

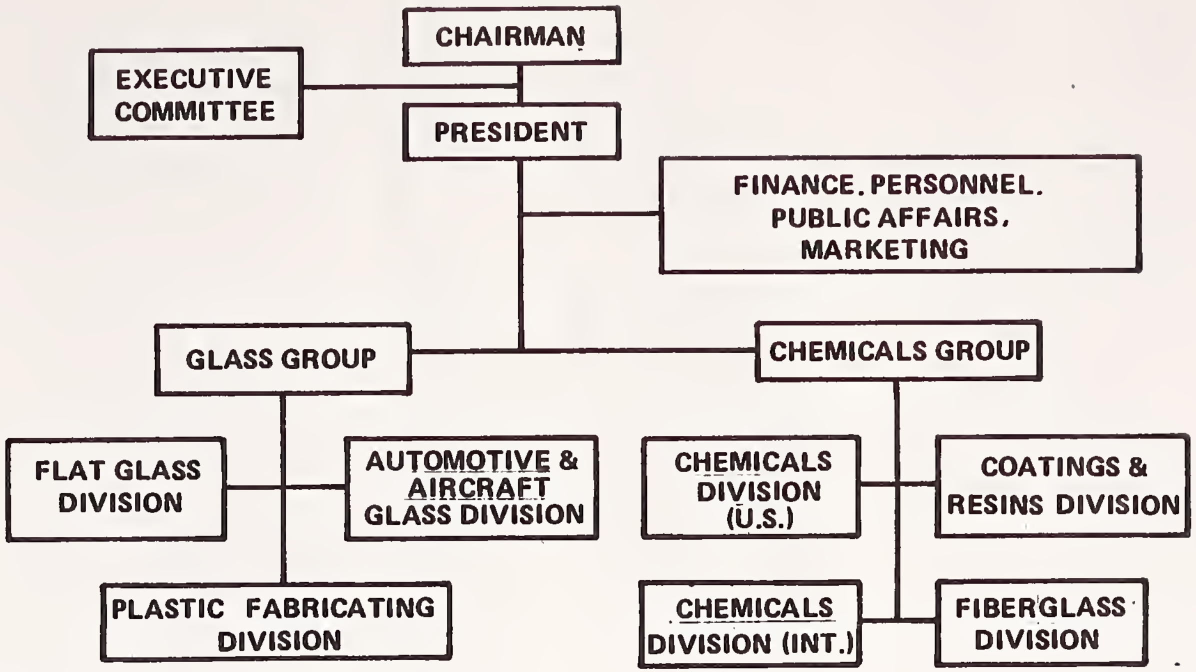


FIGURE 15-1. PPG INDUSTRIES, INC., CORPORATE STRUCTURE

Construction sales are derived principally from the sale of commercial and residential building windows. Production of a number of basic chemicals such as chlorine, caustic soda and VCM (vinyl chloride monomer), fiberglass for plastics reinforcement, and additives for leaded gasoline were the basis for sales to the chemical processing, petroleum refining and plastics markets.

Another significant transportation market for PPG products is the aircraft industry. The company manufactures windshields and other transparencies for military, commercial and business aircraft and is the free world's largest manufacturer of these products.

Additionally, PPG's recently developed "electronic glass" is finding new markets for the company among manufacturers of appliances and equipment utilizing electronic touch control panels and liquid crystal displays. (See Figure 15-2.)

MARKET DATA

Major Markets: Automotive, construction, aircraft industry, furniture industry, appliances, and the mass market for paints.

Percent of Sales to the Auto Industry: 15 percent

Supplies to the Following Automotive Companies: Chrysler, General Motors, American Motors, VW of America, plus many independent suppliers.

Major Products: OEM fabricated automotive glass, automotive glass for the aftermarket, automotive coatings and finishes, fiberglass for plastic reinforcement, plastic resins, injection molded automotive components, leaded gasoline additives, ethylene glycol, industrial coatings, consumer paints, residential and commercial window glass, optical plastic lenses.

FIGURE 15-2. PPG INDUSTRIES MARKET DATA

### 15.2.2 Products

PPG's major products are glass, resins, chemicals, and fiberglass.

*Glass*

PPG is the largest manufacturer of flat glass in the U.S., producing approximately one-third of all U.S. flat glass shipped. One-third of the PPG primary glass output goes into PPG-fabricated products which are sold predominantly to the transportation and construction markets in the form of windshields and windows. The company's glass operations are its largest revenue producer, contributing 36 percent of total sales and 40 percent of operating earnings in 1979.

*Coatings and Resins*

PPG claims to be the leader in industrial coatings and holder of a strong position in sales of trade paints. Included in the industrial segment of this business are sales of automotive finishes and resins for use in the manufacture of reinforced plastics. In 1979, the coatings and resins business accounted for 25 percent of total sales and 20 percent of operating earnings.

*Chemicals*

Production of chlorine and its byproduct, caustic soda, and basic building blocks for a wide variety of other chemicals and end products (including plastics) are primary products within PPG's chemicals business segment. PPG is the second largest producer of chlor-alkali chemicals. Other major basic chemicals produced include leaded gasoline additives, ethylene glycol (used in automotive antifreeze/coolant), and vinyl chloride monomer (used in polyvinyl chloride plastics found in automotive upholstery). PPG's chemicals business accounted for 31 percent of total sales and 33 percent of operating earnings in 1979.

*Fiberglass*

Fiberglass accounted for 7 percent of total sales and 7 percent of operating earnings in 1979. Increased demand for fiberglass textile yarn and new applications of reinforced plastics, caused largely by new automotive applications, increased fiberglass sales. This trend is expected to continue. Weight savings, the company says, continues to be the major factor behind the rising use of fiberglass reinforced plastics in autos and trucks. Because of the automotive industry's steadily increasing demand for parts made from high-strength reinforced plastics, growth in plastics reinforcements outpaced the fiberglass industry, according to PPG.

### 15.2.3 Marketing Strategy

PPG's marketing strategy regarding the automotive community is to keep its products at the leading edge of Detroit's push for lighter, more fuel-efficient cars, and to counter a decreasing overall usage of automotive glass with new and more sophisticated glass and plastic products. The overriding theme of the firm's automotive marketing and sales strategy is that the firm's products can help the automakers achieve their overall objectives for energy conservation. Pursuing the theme of energy savings through weight reduction, PPG advertisements stress how the firm's Azdel thermoplastic stamping sheet is now being used to stamp the structural back and bottom shells of the seats for the 1979 Corvette, and how this thermoplastic polypropylene reinforced with glass fibers offers weight savings of more than 50 percent over steel.

As was true with the major steel and aluminum producers, the company is attempting to market to Detroit an increasing volume of fabricated products—which bring a far higher profit than flat glass and resins. Although PPG basically supplies flat glass to Detroit and plastic resins to plastic fabricators who in turn produce finished components, the firm's Plastic Fabricating Division produces injection-molded front-end components for Chrysler. The firm reports that "Although Detroit's downsizing program has resulted in from 5 to 10 percent less glass per car since 1973, there has been a steady increase in the use of more sophisticated, value-added glass products that improve our business because they require additional fabrication."

## 15.3 PRODUCTION AND OPERATIONS

Twelve of PPG's many plants produce glass, fiberglass, or polyester resins for the automotive community, as well as a wide variety of products for other markets. The plants are under the jurisdiction of the Automotive and Aircraft Glass Division, Plastic Fabricating Division, or the Coatings and Resins Division.

### 15.3.1 Automotive Facilities

PPG plants with significant automotive production are described below. (See Figures 15-3 to 15-14.)

*Fabricated Glass Plants*

Fabricated automotive glass plants are located in Creighton, Pennsylvania (Works One); Tipton, Pennsylvania; Crestline, Ohio; and Greensburg, Pennsylvania (Works 25). The Creighton plant output is mostly for the original equipment market and the plant employs 2,500 people. The Tipton facilities employ 700 people.

Seventy-five percent of the output of the Crestline plant is shipped to the original equipment and aftermarket automotive customers. The balance of its output is industrial glass. Door glass, ventilators and heated rear window units are produced here for Volkswagen Rabbits manufactured in Pennsylvania.

The Greensburg plant produces fabricated original equipment and aftermarket automotive glass, and supplies windshields to the nearby Volkswagen plant.

*Flat Glass Plants*

Flat glass is produced at Carlisle, Pennsylvania (Works Six), and Meadville, Pennsylvania. Flat glass produced at both plants is shipped to the Greensburg and Crestline plants for fabrication into auto glass.

*Columbus, Indiana, Plant*

The Fabricating Division's plant at Columbus produces injection-molded front-end components for Chrysler Corp., as well as other automotive components. The 130,000 square foot plant employs approximately 300.

Company PPG Industries, Inc. County Allegheny Plant Size

Plant Creighton, PA - Works 1 Congressional District

Address Rt. 28 at Ferry St. P.O. Box 617 Creighton, PA 15030 Standard Metropolitan Statistical Area No. of Employees 2,500

Telephone (412) 224-6500 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Automotive glass (fabricated) | N.C.A. | N.C.A. | Plant produces primarily OEM with some after-market |

FIGURE 15-3. CREIGHTON PLANT (WORKS ONE)

Company PPG Industries, Inc. County Blair Plant Size

Plant Tipton, PA Congressional District

Address Tipton, PA 16684 Standard Metropolitan Statistical Area No. of Employees 700

Telephone (814) 684-2300 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Automotive glass (fabricated) | Proprietary | N.C.A. | Plant production is primarily OEM automotive glass fabrication with some aftermarket production |

FIGURE 15-4. TIPTON PLANT

Company PPG Industries, Inc. County Richland Plant Size ______

Plant Crestline, OH - Works 26 Congressional District ______

Address P.O. Box 269 Crestline, OH 44827 Standard Metropolitan Statistical Area ______ No. of Employees ______

Telephone (419) 683-2400 Primary SIC Code(s) ______

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Automotive glass (fabricated) for door glass, ventilators and heated rear window units | N.C.A. | N.C.A. | 70-75% of plant's production is automotive OEM and aftermarket |
| Industrial glass | | | VW of America-Rabbit |

FIGURE 15-5. CRESTLINE PLANT (WORKS 26)

Company PPG Industries, Inc. County Westmoreland Plant Size

Plant Greensburg, PA - Works 25 Congressional District

Address Huff Avenue Greensburg, PA 15601 Standard Metropolitan Statistical Area No. of Employees

Telephone (412) 837-2500 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Automotive replacement glass fabrication<br><br>OEM automotive glass fabrication | N.C.A. | N.C.A. | VW of America - Rabbit windshields |

FIGURE 15-6. GREENSBURG PLANT (WORKS 25)

Company PPG Industries, Inc. County Cumberland Plant Size

Plant Carlisle, PA - Works 6 Congressional District

Address P.O. Box 6 Carlisle, PA 17013 Standard Metropolitan Statistical Area No. of Employees

Telephone (717) 486-3366 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Flat glass | N.C.A. | N.C.A. | Flat glass used to manufacture windshields at Greensburg plant and tempered safety glass at Crestline, Ohio, plant |

FIGURE 15-7. CARLISLE PLANT (WORKS 6)

Company PPG Industries, Inc. County Bartholomew Plant Size 130,000 sq. ft.

Plant Como Plastics Co. (PPG Plastics Fabricating Division) Congressional District

Address 2860 N. National Rd<br>P.O. Box 387<br>Columbus, Indiana 47201

Standard Metropolitan Statistical Area

No. of Employees 302

Telephone (812) 372-8251 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Injection-molded parts for: televisions, automobiles, business machines and air conditioner fronts | N.C.A. | N.C.A. | Chrysler - front-end parts |

FIGURE 15-8. COLUMBUS PLANT

Company PPG Industries, Inc. County Pickaway Plant Size

Plant Circleville, OH Congressional District

Address P.O. Box 457, Route 23, South Circleville, OH 43113 Standard Metropolitan Statistical Area No. of Employees

Telephone (614) 474-3161 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polyester resin | N.C.A. | N.C.A. | Manufacturers of HMC and XMC plastic |

FIGURE 15-9. CIRCLEVILLE PLANT

Company PPG Industries, Inc. County Allegheny Plant Size

Plant Springdale, PA Congressional District

Address 125 Colfax Street Springdale, PA 15144 Standard Metropolitan Statistical Area No. of Employees

Telephone (412) 274-7900 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polyester resins<br>Automotive refinishes | N.C.A. | N.C.A. | Manufacturers of HMC and XMC plastic |

FIGURE 15-10. SPRINGDALE PLANT

Company PPG Industries, Inc. County Crawford Plant Size

Plant Meadville, PA - Works 8 Congressional District

Address P.O. Box 800 Meadville, PA 16335 Standard Metropolitan Statistical Area No. of Employees

Telephone (814) 336-4411 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Flat glass | N.C.A. | N.C.A. | Flat glass used to manufacture windshields at Greensburg plant and tempered safety glass at Crestline, Ohio plant |

FIGURE 15-11. MEADVILLE PLANT

Company PPG Industries, Inc. County Davidson Plant Size 158 acres

Plant Lexington - Works 53 Congressional District

Address P.O. Box 949 Lexington, NC 27292 Standard Metropolitan Statistical Area No. of Employees 1,400

Telephone (704) 249-8151 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Fiberglass plastic reinforcement products (though the plant primarily produces textile yarns) | 210 million lbs. per year | N.C.A. | N.C.A. |

FIGURE 15-12. LEXINGTON PLANT

Company PPG Industries, Inc. County Cleveland Plant Size 152 acres

Plant Shelby, NC - Works 52 Congressional District

Address Route No. 4 Shelby, NC 28150 Standard Metropolitan Statistical Area No. of Employees 1,400

Telephone Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Plastic reinforcement products, including tire cord (fiberglass)<br><br>Polypropylene sheet (Azdel) | 180 million lbs. per year | N.C.A. | N.C.A. |

FIGURE 15-13. SHELBY PLANT

Company PPG Industries, Inc. County Los Angeles Plant Size

Plant Torrance, CA Congressional District

Address 465 Crenshaw Blvd.
Torrance, CA
90509

Standard Metropolitan Statistical Area Los Angeles

No. of Employees

Telephone (213) 328-7260 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Automotive coatings (primers and top coats)<br>Polyester resins<br>Automotive refinishes | N.C.A. | N.C.A. | Production is 15%-25% automotive |

FIGURE 15-14. TORRANCE PLANT

*Polyester Plants*

Polyester resins are produced at plants in Circleville, Ohio; Springdale, Pennsylvania; and Torrance, California. Resins produced at Circleville and Springdale are shipped to manufacturers of SMC (Sheet Molding Compound) and HMC (High Strength Molding Compound) plastics for automotive and other uses. Both automotive coatings and polyester resins are produced at Torrance. Twenty percent of the plants' overall production goes to the automotive market.

*Fiberglass Plants*

Fiberglass is made at Lexington, North Carolina, and Shelby, North Carolina. The Lexington plant occupies 158 acres and produces continuous filament fiberglass. It has an annual capacity of 210 million pounds of fiber. Although the plant's output is primarily for textile use, some of the fiber is shipped for automotive plastics reinforcement. Plant employment is 1,400.

Like Lexington, the Shelby plant produces continuous filament fiberglass. Its annual capacity is 180 million pounds. Recently brought on stream adjacent to the fiberglass plant is a new plant producing Azdel polypropylene sheet. Situated on 152 acres, the Shelby facilities employ a work force of 1,400.

### 15.3.2 New Plants and Expansions

Annual capital spending for PPG was approximately $252 million in 1979. PPG recently built new production facilities for Azdel polypropylene sheet at Shelby, North Carolina. In addition, several other new plants and expansions are planned, and some are already underway:

- Evansville, Indiana—When this plant goes on stream in mid-1980 it will be PPG's first automotive glass plant to fabricate both laminated glass windshields and tempered glass side and rear windows. Currently, windshields are produced at plants separate from those producing side and rear windows. The new 250,000 square foot facility will employ approximately 250 and will be located on a 60-acre site.

- Mount Zion, Illinois - Start-up of new float glass manufacturing facilities here signals PPG's conversion of its entire North American sheet glass operations to the more advanced and energy-efficient floats glass process.

PPG is continuing to add fiberglass production capacity at both Lexington and Shelby, North Carolina. The firm is considering plans for a new 250 million pound capacity fiberglass plant near Midland, Texas.

## 15.4 FINANCIAL ANALYSIS

PPG's overall businesses have been very sound in recent years, although problems in Puerto Rican chemical operations have seriously reduced earnings.

### 15.4.1 Operations

In 1978 PPG's glass, coatings and resins, and fiberglass divisions all had record sales and earnings. The total company picture, however, was adversely affected by the chemicals group which had slowed sales due to industry overcapacity in some products. In addition, the company's Puerto Rican chemical operations were forced to shut down in 1978 due to the bankruptcy of the Commonwealth Oil Refining Company, Inc., PPG's joint venture partner in Puerto Rico Olefins Company. Overall company profits were reduced by $55 million. (See Figure 15-15.)

In 1979, PPG had earnings 66 percent higher than in 1978 on a sales increase of 11 percent. The record earnings were due to large increases in earnings as a percent of sales. In addition, there were no operating losses from the Puerto Rican facilities.

Coatings, resins and commercial glass should be strong in 1980 although automotive sales will be hurt by the recession.

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | Operating Income*/Sales Percent |
|---|---|---|---|---|
| 79 | 3092 | 219 | 17.4 | 15.5 |
| 78 | 2794 | 132 | 11.8 | 16.1 |
| 77 | 2506 | 92 | 8.8 | 16.4 |
| 76 | 2255 | 152 | 15.7 | 16.9 |
| 75 | 1887 | 89 | 10 | 13.1 |
| 74 | 1744 | 94 | 11.3 | 13 |

| Year | Earnings/Total Assets Percent | Sales/Assets | Earnings/Sales Percent |
|---|---|---|---|
| 79 | 8.7 | 1.23 | 7.1 |
| 78 | 5.9 | 1.27 | 4.7 |
| 77 | 4.4 | 1.19 | 3.7 |
| 76 | 7.8 | 1.16 | 6.7 |
| 75 | 5 | 1.06 | 4.7 |
| 74 | 5.9 | 1.09 | 5.4 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 15-15. OPERATING ANALYSIS OF PPG

### 15.4.2 Capital Analysis

PPG plans to spend $300 million annually over the next several years for additional modernization and expansion of production facilities, compared to $150-250 million during 1974-79. (See Figure 15-16.) The company took out additional long-term debt in 1974 and 1975, but has recently funded its expenditures internally. (Although earnings in 1977 and 1978 were depressed by $74.4 million and $50 million respectively due to termination of Puerto Rican operations, these charges did not involve cash outflows.) The large capital expenditures forecasted will likely require an increase in long-term debt. In July 1979 the company sold $100 million of 9-3/8 percent notes due in 1989 to help finance the capital spending program and provide working capital.

## 15.5 RESEARCH AND DEVELOPMENT

At PPG, as at all manufacturing organizations, research and development is a key element in overall corporate strategy. R&D expenditures for PPG were $83.3 million in 1979 and $70.1 million in 1978. The company maintains several R&D facilities, segregated by product grouping. The firm's R&D labs developed the technologies for HMC and XMC (high-strength reinforced plastic molding compounds) and successfully developed a lightweight fiberglass-reinforced automotive leaf spring. PPG's R&D labs are currently working on other "sheet metal replacement" techniques, including the development of fiberglass-reinforced reaction injection-molded (RRIM) urethane plastics with higher modulus and better dimensional stability. Other R&D efforts are currently being directed at improving surfaces by adding fiberglass-reinforced materials. This entails finding better methods of combining the fibers with plastic resins, injection molding rather than compression molding of complex components such as grille panels, and in-mold coating with urethane while a part is being made.

The firm is also working on increased automotive applications for its "Selection" Phase II automotive resins, including one-piece, ribbed skin parts such as door or roof panels.

| | | | Sources | | | |
|---|---|---|---|---|---|---|
| Year | Sales | P/E Ratio[1] | Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings |
| 79 | 3092 | 4.3 | 219 | 119 | 13 | 21.3 |
| 78 | 2794 | 4.8 | 132 | 105 | 0 | 16 |
| 77 | 2506 | 11.2 | 92 | 99 | 35 | 3 |
| 76 | 2255 | 6.4 | 152 | 87 | (15) | 0 |
| 75 | 1887 | 7.1 | 89 | 77 | 117 | (1) |
| 74 | 1744 | 5.4 | 94 | 69 | 63 | (1) |

| | | Uses | | | | | |
|---|---|---|---|---|---|---|---|
| Year | Change in Working Capital | Capital Expenditures | Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ % | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ % | Current Ratio |
| 79 | 112 | 252 | 61 | 25.5 | 10.3 | 10.1 | 2.5 |
| 78 | 12.9 | 261 | 54 | 28.1 | 10.4 | 11.1 | 2.4 |
| 77 | 21.3 | 203 | 49 | 29.7 | 8.9 | 9.6 | 2.8 |
| 76 | 55.4 | 167 | 41 | 28.9 | 9.1 | 8.2 | 2.7 |
| 75 | 117.0 | 160 | 36 | 32.2 | 5.7 | 8.6 | 2.8 |
| 74 | 2.3 | 199 | 36 | 27.7 | 7.2 | 11.8 | 2.4 |

Dollar figures are in millions

[1]Average for the Year

[2]Capitalization Defined as Total Liabilities – Current Liabilities

[3]Operating Profit/Interest

FIGURE 15-16. CAPITAL ANALYSIS OF PPG

## 15.6 GOVERNMENT AND LABOR RELATIONS

In January of 1979 the Environmental Protection Agency (EPA) instituted a civil action suit against the company, alleging that PPG was unlawfully emitting vinyl chloride from its Lake Charles, Louisiana, plant, and seeking to require that such emissions be brought into compliance with national emission standards. The EPA later concluded that the emissions were in compliance, according to PPG.

The effective management of raw materials and fuels is vital to PPG's continued success, PPG management feels. Most of its raw materials are purchased from outside sources, and PPG reports it is taking great pains to make satisfactory supply arrangements to meet anticipated operating requirements. The firm has instituted backup energy systems to counter any near-term energy shortages.

The firm moved recently to improve its employees' job satisfaction by instituting a system which prescribes a clear assignment of accountabilities to each individual manager and potential manager, followed by a periodic assessment of current performance and potential. Individual development plans are also formulated to identify the assignments and experience required to enable each key individual to reach his or her potential.

PPG spent approximately $21 million on environmental control projects in 1979 and $35 million in 1978. Estimated expenditures for such projects in 1980 is $24 million.

# 16. LIBBEY-OWENS-FORD

Libbey-Owens-Ford (LOF) is a giant and an innovator in the glass industry. Although cars are getting smaller, LOF is finding they are using more glass and expensive curved glass for styling reasons. The company has contributed extensively toward the development of thin glass for autos. At the same time LOF has increased its sales of energy-saving glass to industrial and construction customers. This helps reduce LOF's dependence on automotive glass, and in particular, General Motors, its largest customer. Also to help reduce dependence on a single product, LOF has entered the fluid systems and plastic molding businesses. Its plastic molding company has been an innovator in new automotive uses for plastic and fiberglass-reinforced plastic parts.

## 16.1 CORPORATE SIZE AND STRUCTURE

Libbey-Owens-Ford is the largest supplier in the country of flat glass for use in automobiles and the second largest supplier for use in building construction. In addition, the company is a major molder of plastic parts for cars.

### 16.1.1 Revenue, Profit and Employment

In 1979, Libbey-Owens-Ford had sales of $1.2 billion and earnings of $58 million, 12 percent lower than 1978 earnings. (See Table 16-1.) The glass division accounted for about 50 percent of sales and 40 percent of operating earnings while the plastic subsidiary (LOF Plastics, Inc.) accounted for 12 percent of sales and 10 percent of earnings. The company employed about 20,500 persons in 1979.

TABLE 16-1. LIBBEY-OWENS-FORD REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $1,208.0 | $58.1 |
| 1978 | $1,107.1 | $65.8 |
| Average Number of Employees: 20,500 (1979) | | |

### 16.1.2 Corporate Organization

LOF is divided into three broad categories: the Glass Division, which makes flat glass products; Aeroquip Corporation, which makes fluid systems components; and LOF Plastics, Inc., which makes plastic products. The company's organization and management responsibilities are structured along these lines. (See Figure 16-1.) The plastics company is further divided into the Woodall Division which makes molded plastic and fiber products for the original-equipment automotive market, the Pioneer Division which makes decorative plastic laminates, and the Custom Trim Products Division which makes self-adhering protective car moldings.

## 16.2 MAJOR MARKETS AND PRODUCTS

Figure 16-2 summarizes the major market information for Libbey-Owens-Ford.

### 16.2.1 Major Markets

Libbey-Owens-Ford's glass is used in automobiles, aircraft, boats, military vehicles, other vehicles, buildings, display cases, projectors, scientific instruments, and space vehicles. The flat glass products are sold directly to OEM auto companies, auto suppliers, industrial sash and door companies, and independent installers and distributors.

The company's major glass competitors include: PPG, ASG Industries, Inc., Ford Motor Co., Guardian Industries, Inc., and Combustion Engineering Corporation.

LOF Plastics, Inc., sells its products to automobile, truck, and appliance manufacturers, furniture manufacturers and home builders. Few products are sold to the automotive aftermarket.

LOF supplies about two-thirds of the glass requirements for General Motors and participates extensively in the development and in the technical aspects of glass usage for GM's vehicles. Total sales to General Motors in 1978 amounted to about one-third of LOF's total sales.

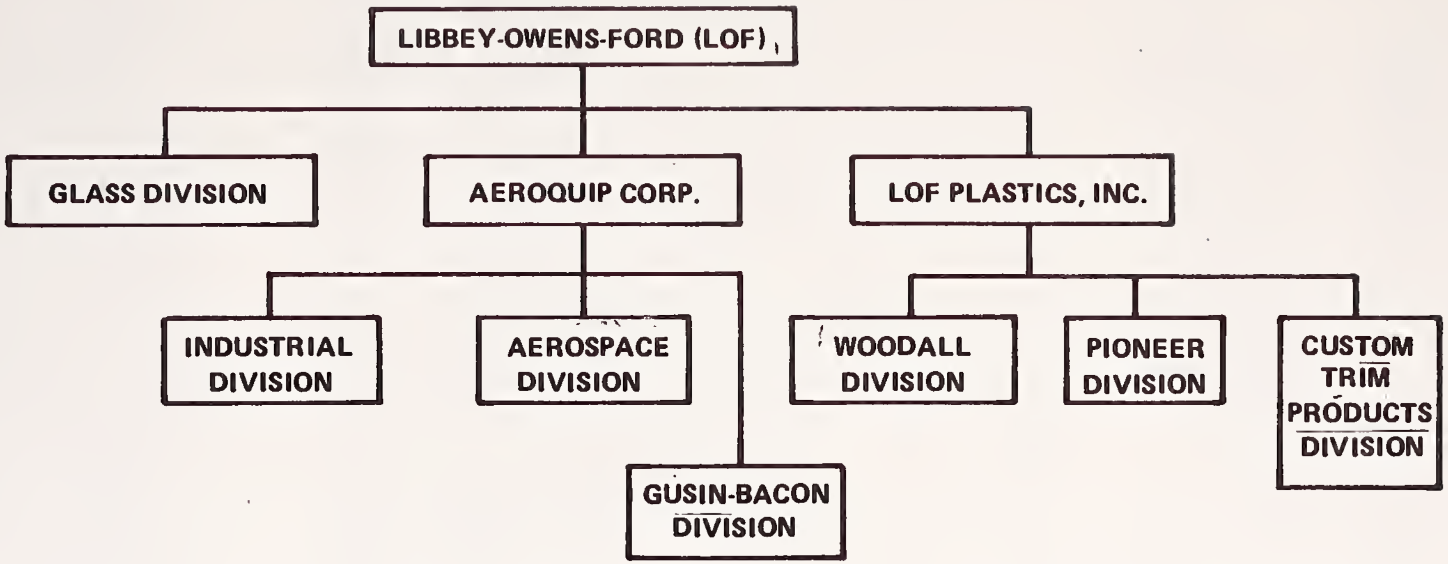


FIGURE 16-1. LIBBEY-OWENS-FORD CORPORATE ORGANIZATION

MARKET DATA

Major Markets: Automobile industry, aircraft and other transportation markets, construction, specialty glass market.

Major Automotive Products: Automotive safety glass for windshields, tempered glass for side and rear auto windows, molded plastic and composite parts such as instrument panels and heater housings.

FIGURE 16-2. MARKET DATA FOR LOF

### 16.2.2 Products

Libbey-Owens-Ford's products can be segmented roughly by the basic components of the organization. The plastic and glass products of particular relevance to the auto industry are made in the Glass Division and the Woodall Division of the Plastics Company.

Glass Division products include float, bent, laminated and tempered glass; insulating glass; filmed and tinted environmental control glass, solar energy collector panels, mirrors, and specialty glass products. Plastic products are mostly engineered molded plastic and composite parts.

LOF's main automotive products fall into three categories: laminated safety glass, tempered glass, and plastic products.

*Laminated Safety Glass*

Laminated glass is used for front windshields. The basic components are two panes or "plies" of float glass with a layer of plastic between them. Large machines called "autoclaves" operate much like massive pressure cookers and permanently bond the two plies of glass to the plastic inner layer at high temperatures. The plastic becomes transparent in the process. This type of glass has been available for automobiles since the late 1920's and is used to improve vehicle safety. When this laminated safety glass is broken, the glass particles adhere to the plastic and reduce injury from shattering.

Since 1966 Libbey-Owens-Ford has produced a windshield with a new, highly penetration-resistant plastic interlayer. The new plastic interlayer gives controlled adhesion of the plastic to the glass, allowing the windshield greater "stretch" when impacted. This reduces the likelihood of penetration and the chance of severe lacerations to the heads of passengers thrown against the windshield in an accident. The glass shatters upon impact, but the plastic layer is able to bulge out and absorb the energy of impact without tearing. Libbey-Owens-Ford reports that major decreases in glass-related injuries from auto accidents have resulted from use of the new safety glass.

In 1971 LOF introduced on GM cars its Super Shock Absorber windshield which is yet a safer laminated glass. The new aspect of this product is thinner and lighter float glass. The decreased thickness, combined with basic surface strength characteristics of float glass, allows the glass to break into smaller, safer fragments.

*Tempered Glass*

Tempered glass is widely used for automotive side and back windows. LOF's tempered safety glass product is made by heating the glass until it is almost plastic and then cooling it suddenly by subjecting the surfaces to jets of air. Both outer surfaces, cooling more rapidly, are in a state of compression while the inner portion of the glass is in tension. This makes the glass three to five times as strong as regular annealed glass and also more resistant to impact shock from blunt objects. It offers a high degree of resistance to breakage and when fractured disintegrates into small fragments.

*Plastic Molded Parts*

The Woodall Division makes molded plastic and fiber products such as engine covers, heater housings, instrument panels, fuel tanks, truck cab headliners, interior trim panels, and seat shells. The parts are mostly fiberglass and made by compression molding. In some cases the plastic components replace many parts that were formerly made of metal and joined together.

### 16.2.3 New Products

New products connected with the auto industry include thin glass, plastic bumpers and seat shells, and plastic gas tanks.

*Thin Glass*

Efforts to lighten cars have resulted in the development of thinner, lighter automotive glass. LOF has contributed substantial production testing, engineering and research in cooperation with automotive designers and engineers to develop lightweight laminated windshields and tempered side and back windows. The program required changes in float glass manufacturing methods, improvements and modifications of production tempering facilities, and the installation in 1977 of a new computer-controlled tempering facility at the East Toledo plant. To date the program has succeeded in reducing the weight per square foot of windshields by as much as 27 percent over 1970, while the weight per square foot for side and back windows has been reduced as much as 34 percent.

*Plastic Seat Shells and Bumper*

LOF has been working on some new lightweight plastic parts for cars. In 1978 the company developed a stamped thermoplastic seat shell for use on the 1979 Corvette, achieving a weight savings of 12 pounds per seat or 24 pounds per vehicle. The product received the 1979 Grand Award for the most innovative use of plastics in an automotive application from the Society of Plastic Engineers.

For the 1980 Corvette, LOF is the principal supplier of a new glass fiber-reinforced front bumper system. The bumper will comprise several elements including a honeycomb plastic cushion and a glass-reinforced plastic impact bar. The assembly will weigh ten pounds less than the previous 18 pound bumper. LOF will make the components out of high strength 65 percent fiber-reinforced plastic in the form of sheet molding compound.

LOF also now makes plastic front-end panels. These panels replace many metal parts and thus reduce tooling costs by 64 percent while reducing weight by more than 50 percent.

*Plastic Gas Tanks*

LOF has drawn considerable attention to the use of high density polyethylene in the manufacture of gas tanks. The company recently obtained under license agreement with the Dow Chemical Company a sulfonation process which enables plastic fuel tanks to meet fuel permeability standards for passenger car use. The plastic tank is lighter and offers improved impact resistance when compared with conventional metal tanks of similar capacity.

Woodall blow molds some of its plastic tanks at its Fremont, Ohio, plant. The plastic tank is currently being supplied for vans and light trucks and is expected to become widely used in passenger cars. The tank has an additional advantage of being capable of fabrication in asymmetrical shapes and sizes to fit unusual chassis design requirements.

### 16.2.4 Corporate Strategy

Four recent elements of Libbey-Owens-Ford's overall corporate strategy have been:

- To diversify and eliminate dependence on a single customer and industry
- To change production fully to the float glass process
- To pursue energy-saving glass markets
- To pursue markets for new automotive plastic parts.

*Diversification*

LOF supplied all of General Motors' glass requirements until 1961. In addition, until 1967, almost 100 percent of the company's revenues came from glass manufacturing. Since that time, the company has attempted to diversify and reduce its dependence on one business and one customer. LOF has increased its sales in non-automotive glass markets and has added Aeroquip Corporation, which makes fluid system components, and LOF Plastics, Inc., which makes plastics products, to its operations.

*Conversion to the Float Glass Process*

The company made hundreds of millions of dollars of investments to convert its entire glassmaking capability to the new efficient float glass process. Libbey-Owens-Ford began producing float glass in 1964 at Lathrop, California. The company now has five float glass facilities.

*Pursuit of Energy-Saving Markets*

LOF sees the energy crisis as an excellent opportunity for sales of the glass industry. Demand should increase for LOF's products that are able to create environmentally controlled buildings. In addition, LOF sees increasing glass use in cars and solar energy systems. To pursue the solar energy field the company two years ago acquired a 39 percent interest in Photon Power, Inc., a company concerned with the development of electrical solar cells. LOF is also marketing its own solar collectors.

*Pursuit of Markets For New Automotive Plastic Parts*

LOF sees continuing increases of plastics in cars, in such components as doors, wheels, bumpers, hoods, decklids, oil pans, and tires. In addition, as new materials are developed, LOF sees advances for plastic in structural parts, leaf springs, driveshafts, radiator supports, transmission supports, and various types of brackets and hardware applications. Although divisions of the automobile companies may produce some of these, LOF sees excellent opportunities for a large supplier such as LOF Plastics, Inc. They feel that their efficiency, financial strength, and specialized research and development capability will make them very attractive to auto manufacturers.

## 16.3 PRODUCTION AND OPERATIONS

LOF's main offices are in Toledo. The company has five float glass plants and 15 glass fabrication plants. LOF Plastics, Inc., has three main plants that make general plastic products and ten other plants.

16.3.1 Major Automotive Facilities

The five float glass plants (which also fabricate parts), one U.S. fabrication plant, and one Canadian fabrication plant serve the auto industry. Several of the plastics company's plants also supply the auto industry. (See Figures 16-3 to 16-14.)

*Rossford Plant*

The Rossford, Ohio, plant is a large float glass plant that covers about 2.5 million square feet. The plant manufactures tempered and filmed glass products and employs roughly 2,000 people.

*East Toledo Plant*

This plant in Toledo, Ohio, makes float glass and fabricates tempered, laminated and specialty glass products used in windshields and automotive side and rear windows. The plant covers 2.1 million square feet and employs approximately 2,000 people.

*Ottawa Plant*

This is a 1.9 million square foot plant that employs 1,500 people. Located in Ottawa, Illinois, it manufactures float glass and fabricates tempered and laminated glass products used in windshields and side glass.

*Lathrop Plant*

The Lathrop plant is in Lathrop, California. The plant covers 951,000 square feet and manufactures float glass and tempered and laminated glass products.

*Collingwood Plant*

This plant in Ontario, Canada, is solely a glass fabrication plant and does not make its own glass. The facility makes laminated and tempered glass products used in windshields and side glass. The plant area is 322,000 square feet.

Company LOF Co. Glass Div. County Wood Plant Size 453 acres
2,411,000 Sq. Ft.

Plant Rossford Congressional District

Address 140 Dixie Hwy.
Rossford, OH 43460 Standard Metropolitan Statistical Area Toledo (Ohio-Mich) No. of Employees 2,000

Telephone (419) 247-3731 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Float Glass<br>Tempered Glass | N.C.A. | Float Process | N.C.A. |

FIGURE 16-3. ROSSFORD PLANT

Company LOF Co. Glass Div. County Wood Plant Size 393 acres
2,137,000 Sq. Ft.

Plant East Toledo Congressional District

Address 1769 E. Broadway
Toledo, OH 43605

Standard Metropolitan Statistical Area Toledo

No. of Employees 2,000

Telephone (419) 247-5000 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Auto Windshields and Window Glass (float glass, tempered and laminated glass) | N.C.A. | Float Process | N.C.A. |

FIGURE 16-4. EAST TOLEDO PLANT

Company LOF Co. Glass Div. County LaSalle Plant Size 416 acres
1,895,000 Sq. Ft.

Plant Ottawa Congressional District

Address P.O. Box 578
Ottawa, IL 61350

Standard Metropolitan Statistical Area None

No. of Employees 1,500

Telephone (815) 433-0932 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Automotive Windshield and Side Glass | N.C.A. | Float Process | N.C.A. |

FIGURE 16-5. OTTAWA PLANT

**Company** LOF Co. Glass Div. **County** Joaquin **Plant Size** 854 acres
951,000 Sq. Ft.

**Plant** Lathrop **Congressional District**

**Address** P.O. Box 128
Lathrop, CA 95330

**Standard Metropolitan Statistical Area** None

**No. of Employees**

**Telephone** (209) 858-5151 **Primary SIC Code(s)**

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Auto Windshield and Side Glass | N.C.A. | Float Process | N.C.A. |

FIGURE 16-6. LATHROP PLANT

Company LOF Co. Glass Div. County Ontario Plant Size 109 acres
322,000 Sq. Ft.

Plant Collingwood Congressional District ______

Address P.O. Box 150
Collingwood,
Ontario L9y325

Standard Metropolitan Statistical Area ______ No. of Employees ______

Telephone ______ Primary SIC Code(s) ______

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Tempered and Laminated Glass | N.C.A. | N.C.A. | N.C.A. |

FIGURE 16-7. COLLINGWOOD PLANT

Company Woodall Ind. Div.
Libbey-Owens-Ford

County Sandusky

Plant Size 20 acres
254,000 Sq. Ft.

Plant Fremont

Congressional District

Address 400 S. Stone St.
Fremont, OH 43420

Standard Metropolitan Statistical Area None

No. of Employees 50-75

Telephone (419) 332-1587

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Plastic Bottles and Gas Tanks | N.C.A. | Blow molding | N.C.A. |

FIGURE 16-8. FREMONT PLANT NO. 1

Company Woodall Div.
Libbey-Owens-Ford

County Sandusky

Plant Size 20 acres
254,000 Sq. Ft.

Plant Fremont

Congressional District

Address 1410 Motor Drive
Fremont, OH 43420

Standard Metropolitan Statistical Area None

No. of Employees 200

Telephone (419) 332-8276

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Various Plastic Products | N.C.A. | N.C.A. | N.C.A. |

FIGURE 16-9. FREMONT PLANT NO. 2

Company Libbey-Owens-Ford

County Jackson

Plant Size 27 acres
97,000 Sq. Ft.

Plant Spring Arbor, MI

Congressional District

Address 345 E. Main St.
Spring Arbor, MI
49283

Standard Metropolitan Statistical Area

No. of Employees 200-300

Telephone (517) 750-1610

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Plastic Products<br>Automotive Decorative Body Parts<br>Dashboards | N.C.A. | N.C.A. | N.C.A. |

FIGURE 16-10. SPRING ARBOR PLANT

Company LOF Plastics
Woodall Div.

County Iredale

Plant Size 7 acres
109,000 Sq. Ft.

Plant Mooresville, NC

Congressional District

Address P.O. Box 900
Mooresville, NC
28115

Standard Metropolitan Statistical Area No

No. of Employees 200

Telephone (704) 663-4511

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | : Consumed by (Automotive) |
|---|---|---|---|
| Small Plastic Parts | N.C.A. | N.C.A. | N.C.A. |

FIGURE 16-11. MOORESVILLE PLANT

Company Custom Trim Prod.
Libbey-Owens-Ford

County Cuyahoga

Plant Size
99,000 Sq. Ft.

Plant Cuyahoga Heights, OH

Congressional District

Address 4911 Grant Ave.
Cleveland, OH
44125

Standard Metropolitan Statistical Area Cleveland, OH

No. of Employees 130

Telephone (216) 441-4800

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Vinyl Moldings<br>Body Side Moldings | N.C.A. | N.C.A. | N.C.A. |

FIGURE 16-12. CUYAHOGA HEIGHTS PLANT

Company Custom Trim Prod.
Libbey-Owens-Ford

County Fulton

Plant Size 9 acres
101,000 Sq. Ft.

Plant Atlanta, GA

Congressional District

Address 4600 Fulton Indus.
Boulevard
Atlanta, GA 30336

Standard Metropolitan Statistical Area

No. of Employees

Telephone (404) 691-7200

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Body Side Moldings | N.C.A. | N.C.A. | N.C.A. |

FIGURE 16-13. ATLANTA PLANT

Company LOF Co. Glass Div. County Grayson Plant Size 187 acres
451,000 Sq. Ft.

Plant Sherman Congressional District

Address P.O. Box 248
Sherman, TX 75090

Standard Metropolitan Statistical Area None

No. of Employees 300

Telephone (214) 893-9431 Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Automotive Windshield & Side Glass | N.C.A. | N.C.A. | N.C.A. |

FIGURE 16-14. SHERMAN PLANT

*Fremont Plants*

The Fremont plants in Fremont, Ohio, are plastic molding facilities. Among the molding processes available, the facilities have capability in blow molding and "clam shell" molding of polyethylene. LOF's new plastic gas tanks are made at Fremont.

*Spring Arbor And Mooresville Plants*

These two plants are also plastic molders of automotive parts. The Spring Arbor, Michigan, plant makes large automotive parts such as body parts, dashboards, and other decorative parts. The 97,000 square foot plant employs more than 200 people. The Mooresville, North Carolina, plant specializes in polyethylene extrusion. The plant, which makes small automotive parts, covers 109,000 square feet and employs 200 people.

*Custom Trim Plants*

The Custom Trim Products part of LOF has two plants that make body side vinyl molds for external car trim. One plant is in Atlanta, Georgia, and the other is in Cuyahoga Heights, Ohio.

### 16.3.1 New Plants and Expansions

Expenditures for plants and properties in 1979 totaled \$128.4 million including \$8.4 million in property of newly acquired businesses. The company spent \$64 million for plants and properties in 1978.

LOF has recently built a \$38 million auto safety glass plant near Sherman, Texas. The plant is designed to fabricate laminated windshields and tempered sidelights and backlights for new automobile and truck production and automotive replacement requirements in the Southwest. The plant covers a large 451,000 square foot area and presently employs 300 people.

The company is also investing \$60 million to enlarge its total float glass capacity by 25 percent. An addition will be built to an existing float glass facility in Laurinburg, North Carolina, to be completed in 1980. The facility serves the glass requirements for the architectural, industrial, residential, mirror and furniture markets.

Recently, LOF completed rebuilding and enlarging its float glass furnace in Lathrop, California, and completed rebuilding of a float glass furnace in Rossford, Ohio.

## 16.4 FINANCIAL ANALYSIS

Libbey-Owens-Ford may have lower sales of auto glass for 1980 due to the auto slump. LOF is also beginning a major capital spending program.

### 16.4.1 Operations

Libbey-Owens-Ford has had higher sales and earnings in the last few years; however, operating margins (operating income/sales) have been declining. (See Figure 16-15.) Earnings in 1978 were increased by about 10 percent as the net result of two unusual and nonrecurring transactions—the sale of shares in Nippon Sheet Glass Company and the closing of a hydraulic hose plant. The decreased operating margins have been attributed to higher costs of material, energy, payrolls and benefits not fully recovered by price increases and operating efficiencies.

In 1979 LOF posted a sales gain of 13 percent and a decrease in net income of 12 percent. Much of the drop in net income reflected an accounting change. However, the auto slump is significantly affecting LOF's 1980 performance.

### 16.4.2 Capital Analysis

LOF has been funding its capital expenditures internally with borrowing in 1974 and 1979. (See Figure 16-16.) Even though capital expenditures almost doubled in 1978, funding was still accomplished without significant changes in debt or equity. However, capital expenditures for 1979 doubled again to around $120 million. This large expenditure required borrowed funds. In June 1979 LOF negotiated the private financing of $100 million at 9-7/8 percent interest for 20 years. The money was planned to be used to help finance LOF's various expansion programs, such as the new safety glass and float glass plants.

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | Operating Income*/Sales Percent |
|---|---|---|---|---|
| 79 | 1208 | 58.1 | 13.6 | 11.3 |
| 78 | 1107 | 65.8 | 16.9 | 12.2 |
| 77 | 979 | 58.9 | 16.5 | 13.8 |
| 76 | 872 | 58.9 | 18.3 | 16.0 |
| 75 | 684 | 31.9 | 10.0 | 11.7 |
| 74 | 655 | 31.7 | 10.2 | 13.4 |

| Year | Earnings/Total Assets Percent | Sales/Assets | Earnings/Sales Percent |
|---|---|---|---|
| 79 | 7.4 | 1.54 | 4.8 |
| 78 | 9.6 | 1.62 | 5.9 |
| 77 | 9.2 | 1.53 | 6.0 |
| 76 | 9.8 | 1.44 | 6.8 |
| 75 | 5.6 | 1.19 | 4.7 |
| 74 | 5.8 | 1.21 | 4.8 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 16-15. OPERATING ANALYSIS OF LIBBEY-OWENS-FORD

| Year | Sales | P/E Ratio[1] | Sources: Earnings | Sources: Depreciation | Sources: Changes in Long-Term Debt | Sources: Changes in Owners' Equity Other Than Retained Earnings |
|---|---|---|---|---|---|---|
| 79 | 1208 | 5.4 | 58.1 | 37.2 | 74 | (0.1) |
| 78 | 1107 | 6.0 | 65.8 | 33.3 | 7.1 | (0.5) |
| 77 | 979 | 6.4 | 58.9 | 31.3 | 2.0 | 2.3 |
| 76 | 872 | 6.0 | 58.9 | 32.4 | (1.4) | (4.0) |
| 75 | 684 | 7.5 | 31.9 | 30.8 | 3.6 | (1.9) |
| 74 | 655 | 9.3 | 31.7 | 31.4 | 61.2 | (1.3) |

| Year | Change in Working Capital | Uses: Capital Expenditures | Uses: Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ % | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ % | Current Ratio |
|---|---|---|---|---|---|---|---|
| 79 | 14 | 120 | 30.3 | 24.3 | 8.6 | 15.3 | 2.9 |
| 78 | 16.6 | 59.7 | 30.3 | 15.9 | 14.2 | 8.2 | 3.0 |
| 77 | 29.5 | 34.8 | 29.2 | 15.7 | 16.4 | 5.3 | 3.3 |
| 76 | 33.4 | 23.4 | 26.9 | 16.4 | 16.5 | 3.7 | 2.9 |
| 75 | 27.1 | 15.5 | 17.0 | 17.5 | 7.2 | 2.7 | 3.1 |
| 74 | 62.1 | 37.9 | 29.4 | 17.4 | 9.1 | 6.5 | 2.5 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 16-16. CAPITAL ANALYSIS OF LIBBEY-OWENS-FORD

## 16.5 RESEARCH AND DEVELOPMENT

Total R&D expenditures for Libbey-Owens-Ford were $20.8 million in 1979 and $18.4 million in 1978. The glass and plastic divisions' research and development have included work in at least four areas as described below:

- The glass division is continuing research and engineering trials to reduce the weight of glass used in automobiles. The staff is looking at changes in float glass manufacturing methods, and is examining changes in processing and tempering.

- The glass division is giving considerable attention to the production of tinted, reflective coated, insulating glass products, and solar energy collector panels, all with energy-saving capabilities.

- In connection with the joint venture with Photon Power, Inc., LOF is involved with research into the production of photovoltaic cells.

- The plastic company continues to work on new processes and products for the automobile. Recent work has been done on plastic seats and bumpers for the Corvette.

## 16.6 LABOR RELATIONS

No major labor agreements covering Glass Division employees required negotiation in 1978 and there were no work stoppages due to labor difficulties. Most contracts covering union employees are scheduled to run until the final quarter of 1980.

# 17. OWENS-CORNING FIBERGLAS CORPORATION

Owens-Corning Fiberglas Corporation, founded in 1938, is the world's largest manufacturer of glass fiber products. These fiber products, made from sand and marketed under the trade name of Fiberglas, come in a fluffy form for insulation and in textile fibers for weaving into cloth and for use as reinforcement of other materials. Currently over 35,000 end products contain some kind of glass fiber.

This growing glass fiber producer sells its products in a variety of markets including automotive, construction, and consumer goods. With the ever-growing concern for energy conservation on all consumer and industrial fronts, Owens-Corning is counting on a continuing research and development effort to find even more uses for its versatile product within the automotive community.

## 17.1 CORPORATE SIZE AND STRUCTURE

Owens-Corning experienced a substantial growth year in 1979 with earnings up 21 percent over 1978. Recently, the corporation expanded its traditional insulation and acoustical tile market and explored new roofing and bathroom component markets. Owens-Corning also opened a new manufacturing plant, its 76th, in Amarillo, Texas, to produce fiber reinforcements for use in automotive plastics.

In 1979, sales passed the $2 billion mark for the first time. However, this growth in sales was not translated into satisfactory earnings performance. Although sales were high, Owens-Corning's principal markets followed irregular patterns over the course of the year. This erratic sales pattern caused periodic underutilization of some major facilities, contributing to higher operating costs.

### 17.1.2 Revenue, Profit and Employment

Owens-Cornings recorded $1,730.8 million in sales in its insulation and construction group in 1979, $356.5 million in industrials and textiles, and $157.8 million through its international subsidiaries in Europe and Brazil. Total net sales in 1979 were therefore $2.2 billion.

TABLE 17-1. OWENS-CORNING FIBERGLAS CORPORATION REVENUES, PROFIT AND EMPLOYMENT

| Year | Revenues (Millions) | Profits (Millions) |
|---|---|---|
| 1979 | $2,245.2 | $109.3 |
| 1978 | $1,853.1 | $130.3 |
| Average Number of Employees: 26,500 (1979) | | |

### 17.1.3 Corporate Organization

Over the past several years, the company has decentralized into free-standing business operating units with the profit center concept being extended to the lowest practical organizational level. Its structure focuses on increased corporate management leadership and an expanded role for its operating divisions. (See Figure 17-1.)

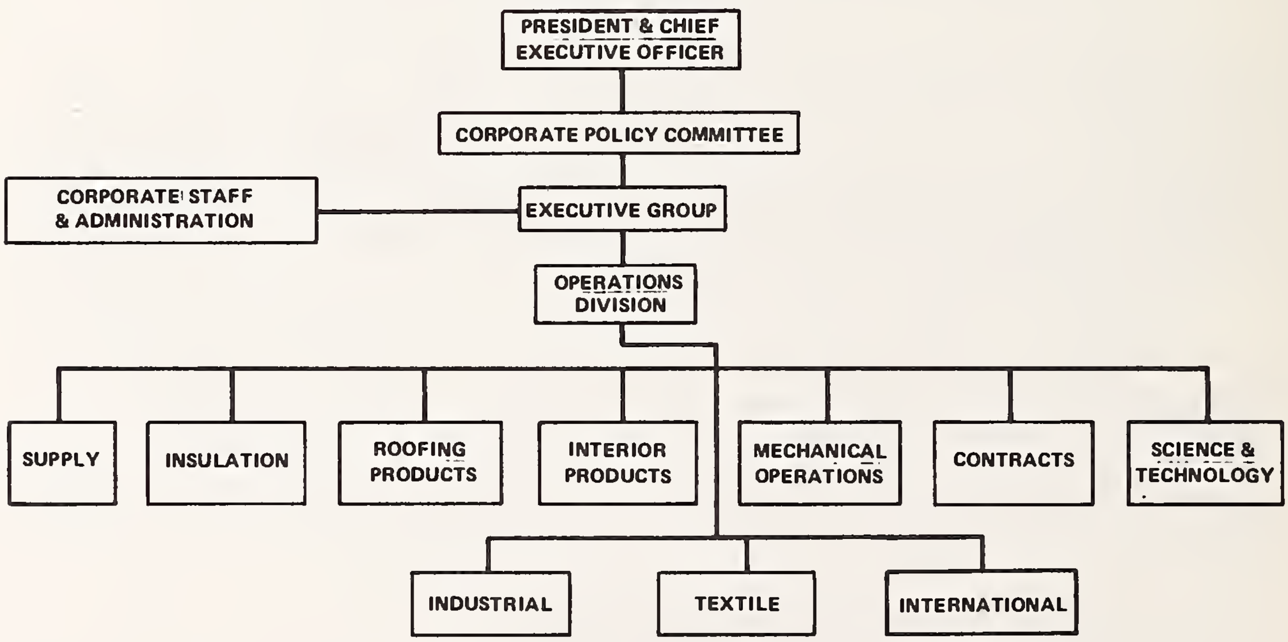


FIGURE 17-1. OWENS-CORNING CORPORATE ORGANIZATION

Owens-Corning's major products divisions include:

- Insulation
- Roofing Products
- Supply
- Interiors
- Mechanical
- Contracting
- Industrial
- Textile
- International
- Science and Technology.

The office of Chief Executive was expanded to include two additional vice presidents. Also, a Corporate Policy Committee was established to provide top management guidance on programs and policies. The committee includes the five chief executive officers and four additional senior vice presidents. Automotive products emanate from the insulation, industrial, and mechanical divisions.

## 17.2 MAJOR MARKETS AND PRODUCTS

Owens-Corning's major markets are detailed and summarized in Figure 17-2.

### 17.2.1 Major Markets

Owens-Corning's three fastest growing markets are auto transportation, marine, and corrosion-resistant materials. Other major markets include: consumer and industrial insulation, construction, recreational goods, tires, and interior space systems.

Automakers, one of Owens-Corning's three fastest growing markets, are substituting fiberglass-reinforced parts for metal in order to reduce weight and improve gas mileage. In the snowbelt region, the resistance of fiberglass parts to corrosion by road salts is an added incentive for automakers to use the material for body components. Another use of fiberglass in the auto industry is in tires. The lighter weight of fiberglass-belted radial tires as compared to steel-belted tires can cut up to four pounds from the weight of a car. An estimated 599 million pounds of fiberglass-reinforced plastic was used by the transportation industry in 1979, a 12 percent increase over 1978.

MARKET DATA

Major Markets: Transportation, marine, corrosion-resistant materials, construction, consumer and recreational, electronics and aircraft, interior space systems, tires, appliances.

Percent of Sales to the Auto Industry: Approximately 10 percent.

Supplies to the Following Auto Companies: Ford, General Motors, Chrysler, various independent suppliers.

Major Products: Reinforcements for automotive and other plastics, tire cord, insulation, roofing and acoustical tile, fabric.

FIGURE 17-2. OWENS-CORNING FIBERGLAS CORPORATION MARKET DATA

### 17.2.2 Products

Major automotive products shipped by Owens-Corning include textile thread reinforcements and resin reinforcements for tires and various automotive plastics.

Owens-Corning is also shipping a wide range of construction and roofing materials, a new integrated ceiling system, new molded pipe insulation, and a new line of color coordinated molded bathroom components.

### 17.2.3 Marketing Strategy

Owens-Corning's overall marketing strategy is to expand their traditional core markets in the insulation area, to expand in established businesses that are new to Owens-Corning but which are compatible with their core markets, to establish new business ventures which exploit Fiberglas (such as automotive), and to expand international markets.

Part of Owens-Corning's sales approach to the automotive industry is to present its new automotive developments in advertising pages of major industry magazines. Owens-Corning, in response to the automakers' concern over car weight and mileage, is selling new uses for Fiberglas in a variety of car components.

### 17.2.4 Production and Operations

Owens-Corning operates 76 plants in the U.S., including locations in Alabama, California, Colorado, Florida, Georgia, Illinois, Indiana, Kansas, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, and Utah.

### 17.2.5 Major Automotive Facilities

Four of Owens-Corning's facilities, Amarillo, Texas; Anderson, South Carolina; Jackson, Tennessee; and Valparaiso, Indiana; are major shippers of textile thread and resin reinforcements used in the automotive industry. The Anderson plant is the oldest of the four, while the Amarillo plant is brand new. (See Figures 17-3 to 17-6.)

*Amarillo, Texas*

The newest Owens-Corning facility is the 500,000 square foot Fiberglas reinforcement plant at Amarillo, Texas, which opened in March 1978. Capacity for the plant, which employs 600 people, is 200 million pounds of Fiberglas reinforcement material annually. The plant uses the largest overhead conveyor system in the country and eight lasers to move up to 3,000 spools of Fiberglas to four product fabrication areas.

*Anderson, South Carolina*

The Anderson plant, employing 1,650 people, opened in July 1951. It has the largest direct-melt glass furnace in the industry and produces more than 100 varieties of polyester resins. Two Anderson-made products, chopped glass strands and resins, are combined to form Fiberglas-reinforced plastic for use in the automotive industry.

*Jackson, Tennessee*

Jackson was the first Owens-Corning plant built exclusively for the manufacture of fiberglass reinforcements

Company: Owens-Corning Fiberglas Corp.

County:

Plant Size: 500,000 sq. ft.

Plant: Amarillo, Texas

Congressional District:

Address: P.O. Box 8000, Amarillo, TX 71909

Standard Metropolitan Statistical Area:

No. of Employees: 600

Telephone: (806) 622-1582

Primary SIC Code(s):

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Fiberglas reinforcement materials for automotive plastics | 200 million pounds of Fiberglas reinforcement threads and fabric annually | Fiberglass is made by melting sand, limestone and other ingredients at temperatures of about 2,500 degrees Fahrenheit. The molten glass is then drawn through small openings that shape it into fibers. These fibers are processed into basic types of fibrous glass, a fluffy blanket for insulation, yarn-like strands for weaving fabric for reinforcements, and chopped strands for reinforcement.<br>Roving, a fabric made by joining fibers together and weaving into fabric, is the basic product made at Amarillo for reinforcement fabric. | Used to reinforce automotive plastics |

FIGURE 17-3. AMARILLO PLANT

Company Owens-Corning Fiberglas Corp.

County ____

Plant Size ____

Plant Anderson, SC

Congressional District ____

Address P.O. Box 1367 Anderson, SC 29622

Standard Metropolitan Statistical Area ____

No. of Employees 1,650

Telephone (803) 296-3511

Primary SIC Code(s) ____

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Chopped glass strands and resins | Largest direct-melt glass furnace in the industry | Same as Figure 3 | Used to reinforce auto plastics |

FIGURE 17-4. ANDERSON PLANT

Company Owens-Corning Fiberglas Corp.

County ______

Plant Size Located on 200 acres

Plant Jackson, Tennessee

Congressional District ______

Address P.O. Box 2208 Jackson, TN 38301

Standard Metropolitan Statistical Area ______

No. of Employees 900

Telephone (901) 424-5330

Primary SIC Code(s) ______

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Fiberglas tire cord | N.C.A. | Fiberglas reinforcement threads are coated with rubber and woven into fabric to be cut into belts | Tire manufacturers |

FIGURE 17-5. JACKSON PLANT

Company Owens-Corning Fiberglas Corp.

County

Plant Size Located on 50 acres

Plant Valparaiso, Indiana (one of two plants)

Congressional District

Address 2552 Industrial Drive, Valparaiso, IN 46383

Standard Metropolitan Statistical Area

No. of Employees

Telephone (219) 465-1611

Primary SIC Code(s)

| Products (Automotive) | Capacity | Processes Used | Consumed by (Automotive) |
|---|---|---|---|
| Polyester resins and reinforcements | N.C.A. | Raw materials mixed together for 12 to 30 hours at constantly increasing temperatures. Then processed like fiberglass (see Figure 3) | Used to reinforce and manufacture automotive plastics |

FIGURE 17-6. VALPARAISO PLANT

and today it is one of the world's largest producers of fiberglass tire cord. The Jackson cord is woven into fabric and cut into belts to reinforce bias and radial tires. The Fiberglas cord improves the tire's performance since tires run cooler and weigh less with Fiberglas belts than with steel belts. The plant, built in 1969, employs 900 people.

*Valparaiso, Indiana*

Owens-Corning operates two plants in Valparaiso. The first opened in April 1969 for the manufacture of underground gasoline storage tanks. The second opened in 1973 for the production of polyester resins. Over 50 varieties of resins are made in Valparaiso for use in Fiberglas-reinforced plastics for car body components.

### 17.2.6 Expansions and New Plants

In 1978 Owens-Corning made process improvements and capacity expansions at two of the automotive products plants in Anderson, South Carolina, and Valparaiso. In 1979, the major capacity expansion was the completion of Phase I of a new glass fiber reinforcements plant in Amarillo, Texas.

## 17.3 FINANCIAL STATUS

Owens-Corning has been very successful as demand has increased for its Fiberglas products. It has begun a major capital spending program.

### 17.3.1 Operating Analysis

As can be seen in Table 17-1, Owens-Corning's sales have more than doubled and profits have tripled since 1975. Operating income and return on sales increased significantly through 1978 and sales have increased considerably relative to assets. The slight drop in operating income as a percentage of sales in 1978 was partly due to strikes at two of Owens-Corning's major insulation plants. Sales gains have been made in both the insulation and industrial sections of the firm.

In 1979, sales easily exceeded 1978. Revenues were 21 percent higher than 1977. However, earnings fell by 14 percent. Earnings were penalized by market fluctuations, escalating costs and start-up costs. (See Figure 17-7.)

### 17.3.2 Capital Analysis

Owens-Corning has maintained its growth so far without substantially changing its debt or having a new stock issue, with the exception of a 1979 increase in debt. Long-term debt to capitalization thus decreased from 28.4 percent in 1975 to 16.8 percent in 1978 and rose to 18.9 percent in 1979. During 1975 and 1976, internally generated funds more than covered dividends and capital expenditures. However, the major increases in capital expenditures in 1979 and 1978 drew down most of the excess working capital that had been saved in earlier years. Owens-Corning plans to continue heavy capital expenditures. This could require more borrowing. However, with the low debt to capitalization structure the company presently has, borrowing should be no problem. (See Figure 17-8.)

## 17.4 RESEARCH AND DEVELOPMENT PLANS

Over the past five years, the company has substantially increased basic research in areas such as the physics and chemistry of melting glass. Major new laboratory facilities, a new library and a computer complex have been constructed at the company's technical center at Granville, Ohio. The newly constructed Thermal Research Laboratory enables Owens-Corning engineers to measure the performance of full-sized components including roofs and insulated walls as well as automotive parts under actual climatic conditions. In all, Owens-Corning spent $33.5 million on research and development in 1979, a 33 percent increase over 1978.

The primary thrust of Owens-Corning's automotive research is the continuing development of fiberglass and resin systems ideally suited for use in different areas of the car, from cosmetic parts to structural applications. Owens-Corning engineers and chemists have developed two

| Year | Sales ($Millions) | Earnings ($Millions) | Return on Equity, Percent | Operating Income* / Sales Percent |
|---|---|---|---|---|
| 79 | 2245 | 109 | 15.5 | 14.1 |
| 78 | 1853 | 130.3 | 21.3 | 17.3 |
| 77 | 1481 | 112.5 | 22.2 | 18.3 |
| 76 | 1079 | 71.8 | 16.9 | 16.9 |
| 75 | 885 | 41.8 | 11 | 14.8 |
| 74 | 829 | 32.8 | 9.7 | 11.3 |

| Year | Earnings / Total Assets Percent | Sales / Assets | Earnings / Sales Percent |
|---|---|---|---|
| 79 | 8.0 | 1.63 | 4.9 |
| 78 | 11.7 | 1.67 | 7 |
| 77 | 12.2 | 1.61 | 7.6 |
| 76 | 9.1 | 1.35 | 6.7 |
| 75 | 6 | 1.28 | 4.7 |
| 74 | 5.5 | 1.32 | 4.2 |

*Operating Income = Sales – Cost of Goods Sold – Selling, General and Administrative Expenses, Before Depreciation, Interest, and Income Taxes.

FIGURE 17-7. OPERATING ANALYSIS OF OWENS-CORNING

| | | | Sources | | | |
|---|---|---|---|---|---|---|
| Year | Sales | P/E Ratio[1] | Earnings | Depreciation | Changes in Long-Term Debt | Changes in Owners' Equity Other Than Retained Earnings |
| 79 | 2245 | 7.7 | 109 | 90.1 | 47 | 2.5 |
| 78 | 1853 | 6.9 | 130.3 | 62.8 | (2.6) | 4.5 |
| 77 | 1481 | 8.8 | 112.5 | 50.5 | (5) | 3.4 |
| 76 | 1079 | 11.1 | 71.8 | 47.3 | (13) | 5.6 |
| 75 | 885 | 12.6 | 41.8 | 43.9 | 28 | 2 |
| 74 | 829 | 16.5 | 32.8 | 33.4 | 15 | 1.7 |

| | | Uses | | | | | |
|---|---|---|---|---|---|---|---|
| Year | Change in Working Capital | Capital Expenditures | Dividends | $\frac{\text{Long-Term Debt}^2}{\text{Capitalization}}$ % | Coverage[3] | $\frac{\text{Cap. Exp.}}{\text{Total Assets}}$ % | Current Ratio |
| 79 | (4) | 184 | 36.5 | 18.9 | 14.3 | 13.6 | 1.4 |
| 78 | (60) | 246 | 30.3 | 16.8 | 24.3 | 20 | 1.5 |
| 77 | (18) | 167 | 16.9 | 19.8 | 21.5 | 16.6 | 2 |
| 76 | 53 | 44 | 14.4 | 23.9 | 13.7 | 5.3 | 2.4 |
| 75 | 73 | 44 | 13 | 28.4 | 9.2 | 5.9 | 2.4 |
| 74 | (20) | 92 | 12.5 | 26.2 | 8.2 | 14.1 | 2.1 |

Dollar figures are in millions

[1] Average for the Year

[2] Capitalization Defined as Total Liabilities – Current Liabilities

[3] Operating Profit/Interest

FIGURE 17-8. CAPITAL ANALYSIS OF OWENS-CORNING resins, E 4297 for surface parts and E 980 for structural parts, primarily for use in sheet molding compound systems for auto components.

Owens-Corning's System 1, using E 4297 resin and 956 fiber thread, is for molding surface parts. The two ingredients are designed for a low-shrink system so that molded parts have a good surface. The easily processed compound can be used to mold everything from decklids to doors.

System 2, using E 980 resin and 433 fiber thread, is for high-strength, high-glass content structural parts. This system can be used for such structural applications as leaf springs and radiator core supports.

The new compounds cost less to assemble, tool, and produce than steel, and they weigh less and never corrode.

Owens-Corning is also developing advanced processing machinery to mold its new resin systems into a variety of automotive parts. One Owens-Corning machine can now produce sheet molding compound strong enough for structural applications as well as cosmetic parts at high-volume production rates with only a few adjustments.

## 17.5 LABOR RELATIONS

Owens-Corning was not without labor-related problems in 1978. Strikes at the Newark, Ohio, and Jackson, Tennessee, plants adversely affected insulation production and sales. The company negotiated three-year contracts with those two plants as well as the Santa Clara, California, and Waxahachie, Texas, plants.

The number of Owens-Corning employees jumped from 22,000 in 1977 to 24,400 in 1978. About 390 employees were added due to the acquisition of two wood fiberboard plants.

200 copies