Profiles of Major Suppliers to the Automotive Industry

Volume 6: Foreign Automotive Parts and Components Suppliers

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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.

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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.

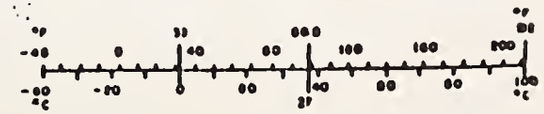
METRIC CONVERSION FACTORS

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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SUMMARY

This report on foreign parts and components 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 changing conditions in the automotive industry.

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 requirements for parts and components purchased from automotive suppliers.

Shock absorbers, for instance, will soon be replaced in many cases by MacPherson struts used in front-wheel-drive cars. Brakes are being redesigned in lighter configurations and plastic and aluminum are being used to manufacture master cylinders. In almost every part of the car new technology and new designs are being introduced. As parts and components suppliers respond to and adjust to these changes, decisions are made that can have significant economic impacts, especially on local employment trends and economic activity.

SCOPE OF THIS REPORT

This report provides a detailed view of the response of foreign parts and components suppliers to new car needs by looking at specific companies that are important in the industry. In addition, it provides a baseline of data that can be used to track industry changes or predict industry response to future regulations.

Six foreign parts and components suppliers to the auto industry are covered in this report. Each is significant or potentially significant in the American automotive industry. For each company, information is provided, wherever possible, 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 location, products and employment of major automotive facilities and plans for plant expansions
- Financial status including profitability and capital spending
- 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.

METHODOLOGY

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

- Magazine and trade journal articles
- Annual reports
- Company marketing literature and advertisements
- Annual meeting speeches.

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. In general, financial data was far more difficult to obtain from foreign companies than from U.S.-based companies.

ORGANIZATION

This report begins with an overview that presents the size and structure of the foreign parts and components industry and the key issues currently confronting the industry. Following the overview, company analyses are given for six major corporations.

1. FOREIGN PARTS AND COMPONENTS SUPPLIERS

Compared to data on North American-based companies, detailed information about automotive components suppliers in Europe is less available in the public literature. Therefore, the focus of this report has been on the largest European-based suppliers with a multinational focus.

1.1 INDUSTRY SIZE AND STRUCTURE

The top five companies that supply parts and components in Europe have annual combined sales in excess of $15 billion (excluding tires). Two European-based tire companies (Michelin and Dunlop) dominate that industry in Europe with combined sales in excess of $12 billion. Below these major components suppliers, there exist 10 to 15 companies with annual sales of $500 million or more.

Each of the major European countries has one or two very large components suppliers. These large companies have strong domestic markets, but unlike many U.S. suppliers, have substantial markets in nearby countries in Europe and the rest of the world. While it is difficult to generalize about the products of these very large European components manufacturers, there is a clear orientation toward high-technology fuel and electrical system components.

A pattern of partial joint ownership of smaller European components suppliers by the very large suppliers appears to be emerging, but this is often an issue with the various national governments in Europe. The complexity of joint ownership, joint ventures, and other related activities among suppliers and vehicle manufacturers in Europe is substantial.

1.2 MAJOR COMPANIES

Table 1-1 lists the major foreign components suppliers to the auto industry. The companies selected for analysis in this report are identified with a dot in the table. These manufacturers were chosen because they are important in the Atlantic market and/or they have product technologies likely to be important in the U.S. in the next few years.

TABLE 1-1. MAJOR FOREIGN COMPONENTS SUPPLIERS

Company	Location	1979 Revenue ($ Billions)
Michelin●	France	6.24
Dunlop Pirelli Union●	Britain-Italy	5.98
Robert Bosch●	Germany	5.90
Guest, Keen and Nettlefolds●	Britain	4.16
Bridgestone Tire	Japan	2.66
Lucas Industries●	Britain	2.18
Ferodo Groupe●	France	1.43
Continental Gummi Werke	Germany	1.43
Zahnradfabrik Friedrichshafen	Germany	1.11
Yokohama Rubber	Japan	1.00
Usines Chausson	France	.96
Ausin Seki	Japan	.87
Kanto Auto Works	Japan	.86
Associated Engineering	Britain	.76
Dunlop Australia	Australia	.72

● Companies covered in this report.

1.3 TRENDS

The European automotive industry and the foreign parts and components suppliers are now dealing with major challenges connected with a:

- Changing market environment
- Changing automotive technology.

1.3.1 Changing Market Environment

The growing saturation of some European automotive markets is having a significant impact on the market potential of European suppliers. In addition, the automotive manufacturers in certain European countries such as England have faced declining automotive sales in recent years. The threat of increased market penetration of Japanese automakers into the European market has further weakened that market potential from the viewpoint of European automotive parts and components suppliers. In reaction, suppliers are diversifying into non-automotive products, increasing their focus on high-technology automotive products and attempting further penetration into worldwide markets. The development of "world cars" by various manufacturers has provided an opportunity for European suppliers to increase sales on a worldwide basis.

Because of the growing saturation of some European markets and declines in domestic vehicle production in some countries, European components suppliers have begun to view the U.S. market and its needs for high-technology, downsized components as very attractive. Current sales to U.S. vehicle manufacturers are relatively small. However, as is clear from the profiles of the large European-based components suppliers contained in this report, substantial strategic activities in product research, development, and even new U.S. plant construction is underway. Again the focus is on high-technology, hence high-margin products. Several European companies feel they have developed an expertise in parts used to make fuel-efficient cars and thus have a competitive advantage in selling to the American market.

The plant investment appears to be occurring disproportionately in the southeastern states. Among the European manufacturers locating or expanding plants in the United States and Canada are:

- Michelin, which since 1975 has opened four plants in the U.S. and is now building new plants in South Carolina and Nova Scotia

- Robert Bosch, which is expanding its capacity for diesel fuel injection equipment in North Carolina

- GKN, which by mid-1981 will have the capacity to manufacture constant velocity joints for 1.2 million cars at plants in North Carolina.

1.3.2 Changing Automotive Technology

Europeans have been manufacturing small cars for years. Nevertheless, the increasing cost of fuel and the development of new technologies in electronics and materials have led to considerable investment on the part of European parts and components suppliers in new automotive products. Examples of such new products include:

- Fuel injection systems. Bosch hopes the need for greater fuel economy will boost its sales of fuel injection systems to the auto industry. A considerable amount of the company's research and development expenses are now being spent on improving and developing new fuel injection equipment. Bosch is involved with equipment for use on both gasoline and diesel engines. Lucas also sees considerable growth in the diesel market and is building a new factory in France to make fuel injectors.

- Electronic controls. Several European suppliers are developing computer microprocessor-based controls for automobiles. Included in this group are Valeo and Lucas. Lucas is becoming an important original equipment supplier to European car manufacturers, particularly in electronics, engine management and diesel starters.

- New materials and lightweight parts. GKN is investigating lightweight materials and composites for automobiles, including carbon fiber materials. The company is also designing lightweight axles and suspension parts which would allow trucks to carry heavier loads, while doing less damage to roads and being safer than current heavy-duty trucks.

- Run-flat tires. Dunlop has developed a tire that can be used for 100 miles at 50 miles per hour after deflation. Such tires are now being offered

on a few Datsun and Peugeot car lines. However, the tires are more expensive than conventional tires and provide only a limited advantage to the motorist. The company hopes to develop tires that can operate permanently and never deflate. These could thus permanently eliminate the need for spare tires.

* * * * *

The company profiles which follow are for the six largest (non-Japanese) independent parts and components suppliers outside the United States. While all of these companies are multinational in scope, their lack of a U.S. headquarters for corporate operations makes it difficult to obtain public information at the level of detail available from firms which must meet U.S. corporate reporting requirements. The profiles which follow were prepared by Booz, Allen & Hamilton based upon information supplied by the Economist Intelligence Unit, Ltd. (EIU), under subcontract. The profiles focus on the automotive operations of:

- The Bosch Group—Germany
- Dunlop Holdings, Ltd.—U.K., Italy
- Michelin—France
- Guest, Keen and Nettlefolds (GKN)—U.K.
- The Valeo Group (formerly Ferodo)—France
- Lucas Industries, Ltd.— U.K.

2. AUTOMOTIVE OPERATIONS OF MICHELIN

2.1 INTRODUCTION

Michelin et Cie was originally established in 1893 as a rubber processing company. It took over a business formed in 1832 by Messrs. Barbier and Daubree. The company has since traded under a succession of names:

- Barbier, Daubree et Cie
- E. Daubree et Cie
- J. G. Bideau et Cie
- Manufacture de Caoutchouc Michelin
- Compagnie Generale des Etablissements
- Michelin (Robert Puiseux et Cie) 1951
- Compagnie Generale des Etablissements
- Michelin (Michelin et Cie) 1959.

An important change in the structure of the company occurred in 1951. A subsidiary manufacturing company was created to control all the company's industrial and commercial assets in France and in the French "Communaute" (directly controlled French territories overseas). The new company was named Manufacture Francaise des Pneumatiques Michelin (Puiseux, Durin et Cie). In 1959 it was renamed Manufacture Francaise des Pneumatiques Michelin (Michelin, Durin et Cie) and in 1962 the name was changed to its present form of Manufacture Francaise des Pneumatiques Michelin (Michelin et Cie). The parent company, Compagnie Generale des Etablissements Michelin, remained in direct control of the management of the foreign subsidiaries, that of its properties and of its financial portfolio.

In 1975/76, within the framework of a reorganization of the French automotive industry, Michelin sold to the Peugeot group the whole of its 53-percent holding in Andre Citröen which it had held since the end of the Second World War. Michelin now retains only a very small financial interest in PSA Peugeot Citröen. In 1979/80, Michelin severed its connection with Kleber Colombes, the other indigenous French tire manufacturer. In 1979 it took over control of the company in which previously both Michelin and the Austrian tire producer Semperit had

an interest. However, Kleber Colombes had been consistently making large losses from 1973 onwards, and at the beginning of 1980, Michelin announced plans to sell Kleber Colombes to the Germany company Continental Gummi, part of the Bayer Group. However, on September 17, 1980, there was a terse announcement from Continental that the deal was called off.

Before examining Michelin operations in any detail, it must be stressed that the group and its component companies have a policy of virtually total secrecy. This applies to production figures as well as to information about research projects. The company profile given in the following pages has therefore been written from those annual reports which were available in London and what information could be gleaned from the press in the UK, France and the United States. Attempts to gather more facts about the operations of the group by personal interviews were rebuffed both in the UK and at the headquarters of the company in Clermont Ferrand.

2.2 STRUCTURE

As explained in the introduction, the central company in the Michelin group is the Compagnie Generale des Etablissements Michelin. This company controls all the sectors of Michelin activity through a number of companies. Six of these companies are concentrated on the large financial portfolio of the group, which consists mostly of property and finance companies. Table 2-1 lists these companies together with the proportion of their equity held by the Compagnie Generale and their main areas of activity.

TABLE 2-1. COMPANIES WITHIN THE FINANCE SECTOR OF THE MICHELIN GROUP 1979

Name of Company	Percent of Equity Held by Michelin	Main Activity
Participation et Developpements Industriels SA (Pardevi)	99.99	Holding company
Spika SA	100.00	Property company
Societe de Participations dans les Entreprises Regionales en Expansion SA (Siparex)	100.00	Finance company
Transpriva SA	100.00	Property company
Istel Fund Incorporated (New York)	Not known	Finance
Domequity Growth Calgary Limited (Montreal)	Not known	Finance

It is through the Pardevi holding company that Michelin retains its small interest in the Peugeot Citröen group There are few other details available about this sector of Michelin activity. First, it has little to do with the industrial and commercial sector of activity of the Michelin group. Second, the financial role of this sector of the company helps explain the strong financial position in which Michelin finds itself despite the crisis in the world tire market, a position which the group strives to maintain.

The "active" part of the group is controlled by the Compagnie Generale through five companies:

- Manufacture Francaise des Pneumatiques Michelin
- Compagnie Financiere Michelin
- Societe d'Exportation Michelin
- Societe des Matieres Premieres Tropicales
- Societe Antillaise des Pneumatiques Michelin.

The last three companies in this list do not control any further companies within the group. For all three, 100 percent of their equity is held directly by the Compagnie Generale. Their functions, however, differ. The two companies remaining in the list are those through which the Compagnie Generale controls the entire production

of tires worldwide and most of the marketing of this production. The French part of the group is controlled through the Manufacture Francaise des Pneumatiques Michelin, and the overseas part is controlled through a Swiss holding company, the Compagnie Financiere Michelin. Each of these companies in turn controls a number of other companies of varying functions within the Michelin group. The above five are described further below.

Societe d'Exportation Michelin

The Societe d'Exportation Michelin is a distribution company for Michelin products in Greece, Upper Volta, Libya, Mauritania, Portugal, Senegal, Syria, South Vietnam and Zambia. Its supply source is mainly the French production units, but it may draw from any other Michelin factory worldwide depending on availability, transport and exchange rates.

Societe des Matieres Premieres Tropicales

The Societe des Matieres Premieres Tropicales is primarily a rubber trading company based in Kuala Lumpur and Singapore. No other information was available on the company.

Societe Antillaise des Pneumatiques Michelin

The Societe Antillaise des Pneumatiques Michelin is an anomaly insofar as it is directly controlled by the main company rather than by its French subsidiary Manufacture Francaise des Pneumatiques Michelin. It is a distribution company for Michelin tires in the areas of the French West Indies which are French overseas departments and territories. Being part of the so-called French "communaute" it should logically be part of the French sector of the group. Because of its proximity to the U.S., however, it seems that is was kept independent to facilitate its functioning with other parts of the organization.

Manufacture Francaise des Pneumatiques Michelin

This company has a capital of Fr 700mn and 99.98 percent of its equity is held by the Compagnie Generale. In 1979, its turnover amounted to Fr 10,089 mn. The commercial headquarters are in Clermont Ferrand and there are 19 factories in France which are listed below.

In Clermont Ferrand itself there are five factories:

- Les Carmes (est 1889)
- Estaing (est 1913)
- Cataroux (est 1921)
- La Combaude (est 1960)
- Chantmerle (est 1972).

In the rest of France, there are 14 other factories:

- La Capelle St Mesmin - Orleans (est 1951)
- St Doulchard - Bourges (est 1953)
- La Capelle St Luc - Troyes (est 1958)
- Youe les Tours - Tours (est 1960)
- Vannes (est 1964)
- Bassens - Bordeaux (est 1964)
- Golbey - Epinal (est 1969)
- Montceau les Mines (est 1970)
- Cholet (est 1970)
- Poitiers (est 1972)
- La Roche sur Yon (est 1972)
- Roubaix (est 1972)
- Roanne (est 1974)
- Le Puy (est 1977).

Few details are available about the activities of the above factories. The range of products manufactured in each, and the turnover attributable to it, are a secret which Michelin jealously guards. It is a known fact, however, that Michelin manufactures on a continuous basis all of its products in the French factories from its traditional tires for cars, trucks, industrial vehicles, and off-highway equipment to synthetic rubber products, car wheels/rims and drawn wire. Some idea of the size of the whole organization may be gained by its employment which numbered 50,000 in 1979.

Over and above its management function for the above quoted factories, and its responsibility for the commercialization of their production, this company also directly controls two nominally wholly-owned subsidiaries:

- Societe d'Applications Techniques et Industrielles in Algeria

- Societe des Plantations et Pneumatiques Michelin in South Vietnam.

The latter also controls its own subsidiary, the Manufacture Saigonnaise des Pneumatiques Michelin. Nothing is known of the fate of the South Vietnamese operations (plantations in Dan-Tieng and Thaun-Loi and the factory in Saigon) since the fall of Saigon to the North Vietnamese. No mention is made of this part of the Michelin group in any annual report since U.S. military withdrawal. Both companies, however, are still nominally part of the Michelin group. Turnover and production figures for the Algerian operations are not published. The manufacturing plant is in Husseiu-Dey while the commercial headquarters are in Algiers.

Compagnie Financiere Michelin

As already mentioned, the Compagnie Financiere Michelin is a holding company based in Switzerland which controls all foreign based subsidiaries of the Michelin group whether manufacturing or solely marketing. In 1978 the nominal capital amounts to SFr534.78 mn. A new issue was raised in 1979 of SFr133.695 mn bringing the capital to SFr668.47 mn. The percentage of the equity held by the group through the Compagnie Generale remained 99 percent. The Compagnie Financiere controls the operations of eight main manufacturing subsidiaries in Italy, West Germany, Spain, Belgium, Holland, the UK, Canada and the U.S. It also controls the commercial companies which distribute Michelin products in Argentina, Austria, the Cameroons, Denmark, Finland, the Ivory Coast, Madagascar, Mali, Morocco, Norway, Sweden, Switzerland, Tunisia and Zaire. Three further companies are controlled by the Basle Holding Company: Michelin Recherche et Technique based in Basle; Michelin Investment Holding Company based in Hamilton (Bermuda) which concentrates on investment in North America, and Michelin International Development NV based in Holland, an international finance company. All three companies are wholly owned and the latter two fulfill some of the function of managing the Michelin group foreign portfolio of investment.

The eight foreign manufacturing subsidiaries of this company are described below.

The Societa per Azioni Michelin Italiana

This company is 100 percent owned and consolidated into the group. The manufacturing activity is based in

Turin where there are two factories: one established in 1906 and a recent addition in 1972 at Torina-Stura. There are four other factories in Italy:

- Tzeuto (est 1927)
- Cuneo (est 1963)
- Alessandria (est 1971)
- Fossano (est 1971).

The marketing operations of the company have their headquarters in Milan.

The Michelin Reifenwerke AG

Fully consolidated with 96.29 percent of its equity held by the Basle company, this Germany company manufactures Michelin products in five factories:

- Karlsruhe (est 1931)
- Bad Kreuznach (est 1966)
- Bamberg (est 1971)
- Homburg (est 1971)
- Triers (est 1971).

The commercial headquarters of the company are in Karisruhe.

The Sociedad para la Fabricacion en Espana de Neumaticos Michelin

This company has the same equity status as the Italian subsidiary, i.e., 100 percent owned. The manufacturing activities are carried out in four factories:

- St Sebastian-Lazarte (est 1934)
- Vitoria (est 1966)
- Aranda de Deuro (est 1970)
- Valladolid (est 1974).

The marketing operation of the company is based in Madrid.

The Society Belge du Pneumatiques Michelin SA

This company, like the previous one, is a 100 percent owned subsidiary controlled through Basle and fully consolidated in the Michelin group. Its only factory is at Zuen-les-Bruxelles and distribution is carried out at its commercial headquarters in Brussels.

The Nederlandsche Banden-Industrie Michelin

Ninety-nine percent of the equity of this company is held by the Compagnie Financiere Michelin and it is a consolidated company within the Michelin group. Its only factory is at Bois-le-Duc. Marketing headquarters of the company are in Amsterdam.

Michelin Tire Company Limited

The Michelin Tire Company Limited is the British subsidiary of the Michelin group. It is a larger operation than those in other European countries due to its control of a number of overseas subsidiaries both manufacturing and commercial. In 1979, Michelin Tire and its subsidiaries had a group turnover of 425, with net profits of 20. The company is wholly owned by the Michelin group and itself wholly owns its subsidiaries abroad and in the UK with the exception of the Nigerian operation, of which it only owns 67 percent of the equity because of the National Enterprise Decree of the Nigerian government.

The factories in the UK which are under the direct control of Michelin Tire are the following:

- Stoke-on-Trent (est 1927)
- Burnley (est 1960)
- Dundee (est 1972)
- Aberdeen (est 1973).

The headquarters of the manufacturing sector are in Stoke-on-Trent while the commercial headquarters are in London. There are two further factories in the UK which are directly controlled by a wholly-owned subsidiary of the company, Michelin (Belfast) Limited. Both are in Northern Ireland at Belfast (est 1965) and Ballymena (est 1969).

Michelin Tire also controls a manufacturing subsidiary in Nigeria whose factory is in Port Harcourt (est 1962). The marketing subsidiaries of the Michelin Tire Company Limited in Africa are as follows:

- Michelin (East Africa) Limited, Kenya
- Michelin (Uganada) Limited, Uganda

- Michelin (Tanzania) Limited, Tanzania
- Michelin Tire Company SA (Pty) Limited, South Africa
- Michelin (Ghana) Limited, Ghana.

To these commercial subsidiaries must also be added the Motor Tire Services Company of Nigeria Limited, only 40 percent of whose equity is held by Michelin, UK.

There are two manufacturing operations of the Michelin group in North America, the Michelin Tire Corporation (U.S.) and Michelin Tire Limited (Canada). The Michelin Tire Corporation (New York) is a wholly-consolidated subsidiary of the group and is, again, controlled by the Compagnie Financiere Michelin in Basle. The production is carried out in four factories:

- Anderson (est 1975)
- Greenville (est 1975)
- Spartanburg (est 1978)
- Dothan (est 1979).

A fifth manufacturing unit is in the process of being built in Columbia, South Carolina. This factory will produce passenger car tires. Spartanburg mainly produces truck tires while Dothan manufactures tires for light trucks. The commercial operations of Michelin in the United States are based in Lake Success, Michigan.

Michelin Tires (Canada) Limited, in Montreal is the wholly-consolidated Canadian subsidiary of the Michelin group. Two plants are at the moment in operation in Canada: Granton (est 1971) and Bridgewater (est 1971). A third is planned in Nova Scotia for all types of tires. The construction of this last factory was arrested by labor troubles in 1979. Construction started again at the beginning of 1980 following the passing by the Canadian Parliament of a controversial so-called "Michelin" Bill (or the Nova Scotia Trades Union Act). The effect of the Bill has been to reduce the power of the unions with which Michelin has to deal in Nova Scotia where all three plants are located. The commercial headquarters of the Michelin operation in Canada are in Montreal. The present number of employees in the two operating Canadian factories is 3,600. The number is expected to rise by 1,800 when the new plant comes on stream.

Michelin UK also holds 100 percent of the equity of the distribution company Associated Tire Specialists Limited and its 15 regional subsidiaries. One of the latter is Langley Moor Remoulds Limited.

The bulk of Michelin activity is in tire production. The group is, however, also involved in the production of wheels and rims, rubber (synthetic and natural) and steel cord, an important component of the Michelin X tire.

There are seven main categories of tires produced by Michelin. Each different category is made up of a number of tire types. The main tire categories are:

- Car tires
- Truck tires
- Industrial truck tires
- Construction equipment tires
- Agricultural tractor tires
- Bicycle and motorcycle tires
- Winter tires.

2.3 PRODUCTION

It has already been pointed out that very little information could be obtained on the production operations of the Michelin group. However, the scope of the organization may be guessed at by the numbers employed: around 110,000 in the 48 factories operating in all 11 different countries. Two more factories are in the process of being built, one in Nova Scotia and one in South Carolina. Additionally, eight more are at the planning stage, as follows:

- Two are to be built in France, possibly in Lorraine. One is to be for the production of wheels and rims and the other for the production of car tires.

- One factory is planned for the U.S. near Austin, Texas. The Michelin Tire Corporation has also taken options on two further sites in Texas, one at Midland and one at Temple.

- Two factories are in the final planning stages in Brazil: one will produce heavy duty truck tires and the other, drawn wire.

- One factory is planned for Egypt.

The only production figures which are available for the Michelin group are for the whole organization and are outdated. The figures are reproduced below in Table 2-2. They do not include, for obvious reasons, the production from the two U.S. factories at Spartanburg and Dothan.

TABLE 2-2. AVERAGE DAILY PRODUCTION OF THE MICHELIN GROUP IN 1977

Tires (units)	330,000
Tubes (units)	226,000
Wheels (units)	42,000
Steel cord (tons)	600

A brief survey of the main production areas is presented below. Some of the details included in this survey have already appeared in the section on structure.

France

The turnover of the French subsidiary rose by some 15 percent from Fr8,762 mn in 1978 to Fr10,089 mn in 1979. The bulk of the increase was attributable to export sales which grew by 25 percent to reach more than 50 percent of total production in 1979. The domestic market saw little progress during the year, particularly for truck tires, because of the weak state of the French truck industry. The main development area at home and abroad was in off-highway equipment tires. A direct result of the buoyancy in Michelin's off-highway equipment tire market has been an increase in production capacity for such tires at its factory at Montreau-les-Mines. Despite the increase in turnover by the French subsidiary in 1978, net profits fell by some 31 percent from Fr15,654 mn to Fr10, 749 mn. Michelin claimed that the main reason for the decline was exchange losses because export prices were quoted in U.S. dollars in many markets. Another reason was the sharp rise in raw material costs.

U.S.

Overall the Mechelin Tire Corporation realized substantial losses in 1979. This was largely attributed to the implementation of several new factories. Production and sales of industrial and off-highway tires continued on an upward trend, although sales in the private car sector slowed down considerably.

Canada

Sales in the domestic Canadian market saw a significant increase, especially for truck tires. For the first time the company was profitable, despite the fact that export sales to the U.S. market were and are still impeded by a heavy duty tax.

UK

The British operation saw an improvement in sales in 1979 as compared to 1978. Sales increased both domestically and on the export market, with turnover increasing from £398 mn in 1978 to £425 mn in 1979. Net profits also rose from £13 mn in 1978 to £14.7 mn in 1979. Production facilities at Stoke-on-Trent were also modernized during the year.

West Germany

Both export and domestic sales increased in 1979, especially in the truck tire market. Better use of existing capacity helped increase producion levels, and capacity has been extended in both tires and drawn wire at the Triers factory. The operation was profitable despite some exchange losses.

Spain

The Spanish operations recorded a loss in 1978 due to production and labor problems at the factories in Lazarle and Vitoria. Production and sales levels stagnated in all sectors of activity. Despite these problems, a new plant for the production of truck tires came on stream in early 1980.

Italy

Replacement sales in the domestic market and production for export progressed significantly in 1979. Net financial results were satisfactory although productive capacity was not fully utilized.

Belgium

Production levels at the Zuen factory increased during 1979 by better usage of existing capacity. Domestic and export sales also saw an increase. Despite this positive trend, however, a financial loss was recorded.

Netherlands

Michelin is dissatisfied with productivity in its Dutch operations, although 1979 saw an increase in production and sales. A net loss was recorded.

Other Countries

Details of the Nigerian operation can be found in other parts of this report. In 1979, both production and sales showed a marked increase with a consequent positive effect on profits. On the other hand, in Algeria, sales and production declined slightly. Other markets in which Michelin is only present as a marketing company showed varied sales results in 1979. Those in which sales increased were:

- Japan
- Eastern Europe
- The Middle East
- Argentina.

With respect to Michelin's rubber production, it would appear that the South Vietnamese operations have ceased to function. As a consequence, Michelin has attempted to find other secure sources of natural rubber. In this context, it has given substantial technical aid to an Ivory Coast company, the Societe des Caoutchouc de Grand Bereby, of which Michelin holds 10 percent of the equity. In Brazil, with a view to creating an integrated industrial complex, Michelin has bought substantial amounts of land in the Matto Grosso to create plantations. Nigeria is also being considered for the development of a similar industrial complex.

2.4 MARKETING AND DISTRIBUTION

A certain amount of information about the marketing of Michelin products is already included in the previous sections of this report. Although no comprehensive list of Michelin subsidiaries worldwide is available, Michelin has a marketing organization in the following countries:

- Argentina -
- Austria Michelin Reifenverkauf (Osterreich)

Cameroons	Commerciale du Pneumatique SA
Denmark	-
Finland	-
Ivory Coast	-
Madagascar	-
Mali	-
Morocco	Commerciale du Pneumatique SA (Casablanca)
Norway	-
Sweden	-
Switzerland	SA des Pneumatiques Michelin (Geneve)
West Indies	Society Antillaise des Pneumatiques Michelin SA
Greece*	Societe d'Exportation Michelin SA
Upper Volta*	Societe d'Exportation Michelin SA
Libya*	Societe d'Exportation Michelin SA
Mauritania*	Societe d'Exportation Michelin SA
Portugal*	Societe d'Exportation Michelin SA
Senegal*	Societe d'Exportation Michelin SA
Syria*	Societe d'Exportation Michelin SA
South Vietnam*	Societe d'Exportation Michelin SA

* These are foreign branches of the Societe d'Exportation Michelin and are not registered in their own right.

•	Zambia*	Societe d'Exportation Michelin SA
•	Kenya**	Michelin (EA) Limited
•	Uganda**	Michelin (Uganda) Limited
•	Tanzania**	Michelin (Tanzania) Limited
•	South Africa**	Michelin Tire Company SA (Pty) Limited
•	Ghana**	Michelin (Ghana) Limited
•	Zaire	Societe Zairoise des Pneumatiques Michelin (Kinshasa)
•	Tunisia	Societe Tunisienne des Pneumatiques Michelin.

Through the above noted organizations Michelin products are marketed worldwide in 150 different countries. Michelin is also present in two countries not mentioned above in the form of granted licenses for retreading. These countries are Australia (Bell Bros. Limited) and San Salvador.

One salient fact about Michelin marketing policies is that each distribution unit acts independently and can buy from any production unit within the Michelin group. This gives great flexibility to the commercial structure and allows each unit to maximize its profits to market requirements, production availability and prevailing exchange rates.

The net result of such a policy is that the Michelin group as a whole has managed in recent years to increase its market share in virtually all its markets, despite a gloomy automotive and general economic situation. Michelin holds some 60 percent of the French tire market, 30 percent of the West German market, 35 percent of the Italian market and 24 percent of the UK market.

** These are subsidiaries of Michelin (UK).

In the U.S., Michelin has about 5 percent of the car tire market and 8 percent of the truck tire market.

2.5 FINANCIAL ANALYSIS

The Michelin Group's published consolidated accounts are kept to the absolute minimum legal requirement. The most helpful figures in trying to evaluate the progression of the group in recent years are turnover and profits and these are reproduced in Table 2-3 below.

TABLE 2-3. CONSOLIDATED TURNOVER AND PROFITS OF THE MICHELIN GROUP 1975 TO 1979
(in Millions of Francs)

	1975	1976	1977	1978	1979
Net turnover	12,798	16,220	18,060	20,700	23,936
Net profits	408	754	675	686	598

Note: The figures are rounded to the nearest million.
Source: Consolidated accounts for the relevant years.

As shown, total untaxed net sales of the Michelin Group worldwide amounts to FR23,936 mn in 1979. More than 50 percent of this total was generated by the overseas subsidiaries of the group. About half the output of Michelin in France is exported.

It should be noted that the above figures are exclusive of the Kleber Colombes part of the Group. Prior to 1975 the accounts included Kleber-Colombes. As has already been pointed out, one of the mainfinancial operations carried out within the group in 1979 was the increase in the nominal capital of the Compagnie Financiere Michelin from SFr535 mn to SFr668 mn. The totality of the new issue was taken up by the Compagnie Generale des Establissements Michelin. As this is the main company within the group a few key figures are given in Table 2-4.

TABLE 2-4. KEY FIGURES FOR THE COMPAGNIE GENERALE DES ETABLISSEMENTS MICHELIN 1975 TO 1979
(in Thousands of Francs)

	1975	1976	1977	1978	1979
Nominal capital	44,977	494,937	495,536	496,667	496,676
Net turnover	245,838	290,306	400,792	417,775	424,901
Net profits	91,321	109,302	125,501	140,965	152,250
Distributed profits	81,183	96,255	103,443	118,456	137,530
Net assets	1,921,720	2,235,454	2,494,004	7,320,408	7,341,957
Medium- and long-term loans	874,814	1,110,148	1,042,386	963,354	902,750

It must also be noted that the production of steel cord is mostly destined to be used for the manufacture of tires. As each unit of production acts independently within the group, there may be some element of double counting of the net sales figures quoted above. The effect of this double counting is, however, believed to be small. Net sales of the group increased by some 15 percent in 1979 over the sales in 1978. Consolidated net profits fell, however, by some 12 percent from Fr686 mn in 1978 to Fr598 mn in 1979. The bulk of the decrease was attributed by Michelin to the firm Franc against the U.S. dollar, and not to a diminution of activity due to falling sales.

2.6 RESEARCH AND DEVELOPMENT

Some 3 percent of total group turnover is allocated to research and development. The main research center is at Ladoux near Clermont Ferrand where there is also an extensive test center. Test facilities are also available at Stoke-on-Trent in the UK, at Almeria in Spain and at Laurens in South Carolina.

The Spanish test center is devoted to the testing and associated research of giant tires for earth movers and for tires for tractors and trucks. Staff employed in the various research departments and laboratories number some 4,500.

The main areas in which research has been concentrated in recent years are those concerned with the development of tires for industrial use, although research is carried out on a continuous basis for car tires as well. One of the factors which is given the most attention is that of weight in the context of energy conservation.

3. AUTOMOTIVE OPERATIONS OF THE BOSCH GROUP

3.1 INTRODUCTION

The Bosch Group was established in 1886 as Robert Bosch Werkstätte für Feinmechanik und Elektronik. It became a public company in 1917, and adopted its present name Robert Bosch GmbH and private status in 1937. The company was reorganized in 1964 to its present form. Of the total shares in the company, 89.1 percent are owned by the Robert Bosch Foundation (Stiftung) and the remaining 10.9 percent by Bosch family interests.

The Bosch Group now has subsidiaries and affiliates worldwide, operating in manufacturing and marketing capacities. Although around 60 percent of revenue is derived mainly from electrical, electronic and mechanical automotive components, Bosch has diversified into a variety of fields, principally with a view towards energy conservation. The other main product areas are:

- Heating appliances
- Power tools
- Radios
- Televisions
- Capacitors
- Medical equipment
- Cine/optics
- Generators
- Electric motors
- Hydraulics
- Pneumatics
- Packaging machines
- Metallurgy and plastics.

Despite the advent of a world recession and increasing competition from Japan, with the exception of Blaupunkt Werke GmbH the automotive equipment divisions operated at capacity in 1979, as did other divisions on the whole. The general strength of demand in 1979 led to further expansion of facilities and personnel, both at home and abroad. At the end of 1979 the number of Bosch employees totalled 121,395.

In addition to the expansion of existing operations, Bosch has broadened its interests outside of Germany through takeovers. The acquisition of Stanley Power Tools, based at New Bern, North Carolina, for example, is seen as a starting point for expansion of its machine tool interests in the U.S. market.

In spite of a recession in world automotive markets, Bosch is increasing investment in this sector, as it sees the energy problem as a chance to market and develop fuel-saving devices, particularly fuel injection equipment in which it is market leader.

A further recent development in the Bosch Group is the so-called "nationalization" of the production of foreign subsidiaries; the rising value of the German Mark has created difficulties for the foreign manufacturers dependent on the parent company for supplies. It is therefore becoming increasingly common for the subsidiary to make use of local suppliers, thus contributing to the establishment of new supporting industries, especially in developing countries.

3.2 STRUCTURE

Tables 3-1 and 3-2 show the domestic and principal foreign subsidiaries of the Bosch Group as of December 31, 1979, respectively. Each table contains information on ownership, location, capital stock and principal manufacturing activities. It should be noted that a number of the foreign subsidiaries shown are holding companies or act as importers and distributors of Bosch products.

In 1979, Bosch companies in the U.S. were reorganized and as of January 1, 1980, the following have been the responsibilities of U.S.-based Bosch subsidiaries.

- Robert Bosch North America, Inc.: Holding company responsible for all Bosch activities in the U.S. Located in Broadview/Chicago, Illinois.

- Robert Bosch Corporation: Responsible for automotive original equipment sales. Located in Broadview, Illinois.

- Robert Bosch Sales Corporation: Responsible for aftermarket business. Also located in Broadview, Illinois.

TABLE 3-1. DOMESTIC SUBSIDIARIES OF THE BOSCH GROUP

Company	Capital stock (DM'000)	Owned[a] (%)
Robert Bosch GmbH, Stuttgart (automotive, household, industrial)	680,000	
Robert Bosch Industrieanlagen GmbH, Stuttgart (industrial)	35,000	100
Robert Bosch Versicherungsvermittlungs GmbH, Stuttgart	20	100
Blanpunktwerke GmbH, Hildesheim (car radios, radio traffic guidance systems)	100,000	75
Hans Feierabend GmbH, Einbeck (kitchen & bathroom furniture, radio & TV consoles)	8,400	98.8
Hamac-Höller GmbH, Viersen (packaging machinery)	10,000	100
Fr Hesser AG, Stuttgart (packaging machinery)	10,000	96.6
Höfliger & Karg GmbH & Co, Waiblingen (packaging machinery)	7,600	100
Höfliger & Karg Verwaltungs-und Beteiligungs GmbH, Waiblingen	100	100
Junkers & Co GmbH, Wernau (heating appliances)	30,000	100
Resicoat GmbH Beschichtungspulver, Reutlingen (powder coatings)	4,380	100
Schäfer Einspritztechnik GmbH, Munich (fuel injection)	30,000	100
Siba Elektrik GmbH, Gerlingen (electrical)	1,000	100
SIBA Elektrik GmbH & Co, Stuttgart	100	100
Strukturbau Bosch und Wüstenrot GmbH & Co, Gerlingen	5,162	100
Strukturbau Bosch und Wüstenrot GmbH, Stuttgart	500	90
H. Strunck GmbH & Co Maschinenfabrik, Cologne (packaging machines)	3,000	57.4

a Ownership by parent company and foreign subsidiaries.

TABLE 3-2. PRINCIPAL FOREIGN SUBSIDIARIES OF THE BOSCH GROUP

Company	Capital stock in '000 units of local currency	Owned (%)
Europe		
Belgium	(BFr)	
Robert Bosch Belgie NV, Tienen	240,000	100
Denmark	(DKr)	
Robert Bosch A/S, Ballerup	25,000	100
France	(FFr)	
Robert Bosch (France) SA, St-Ouen (automotive equipment)	66,000	100
Blaupunkt (France) SA, Mondeville (car radios)	21,000	100
FBC SA, Clichy	2,250	98.8
Femsa (France) SA, Trappes	4,000	100
Ets Regamey & Cie, Paris	1,100	99.8
Sigma Diesel SA, Venissieux (fuel injection)	68,000	99.8
Great Britain	(UK£)	
Robert Bosch Ltd, Watford	2,200	100
Robert Bosch Packaging Machinery Ltd, London	200	100
Italy	(Lire)	
Robert Bosch SpA, Milan	7,000,000	100
Silma SpA, Rivola Torinese	1,000,000	90
Luxemburg	(LFr)	
Robert Bosch Finance Holding (Luxemburg) SA, Luxemburg	300,000	100
Femsa-Societe Financiere et de Brevets SA, Luxemburg	(US$) 2,500	100
Netherlands	(NFl)	
Robert Bosch Verpakkingsmachines BV, Weert (packaging machinery)	5,000	100
Norway	(NKr)	
Robert Bosch Norge A/S, Oslo	14,700	98
Portugal	(PEsc)	
Robert Bosch (Portugal) Lda, Lisbon	115,000	100
Sweden	(SKr)	
Robert Bosch AB, Stockholm (automotive & marine electrical equipment)	30,000	100
AB ROBO, Linköping	4,000	100

/continued

TABLE 3-2. PRINCIPAL FOREIGN SUBSIDIARIES OF THE BOSCH GROUP (CONTINUED)

Company	Capital stock in '000 units of local currency	Owned (%)
Europe (cont'd)		
Switzerland	(SwFr)	
Robert Bosch Internationale Beteiligungen AG, Zürich	100,000	90
Robert Bosch AG, Zürich	10,000	100
Scintilla AG, Solothurn (power tools)	25,000	82.9
Spain	(SPts)	
Robert Bosch Comercial Espanola SA, Madrid	200,000	100
Robert Bosch Espanola SA, Madrid (electrical automotive)	540,000	86.8
Fabrica Espanola Magnetos SA (Femsa), Madrid (electrical & electronic automotive)	2,359,117	54.9
America		
Argentina	(Arg $)	
Robert Bosch Argentina SA, Buenos Aires (fuel injection, spark plugs)	14,000,000	100
Brazil	(Cr $)	
Robert Bosch do Brasil Ltda, Campinas (automotive, power tools, car radios)	2,400,000	100
Robert Bosch do Brasil-Nordeste Industria e Comercio SA, Salvador	120,000	100
Robert Bosch Maquinas de Embalagem Ltda, Sao Paulo (packaging machinery)	9,000	100
Canada	(Can $)	
Robert Bosch (Canada) Ltd, Mississauga	1,750	100
Mexico	(Mex 6)	
Robert Bosch de Mexico SA de CV, Mexico DF (automotive electrical)	25,000	100
Venezuela	(Bs)	
Fabrica Electro Magnetica SA (Femsa), Maracay	11,000	54.4
United States	(US$)	
Robert Bosch Corporation, Broadview, Il.	22,500	100
Robert Bosch North America Inc, Broadview, Il.	65,000	100
Robert Bosch Packaging Corporation, Piscataway, N.J.	2,000	100
Surftran Corporation, Mad. Heights, Mi.	1,000	100

/continued

Company	Capital stock in '000 units of local currency	Owned (%)
Asia		
India	(Ind Rs)	
Motor Industries Co Ltd (MICO), Bangalore (automotive equipment)	126,838	51
Japan	(¥)	
Robert Bosch (Japan) Ltd, Tokyo	550,000	100
Malaysia	(M$)	
Robert Bosch (Malaysia) Sdn Bhd, Penang (photo, radio, automotive)	7,500	100
Singapore	(S$)	
Robert Bosch (South East Asia) Pte Ltd, Singapore	3,000	70
Taiwan	(NT$)	
Bauer and Sun Optical Co Ltd, Taichung (photokino)	32,000	100
Turkey	(TL)	
Robert Bosch Türk Sanayi AS, Bursa	40,740	60
Africa, Australia		
Republic of South Africa	(SAR)	
Robert Bosch South Africa (Pty) Ltd, Brits	5,200	100
Auto Electrical and Engineering Co (Pty) Ltd Brits (electrical automotive)	300	100
Australia	(A$)	
Robert Bosch (Australia) Pty Ltd, Clayton	5,800	100

a 11 small foreign subsidiaries are not included.

- Robert Bosch Technical Products Corporation: Responsible mainly for packaging machine and electronics division.

In addition to the above, a distribution center began operations in Atlanta and a new sales office, in addition to the ones in Detroit, Los Angeles and San Francisco, was opened in Paramus, New Jersey, to serve the Northeastern part of the country.

Also in 1979, a number of licensing agreements were established with several companies in Japan in which Bosch has minority interests.

3.2 MARKETS AND PRODUCTS

The following is a brief overview of the Bosch Group's major markets and products, including product plans.

3.3.1 Markets

The Bosch Group has three principal manufacturing areas: industrial, household and automotive electrical equipment, the latter being the most important, accounting for approximately 60 percent of revenue. It is hardly surprising, therefore, that the principal developments and the greatest amount of research expenditure are attributable to this sector.

3.3.2 Products

The Bosch Group's principal products are electrical, electronic and mechanical automotive components. Other main products are:

- Heating appliances
- Power tools
- Radios
- Televisions
- Capacitors
- Medical equipment
- Cine/optics
- Generators
- Electric motors
- Packaging machines.

Hydraulics, pneumatic, metallurgy and plastics are also product areas.

3.3.3 New Product Plans and Developments

Recently there have been a large number of developments throughout the Bosch product areas, aided by the use of computers to carry out design calculations and drawings. Research is being carried out in all the principal product areas, into materials and manufacturing methods. The most important work, however, is being carried out in the field of automotive research, where devices are being developed and improved to increase efficiency in a variety of different ways. The following is a brief description of some of the more recent product development plans:

Fuel-injection

Fuel-injection equipment is the largest single research area within the Bosch Group. Bosch has many years of experience in this field, beginning with injection systems for diesel and gasoline engines and is currently working on the adaptation of this equipment to engines using different fuels. A brief description of the types of systems which are presently available is presented below. Each were developed from the D-Jetronic system.

- K-Jetronic System. The K-Jetronic system is mechanical and has continuous-flow fuel injection with airflow measurement. This system is simpler than the L-Jetronic system, metering the fuel in a unit that uses only a simple lever between the air measuring component and the fuel metering section.

- L-Jetronic System. This system has electronically controlled intermittent fuel injection with airflow measurement. Many features of the system are similar to the earlier D-Jetronic but the airflow sensor and the circuitry of its control unit are new. The L-Jetronic's electronics make good use of semi-conductor technology with three extensive component groups combined into integrated circuits.

- LH-Jetronic System. The latest fuel-injection system is the LH-Jetronic with a hot-wire air-mass sensor. The air mass is measured by an electrically heated platinum wire which loses heat to the intake air. The measured values are passed on to the microcomputer in the control unit which then decides on the amount of fuel.

The Motronic

The Bosch Motronic is an integrated system for electronically controlling gasoline injection and ignition. The system has a microcomputer in which the engine data for the appropriate vehicle model are stored. Sensors report on the intake-air quantity, engine speed, crankshaft position, engine temperature and ambient temperature. The microcomputer uses this information to calculate the optimum ignition point and the correct quantity of fuel to be injected up to 400 times every second. Bosch is presently looking into ways of using the Motronic to adapt fuel-injection and ignition systems to alternative fuels or modified exhaust regulations and other control functions such as gearbox control, knock control or closed-loop control.

ALI

ALI (Autofahrer Leit und Informationssystem) is a traffic control and information system developed by Blaupunkt with the aim of avoiding traffic holdups. The system operates from a central computer through a series of control loops along the road. (The system is being tested along a three box section of motorway in West Germany totaling about 60 miles with 83 flyover intersections.)

During a journey the driver is provided with constant information on direction, speed, road conditions and holdups by means of a control unit on top of the car facia. Given this information, the driver can optimize his route. If the experiment is a success, Blaupunkt hopes ot install the system on all 7,000 kilometers of German motorway thereby saving fuel and avoiding the construction of a number of new motorway sections by a more even distribution of traffic over the existing road network.

Electronic Testers

Bosch engine testing equipment ranges from a pocket tester to a microprocessor-controlled test system. This equipment helps to reduce fuel consumption (by as much as 15 percent) by clearly detecting defects and malfunctions and by correctly adjusting the systems which control the quantity of fuel used. These test systems are expected to gain in importance as electronics are increasingly used in such areas as ignition and fuel injection.

Anti-Skid Systems and Other Developments

Other development areas in the automotive field are: brake equipment (the ABS anti-skid system has been in production since the end of 1978); materials; monitoring and information systems; small electric engines for seat adjustment, etc; electronic control systems and a radar safety device for driving through fog.

Non-Automotive Research

Research in non-automotive areas has been along similar lines—developing ways of saving energy. Bosch manufactures a range of household and industrial equipment and heating systems all of which attempt to consume considerably less energy than their counterparts and yet perform equally well. It has applied a good deal of this new technology to its own factories and offices.

3.4 MARKETING AND DISTRIBUTION

As shown in Table 3-3 below, EEC countries account for more than two-thirds of Bosch sales. Europe as a whole accounts for around 83 percent of sales. Although sales to North America account for a relatively small percentage of revenue, Bosch is anxious to increase its activities there and achieve an annual turnover of around $500 million by the mid-1980s. Sales in 1979 totaled $308 million (excluding companies in which Bosch has less than 50 percent interest). Bosch hopes to increase sales through the introduction of specialized technologies and has already received contracts with the principal U.S. motor manufacturers. In spite of the economic recession, Bosch is still investing in the automotive sector and is planning to spend $40 million in the next three years to expand its diesel injection equipment plant in Charleston, North Carolina.

TABLE 3-3. BOSCH GROUP SALES BY REGION

	1979		1978	
	DM mn	%	DM mn	%
EEC countries	7,291	67.5	6,549	68.1
Other European countries	1,653	15.3	1,360	14.1
North & Latin American countries	1,210	11.2	1,031	10.7
Others	650	6.0	678	7.1
Total	10,804	100.0	9,618	100.0

Despite the drop in demand for motor vehicles during 1979, consolidated sales of the Bosch Group to third parties rose by 12 percent to DM10,804 million. The domestic divisions increased exports from DM2,755 million to DM3,082 million representing 37 percent of sales. A breakdown of sales is given in Table 3-4.

TABLE 3-4. SALES BREAKDOWN IN PERCENT, 1978/79

Product Area	1979	1978
Raw materials, parts, capital goods	10.2	10.0
Household appliances	18.0	19.4
Electrical & electronic automotive equipment	39.3	38.1
Mechanical, hydraulic and pneumatic automotive equipment	23.3	23.0
Technical consumer products	9.2	9.5

As shown in the table, more than 60 percent of the sales revenue was derived from electrical, electronic and mechanical automotive products. Foreign subsidiaries contributed 35 percent to consolidated Bosch Group sales in 1979.

Bosch has over 5,000 facilities worldwide providing service to its customers and intends to expand further in this area. In 1979 a new distribution center was opened in Karlsruhe, West Germany, employing advanced technology to provide the worldwide marketing and service organization with Bosch products.

3.5 PRODUCTION

Strong demand for automotive equipment during the greater part of 1979 helped to maintain favorable levels of operation in most domestic and foreign plants. In face, demand for some products could only be met by further expansion of facilities and personnel. As shown in Table 3-5, employment for the entire Bosch Group increased by 2.0 percent, as follows:

- The parent company increased by 3.2 percent from 61,200 to 63,145
- The domestic Bosch Group increased by 1.0 percent from 75,620 to 76,450

- The number of employees in the foreign subsidiaries rose by 3.7 percent to 44,945.

Only Blaupunkt Werke GmbH reduced its workforce by about 1,115. This reduction in workforce, however, was part of an effort by Blaupunkt to overcome problems it is having in the sale of the car radio equipment, traffic warning and guidance systems, televisions, video recorders, hi-fi systems, radios and clocks it manufactures.

TABLE 3-5. NUMBER OF EMPLOYEES IN THE BOSCH GROUP IN 1978 AND 1979

	1979	1978	% Change
West Germany			
Parent Company	63,145	61,200	3.2
Domestic subsidiaries & affiliates	13,305	14,420	-7.8
Domestic Bosch Group	76,450	75,620	1.0
Abroad			
Foreign subsidiaries	44,945	43,431	3.7
Bosch Group Total	121,395	118,961	2.0

In 1979, Bosch's foreign subsidiaries expanded their production in virtually all important markets. Although Europe and North America are proving to be tough markets and are made more difficult by the world economic recession, Bosch intends to increase investment and hopes to improve sales in the medium to long term by providing more high technology equipment for each vehicle sold. One problem faced by Bosch's foreign subsidiaries in 1979 was the rise of the German Mark compared with the currencies of other countries. As a result of this increase, Bosch's foreign subsidiaries which are dependent to a large extent on exports from Bosch companies in West Germany, have become increasingly dependent on local suppliers, thereby contributing to the development of industry there.

The following are descriptions of some of the major foreign companies.

Africa

The major African Bosch subsidiary is Auto Electrical and Engineering Co. (Pty) Ltd., a manufacturer and marketer of electrical automotive equipment. One hundred percent of the company's stock is owned by Robert Bosch (South Africa). The company employed 490 at the end of 1979 (20 more than in 1978) and is based in Brits near Pretoria. The company also holds a 30 percent interest in Diesel Electric Holdings (Pty) Ltd. in Johannesburg which serves the aftermarket in South Africa. At the end of 1979, 830 workers were employed.

North and South America

Four of the major Bosch subsidiaries in North and South America are described below.

Robert Bosch Corporation, Broadview (Chicago), Illinois

This company manufactures diesel fuel-injection equipment and distributes and services Bosch products in the U.S. production facilities are based at Charleston (South Carolina) and are being expanded; the number of employees increased from an average of 560 in 1978 to 620 at the end of 1979.

A new distribution center in Atlanta opened recently. Sales offices are located in Detroit, Los Angeles, Paramus (New Jersey) and San Francisco. The total number of employees at the end of 1979 was 1,520, an increase of 40 compared with the previous year.

Robert Bosch Argentina SA, Bureno Aires

Production of diesel fuel-injection equipment and spark plugs is located in Tucuman. The company is also responsible for the distribution and service of Bosch products in Argentina. The number of employees at the end of 1979 was 700, 30 less than in 1978. The company has recently increased its product mix for original equipment as well as for the aftermarket and has also expanded its service network.

Robert Bosch do Brasil Ltda., Campinas, Brazil

In addition to distributing and servicing Bosch products in Brazil, this company manufactures automotive equipment, power tools, car radios and workshop equipment. Automotive equipment accounts for approximately 80 percent of this company's total sales.

Robert Bosch do Brasil employed 9,230 people at the end of 1979, 920 more than in 1978. Factories situated in Campinas, Sao Paulo, Curitiba and Aratu (Bahia) all operated at full capacity during the year. The plant in Curitiba, which manufactures nozzles and components for diesel engines, underwent further expansion.

Also in 1979, capital stock was increased by Cr$1,000 million to Cr$2,400 million through conversion of reserves.

Automagneto SA de CU, Toluca, Mexico

This company manufactures automotive electrical equipment and operated near capacity throughout last year helped by a 15 percent increase in the output of the Mexican automobile industry. Automagneto's sales rose 16 percent in real terms and the share of exports increased. In order to increase production, considerable capital investment was required.

Asia

Three Bosch subsidiaries presently exist in Asia as described below.

Motor Industries Co. Ltd. (MICO), Bangalore, India

MICO manufactures equipment for diesel engines, spark plugs and other automotive equipment and distributes and services other Bosch products in India. The company has production facilities in Bangalore and Nasik, and sales offices in Bombay, Calcutta, Madras and New Delhi. Employees numbers 9,550 at the end of 1979, an increase of 250 over the previous year.

Demand for MICO products is increasing, helped by the government's support in the transportation and agricultural areas. Expansion for the plants in Bangalore and Nasik is planned.

Despite labor troubles which caused a fall in output, earnings were satisfactory in 1979. Production costs were cut and the quality of products improved through the introduction of new processes developed by the parent company.

Robert Bosch (Malaysia) Sdn Bhd Penang

Although principally engaged in the manufacture of 8mm motion picture cameras and sound amplifiers, this

company also manufactures sub-assemblies for automotive equipment and two-way radios for export. In 1979, the number of employees increased from 935 in 1978 to 1,370 and capital stock was increased from M$6 million to M$7.5 million.

Robert Bosch Türk Sanayi AS, Bursa, Turkey

This company manufactures nozzles and nozzle holder assemblies for diesel fuel-injection equipment. Employees numbered 260 at the end of 1979.

In 1979, sales were affected by the Turkish automobile industry which operated only at a third of its capacity, and there were no deliveries to Iran. However, a high export volume was maintained and represented 42 percent of total sales.

Australia

Robert Bosch (Australia) manufactures electrical automotive equipment and distributes and services Bosch products in Australia. Sales offices are located in Adelaide, Brisbane, Melbourne, Sydney and Perth. The number of employees at the end of 1979 was 1,200, an increase of 40 compared with 1978. In 1979, the plant operated to near capacity and both original and aftermarket sales increased.

Europe

Four Bosch subsidiaries presently reside in Europe—two in France, and one each in Sweden and Spain.

Robert Bosch (France) SA

This company manufactures automotive equipment and distributes and services Bosch products in France. At the end of 1979 it had 2,760 employees (40 fewer than the preceding year) and has production sites in Massy (Essonne), Saint Ouen (Seine St-Denis) and a new production facility in Rodez (Aveyron). Output in 1979 increased slightly. Exports accounted for 22 percent of sales which reached approximately FFr1,314 million.

Sigma Diesel SA France

Sigma is a manufacturer and distributor of fuel-injection equipment for diesel engines with production

sites at Venissieux (Rhone) and Chatellerault (Vienne). The manufacture of this equipment in small quantities proved to be uneconomical, however, and as the market would not allow a price increase, Sigma equipment is now being replaced by Robert Bosch GmbH products. However, research into new injection systems is still carried out.

In 1979, sales increased by around 50 percent compared with 1978 and the export share also increased considerably to 46 percent. The number of employees increased slightly from 910 to 925. Capital stock increased by FFr24 million and was financed by the parent company.

Robert Bosch AD, Sweden

Robert Bosch AB (AB ROBO) is a manufacturer of electrical equipment for vehicles and boats with its base in Linköping. It also acts as a distributor and service organization for Bosch products in Sweden with sales offices in Gothenburg, Malmö, Norrköping and Sundsvall. Employees numbered 650 at the end of 1979.

Domestic and foreign demand for original and aftermarket automotive equipment was strong in 1979 with exports accounting for over 60 percent of sales. Expansion of the manufacturing capacity progressed according to schedule.

Fabrica Espanola Magnetos SA (Femsa), Spain

Bosch holds a 54.9 percent interest in Femsa which manufactures electrical and electronic automotive equipment. Although exports and aftermarket sales increased during the year, sales to the Spanish motor industry declined. With the exception of battery production, all sectors operated below capacity throughout the year and the company made a loss. Also, the number of employees was reduced from 6,950 to 6,880. Manufacturing capacity for starter batteries, however, was expanded and the production of electronic regulators for alternators was increased. Production sites are in the following areas:

- Madrid
- Albacete
- Aranjuez
- Castellet
- El Bosque

- Guardamar
- Hospitalet
- La Carolina
- Palazuelos
- San Juan Despi
- Treto.

3.6 FINANCIAL STATUS

Key financial results for the Bosch Group worldwide during the period 1975-79 are given in Table 3-6. The figures given are those presented in the Annual Report and reflect the slightly different practices used in German accountancy.

TABLE 3-6. FIVE-YEAR FINANCIAL RESULTS OF THE BOSCH GROUP (DM MILLIONS)

	1975	1976	1977	1978	1979
Sales	7,281	8,319	9,160	9,618	10,804
Foreign share as % of sales	52	51	49	49	51
Additions to tangible fixed assets	300	424	551	602	676
Depreciation on tangible fixed assets	280	315	357	385	478
Balance sheet total	4,856	5,313	6,186	6,937	7,717
Equity capital	1,534	1,659	1,963	2,118	2,276
Net income	137	224	240	224	172
Consolidated net earnings	47	57	65	65	58

As shown in the table, since 1975 Revenue from Bosch Group sales has risen by almost 50 percent. In 1979 sales rose by about 12 percent from 1978 to DM10,804 million. Trading profit and profit before tax both showed an increase of around 11 percent compared with the previous year, but profit after tax declined by 23 percent from DM223.6 million to 171.8 million.

Net profits reached their highest level in 1977 at DM240 million. The net profit margin of the group has fallen steadily since 1976 from 2.7 percent to 1.6 percent, partly accounted for by higher levels of investment in recent years. Other reasons for the decline are:

- Write-offs of financial investments totaling DM80.2 million in 1979
- Payment of taxes, including back taxes amounting to DM603,780 million.

Consolidated net earnings (net profit after appropriations) after rising from DM47 million in 1975 to DM65 million in 1978, fell by DM7 million in 1979. It must be mentioned, however, that it is possible for companies in Germany to place profits in hidden reserves.

Sales for the first half of 1980 rose 10 percent but the company expects a slump in the second half of the year resulting in a net increase in sales of around 6 percent for the whole year. Performance has been patchy, however, with an increase of 26 percent in one sector and a fall of 17 percent in another. Returns on sales in the first six months of the year were also lower than in previous years. Several reasons for Bosch's patchy performance include:

- Continuing losses of its subsidiary Blaupunkt Gmbh. In 1979, Balupunkt GmbH lost DM29 million*. While the loss was less than the previous year due to cost reductions and efficiency measures, further losses are expected in 1980, partly due to the strength of foreign competition (Japanese) in the car radio and home entertainment areas (televisions, hi-fi etc.)

- Currency translation. The decline in the value of the Brazilian currency in relation to the German Mark and the official inflation index, which determined the adjustment of the operating result in the local financial statements, were inconsistent, resulting in a reduction in the consolidated net income for the year. This resulted in some discrepancies between local and internal financial statements and reduced the consolidated net income figure.

- Rising labor and material costs and underutilized capacity.

In addition to these difficulties, more problems are foreseen as vehicle manufacturers move towards vertical integration in parts, thus lessening the dependence on suppliers. Bosch hopes to combat this, however, by injecting large amounts of money into research and development in order to satisfy the rising demand for high-technology equipment in the automotive industry. Bosch investment spending is expected to run at around DM800 million in 1980.

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* This loss was absorbed by Robert Bosch GmbH as part of a profit and loss transfer agreement.

3.7 RESEARCH AND DEVELOPMENT

In 1979 Bosch spent DM676 million on research and development. The company is largely self-financing in this respect as it believes that too much public investment could lead to premature publicity and facilitate access by competitors. However, a grant of DM12 million was received from the Federal Ministry for Research and Technology. The major single research project, accounting for approximately 32 percent of the total, is concerned with the development of fuel-injection systems, the market for which is growing by 25 percent per year. Bosch plans to spend between DM700 and DM800 million on research and development in 1980 with an emphasis on energy-saving devices. The total number of personnel involved in research and development at the end of 1979 was 6,595; 5,780 of those were West Germany.

4. AUTOMOTIVE OPERATIONS OF DUNLOP HOLDINGS LTD.

4.1 INTRODUCTION

Dunlop Holdings Limited was first registered in the UK in 1896 for the production of tires. Since then, it has expanded into a multinational company producing a wide range of industrial products. Tires, however, remain the Group's principal source of revenue, with other diversified products contributing around 40 percent of current annual turnover.

Group development has stemmed from continual product diversification and an international approach to its manufacturing bases. The whole trend of the tire industry towards internationalism was pioneered by Dunlop's establishment of factories in France and Germany (1893), Canada (1894), Australia (1899), Japan (1909), and the U.S. (1920). The first Dunlop Malaysian rubber plantation began in 1910.

During the past half-century, the pace of overseas expansion has accelerated. Tire plants were established in South Africa and Eire in 1935; the largest Dunlop factory outside the UK was set up at Sahaganj in India in 1936. Factories were established in the following countries:

- New Zealand (1946)
- Brazil (1953)
- Malaysia (1956)
- Rhodesia (1959)
- Nigeria, Uganda, Trinidad and Zambia during the 1960s.

Currently over two-thirds of Dunlop's assets are overseas: not only the manufacturing plant and raw materials, but also the assets of research and technology.

More recently, this expansionary trend has received setbacks principally in the form of excess tire production capacity in Western Europe, aggravated by inexpensive

imports from Eastern European countries and technological developments, such as the steel-braced radial tire, which have severely affected the replacement tire market. To combat this trend, the Group has undertaken several actions:

- It has pruned its operations in the markets most affected.
- It has developed its interests in other product lines.

In the automotive sector, this has meant increased output of hydraulic hoses, suspension units, fluid seals, and a variety of rubber components. Through acquisition and otherwise, Dunlop has recently entered the new fields of industrial automated systems, and soil-less cultivation systems to add to product innovations such as 'Dunlopipes' and the 'Dunlopair' system of space-heating.

4.2 STRUCTURE

The principal companies in the Dunlop Holdings Group have been classified in this section, with information on their activities, ownership and location, as follows:

- Table 4-1: Principal Subsidiaries of Dunlop Holdings Ltd.
- Table 4-2: Principal Associated Companies of Dunlop Holdings Ltd.
- Table 4-3: Principal Subsidiaries of Dunlop Ltd.
- Table 4-4: Principal Subsidiaries and Companies in Which Dunlop International Ltd. and Dunlop Overseas Ltd. Hold an Interest.

At the beginning of 1979, Dunlop Holdings Ltd. completed the acquisition of Rice Trailers Ltd. of Leicestershire, England, which makes a range of trailers for transporting horses.

Dunlop Ltd. also has a series of divisions, the following of which are engaged in automotive parts either in whole or in part:

- Belting
- Research and Development

TABLE 4-1. PRINCIPAL SUBSIDIARIES OF DUNLOP HOLDINGS LTD.

Title and Activities	% of equity held by: Dunlop Holdings Ltd.	Pirelli SpA	Societe Internationale Pirelli SA	Country of Incorporation
Dunlop Ltd - tyres, engineering, consumer, industrial, sports, - holding co.	51	49	-	England
Dunlop International Ltd - holding company	60	20	20	England
Dunlop Overseas Ltd - holding company	60	20	20	England
Dunlop Plastics Canada Ltd - industrial	60	20	20	Canada
Dunlop (New Zealand Holdings) Ltd - holding company, with 52 per cent of the equity shares of	60	20	20	New Zealand
Dunlop New Zealand Ltd - tyres, engineering, consumer, industrial, sports.				New Zealand
Compagnie Colmant Tournai SA - industrial	50.6	48.6	-	Belgium
Pirelli Ltd - tyres, consumer, industrial	44	25	24	England
Dunlop India Ltd - tyres, engineering, industrial	51			India
Dunlop Rhodesia Ltd - tyres, consumer, industrial	100			Rhodesia

At the beginning of 1979, Dunlop Holdings Ltd. completed the acquisition of Rice Trailers Ltd. of Leicestershire, England which makes a range of trailers for transporting horses.

TABLE 4-2. PRINCIPAL ASSOCIATED COMPANIES OF DUNLOP HOLDINGS LTD.

Name	Activity	Issued Capital (mn)	% held by Dunlop Holdings Ltd.	Location
Industrie Pirelli SpA	tyres, engineering, consumer, industrial	L 79,000	30	Italy
Pirelli France SA	tyres, consumer, industrial	F 10.00	49	France
Pirelli SACIC SA	tyres, consumer industrial	BF 219.9	49	Belgium
Veith Pirelli AG	tyres, industrial	D 36.0	49	Germany
Pirelli General Cable Works Ltd.	engineering	£16.5	37	England
Pirelli Canada Ltd	engineering	Can. $10.0	20	Canada
Pirelli SA Platense	Holding company	Arg. Peso 119.0	40	Argentina
Pirelli Compania Platense de Neumaticos SA	tyres	Arg. Peso 30.2	40	Argentina
Industrias Pirelli SAIC	tyres, consumer, industrial	Arg. Peso 245.4	27	Argentina
Pirelli Hellas SA	tyres	US$ 10.3	32	Greece
Turk-Pirelli Lastikleri AS	tyres	Turkish L 120.0	20	Turkey
Pirelli SA - Companhia Industrial Brasileira	tyres, engineering	C 2,054.9	15	Brazil
Conductores Electricos Peruanos SA	tyres,	Sol. 781.4	16	Peru
Commercial Pirelli SA	holding company	P. 1,000.0	40	Spain
Compania de Inversiones SA	holding company	P. 500.0	40	Spain
Productos Pirelli SA	tyres, engineering, consumer, industrial.	P. 2,835.4	30	Spain
International Synthetic Rubber Co. Ltd.	industrial	£14.7	47	England.

TABLE 4-3. PRINCIPAL SUBSIDIARIES OF DUNLOP LTD.

(subsidiaries with interests in the automotive sector only, are listed).

Name	Activity	% held by Dunlop Ltd.	Country of Incorporation
National Tyre Service Ltd.	retail, distribution of tyres.	100	England
George Angus & Co. Ltd.	production of fluid seals etc.	100	England
Angus Fire Armour Ltd.	manufacture of fire-engines, airport safety tenders and equipment	100	England.
Dunlop SA	tyres, engineering	53	France
Dunlop AG	tyres	83	Germany
Irish Dunlop Co. Ltd.	tyres	100	Ireland

TABLE 4-4. PRINCIPAL SUBSIDIARIES AND COMPANIES IN WHICH DUNLOP INTERNATIONAL LTD. AND DUNLOP OVERSEAS LTD. HOLD AN INTEREST

Name	Activity	% of equity held	Country of Incorporation
Dunlop Tyre & Rubber Corp.	tyres, engineering, sports	99	USA
Dunlop Trinidad Ltd.	tyres	60	Trinidad
Dunlop Nigerian Inds. Ltd.	tyres, consumer	59	Nigeria
Dunlop South Africa Ltd.	tyres, consumer, industrial, sports.	70	South Africa
Dunlop Zambia Ltd	tyres	55	Zambia
Dunlop Plantations Ltd.	plantations	100	England
Dunlop Estates Berhad	plantations	51	Malaysia
Dunlop Malaysian Industries Berhad	tyres, consumer, sports	51	Malaysia
Dunlop Investments Ltd.	finance company	100	England
Dunlop Australia Ltd.	tyres, consumer, industrial, sports	10	Australia
Sumitomo Rubber Inds. Ltd.	holding co,- tyres, engineering, industrial, sports	40	Japan.

Dunlop Ltd also has a series of Divisions. The following are engaged in automotive parts in whole or in part:

Belting; Research and Development; Dunlopillo; Fluid Seal; General Rubber Components; Hydraulic Hose; Precision Rubbers; Polymer Engineering; Redditch Mouldings; Suspensions; Tyres; Wheels. Other Divisions of Dunlop Ltd cover the fields of Aviation; Dunlop Irrigation Services; Industrial Hoses; Industrial Products; Oil and Marine; Plant and Equipment.

- Dunlopillo
- Fluid Seal
- General Ru-ber Components
- Hydraulic Hose
- Precision Rubbers
- Polymer Engineering
- Redditch Moldings
- Suspensions
- Tires
- Wheels.

Other divisions of Dunlop Ltd. cover the fields of:

- Aviation
- Dunlop Irrigation Services
- Industrial Hoses
- Industrial Products
- Oil and Marine
- Plant and Equipment.

4.3 PRODUCTS AND MARKETS

The following is a brief overview of Dunlop's major products and markets, including products plans.

4.3.1 Products

Apart from the range of tires and retreads which Dunlop manufactures, the Group also produces the following products:

- Wheels and rims for all types of passenger cars, light commercial vehicles and agricultural equipment
- Seals - for brakes, doors, universal joints and windows
- Hoses - for air, brakes, heater, washer, fuel and oil
- Hydragas and hydrolastic suspension units
- Pneuride air suspension systems
- Independent front and rear rubber suspension systems for commercial vehicles
- Sound insulation materials

- Anti-lift spoilers
- Anti-skid systems
- Vehicle buffers
- Safety mountings for bumper bars
- Mud-flaps
- Flexible drive couplings
- Spring gear components
- Interior floor trim for vehicles
- Anti-vibration mountings
- Underbody sealant
- Rubbing strips.

It also manufactures fire fighting vehicles and horse trailers through its subsidiaries.

4.3.2 Markets

Table 4-5 is a summary of the Dunlop Group's sales by location of the customer. As shown, the United Kingdom is the Group's principal customer, accounting for one-third of Dunlop's sales. The rest of the EEC accounts for 27 percent of total sales followed by Asia and Australia which combined accounts for 14 percent. The share of sales attributed to North America increased from 12 percent in 1977 to 14 percent in 1978. Africa also experienced a marginal rise in sales in 1978 (approximately 10 percent).

TABLE 4-5. GROUP SALES BY LOCATION OF CUSTOMER
(£ MILLION)

	1978	1977
United Kingdom	487	448
Rest of EEC	394	361
Rest of Europe	55	47
Asia and Australia	207	193
Africa	144	129
North America	168	165
Central and South America	20	
	1,475	1,361

Direct tire exports by the Group from its UK plants totaled £37 million in 1976; £38 million in 1977; and £42 million in 1978. The stated marketing policy of Dunlop is to continue exporting from Britain "wherever this is possible." Secondly, the base of its existing overseas companies is to be expanded, with local diversification from existing lines, and finally, the Group is searching for opportunities to extend its geographical range into markets hitherto untapped.

Resources are being allocated primarily to new and existing markets outside the automotive sphere. Following this strategy, priority is being given to development of the automotive component market, exclusive of tires. Tire development is currently restricted to the markets of the Far East, and to a lesser extent North America, with Western Europe still suffering from an estimated 25-30 percent overcapacity.

4.3.3 New Product Plans

Principal research is still ongoing at Dunlop on the Total Mobility or "run flat" tire concept. In this concept, a tire would be developed which would never deflate, even when punctured. A variation of such a tire was first introduced by Dunlop in the spring of 1972 and was offered as optional equipment on the Rover 3500 and Mini 1275 GT in 1974. More recently, renamed the Dunlop Denovo, it has been offered on the Leyland Princess, the Rover saloons, the Mini Clubman, and the Fiat 126 and 131 (UK only).

The impact of this development has, however, been very limited. Of the British tire market totaling around 22 million sales a year (original equipment and replacement), and a car population of more than 14 million, only an estimated 75,000 vehicles are fitted with Denovo tires. With the sole exception of Peugeot, the European and American car manufacturers have shown little interest in the product. Factors which have gone against the product include:

- The need for a special, millimetric sized rim.
- The motor industry's aversion to single sourcing of a vital component.
- The product's expense and limited service support (only Great Britain).

Prospects for the Denovo tire have improved somewhat with the Mark II version of the tire which dispenses with lubricant containers and the need for a two-piece wheel. The latest version has a coating of Polygel over the interior of the crown of the tire which seals up punctures, and, if it does deflate, it acts as a lubricant during the 100 miles at 50 mph during which the Denovo tire will operate without air.

A specially shaped rim called Denloc has depressions which hold a deflated Denovo's beads in place during hard cornering. These Denloc rims are incorporated into alloy wheels. This means that, on a car equipped with alloy wheels as standard, four Denovo IIs cost no more than five normal tires. Rover and Datsun offer Denovo II tires as a no-cost option on their top-of-the-line models. Peugeot has given buyers the option of the Denovo II on the 104 GR, but only in France, where it adds about £90 to the price. Fiat's new Panda will also have the Denovo II tires as an option.

In general, this development is seen only as an interim stage in tire evolution. To date, the achievement only allows postponement of the moment when the tire must be changed, or repaired, although the Denovo II tire does accommodate small penetrations without deflating. What the car industry wants, and what Dunlop and other manufacturers are researching, is a car tire which cannot possibly deflate. The spare wheel may then be dispensed with entirely. Until that time, most manufacturers are prepared to settle for something cheaper and less sophisticated than the Denovo II tire such as the downsized spare which is now sweeping America, with similar success forecast in Japan.

4.4 PRODUCTION

Through the international network of subsidiary and associated companies described above, the Dunlop Holdings Group now comprises almost 150 factories in 22 different countries. In the UK alone, production capacity is 9.5 million car tires and 1.2 million tires for commercial vehicles a year. Dunlop is active in all sectors of the tire market, including tires for cars, commercial vehicles, tractors, agricultural equipment, earthmovers, industrial vehicles, motorcycles and aircraft. The total number employed by the Group was approximately 96,000 at the end of 1979, which was 4,000 less than in 1978, due principally to the closure of the tire plant at Speke, England. An analysis of the distribution of employees by geographical area and by operating division is provided in Tables 4-6 and 4-7, respectively.

TABLE 4-6. AVERAGE NUMBER OF EMPLOYEES BY AREA (000)

	1978	1977
UK	48	48
Rest of EEC	17	18
Rest of Europe	1	1
Asia and Australia	22	22
Africa	17	8
North America	4	4
Central and South America	1	1
	100	102

TABLE 4-7. AVERAGE NUMBER OF EMPLOYEES BY PRODUCT (000)

	1978	1977
UK	55	57
Industrial	16	16
Engineering	6	6
Consumer	10	10
Sports	6	6
Plantations	7	7
	100	100

4.4.1 Domestic Facilities

The following is a brief description of Dunlop tire production, other automotive product production (i.e., wheels, springs, etc.) and non-automotive production capabilities.

Tire Production

In the UK, the Group's tire production was centered at four plants until the end of 1978. In January 1979, however, a decision was made to close the Speke plant, near Liverpool, which had employed about 2,500 workers. This plant accounted for about 20 percent of the Group's UK tire capacity. Even with this closure, Dunlop still has excess tire manufacturing capacity in the UK. The Group is also believed to be seriously considering the closure of its Inchinnan plant in Scotland, which is the sole producer of Dunlop's cross-ply tires and employs 900 people.

The shrinking market for cross-ply tires must mean that the long-term survival of this factory is in doubt. The plant at Washington Country, Durham, is less than five

years old, and employs only 480 people who have escaped the cutbacks imposed at other plants, including Fort Dunlop. Fort Dunlop is the Group's main tire manufacturing plant. It is located near Birmingham, and after a reduction of 500 in the workforce in 1979, and a further 600 early in 1980, now employs just short of 6,500 people.

During the last two years, Dunlop has also closed and merged factories throughout West Germany and France, due to the depression in the tire industry. One thousand out of the 5,000 employees in Germany were made redundant in 1979, and similar cutbacks were also imposed in Ireland. Along with the reduction in the workforce, Dunlop has also embarked on a scheme aimed at improving productivity and efficiency, with £75 million scheduled for investment in its UK tire factories over the five years beginning mid-1980.

Other Automotive Production

Among the Group's other automotive activities, the Wheel Division is reported to have remained in profit. This division, one of the largest European manufacturers of automotive wheels, is based in Coventry and employs 1,200 people. World supremacy in liquid/gas springs for road vehicles is claimed by Dunlop's Suspensions Division, and the international marketing of these products continues to be successful. Profits from the Polymer Engineering Division, which makes many components for vehicles, have been affected by the reduced output from UK vehicle manufacturers.

Non-Automotive Production

In 1979, the firm of Rice Trailers, which makes horse trailers in Leicester, was acquired with a view towards increasing the range of products available. In the UK, Dunlop's divisions making equipment for fire fighting recorded increased sales in 1978. At the same time HCB-Angus, the company's manufacturer of fire engines, airport safety tenders and other fire fighting vehicles, enjoyed success with its radically new design of fire engine with an all-steel body construction and new safety features.

During 1978, HCB-Angus moved the manufacture of these and other fire engines into a new purpose-built factory close to the company's headquarters at Totton, Southampton. The factor, with advanced jigs for the assembly of fire engines and tender bodies, and comprehensive testing facilities, is expected to increase the company's ability to take advantage of demand for the new equipment from abroad as well as from British fire brigades. In 1978, more than 60 percent of the production of HCB-Angus was exported.

4.4.2 Overseas Facilities

The following are brief descriptions of some of the major overseas facilities of Dunlop. Tire results have recently been much better for the Group outside the over-supplied markets of Western Europe. Increased sales and profits are reported in India, Malaysia, New Zealand and many African territories, including Nigeria, South Africa and Kenya. In 1978, Zambia reported increased sales also, although margins and profits were down. In the United States sales and profits both improved, but only by small amounts in 1978.

Zambia (Ndola)

This tire plant was opened in April 1969, with an initial capacity of 120,000 car and truck tires, and 500,000 cycle tires a year. Subsequent market growth has led to successive expansions, bringing the total annual production of car and truck tires to over 200,000 units. From a workfoce of 250 at the start, the Ndola factory now provides employment for over 600 people.

Japan (Kobe, Nagoya and Shirakawa)

Three factories exist in Japan. The first factory was built at Kobe in 1908, and with subsequent expansion, began exporting to Southeast Asia. The second factory began production on a 19-hectare site at Nagoya, near a major vehicle plant, in July 1961. From an initial output of 160,000 tires a year, annual capacity now approaches 6 million. Since then, both the Kobe and Nagoya plants have been modernized, with extensive automation of control systems, and in 1974, a third factory was opened at Shirakawa with a capacity of 1.7 million tires a year.

New Zealand (Woolston)

Dunlop has long been the major tire manufacturer in New Zealand, with a factory at Upper Hutt. The Rubber Goods Division has two factories making a wide range of components including hoses and moldings.

Trinidad (Point Fortin)

Dunlop's car and truck tire factory first began operations at Point Fortin industrial estate in mid-1968. Initial capacity was 117,000 tires, and expansion projects in 1970 and 1972 increased this to 280,000 tires annually. Performance declined due to increased material costs in 1978, but a significant price increase in 1979 improved sales.

West Germany (Hanau and Wittlich)

Construction of the Hanau plant began in 1893, near the transport facilities of the River Main and the industrial zone at Frankfurt. In 1969, Dunlop began work on a second German plant at Wittlich, near Trier, in the Eifel district, with rail, motorway and canal networks close by. Strategically placed to serve the EEC, the factory opened in 1972, with a degree of mechanization exceptional in the tire industry, and an initial capacity of 1.5 million tires a year. Following cutbacks in the workforce, profitability was restored in 1979.

U.S. (Buffalo and Huntsville)

Two tire manufacturing plants, a textile plant and a fire hose manufacturing plant, presently exist in the U.S. The first tire manufacturing plant, a 150,000-square-meter plant, was built in Buffalo in 1923. Since then it has undergone radical expansion and modernization. To meet the growing demand, a second Dunlop tire plant was erected in Huntsville, Alabama, on a 62-hectare site opened in 1969. Initial capacity was 2.8 million tires a year, and further expansion took place in 1974, more than doubling capacity. The company also has a large textile plant at Utica, New York, producing tire cords in materials such as nylon, polyester and glass fiber. During 1977, a new manufacturing plant was established in South Carolina for the production of fire hoses, in line with the policy of expanding Angus Fire Armour's North American activities. Slight improvements in trading levels are reported, although the North American market remains highly competitive.

Nigeria (Ikeja)

This plant, 25 kilometers from Lagos, started production of car, truck and cycle tires and retreading material at the beginning of 1963. The plant employs 1,500 people and staged a strong recovery in its performance in 1978.

India

Dunlop established the country's first automotive tire factory at Sahaganj near Calcutta in 1936. A second factory was opened in 1959, near Madras. In 1978, a substantial modernization scheme was initiated to enable the company to expand its range of car and truck tires.

Malaysia (Petaling Jaya and Seremban)

In 1963, the Petaling Jaya factory began production of tires near Kuala Lumpur, with an initial capacity of 175,000 car and truck tires, and 28,000 motorcycle tires, together with 570,000 kgs of retread materials. The workforce has now expanded from 600 to over 2,000, with annual tire capacity at 902,000 for trucks and cars and 243,000 for motorcycles, together with 12,200 large earthmover units. The company also has plants in Singapore manufacturing adhesives needed in the tire and retreading industries. The Malaysian Government has now accepted the company's proposals for the establishment of a third tire factory in which Dunlop Malaysian Industries have significant minority share.

4.5 FINANCIAL STATUS

Key financial results for the Dunlop Holdings Group, including sales and profit figures, for the five-year period ending December 31, 1979, are shown in Table 4-8.

TABLE 4-8. FINANCIAL RESULTS - DUNLOP HOLDINGS GROUP (£ MILLION)

	1975	1976	1977	1978	1979
Sales to outside customers	1,002	1,275	1,361	1,487	1,569
Operating profit	63	83	75	66	64
- as percentage of sales	6.3	6.5	5.5	4.4	4.1
- associated companies' profits and investment income	13	17	12	14	12
- financing charges	(25)	(26)	(30)	(34)	(47)
Profit before taxation	51	74	57	46	29
- taxation	(23)	(30)	(25)	(25)	(28)
- minority shareholders interests	(11)	(19)	(12)	(8)	(1)
Distributable profit					
- before extraordinary items	17	25	20	13	-
- extraordinary items	-	-	-	(18)	-
Net assets employed at December 31	540	664	718	779	723
Debentures and other long-term loans	178	228	245	294	272
- as percentage of net assets	33	34	34	38	38

Over the five-year period analyzed, revenue from sales has risen by 57 percent while operating profit has fallen from 6.3 percent to 4.1 percent of sales revenue. Profit before taxation has also fallen by 43 percent. Over this period there has been a parallel deterioration in the cover offered by net assets over debentures and long-term loans. This ratio has risen from 33 percent in 1975 to 38 percent at the end of 1979.

In the operating year 1979, the pre-tax results of the Group slumped from £46 million to £29 million, and with taxes taking £28 million and minorities a further £1 million, Dunlop Holdings broke even at the attributable level. In spite of this, Corporate management decided to repeat the dividend of 8 pence per 50p. Ordinary Share. The Chairman of the Group described the reason as "due to the current and longer term trading outlook." This comment is attributed to progress made overseas, and recent structural changes in tires.

Some of the factors which influenced results in 1979 were:

- Elimination of German Tire Losses. In 1979, German tire losses were eliminated, leading to a £3 million attributable profit from this source.

- Prevalence of Industrial Disputes. These reduced Group operating profit by approximately £10 million in 1979, of which £3 million related to disputes in Dunlop plants in the UK and overseas. The remainder arose through external disputes. The road haulage and engineering disputes each accounted for about £3 million of the total cost.

- High Interest Rates, Additional Borrowings and Exchange Rate Movement. High interest rates together with additional borrowings resulted in finance charges of £47 million in 1979, compared with £34 million in 1978. Exchange rate movements also had an adverse effect on 1979 results. If the 1978 results had been translated into sterling at the rates prevailing on December 31, 1979, the decrease in profits before tax would have been £9 million instead of £17 million.

Recovery towards a more satisfactory profit performance is being aided by the cost improvement program now being implemented by the Dunlop Group, but much will depend on world trading activity in 1980, together with trends in interest

and exchange rates in the remainder of the year. The Speke closure in the UK is also expected to assist net earnings in 1980. An analysis of sales revenue for the Dunlop Group in terms of tires and diversified products is provided in Table 4-9 by location of company.

TABLE 4-9. ANALYSIS OF REVENUE FROM SALES (1978 and 1977)
(£ MILLION)

Company Location	1978		1977	
	Tires	Other Products	Tires	Other Products
United Kingdom	265	326	257	280
Rest of EEC	254	130	235	114
Rest of Europe	11	3	11	2
Asia and Australasia	133	71	118	69
Africa	72	41	68	36
North America	119	41	118	43
Central and South America	8	1	8	2
	862	613	815	546

Financial results for the first three months of 1980 are reported to be significantly better than those for the corresponding period of 1979, which were depressed by the road haulage strike. So far, demand is proving buoyant in Africa and the Far East, but it is less healthy in the United States and sporadic in Europe. In 1979, tires lost £11 million in the UK but the rate of loss was falling towards the year end. The Managing Director has recently stated, "we would be disappointed if we did not come close to making a profit in tires in the second half of 1980."

In 1980, group capital spending is planned to be £65 million to £70 million, although, allowing for a probable shortfall, it will probably emerge close to the £54 million recorded for 1979. The Finance Director has reported that the Group is budgeting for a lower cash outflow in 1980 than the £31 million of 1979.

5. AUTOMOTIVE OPERATIONS OF THE VALEO GROUP

5.1 INTRODUCTION

Valeo is the new name for the French Ferodo company. Ferodo was established in France in 1923. The original French company was an offshoot of a British company of the same name, and was set up to manufactur friction materials under license. In the half century since it was set up, the French company has expanded not only in the production of friction materials but also into many other sectors of the automotive equipment market. At first the expansion was concentrated on the production of mechanical equipment such as clutch systems and cooling systems. In the late sixties an interest taken in SEV-Marchal brought Ferodo into the electrical side of automotive equipment. This interest was consolidated in 1971 and was followed by the acquisition in 1977 of two additional automotive electronics companies: Paris-Rhone and Cibie. Finally, in 1978 a further area of activity was added to the group with the acquisition of SOMA Europe Transmissions, a producer of axles for trucks and off-highway equipment.

The great diversity of the activities of the group forced a rationalization in 1978 and 1979. A financial restructuring was necessary as well, and the group emerged broadly organized into three major sectors of activity, each of which is described in greater detail below. The change of name to Valeo was made to avoid confusion with the British company Ferodo which is part of Turner and Newall. However, management decided to retain the brand name for friction materials because of its traditional and present market value. The present group under its new name is a cohesive entity which represents the many brand names and product lines of its member companies. The worldwide network thus created is advantageous to all these companies and is likely, together with other corporate advantages such as research and development activities, to allow Valeo to develop further as the strongest independent French producer of automotive components. It is, however, the policy of Valeo not to be completely dependent on the volatile automotive sector and the company plans to develop further non-automotive activities.

5.2 STRUCTURE

The Valeo group is broken down into three main areas of activity. Each main section is made up of sub-sectors or branches (10 in the whole group) which are roughly homogeneous in terms of products; e.g., friction materials are one branch. The three main sectors are the following:

- Electrical Automotive Equipment Sector (Equipements Electriques Automobile: EEA): Head lights, ignition parts, etc.
- Mechanical and Thermal Automotive Equipment Sector (Equipements Automobile Mecaniques et Thermiques: EAMT): Friction materials, transmissions, heating and cooling systems, etc.
- Truck, Off-Highway and Non-Automotive Products (Equipement et Produits hors Automobile: EPHA): Parts for industrial vehicles, building materials and domestic appliances.

Each company within the Valeo group falls within one of these sector categories. The only company which reports to more than one sector is Faessa Internacional in Spain (newly consolidated in 1979). This company has product lines in both electrical (EEA) and mechanical and thermal (EAMT) equipment.

The following is a brief overview of the three main sectors of Valeo, plus some notes on the company's recent reorganization.

5.2.1 EEA Sector

The EEA Sector groups its activities into three main companies and their subsidiaries:

- SEV (Societe pour l'Equipement de Vehicules) Marchal
- Paris-Rhone
- Cibie.

The equity structure of this part of the group was altered during the reorganization described above. Although most existing distribution and production

structures were allowed to remain unchanged, in several areas, distribution of the Marchal, Cibie and Paris-Rhone product lines were regrouped under the generic SEV name giving rise to:

- SEV service (sales to France and general export)
- SEV corporation (distribution in the U.S.)
- SEV Japan for Japan.

Valeo now controls this part of the group through the SEV holding company which includes all the companies formerly part of the SEV-Marchal group and those of the Cibie and Paris-Rhone groups. There are four branches or sub-sectors in the EEA sector:

- Branch 1: lights, headlamps, projectors, etc.
- Branch 2: small electric motors—starter motors, alternators, regulators, etc.
- Branch 3: small auxiliary motors and appliances—wiper sets, etc.
- Branch 4: ignition—coils, plugs, etc.

Table 5-1 gives details of the companies now operating within this EEA sector. Their equity status gives an indication of their affiliations within the reorganized structure of the sector.

5.2.2 EAMT Sector

The EAMT sector is dominated by the production of friction materials and thus by the Ferodo brand name. The main product lines whether Ferodo (friction materials) or Sofica (cooling systems) are in the direct control of Valeo and therefore not controlled through other members of the group as, for instance, Cibie and its subsidiaries in the EEA sector. The only instances of Ferodo or Sofica appearing as member companies are when these are operations outside France or Italy such as Ferodo Espanola or Sofica Limitada in Brazil. The EAMT sector consists of three branches of activity:

- Branch 1: Friction materials

TABLE 5-1. STATUS OF COMPANIES IN THE EEA SECTOR OF THE VALEO GROUP 1979

Name of the company	Equity holding (%)	Equity held by	Country of operation
FEA	99.9	Valeo	France
Scamea	100.0	FEA	France
SEV	100.0	FEA	France
SEV Service	100.0	SEV	France
SEUD	100.0	SEV	France
SEV Japan	100.0	SEV	Japan
SEV UK	100.0	SEV	UK
SEV Marchal Nederland	100.0	SEV	Holland
SEV Marchal Deutschland	100.0	SEV	Germany
Equipements Automobiles Marchal	100.0	SEV	France
SEV Corporation	100.0	SEV	USA
Paris-Rhone	100.0	SEV	France
Sanney-Paris Rhone	Below 50.0	Paris-Rhone	France
Famelec	Below 50.0	Paris-Rhone	France
SEV Alternateurs	100.0	SEV	France
SAM	100.0	SEV	France
Cibie Projecteurs	100.0	SEV	France
Cibie Hainaut	100.0	SEV	Belgium
Pasa	100.0	SEV	Spain
SENA Bresil	Below 50.0	SEV	Brazil
Cibie do Brasil	below 50.0	SEV	Brazil
JOS	100.0	Cibie	France
Cibie UK	100.0	Cibie	UK
Normanto	100.0	Cibie	Switzerland
Britover	100.0	Cibie	UK
Cibie Projecteurs RFA	100.0	Cibie	Germany
Proyectores Argentinos	Below 50.0	Cibie	Argentina
Incrisa	Below 50.0	Cibie	Spain
Projecteurs Maghrebius	Below 50.0	Cibie	Algeria
Simov	100.0	Cibie	
Elma	100.0	Valeo Sud & Valeo	
Saturno	100.0	Valeo Sud & Valeo	
Ducellier	48.0	Valeo	France
Faessa	100.0	Valeo	Spain

- Branch 2: Mechanical equipment such as clutches, transmissions systems, converters, etc.

- Branch 3: Heating and cooling systems such as car heaters, radiators, etc.

The various companies within this sector are shown in Table 5-2.

TABLE 5-2. STATUS OF COMPANIES IN THE EAMT SECTOR OF THE VALEO GROUP 1979

Name of company	Equity status (%)	Equity held by	Country of operation
BTI	Under 50.0	Valeo	Belgium
Ufaga	100.0	Valeo	France
Flertex	87.9	Valeo	France
Luk GmbH	Under 50.0	Valeo	Germany
Valeo Sud	100.0	Valeo	Italy
Valeo Spa	100.0	Valeo & Valeo Sud	Italy
Fraymon	100.0	Valeo & Ferodo Espanola	Spain
Ferodo Espanola	100.0	Valeo	Spain
Faessa	100.0	Valeo	Spain
Valeo Limited	100.0	Valeo	UK
Valeo Inc.	100.0	Valeo	USA
Sofica Limitada	100.0	Valeo	Brazil
Ibramaf	33.0	Sofica Limitada	Brazil
Industrieaufbau	100.0	Valeo	Germany

5.2.3 EPHA Sector

The EPHA sector has 3 branches of activity:

- Branch 1: Parts for trucks and off-highway equipment including brakes, heavy-duty clutches, transmissions and drive axles

- Branch 2: Building materials such as light pre-stressed concrete beams and bars and sound and heat proofing materials

- Branch 3: Domestic appliances such as vacuum cleaners and polishers and cooking equipment such as electric ovens.

The main companies in the EPHA sector are Hydroland and Soma who dominate the industrial vehicle equipment branch of the sector. The newly acquired companies of Bourgeois and FAR (domestic appliances) were in part inherited from the non-automotive sector Paris-Rhone before its integration into the group. Thus the equity of these two companies is held by SEV (holding) as can be seen in Table 5-3. A third newly created and fully controlled Valeo subsidiary is Isba (Societe de Composants et d'Isolation pour le batiment Isba SA) through which the construction materials branch of the sector and its affiliated companies are controlled.

TABLE 5-3. STATUS OF COMPANIES IN THE EPHA SECTOR OF THE VALEO GROUP 1979

Name of company	Equity status (%)	Equity held by	Country of operation
Isba	99.9	Valeo	France
Isba et Cie	100.0	Isba	France
SAVP	100.0	Isba	France
Saret	Under 50.0	SAVP	France
SNPI	100.0	Isba	France
Predimat	100.0	Isba	France
Lespeau	100.0	Isba	France
PPC	100.0	Lespeau	France
Hydroland Intern.	100.0	Valeo	France
Hydroland Bv.	100.0	Valeo	Holland
AFDO GmbH	100.0	Valeo	Germany
SETS	100.0	Valeo	France
SOMA Europe Transmissions	68.0	Valeo	France
SOMA of America	100.0	SOMA ET	USA
SOMA Aranzabal	Under 50.0	SOMA ET	Spain
FAR	100.0	SEV	France
Bourgeois	100.0	SEV	France

5.2.4 Some Notes on Company Reorganization

The Valeo group is a producer of a wide range of automotive components. Both the EEA and the EAMT sectors concentrate on the production of automotive equipment and spare parts and most of the companies involved in this side of Valeo's activities are important suppliers to both the French automotive industry and in export

markets. The changed structure of the Valeo group should assist the various operating companies to develop further their present product lines. A further advantage of the reorganization is that research and development can be better organized.

As shown by the equity figures in Table 5-1 through 5-3, Valeo has been largely successful in the consolidation exercise it carried out during 1978 and 1979. A list of the companies in which a majority holding or a significant minority holding was acquired in this period is set out below:

• Ufaga	EAMT
• Flertex	EAMT
• SOMAET	EPHA
• Ducellier	EEA
• FEA	EEA
• Scamea	EEA
• SEV	EEA
• E.A.Marchal	EEA
• SEV Alternateurs	EEA
• SAM	EEA
• SEV Service	EEA
• SEUD	EEA
• Cibie Projectuers	EEA
• JOS	EEA
• Paris-Rhone	EEA
• FAR	EPHA
• Bourgeois	EPHA
• Valeo Spa	EAMT
• Valeo Sud	EAMT
• Elma	EEA
• Saturno	EEA
• Faessa Internacional	EAMT & EEA
• Fraymon	EAMT
• Ferodo Espanola	EAMT
• Pasa	EEA
• Cibie Hainaut	EEA
• BTI	EAMT
• Luk	EAMT
• Sofica Limitada	EAMT
• Industriaufbau	EAMT.

Among the companies quoted above and in Tables 5-1 through 5-3, there are a number in which Valeo does not hold a majority share. The bulk of these companies are either peripheral to the group (such as Sahney Paris-Rhone controlled through Paris-Rhone) or in such

countries as Brazil or Argentina where legal requirements preclude a majority shareholding by a single foreign company. A list of these peripheral or other companies is set out below:

- Sahney Paris-Rhone (EEA) } Paris-Rhone
- Famelec (EEA)
- Sena Bresil (EEA) } SEV
- Cibie do Brasil (EEA)
- Proyectores Argentinos (EEA)
- Incrisa (EEA) } Cibie
- Projecteurs Maghrebius (EEA)
- Saret (EPHA) - SAVP
- SOMA Aranzabal (EPHA) - SOMAET
- Ibramaf EAMT - Sofica Limitada.

There are three other companies in which a majority share is not held by Valeo: BM, Luk GmbH and Ducellier. BM in Belgium and Luk in Germany are two licensed production units in those countries and therefore are to some extent peripheral to the group as a whole. The association with Ducellier, on the other hand, gives Valeo a certain level of control over the second most important producer of electrical automotive equipment in France and indeed in Europe.

The managerial responsibility for Ducellier is shared out by agreement between Valeo and Lucas Industries (UK). The latter holds 50 percent of the issued capital of Ducellier while Valeo holds 48 percent. The remaining 2 percent is held by a bank as a result of the original agreement between the two controlling companies and this 2 percent will revert to Valeo in the future.

5.3 MAJOR PRODUCTS AND MARKETS

The following is a brief overview of the Valeo Group's major products and markets.

5.3.1 Products

The Valeo group manufactures a wide range of automotive products including:

- Automotive electrical equipment, e.g., head lights, ignition parts, etc.

- Automotive mechanical and thermal equipment, e.g., friction materials, transmissions, heating and cooling systems, etc.

5.3.2 Markets

As indicated earlier, Valeo is a leading European producer of automotive components. The 30 different product lines are sold on a regular basis to 23 motorcar manufacturers in America (both North and South), in Europe and now in Japan. In the case of the latter only the EEA sector is represented through SEV Japan. But in North America all three sectors are represented. Germany, Holland, Belgium, the UK, Italy and Spain are countries in which Valeo is fully represented and claims a substantial market share. The EPHA sector of the three is the least well represented worldwide but efforts in that direction are likely in the future.

5.4 SALES AND EMPLOYMENT

The following is a summary of the Valeo Group's sales performance and employment.

5.4.1 Sales

Through the international network of its member companies and their subsidiaries, the Valeo group now comprises more than 100 different operations in 15 countries. Added to this are a further 46 licensed producers in 24 countries. The group turnover in 1979 reached some Fr6,000 million ($1.5 billion) and net profits were of the order of Fr180 million ($43 million). The growth in sales and profits of the Valeo group over the past five years is shown in Table 5-4.

TABLE 5-4. CONSOLIDATED TURNOVER AND PROFITS OF THE FERODO-VALEO GROUP 1974-79

	1974	1975	1976	1977*	1978	1979
Turnover	1,908	2,090	2,633	4,236	4,854	6,049
% increase	-	5.5	6.0	60.9	14.6	24.6
Profits (net)	26	41	109	147	154	180
% increase	-	57.7	65.8	34.9	4.8	16.9

* The large increase in turnover in 1977 can be attributed to consolidation within the group of Paris-Rhone and Cibie in that year.

The consolidated turnover quoted above for 1979 can be broken down by main sector of activity as shown in Table 5-5.

TABLE 5-5. CONSOLIDATED TURNOVER BY MAIN SECTOR: 1979
(Fr mn)

	Fr mn	Percent
EEA	2,692	44.5
EAMT	2,426	40.1
EPHA	931	15.4
Total	6,049	100.00

More than 50 percent of the consolidated turnover of Valeo is either generated or realized abroad. The turnover of overseas subsidiaries represented 35.5 percent of total sales in 1979.

5.4.2 Employment

The total number of employees in the Valeo group at the end of 1979 was 30,900. The rationalization of the group structure brought about some reductions in staff numbers in certain parts of the group (notably in the Ferodo part of Valeo where the reduction in 1978 levels was 1.7 percent) but the addition of new companies during 1979 has meant a growth in total numbers employed. Some 5 percent of the total employment force are managerial or technical staff. The breakdown of employees by major sector or activity is as follows:

- EEA - 37 percent
- EAMT - 42 percent
- EPHA - 18 percent.

The Faessa Company which produces both in the EEA sector and the EAMT sector employs the remaining three percent of the total (or some 1,194 employees).

5.5 PRODUCTION AND DISTRIBUTION

Table 5-6 summarizes the sector and branches of activity of the main companies within the group, together with plant location and other details of their operation. It must be made clear that these companies are all within the Valeo group although operating

TABLE 5-6. SECTOR OF ACTIVITY AND OTHER DETAILS OF THE MAIN COMPANIES WITHIN THE VALEO GROUP 1979

Name of the company	Number of employees	Turnover	Plant location & number[a]	Activity branch & sector
Cible Projecteurs	2,090	Fr690 mn	Bobigny, Angers, Vendome	EEA : 1 (lights)
Equipements Automobiles Marchal	4,142	Fr720 mn	Issy les Moulineaux, Pantin, Blois, Chatellerault	EEA : 1,3 & 4 (lights; small auxiliary motors; ignition)
Paris-Rhone	4,243	Fr730 mn	Lyon, Bourgoin-Jallieu	EEA 2 & 4 (electric motor & ignition)
SEV-Service	331	Fr339 mn	Distribution in France & for export	EEA sector (electrical in general)
SOMA Europe Transmissions	1,830	Fr482 mn	St Etienne, Mehun sur Yevre, Montfaucon-en-Velay, Sainte Sigolene, Saint Sauveur-en-Rue, Lapte	EPHA : 1 (truck & off-highway component)
Ufaga	271	Fr69 mn	Saint Florentin	EAMT 1 & 2 (friction materials; mechanical components)
Fraymon	1,200	Pts4,241 mn	Murcia (Spain)	EAMT 2 (mechanical component)
Ferodo Espanola	365	Pts997 mn	Alcala de Henares (Spain)	EAMT 1 (friction material)
Faessa	1,194	Pts4,094 mn	Barcelona, Martorellas (Spain)	EAMT 3 (heating & cooling systems); EEA 2 & 3 (electric motors; auxiliary appliances)
Valeo Spa	924	Lire50,292 mn	Mondovi (Italy)	EAMT 2 (mechanical components)
Valeo Sud	340	Lire18,104 mn	Frosinone (Italy)	EAMT 3 (heating & cooling systems)
Elma	182	Lire6,693 mn	Rivalta (Italy)	EEA 1 (lights)
Sofica Limitada	77	Cruz80 mn	Itatiba (Sao Paolo Brezil)	EAMT 3 (heating & cooling systems)

a The location of plant is in France unless otherwise specified.

independently. The main basis of what has now become Valeo was the Societe Anonyme du Ferodo. Ferodo, which initially specialized in friction materials and sold under that brand name, diversified over the years into other automotive equipment giving rise to the Sofica (cooling systems) and the Verto (clutches and other mechanical equipment) brand names. These brand names are repeated as companies when the products are manufactured outside France (e.g., Ferodo Espanola and Sofica Limitada; see Table 5-6). What was the Societe Anonyme du Ferodo (i.e., the whole of the operations described above) realized a turnover of Frl,915 mn in 1979. The total number of employees was 9,441. This figure represents the French part of the operation as the foreign manufacturers of the brands operate independently within the Valeo group. The plant locations in France of Ferodo, Verto and Sofica are shown in Table 5-7.

TABLE 5-7. PLANT LOCATIONS IN FRANCE OF FERODO, VERTO AND SOFICA

Sector	Brand Name	French Location
EAMT 1	Ferodo	Conde-sur-Noireaux Limoges St Florentin
EAMT 2	Verto	Amiens
EAMT 3	Sofica	Nogent le Rotrou

The companies quoted in Table 5-6 represent the most important manufacturing units within the Valeo group. There are many other companies operating within the Valeo group. Some are manufacturing units and the most important are as follows:

- SEV Alternateurs : EEA 2 :plant -Beaugency -Blois
- Scamea : EEA 4 :plant - Marignier
- Hydroland : EPHA 1 :plant - Fontney-le-Comte

• ISBA	: EPHA 2	:plant	- Auxerre - Chatellerault - Sucy-en-Brie
• FAR	: EPHA 3	:plant	- Arney-le-Duc - Arc-les-Gray - Lacanche
• Bourgeois	: EPHA 3	:plant	- Faverges
• Proyectores Argentinos	: EEA 2	:plant	- Buenos Aires (Argentina)
• Ibramaf	: EAMT 1	:plant	- Sao Paulo (Brazil)
• SOMA of America	: EPHA 1	:plant	- Norfolk (USA).

Others are purely distribution companies either for specific brand lines or for a wider range of products from the Valeo group:

• SEV-Corporation	- USA
• SEV Japan	- Japan
• Hydroland BV	- Holland
• AFDO	- Germany
• SOMA Aranzabal	- Spain.

Other companies within the group ally the distribution function to that of licensed production, e.g., Valeo Inc. in the U.S., Valeo Ltd. in the UK, Cibie do Brasil in Brazil, etc.

5.6 FINANCIAL STATUS

Certain details of the Valeo Group financial results have already been quoted in other sections. These are given in more detail in Table 5-8 below.

TABLE 5-8. DETAILS OF THE VALEO GROUP CONSOLIDATED ACCOUNTS 1974-1979 (Fr mn)

	1974	1975	1976	1977	1978	1979
Equity capital	-	-	-	155	157	220
Net turnover	1,908	2,090	2,633	4,236	4,854	6,049
Net profits	26	41	109	147	154	180
Net assets	931	1,117	1,235	1,689	2,013	2,766
Long & medium term debt	-	-	-	742	814	1,013
Re-investment	130	147	232	350	423	553

The main financial operations carried out during 1979 were the consolidation of 33 companies (Ufaga, Flertex, SOMAET, Parmo, Amiapli, Ducellier, FEA, Scamea, SEV, E. A. Marchal, SEV Alternatuers, SAM, SEV Service, SEUD, Cibie Projectuers, Jos, Paris-Rhone, FAR, Bourgeois, Valeo, Valeo Sud, Elma, Saturno, Faessa International, Fraymon, Ferodo Espanola, Pasa, Cibie Hainaut, BTI, Luk, Industriaufbau, and Sofica Limitada). For 29 of these companies a 100 percent holding was taken; for the remaining four (Ducellier, Luk, Industriaufbau and BTI) an interest of 20 to 50 percent was taken. The financial year was dominated by the internal reorganization.

To complete this brief survey of financial results, a condensed profit and loss analysis is provided in Table 5-9.

TABLE 5-9. PROFIT AND LOSS, VALEO GROUP CONSOLIDATED ACCOUNTS 1977-1979 (000 Fr)

	1977	1978	1979
Turnover	4,236,091	4,853,832	6,049,481
Financial & other income	86,727	103,217	135,122
Total income	4,322,818	4,957,049	6,184,603
Purchases & stock variations	1,565,178	1,767,452	2,169,827
Staff costs	1,629,930	1,869,891	2,283,066
General costs	534,276	619,605	840,280
Financial costs	174,416	212,560	249,314
Depreciation	203,353	269,115	355,244
Provisions	3,312	7,840	16,313
Costs	4,110,465	4,746,463	5,914,044
Gross integrated profit	212,353	210,586	270,559
exceptional profits & losses	5,914	2,637	(15,126)
profit tax	(85,214)	(75,009)	(90,994)
Net integrated profit	133,053	138,214	164,439
Income from affiliated companies	13,884	15,771	15,699
Total group profit	146,937	153,985	180,138
Payments to third parties	(25,545)	(37,890)	(50,879)
Net profit to Ferodo	121,392	116,095	129,259

Source: Ferodo-Valeo Consolidated Accounts 1979.

5.7 RESEARCH AND DEVELOPMENT

Some 5 percent of total Valeo turnover is accounted for by expenditure on research and development. There is a research center in Toulouse which up to now has to some extent remained the preserve of the EEA sector. It is likely, however, that other sectors will in the future make use of the facilities or further develop their own.

In the EEA sector, research and development have been concentrated on a new electronics division located partly at Beaugency and partly in the research center in Toulouse. The turnover of this division is programmed to reach Fr100 mn in 1980. The purpose is to develop electronic control modules for the automotive industry with the ultimate aim of increasing energy, reliability and security control. The EEA sector concurrently is developing new product lines in each branch or sub-sector:

- In Branch 1 a new range of lamps and dynamos is being developed.
- In Branches 2 and 3 electronic alternators and a new type of starter motor are among the items being developed.
- In Branch 4 new electronic ignition systems are being developed.

In the EAMT sector research is being carried out to develop new friction linings both for car and truck clutches and brakes. New clutch systems for trucks and tractors, new caliper disc brake systems, anti-lock devices and vehicle air conditioning equipment are among the many other research and development activities in the rest of the sector.

The EPHA sector is still relatively new and represents as yet only 15 percent of total turnover. Little of this turnover is for the moment allocated to technical development as the major effort is still towards market development.

On the whole, the emphasis of research in Valeo is to meet the new requirements of the automotive industry in terms of energy conservation, pollution and security.

6. THE AUTOMOTIVE OPERATIONS OF LUCAS INDUSTRIES LIMITED

6.1 INTRODUCTION

Lucas Industries Ltd. is a leading manufacturer of electrical, electronic, hydraulic and mechanical equipment used in gasoline, diesel and gas turbine engines, road and rail vehicles, ships and aircraft. It also manufactures a wide range of industrial products.

Lucas Industries Ltd. has eight principal operating companies in the United Kingdom which together design, manufacture and market its extensive range of engineering products. These may be broadly categorized as automotive, aerospace and industrial. Of these, the automotive sector is the most important, accounting for about 80 percent of the Group's turnover. In addition to engineering components for cars and commercial vehicles, Lucas automotive products are supplied for agricultural tractors and farm machinery as well as a wide range of defense equipment and off-highway construction equipment.

Lucas manufacturing and marketing facilities incorporate 170 factories, warehouses and depots across the world accounting for 87,543 employees. Of these, 45 major manufacturing sites are located in the United Kingdom, along with 60 smaller units which produce components, sub-assemblies or finished products. Increasing emphasis is being placed on the establishment of overseas manufacturing subsidiaries, particularly in continental Europe and North America, in order to broaden the manufacturing base of the Group. A growing number of partnerships and licensing arrangements have also been set up abroad. Servicing Lucas equipment in the field, worldwide, is a major operation in aftermarket distribution, and, to this end, 6,000 Lucas Service outlets have also been established.

6.2 STRUCTURE

The following summarizes the structure of the company in the United Kingdom, Western Europe and in other countries.

6.2.1 United Kingdom

The eight principal operating companies of the Lucas Group in the UK are discussed briefly below. For each company, the following information is presented:

- The range of products manufactured
- The services offered.

Lucas Electrical Ltd.

Headquartered on Great King Street in Birmingham, Lucas Electrical has 17,000 employees in the following divisions:

- Electronics and Systems Division. Located also on Great King Street in Birmingham, this division makes ignition and fuel injection systems, windshield wiping equipment, horns, and electronic components and sub-assemblies.
- Lighting Division. Located in Cannock, Staffordshire, this division makes a complete range of both standard and individually styled lighting equipment for all vehicle operations.
- Starters and Generators Division. Located in Solihull, West Midlands, this division makes starting and generating equipment for cars and light/medium range commercial vehicles; and intermittently rated motors for hydraulic power packs and trailer lifts.
- Switchgear Division. This division makes a wide range of switchgear, relays, solenoids, warning lights and rheostats for cars, commercial vehicles and tractors. It is located in Burnley, Lancashire.
- Plastics, Diecasting and Rubber Division. With offices in Sparkhill, Birmingham and Willesden, London, this division makes, in Birmingham, thermoplastic and thermosetting moldings, aluminum and zinc die casting for automotive applications and, in London, precision rubber moldings and general mechanical moldings for automotive applications.

- Parts and Service Division. Located in Birmingham, this division makes replacement parts for all makes of electric vehicles and develops related products and services.

- Lucas Kienzle Instruments Ltd. Located in Aston, Birmingham, this Lucas subsidiary serves as marketing and service facilities for Tachograph Recording Instruments used in the UK automotive industry.

Lucas CAV Ltd.

Headquartered in Acton, London, this Lucas company makes a wide range of fuel injection and electrical equipment with a present employment of 13,000 people in its plants. The following is a brief summary of the major divisions of this company:

- CAV Fuel Injection Equipment. Located in Acton, London, this division manufactures multi-cylinder diesel fuel injection equipment for automotive, industrial, agricultural and marine applications.

- CAV Electrical Equipment. This division is also located in Acton, London. Its major products include heavy duty electrical equipment for commercial, public service, industrial and military vehicles.

- CAV Parts and Service. This division provides aftermarket support for CAV original equipment, including maintenance, repair and unit exchange for CAV and other makes of fuel injection and electrical equipment, plus turbochargers and fan drives provided through the Lucas Service Network. It is also located in Acton, London.

- Lucas Bryce Ltd. This division is located in Hucclecote, Gloucester, and employs 1,000 people. Major products include flange-mounted fuel injection pumps and injectors for agricultural, industrial, marine and rail traction purposes, and hydraulic-pneumatic engine starters.

- Crosland Filters Ltd. Located in Nottingham, this division has 500 employees. Major products include air, oil, fuel and gas filters and elements for automotive and industrial applications.

- Leslie Hartridge Ltd. This division makes vehicle, diesel fuel pump and injector test and service equipment and garage equipment. It is located in Birmingham and has 400 employees.

- Lucas Marine Ltd. This division incorporates Francis Searchlights and Siba Electric. It is located in Camberley, Surrey, and has 180 employees. Its major products include fully marinized alternators, starters, and ancillary products for marine, vehicle and land-based applications.

Lucas Girling Ltd.

Headquartered in Tyseley, Birmingham, with 8,050 employees, the major products of this division include shock absorbers, brakes and clutches for cars, commercial vehicles, tractors, off-highway vehicles and railways. The major operating divisions of the firm include:

- Girling Midland-Ross Air Actuation Ltd. Located in Hirwaun, Mid Glamorgan, this division manufactures air actuation equipment for commercial vehicle braking.

- Girling Parts and Service Division. Located in West Bromwich, West Midlands, this division provides service and distributes spares for a range of braking and suspension systems for automotive and associated industries together with the development of special accessories and services.

Lucas Batteries Ltd.

This company is headquartered on Formans Road in Birmingham and has 1,600 employees. Its major products include batteries for cars, commercial and public service vehicles, agricultural equipment, boats, caravans, industrial plant, industrial trucks, defense equipment and electric vehicles.

Rests Ltd.

This company manufactures electric cables and wiring harnesses for the automotive, aircraft, tractor, marine, domestic, defense and telecommunications industries, printed circuits (rigid and flexible), plastic and rubber moldings, fuse boxes, and electrical connectors. It is located in Newcastle-under-Lyme, Staffordshire, and has 4,000 employees.

Lucas World Service Ltd.

This Lucas company which is headquartered in Aston, Birmingham, serves as the marketing and distribution center for the automotive aftermarket of Lucas manufactured equipment which includes a comprehensive product range of almost 200,000 different items including complementary manufactured products. Other offices of this company include:

- Lucas Service Overseas Ltd. This office is located in Aylesbury, Bucks, with 322 employees. Its functions include the distribution of spares for automotive equipment, and the development of special accessories and service for the automotive industry.

- Lucas Service UK Ltd. This office is located in Aston, Birmingham, with 3,850 employees. Its functions include service facilities and distribution of spares for automotive equipment; the manufacture of special products in provision of specialist services to the motor trade and general public.

Automotive Operations of Lucas Aerospace Ltd. and SMEC Ltd.

The remaining two operating divisions in the UK are Lucas Aerospace Ltd. and SMEC Ltd. The latter is an industrial holding company with subsidiaries manufacturing products for both the industrial and consumer markets. Among these subsidiaries, the only ones of significance for the automotive market are:

- NSF Ltd. This subsidiary is located in Keighley, West Yorkshire, and makes radiator filler caps, thermostats, and a complete range of switches.

- Clearex Plastics Ltd. This subsidiary is located in Houghton-le-Spring, Tyne and Wear, employs 86 people, and makes molded panels with metal finishes, switches, etc., and a range of plastic products based on injection molding, vacuum forming and rigid form molding techniques.

6.2.2 Western Europe

Lucas is one of the leading suppliers of engineering products to automotive manufacturers in Continental Europe. The major operating companies of Lucas in Continental Europe are as follows:

- CAV Roto Diesel SA. Located in Blois, France, this company employees 1,500 people and makes fuel injection pumps and associated filtration and injection equipment for automotive type diesel engines.

- Condiesel SA. This company is located in Barcelona, Spain, with 1,200 employees. It makes single and multi-cylinder diesel fuel injection pumps, injectors and filters for automotive, agricultural and marine diesels.

- Crosland Filters (Holland) BV. This company is located in s'Hertogenbosch, Holland, and makes air, oil, fuel and hydraulic filters and elements for automotive and industrial applications.

- Crosland Filters (Ireland) Ltd. This company located in Dublin, Irish Republic, manufactures air, oil, fuel and hydraulic filters and elements for automotive and industrial applications.

- Freins Girling SA. This company is located in Bouzonville, France, and has 550 employees. Its major products include brake and clutch equipment for cars, commercial vehicles and tractors.

- Girling Bremsen GmbH. This company is located in Koblenz/Wallersheim, West Germany, with 850 employees. Its major products include brake and clutch equipment for cars, commercial vehicles and tractors.

- Girling Espana SA. This company also manufactures brake and clutch equipment for cars, commercial vehicles and tractors and has 550 employees. It is located in Orcoyen (Navarra), Spain.

- Keelavite Hydraulics Ltd. This company is located in Oosterhout, Holland. It makes fluid power equipment and hydraulic pumps and motors for tractors and commercial vehicles.

- Lucas International Trading SA. Located in Lausanne, Switzerland, this subsidiary is the European division of Lucas World Service, responsible for managing a group of seven territorial companies and a chain of independent distributors covering 24 countries in Western Europe, the Mediterranean, and the Atlantic Islands.

- Messier Auto Industrie SARL. This is a wholly-owned subsidiary of Lucas Girling located in Longjumeau, France. Its principal product is disc brakes.

- Rist-Cables et Faisceaux. This Lucas subsidiary is located in Calais, France, with 280 employees. Its principal products include electric cables and wiring harnesses for the automotive, aircraft, tractor, marine, domestic, defense and telecommunication industries; printed circuits (rigid and flexible); plastic and rubber moldings; fuse boxes; and electrical components.

Also in France, Lucas holds a 50 percent interest in the component-manufacturer Ducellier, 48 percent being held by Ferodo France. Lucas also has links with Carello in Italy.

6.2.3 Other Countries

Principal companies of the Lucas Group with overseas operations in the automotive field include:

- Brakes India Ltd. Located in Madras, India, with 1,550 employees, this company manufactures brake and clutch equipment for cars, commercial vehicles and tractors.

- CAV Inyec Diesel SA de CV. This company is located in Coah, Mexico, and makes CAV injectors, nozzles and diesel fuel filters.

- CAV do Brasil SA Ind e Com. This company is located in Sao Paulo, Brazil, and has 900 employees. It manufactures a range of CAV fuel injection equipment for automotive type diesel engines and ignition coils for gasoline engines.

- Equipamentos Varga SA. This company is located in Estado de Sao Paulo, Brazil, and has 150 employees. Its major products are brake equipment and compressors.

- Girlock SA (Pty) Ltd. This company makes brake and clutch equipment for cars, commercial vehicles and tractors. It is located in Transvaal, South Africa, and has 590 employees.

- Girlock Ltd. This company also makes brake and clutch equipment for cars, commercial vehicles and tractors. It is located in New South Wales, Australia, and has 940 employees.

- Lucas Industries Australia Ltd. This company is located in Victoria, Australia, with 630 employees. It makes electrical equipment for cars and commercial vehicles.

- Lucas Industries New Zealand Ltd. Located in Auckland, New Zealand, with 550 employees, this company makes auto electric and sundry automotive equipment, including horns, coils, hoses, starter solenoids and diesel fuel filter elements.

- Lucas Industries Inc. Located in Troy, Michigan, U.S., this is the corporate headquarters and engineering research and development center of Lucas in the U.S.

- Lucas Industries South Africa (Pty) Ltd. This company is located in Florida, South Africa, and employees 260 people. It manufactures starters, generators and brake equipment for the automotive industry.

- Lucas Philec Inc. Located in Manila, Philippines, this company makes starters, alternators and windshield wipers for cars and light commercial vehicles.

- Lucas Tundar Industries Corporation. This company is located in Tehran, Iran. It makes starters, alternators, distributors and coils for cars and light commercial vehicles.

- Lucas-TVS Ltd. Located in Madras, India, with 2,750 employees, this company makes electrical equipment for cars, commercial vehicles, tractors, motorcycles, stationary and marine engines.

- Martin Amato y Cia SAIC. This company is located in Buenos Aires, Argentina, with 1,300 employees. Its major products include auto electronics and diesel starting aids for cars, commercial vehicles, tractors and industrial engines.

- Maquinas Varga SA. This company is located in Sao Paulo, Brazil. It employees 2,700 people and makes brake equipment for cars, commercial vehicles and tractors.

- Nihon-CAV Co. Ltd. Located in Tokyo, Japan, with 35 employees, this company makes diesel fuel injection equipment for automotive type diesel engines.

In addition to the above, all the following companies, in which the Group holds an interest, are employed in the production of batteries for cars, commercial vehicles and public service vehicles overseas:

- Acumuladores Vulcania SA. Located in Sao Paulo, Brazil. Has 435 employees.

- Associated Battery Manufacturers (Ceylon) Ltd. Located in Sri Lanka. Has 165 employees.

- Associated Battery Manufacturers (Ghana) Ltd. Located in Zema, Ghana. Has 180 employees.

- Associated Battery Manufacturers (Nigeria) Ltd. Located in Ikeja, Nigeria. Has 154 employees.

- Associated Battery and Metal Industries (Trinidad) Ltd. Located in Port of Spain, Trinidad. Has 128 employees.

- Lucas Industries Australia Ltd. (Batteries Division). Located in Victoria, Australia. Has 320 employees.

- Lucas Industries New Zealand Ltd. Located in Auckland, New Zealand. Has 140 employees.

- Lucas Batteries Ireland Ltd. Located in Dublin, Irish Republic. Has 36 employees.

- Lucas Service Bangladesh Ltd. Located in Dacca, Bangladesh. Has 40 employees.

- Lucas Industries South Africa (Pty) Ltd. Located in Transvaal, South Africa. Has 130 employees.

- Tropical Battery Company. Located in Bridgetown, Barbados.

6.3 NEW FACILITIES

The following is an overview of new facility development planned by Lucas.

6.3.1 United Kingdom

New facilities are planned in the United Kingdom for the manufacture of fuel injection equipment and tachographs.

Fuel Injection Facilities

At Gravelly Industrial Park, Birmingham, a new facility has been acquired by Lucas Industries which represents part of the substantial commitment the company is making to the future of micro-electronics in the control of fueling car engines. The new factory produces digital fuel injection equipment for use on the Jaguar V12 and Rover V8 engines, with the objective of obtaining levels of efficiency and economy which would be impossible using traditional mechanical means.

Another large investment in facilities is taking place at Ipswich where the new Microjector injector for

use in diesel cars is being produced. This system of high-speed fuel injection represents the beginning of a new generation of diesel fuel injection equipment planned by the company, and has already been well received in world markets, particularly in the United States. The demand for conventional, diesel injectors has been so great that the fuel injection equipment factory at Sudbury had insufficient space to accommodate this major new product.

At the new Ipswich plant, spark erosion techniques have been developed using high-power electric current to achieve precision machining for the Microjector, where conventional drilling methods have proved to be inadequate for the purpose. The new plant also incorporates new, fully automatic, high precision volume production grinding machines.

Tachograph Facilities

With 400,000 existing vehicles and around 100,000 new trucks scheduled to be fitted with tachographs by the end of 1981 under new UK legislation, Lucas-Kienzle opened a new headquarters building near Birmingham in April 1980. This is to serve as the center for importing from Germany marketing, rebuilding and servicing the range of tachographs offered. Manufacture of tachographs in the UK was discussed, but it was decided that Kienzle would supply the UK market from its plant at Villengen, Germany, its manufacturing center for the European market. Lucas-Kienzle has now set up 120 Department of Transport-approved fitting and calibrating stations in the UK.

6.3.2 Overseas Market

New facility developments in the overseas market included:

- The development of a new advanced testing center at Troy, Michigan.
- The development of facilities for the manufacture of diesel injectors, filters and nozzles.
- The development of facilities for the manufacture of alternators and starter motors.

6.3.3 New Advanced Testing Center

The Lucas USA headquarters at Troy, Michigan, is being extended to incorporate a new advanced testing center. Lucas has also built a 25,000-square-foot factory on a 58-acre site at Greenville, South Carolina. The building contains the engineering facility for the production of diesel fuel injection pumps. It consists of:

- Three engine test beds
- A cold room
- A test and assembly unit.

The new factory assembles the pumps from components brought in from the U.K. In the future the intention is to introduce complete local manufacture "when the conditions are right."

Facilities for the Manufacture of Diesel Injectors, Filters and Nozzles

With the diesel market in France projected to grow by 50 percent in the next five years, Lucas has built a new factory at La Rochelle to produce diesel injectors and filters. The existing facilities at Blois could not handle the required expansion in production to meet demand. The new factory at La Rochelle consists of an 86,000-square-foot building located on a 25-acre site. A new plant for the manufacture of diesel nozzles in Korea has also been established.

Facilities for the Manufacture of Alternators and Starter Motors

In July 1979, Lucas Industries received the authorization of the Turkish Government to invest in the local manufacture of alternators and starter motors with Turkish partners. The project was led by Lucas' distributors in Istanbul, Elektro-Diezel Motor Sanayi ve Ticaret, which is also reported to be awaiting authorization from the Government to proceed with a fuel-injection equipment project with CAV. Under the current project, Lucas will hold 31 percent of the equity and provide about £750,000 in capital and £2 million in equipment. Production is scheduled to start in 1982, with the plants having a capacity of about 100,000 alternators and 185,000 starter motors of various sizes.

Other Overseas Facilities Expansions

Other investments in overseas plants, which exceeded 24 million in the fiscal year ended July 31, 1979, included:

- The establishment of a new engineering center at Koblenz, Germany, by Lucas Girling
- The acquisition of a 90 percent interest in Metalurgica Rossi, a Brazilian lighting equipment manufacturer
- An increase in the company's shareholding in CAV Condiesel of Spain, from 47 percent to 60 percent.

In addition, the auto-electrical component company, Martin Amato, in Argentina, recently purchased a new 65,000-square-foot factory, while in southern India, Brakes India is building a new iron foundry. A new battery factory in Indonesia was also completed, and the installation of plant and equipment is proceeding.

6.4 MARKETING

Forty-three percent of the sales of Lucas Industries arose from its overseas ventures in 1979, i.e., £465 million of the total turnover of £1,072 million. In addition to this, a further £191 million of revenue was accounted for by sales of UK companies which were destined for overseas markets. Thus, in total, overseas business accounted for over 60 percent of Lucas' turnover in the 12 months to July 1979, with almost one-third of Group sales from the UK companies going for export. Four-fifths of total sales revenue in 1979 was derived from vehicle equipment.

A geographical analysis of sales in the principal markets in which Lucas Industries operates is provided in Table 6-1 with reference to the 1979 trading year. A comparative analysis of sales for the trading year 1978 reveals a trend towards sales growth in the EEC and the rest of Europe, together accounting for 25 percent of sales revenue in 1979 compared with 22 percent in 1978. Sales revenue arising from the United Kingdom market represented 56 percent of total sales revenue in 1979 compared with 58 percent in 1978.

TABLE 6-1. LUCAS GROUP SALES
BY TRADING AREA (1978/79)

Market	% Sales
United Kingdom*	56
EEC	18
Europe (Outside EEC)	7
Asia	5
North America	4
Central and South America	4
Australia	4
Africa	22
Total	100

* Includes direct exports amounting to 18 percent of total sales.

In an attempt to compensate for the lower activity of its major UK original equipment customers, Lucas is putting greater emphasis on direct exports. A summary of Lucas' efforts in this area is given below for the following Lucas subsidiaries:

- Lucas CAV
- Lucas Electrical
- Lucas Girling
- Lucas Batteries
- Rists Ltd.
- Lucas World Service
- Crosland Filter.

6.4.1 Lucas CAV

Lucas CAV took advantage of the 5 percent growth in world diesel engine production in 1979, and gained important new contracts in Europe and the U.S. In October 1979, it was announced that Lucas Industries had won a £30 million contract to supply fuel injectors for diesel-powered cars being built by General Motors in the U.S. Microjectors from the company's plant at Ipswich are being supplied to General Motors for its 1980s generation of diesel-powered passenger cars. Demand from Volkswagen for components supplied for its diesel-engined Golf models has also increased significantly, along with supplies to SOFIM (the Fiat/Saviem engine plant in Italy).

Lucas CAV is now supplying fuel injection equipment for one in every three diesel cars made in Europe. Lucas CAV license agreements in Yugoslavia and Romania were also updated in 1979, and a contract to equip production facilities in Poland was completed, opening the way to the export of component packs from CAV Medway. Other new contracts secured in 1979 include those from Ford, Daimler-Benz, Lancia, Peugeot and International Harvester. CAV Inyec Diesel also achieved a 71 percent increase in sales in Mexico. In addition, sales by Electro Diesel de Mexico, the service company, increased by 30 percent. Sales of fuel injection equipment by Lucas CAV in Japan also rose by 45 percent in the 1979 trading year.

6.4.2 Lucas Electrical

Lucas Electrical is becoming an important supplier of original equipment to European automotive manufacturers, and sees electronics, engine management and diesel starters as particular areas of opportunity. At Lucas Electrical, the consolidation of manufacturing operation in South Africa continued with the introduction of new products for the local market, and a new technical collaboration agreement was reached with the Government of India to facilitate the introduction of new products. Other new agreements worth noting include those with:

- Polmot, of Poland, for the manufacture of alternators and switches.

- Zastava, in Yugoslavia, where the agreement relating to small motors has now been extended to embrace headlamps and windshield washers.

Following the compromise reached in December 1979 allowing Lucas to increase its stake in the French car parts manufacturer Ducellier to 50 percent, with 48 percent currently retained directly by Ferodo, a joint assault is planned on the French motor industry. One of the first contracts to be secured was with Talbot France for the supply of a range of windshield wipers, with Lucas alternators are now fitted across the full Fiat 127 1050 cc range, and windshield wiper business in Italy now expanding in conjunction with Carello.

Lucas Electrical has also recently tendered for a substantial quantity of diesel car starters for the Oldsmobile division of General Motors in the United States.

In addition to its sales of digital fuel injection equipment for the Jaguar V12 and Rover V8 engines, the company is involved in similar development contracts with several other major European manufacturers. The Parts and Service division of Lucas Electrical has expanded its "All Makes" program and now offers replacement ignition units, starters and alternators for all popular UK, French, Italian, German, Swedish, Japanese and East German vehicles.

6.4.3 Lucas Girling

A strengthening of activities in the U.S. has helped Lucas Girling gain significant original equipment business from vehicle producers. The technically improved air actuation equipment offered by the Girling-Midland Ross operation is also finding increasing acceptance among truck producers. The Lucas Girling Skidchek system is in increasing demand for vehicles transporting hazardous loads and those in the emergency services. More than one-third of the UK Fire Brigade now uses this anti-lock system, and it has also been sold to the Trinidad and Tobago fire service. Shell and Calor have also specified this unit for installation in their UK vehicle fleets. Skidchek is an official factory option for the British truck producers, Talbot UK, ERF, Leyland and Volvo.

In 1979, Lucas Girling won major new contracts from the following companies:

- Savieur, the commercial vehicle part of Renault and Chrysler. Both contracts are for the installation of Girling's self-adjusting hydraulic brake drums. For Savieur the brakes will be installed on their lightest van line and for Chrysler, on their new line of trucks. Both contracts were awarded in July 1979.

- American Motors Corporation and De Lorean Corporation. In September 1979, Lucas Girling secured two contracts worth several million pounds over a period of four to five years. A clutch actuation contract with the American Motors Corporation called for the supply of clutch master cylinders and slave cylinders for the latest Jeep, Concorde and Spirit models fitted with four-cylinder engines and manual gearboxes. A contract with De Lorean Corporation was secured for the supply of braking equipment for the De Lorean sports car due to go into production in Belfast later in 1980.

In addition to the above, negotiations to gain more tractor brake business in continental Europe resulted in a contract from Renault, and in December 1979, Lucas Girling also won a contract to supply the braking equipment for David Brown Tractors' new 1490 model.

During 1979 Lucas Girling made notable progress in its exports to Scandinavia, Poland and the Republic of Korea. An increase in orders by Ford for Lucas' car and light commercial vehicle suspension units is also reported, with the company's engineering program indicating a share for Lucas in the next generation of suspension systems.

6.4.4 Lucas Batteries

In the trading year to July 1979, Lucas Batteries also increased its export sales despite surplus capacity for automotive batteries around the world. In the UK, however, the company met with less success due to:

- Poor demand growth
- A steep rise in the price of lead
- Motor industry disputes
- Surplus capacity.

Nevertheless, a complete range of "low-maintenance" car batteries and an updated set of economy batteries were introduced to the UK in 1979.

In conjunction with Vauxhall Motors, Lucas has developed an electric drive system for urban goods delivery vehicles. Currently, some 30 Bedford CF vans are in service with a wide range of fleet operators in London, and similar vehicles are on assessment in the U.S., France, and Austria. Further overseas demonstrations are planned for 1980.

6.4.5 Rists Ltd.

The overseas operations of Rists Ltd. were marred in the last business year by reduced demand from a major customer—Leyland Industries Belgium—and the situation in Iran. However, additional business was obtained from Peugeot, Renault, Talbot and Massey Ferguson. Continental European vehicle manufacturers are showing increasing interest in Rists' flat strip wiring system, Fabrostrip, especially in applications where space is at a premium.

6.4.6 Lucas World Service

At Lucas World Service, the "All Makes" program already described is aiming to provide specialist service for all makes of vehicles, whatever the country of origin. As well as replacement parts, the company is aiming to provide a complete range of accessories. In the UK market, for example, an "extended range program" covering oil, towbars, test equipment, steering, in-car entertainment and an extensive range of selected retail products has been launched. The company has also stepped up its drive into the "do-it-yourself" market, spearheaded by more than 100 Autospares shops now open throughout the UK. A further advance has been achieved by the opening up of a new source of business in the supply of fast-moving parts and accessories to supermarket chains. The growing importance of fuel-conservation has also motivated the setting up of a number of specialized Turbocharger Clinics for commercial vehicles over the last twelve months.

6.4.7 Crosland Filter

Further consolidation of the Crosland Filter export business was achieved in 1979, with the formation of a joint venture warehousing and sales company in Dubai, United Arab Emirates, as a base to develop sales in the Middle East.

6.5 PRODUCT PLANS/RESEARCH AND DEVELOPMENT

In March 1979, a committee was formed under the chairmanship of the chief engineer and director of Lucas Industries, Dr. Ewan McEwan. This committee was charged with the appraisal of alternative product suggestions for the whole of the Group's factories. Also on the joint management/union committee are:

- Two shop stewards
- Finance and marketing experts from the company
- An indepedent member.

Presented below is a summary of the Group's R&D/new product development plans. The plans and activities of the following three Lucas divisions are described:

- Lucas Electrical
- Lucas CAV
- Lucas Girling.

6.5.1 Lucas Electrical

The micro-electronics revolution and the application of the silicon chip has played a significant part both in the manufacturing processes at Lucas and the Group's final products. Instead of manual checking, the performance of Lucas Electrical windshield wipers is now checked by microprocessor controlled equipment. This gives a totally automatic test cycle and records a range of results for every wiper tested. Lucas diodes have also been designed and are now produced for the new series of Lucas Electrical shortened alternators, aimed primarily at the European automotive market. The diodes are now automatically tested and graded at rates up to 7,000 an hour on equipment interfaced with a test console and mini-computer developed by Lucas. Micro-electronics has also played a part in the design of these shortened alternators.

To meet the requirements for lighter construction, greater rotational speeds and finer operating tolerances in alternator rotors, Lucas Electrical is now using a balancing machine which automatically measures and corrects the degree of imbalance and then rechecks to guarantee a 100 percent quality standard. A new computer-controlled barrel zinc plating process, thought to be the first of its kind in the UK, is being employed by Lucas Girling for brake and shock absorber components. The process reduces overall plating cycle times by half, and has improved output by two-and-a-half times. A new Monitube damper has recently been developed at the Group's facilities in Springvale, in Wales. This gas-pressurized unit offers superior performance, simplicity of construction and a reduced number of component parts, with consequent weight-saving of some 16 percent for a typical car application.

6.5.2 Lucas CAV

In July 1979, Lucas Industries completed development of a new microchip monitor which continuously checks fuel consumption and varies supply according to second by second changes in speed. In modified form, this is expected to be incorporated in the average family car within a decade. Eventually, the company envisages the development of a central core of microchips controlling fueling, ignition, combustion and also analyzing exhaust fumes for, among other things, fuel wastage. To this end, CAV is to build a research and development center at Cirencester where for the next 10 or 20 years emphasis will be on developing microchip technology. This center is due to become operational around September 1980.

Other areas being researched include a number of safety-related functions and driver-warning systems. Many aids to comfort are also being developed so that, for example, seats will be positioned by actuator motors capable of memory and recall at the touch of a button.

6.5.3 Lucas Girling

Research at Lucas Girling has led to the development of a compact brake caliper supported by the provision of lightweight actuation, with further developments of the system planned for the 1980s. Technical developments at Lucas Batteries include the extension of the polypropylene and "low maintenance" technologies to more Lucas manufacturing operations around the world, and the replacement of plate formation by the Lucas "sealcharge" process. Work is proceeding on alternative battery chemistries, but no production substitute for the lead-acid battery is envisaged for some time yet. With the assistance of financial support provided under a contract with the Department of Industry, in-service trials of Lucas electric vehicles are being extended with a view to making an electric-drive option, initially for light vans, commercially available within four years.

6.6 CORPORATE GOALS AND STRATEGY

The decline in vehicle production in the UK has meant, for Lucas, a deliberate and planned shift of emphasis to turn the company increasingly into an international concern. This is also in line with trends in the automotive sector as a whole, where the "world-car" concept has become the dominant force for the 1980s. Already many car models have lost their purely national identities, and for Lucas this has required the tailoring of component and system design to customers' international specifications. In parallel with these structural and geographical changes, Lucas has also had to take increasing note of energy conservation, pollution control and safety legislation.

Lucas has based its long-term strategy on increased exports and high spending on research and development, both of which are proving to be vital to profits at a time when they are most needed. With European production of diesel cars now rising at around 25 percent per year, the company's capability in advanced fuel systems is in great demand, and commands a substantial portion of research expenditure.

In its last fiscal year, direct exports from the UK increased by almost one-quarter, offsetting a difficult period for the UK automotive market. Lucas Electrical is

becoming an important original equipment supplier to European manufacturers, particularly in electronics, engine management and diesel starters. While there was a 10 percent fall in UK vehicle output during the year, production on the Continent has remained stable, justifying Lucas' links in Italy with Carello, and in France through Ducellier.

Lucas prefers to have more than one production center where possible. In North America, for example, it has two sources for its fuel injection systems, a feature which is particularly attractive to security-conscious U.S. buyers. The degree of autonomous production at each overseas plant depends on a number of factors, but the objective is to achieve efficient coordination between plants.

Having experienced five relatively subdued years in the UK, Lucas is now convinced that its future expansion must come from overseas. To achieve this expansion, however, it recognizes the need for highly competitive products and hence the £45 million spent on research and development last year. The United States and Continental Europe are seen as the prime areas of growth and are the most profitable markets.

In America, Lucas is finding an increasing number of car manufacturers to purchase its products as original equipment, and, as American cars become smaller and lighter, it is expected that applications for the company's components, largely developed for smaller European cars, will multiply. It therefore appears that, with Lucas now virtually a multi-national company with strong interests in Europe and the U.S., the group has become diverse enough to withstand what is forecast to be a difficult period ahead in the UK automotive market.

6.7 FINANCIAL STATUS

Behind the decline in Lucas Industries' profit from a peak of £77 million in 1976/77 lies a steady fall in the amount of profit earned in the UK—from £56.6 million to £41.8 million. This has been partly offset by growing profits overseas. Including the share of associated companies' profits, the overseas operations have lifted their share of the group total by 43 percent to £28.9 million in the past two years. This trend is expected to continue in the present financial year, as strikes inside and outside the group's UK operations take their toll on profitability.

In 1977/78, the national tool-room strike reduced profits, and in 1978/79 the Ford strike, internal troubles and the transport strike all combined to hamper the Group's performance. In the current financial year, Lucas has also been hit by the engineering strike which affected a large number of the group companies in the UK. The impact of the engineering strike has been considerable, accounting for an estimated £20 million in profits of the Lucas Group. As shown in the interim results below, profit before tax was halved in the first half of the current business year, the reduction arising solely in the UK where a loss of £1.8 million was recorded. Apart from the engineering dispute, demand was reduced by other industrial disputes in the UK motor industry, and there was competitive pressure on UK export prices due to the strength of sterling and the high wage settlements in the UK.

Strikes apart, Lucas has considerable potential in the years ahead and has been building a firm base. Capital spending has been running at an annual rate of over £50 million in each of the last three years, and this excludes new investment charged against revenue. Expenditure on research and development has also been rising fast, reaching £45 million, or 4.2 percent of sales in the last fiscal year.

In the second half of 1978/79 when the group was relatively strike-free, it made £46.7 million before tax, which confirms that it does have real growth potential, and is quite capable of returning a profit of £90 million a year. When Lucas might achieve this depends to a large extent on factors outside its control. Leyland, for instance, still accounts for about 12 percent of group sales, so that any upset there would have a considerable impact.

Summarized financial results for the Group over the five-year period ending July 31, 1979, are shown in Table 6-2. Sales to third parties and surplus on trading attributed to the principal classes of business are shown in Table 6-3. The Group's unaudited results for the half-year to January 31, 1980, are shown in Table 6-4, with comparative figures for the half-year to January 31, 1979.

TABLE 6-2. SUMMARY OF FINANCIAL RESULTS OF THE LUCAS GROUP (1975-1979)
(£ MILLION)

	1979	1978	1977	1976	1975
Sales - United Kingdom	606.4	562.2	508.1	420.3	344.7
Overseas	465.3	409.0	378.0	299.0	225.5
Total sales	1,071.7	971.2	886.1	719.3	570.2
Exports from United Kingdom (Included above).	191.4	154.6	139.9	111.7	93.8
Profit before tax	70.7	73.1	76.8	55.3	32.1
Profit after tax	52.9	57.1	60.5	41.4	23.0
Profit attributable to shareholders	51.0	56.2	59.5	40.5	22.7
Capital employed:					
Shareholders' funds	450.2	420.2	369.8	318.8	216.2
Loan capital	43.4	45.0	50.4	50.0	46.6
Minority interests	10.4	6.3	5.4	3.2	2.9
Total	504.0	471.5	425.6	372.0	265.7
Profit before interest on loan capital and taxation	74.6	76.9	80.8	59.3	35.9
Percentage on capital employed	14.8%	16.3%	19.0%	15.9%	13.5%
Ordinary and Redeemable Preference Shares:					
Issued capital	92.5	92.3	92.3	92.3	68.8
Assets per Ordinary Share (note 1)	498p	465p	408p	352p	308p
Earnings per Ordinary Share (note 1)	54.3p	59.9p	63.5p	50.4p	31.0p
Dividends per Ordinary Share (note 1)	11.00p	9.18p	8.22p	7.36p	5.04p

Note 1. Assets, earnings and dividends per ordinary share have been adjusted for the scrip issue of 1 for 2 in December 1972 and for the rights issue in May 1976.

TABLE 6-3. LUCAS SALES AND PROFITS BY OPERATING DIVISION (1978 - 1979)

	1979		1978	
	Sales £mn	Surplus on trading £mn	Sales £mn	Surplus on trading £mn
Vehicle equipment	857.14	67.12	792.28	70.22
Aircraft equipment	119.08	1.65	103.53	3.51
Industrial products	95.44	5.64	75.36	4.18
	1,071.66	74.41	971.17	77.91
Home subsidiary companies	745.09	46.23	666.43	52.10
Overseas subsidiary companies	326.57	28.18	304.74	25.81
	1,071.66	74.41	971.17	77.91

TABLE 6-4. LUCAS GROUP INTERIM RESULTS

	Half-year to 31.1.80. £ mn.	Half-year to 31.1.79. £ mn.
Sales to outside customers	567.15	510.14
Surplus on trading	16.34	28.87
Share of profits less losses of associated companies	3.19	3.06
	19.53	29.93
Interest payable less received	7.21	5.84
Profit before taxation	12.32	24.09
Taxation	5.67	5.81
Profit after taxation	6.65	18.28
Minority interests	1.04	.53
Profit attributable to shareholders	5.61	17.75
Earnings per ordinary share	5.90p	18.89p
Depreciation charged in arriving at the surplus on trading	15.04	13.21

7. AUTOMOTIVE OPERATIONS OF GUEST, KEEN AND NETTLEFOLDS LIMITED

7.1 INTRODUCTION

The GKN Group comprises more than 300 companies, employs over 100,000 people around the world, and had an annual turnover approaching £2,000 million, of which production of automotive components contributes one-third.

Its automotive products range from industrial fasteners, less than 0.6 mm in diameter, to the largest forgings weighing over 1,250 kilograms, and from garage equipment to off-highway axles for 100-ton vehicles. The company has extensive technological resources which have allowed it to develop innovative products, such as the constant velocity joint, and to experiment with new materials in the development of lightweight components.

One of the GKN Group's strengths is the degree of integration of its production facilities. It commences from production of raw materials like special steels and includes all the component manufacturing and assembly processes to produce complete cab-assemblies. This integrated, in-house production produces benefits in quality control, and allows greater reliability in meeting delivery schedules.

Under the Group's Four Year development program, due for completion in 1981, there has been a move away from its traditional operations in sheet-steel and the production of nuts and bolts. This has taken place through the disposal of loss-making companies operating in these and other peripheral areas, and greater development of its production potential in automotive components, particularly in Europe and North America, and in the area of wholesale distribution of automotive parts.

7.2 MAIN PRODUCTS

The principal automotive products manufactured by the GKN Group are listed in Figure 7-1. (Details on the main product sectors are given below.)

FIGURE 7-1. PRINCIPAL AUTOMOTIVE PRODUCTS MANUFACTURED BY THE GKN GROUP

Agricultural implements	Gears and gear boxes
Agricultural PTO shafts	Hydraulic components
Armored security vehicles	Motor care products
Axles and components	Pins - cotter, dowel, etc.
Bolts - high strength structural alloy steel stud bolts and nuts	Propeller shafts
Camshafts	Push rods
Car park control systems	Screws - all types
Cabs for trucks and tractors	Sintered metal components
Castings - malleable, aluminum, stainless steel, precision	Special steels (alloy and special carbon)
Chassis components	Spring wire
Clutches	Steel bars
Connecting rods	Steel billets
Constant velocity joint drive shafts	Steel sheets, plain galvanized and coated
Couplings for drive shafts	Steel strip
Crankshafts	Steering components
Elastic couplings	Studbolts
Engine bearings and bearing components	Tractor components
Engine diagnostic equipment	Trailers
Extrusions - aluminum	Turned bar-alloy carbon and freecutting steel
Fasteners	Universal and constant velocity joints
Filters, engine, air, gas turbine	Upset forged components (auto)
Forgings and forged components	Wheel balancers and weights
Garage testing equipment	Wheels for vehicles - pressed, steel, cast, aluminum
Garage workshop equipment	

7.2.1 Axles

The Axles division of GKN's operations has three companies—Kirkstall Forge Engineering, Newton Transmissions and Salisbury Transmission. They manufacture rear-drive and front steer axles for high performance passenger cars, heavy commercial vehicles, dump trucks, shovel loaders, mobile cranes, log-skidders, forklift trucks and other special-purpose vehicles. In addition to complete axles, components of all types are manufactured to customers' specifications.

Kirkstall Forge Engineering

Kirkstall Forge Engineering, which has been actively involved in metal forming since the 12th century, manufactures medium and heavy axles for commercial vehicles, military and on- and off-highway applications. In the medium range of axles, where the greatest variety of applications occurs, Kirkstall uses hot formed components to obtain the optimum degree of strength and flexibility in design.

The axle housing is made to standard register throughout the range, allowing any one of six different driving heads to be fitted. Variations in track and mounting center are covered by varying the length of pressing used. Pressings are currently manufactured with a single axle capacity of up to 16 tons, and in tandem form, to meet the requirements of vehicles and construction equipment up to 120 tons GVW.

The entire range of Kirkstall drive axles is complemented by a compatible range of steering axles with nominal capacities from 4 to 20 tons. Kirkstall also makes brakes and drop forgings for vehicles and general engineering and supplies a variety of bevel and hypoid gears.

Salisbury Transmission Ltd.

Salisbury Transmission Ltd. manufactures the lighter range of axles for passenger cars, light commercial vehicles, dumpers and forklift trucks. This range also includes drive-steer axles for 4 x 4 applications, and is readily adapted for individual requirements. Brake options include sealed oil-immersed types for earth-moving machinery application.

Newton Transmissions

Newton Transmissions manufactures hypoid planetary reduction axles specifically designed for off-highway and mechanical handling applications. Rigid drive axles with rating up to 55,000 pounds and offering planetary reduction if required are produced. These have full-width mounting pads to provide any chassis fixing required. A complementary range of steer drive axles using the same basic components is offered.

7.2.2 Forgings

GKN Forgings Ltd., with an annual production of over 300,000 tons of forgings per year, is one of the world's leading producers of forged components for the automotive, agricultural, marine, aerospace and allied industries. Processes include drop, press and upset forgings, cold and hot extrusions and powder forgings. A wide range of crankshafts, front axles, connecting rods, camshafts, gears, transmission parts, universal joints, turbine and compressor discs, fan blades and airframe forgings are produced daily for the world markets.

The Forgings division, in addition to producing crankshafts in the as-forged condition, has, in Sheffield, the largest facility in Europe for finish machining crankshaft forgings up to 3.15 meters long and 1,250 kilograms in weight. At the smaller end of the forgings range, components such as connecting rods, crown wheels, pinions, hubs, yokes, flanges and spiders are produced. Cold extruded components such as rear axle pinions, gearbox input shafts and constant velocity joint components are produced by the Birfield Extrusion Company.

GKN's Forging plant is highly automated. Among the equipment used are two automated forging units with a combined capability of producing up to 9,000 close-limit forgings an hour and, at the GKN Scottish Stamping and Engineering Company's plant at Ayr and at Garrington's Bromsgrove, are installed the most advanced presses available with capacity up to 8,000 tons. GKN Forgings has developed the powder forging process to the point where it is an effective production technique and is supplying components made by this process to many customers.

To maintain a predominant position in the world's forging industry, the companies are backed by a Process

and Product Development department, which carries out a continuous program of modernization and development in both forging and ancillary processes. The GKN Forgings' eight production companies each offer individual expertise in a particular branch of forging, while supplementing each other's capacity as necessary. The following companies are wholly- or partly-owned subsidiary companies of the Group supplying forged components to the automotive industry in their areas:

- Guest, Keen, Williams Ltd. and Shardlow India Ltd. in India
- S. A. Taga in Spain
- Walterscheid Schmeide and Presswerk GmbH in Germany.

7.2.3 Metal Fabricated Products

GKN Sankey is a major producer of metal fabricated products. More than 10,000 people working in nine manufacturing locations, with facilities for almost every kind of metal fabrication, provide production capacity which is the foremost in Europe. The wheel division manufactures 45,000 truck wheels, 12,000 tractor rear wheels and 1,000 earthmover wheels a week. The pressings division supplies 3,000 side members and truck frames each week as well as 5,000 sub-frames for cars. In addition, up to 700 truck and 1,500 tractor cabs are produced each week.

GKN Sankey is the largest independent producer of truck and tractor cabs in Britain and is equipped not only to press the component parts but to assemble and weld them as well as fit interior trim and glazing. More than 600 mechanical and hydraulic presses, ranging from 50 to 4,000 tons capacity, are housed in the company's factories. They produce a wide variety of metal press work from small electrical laminations to 42-foot-long side members for truck frames.

GKN Sankey is the only division within the GKN Group which manufactures complete vehicles. It has been involved in government contracts for more than 50 years, and has a complete special vehicle design and development department capable of carrying military projects through from initial concept to full production. The largest contract in recent years placed by the British Ministry of Defence, was for the design and manufacture of several thousand FV432 track-laying armored personnel carriers and FV434 track-laying armored maintenance

vehicles. The latest development in this field is the Sankey AT105 wheeled armored personnel carrier which has been bought by several countries in Southeast Asia, the Middle East and Africa.

Overseas-based subsidiaries and associated companies include Karl Moller Nagbol of Denmark. This firm, a wholly-owned subsidiary, is one of the most important wheel production plants in Northern Europe. Its main product line is agricultual tractors of which 80 percent are exported. Considerable quantities of hubs and axles are also produced. Guest, Keen, Williams Ltd. in India, John Lysaght (Australia) Ltd., and GKN Sankey-Benson in Australia and GKN Sankey (Pty) Ltd. in South Africa, also manufacture a range of pressed metal components.

7.2.4 Transmissions

The GKN Transmissions division is one of the world's leading suppliers of vehicle-drive line components. Together with its counterpart in Europe, Uni-Cardan AG, and licensees in other countries, it provides 95 percent of the world's requirement of constant velocity joints, some 40,000,000 joints a year. The only other notable producer of constant velocity joints is the Peugeot-Citroen Group.

The division is composed of seven separate companies manufacturing a complementary range of transmission products from clutches, overdrives, industrial, marine and automotive propeller shafts, and plain bearings, to rear axle shafts, light alloy road wheels and flexible couplings. In addition, the sub-group manufactures agricultural equipment products such as power-take-off shafts and overload and free wheel clutches and safety guards. The Walterscheid agricultural three-point automatic coupling system is also marketed.

The following are among the product innovations of the division:

- Hardy Spicer Ltd. developed the constant velocity joint for the original Leyland Mini and was thus involved in pioneering the use of the front-wheel-drive concept for popular mass produced cars.

- Laycock Engineering Ltd. was largely responsible for the development of the overdrive system and the introduction of dual clutches for tractors. Laycock Engineering also manufactures diaphragm spring clutches and flexible couplings as well as garage lifts and wheel balancing equipment.

- Vandervell Products Ltd. is a leading European producer of thin-wall engine bearings.

- GKN Kent Alloys Ltd. has used knowledge originally gained in the aerospace industry to develop a range of light alloy road wheels individually styled to suit the vehicle designers' requirements. In October 1979, Kent Alloys Ltd. won two orders worth about £5 million to supply aluminum road wheels to the Chrysler Corporation and Ford in the United States. They will be fitted to the 1981 Detomosa version of the current Chrysler Omni/Horizon, the current Ford Thunderbird, and to the 1981 Ford Erica/Pinto.

- Nordiska Kardan AB, in Sweden, manufactures needle-roller universal joints, power-take-off shafts and propeller shafts for a wide variety of automotive, marine and railway applications.

The growing requirement for front-wheel drive vehicles in the U.S. has led to the construction of two new plants there. In the past, only 1 percent of American cars had front-wheel drive, but GKN estimates that that number will reach more than 50 percent by 1985. GKN decided early in 1978 to proceed with its first constant velocity joint manufacturing plant at Sanford, North Carolina. Investment in the plant is about £21 million. Its output of constant velocity joints for 400,000 cars a year goes entirely to Ford of North America. Five hundred people are employed at Sanford.

A second plant is being built in Alamance County, about 50 miles from Sanford, at an estimated cost of £ 35 million. It is expected to start production in mid-1981, and with the capacity to provide constant velocity joints for 800,000 cars, it will supply several customers besides Ford. Six hundred people are expected to be needed to operate the Alamance County facility.

GKN predicts that another constant velocity joint facility will be needed in the United States to meet demand, and, since GKN Inc. is working closely with Ford, it is possible that Ford may take a stake in a third plant and share the cost, although this has not been confirmed to date.

7.2.5 Uni-Cardan

Uni-Cardan AG was formed in 1964 as a holding company for three West German companies in the GKN Group, all of which are involved in the manufacture of a range of products for the automotive, agricultural machinery and tractor industries. The three companies are:

- Jean Walterscheid GmbH
- Gellenkwellenbau GmbH
- Löhr and Bromkamp GmbH.

Although with similar general interests, the three companies' products complemented one another, and so each continued with its own development and production program within the Uni-Cardan group.

The group was expanded and now employs more than 9,000 people in six member companies with manufacturing facilities in West Germany, France and Italy. The three additional companies are:

- Walterscheid Schmeide und Presswerk GmbH, in Germany
- Glaenzer Spicer SA in France
- Birfield Transmissioni SpA in Italy.

The most important product manufactured by the Uni-Cardan group is the constant velocity joint. The trend towards front-wheel drive and independent suspension among many European car-builders has given impetus to the volume production of constant velocity joints, and has led to Uni-Cardan gaining a position as a leading supplier of this component. The company produces two main types of constant velocity joints:

- The 6-ball joint is made in either fixed or plunging variants which are used not only for cars but also on equipment such as machine tools, marine pumps and winches.

- The other type is of "TRIPOD" construction, and this has been particularly popular with French and Italian automotive manufacturers for its strength and compact size.

Other items produced for the automotive market include drive shafts and a variety of forgings.

For the heavy truck and bus sector Uni-Cardan produces a variety of products. Shafts are produced for front-, rear- and all-wheel-drive vehicles. In addition, they are used to transmit mechanical power in a range of applications, e.g., cranes. Uni-Cardan has also developed universal and power-take-off shaft guards for agricultural equipment. The latest in the series of developments in the agricultural equipment sector is the Walterscheid three-point-coupling which allows the driver of a tractor to couple an implement single handed, without leaving his seat.

The replacement market is served by ten sales companies established in nine continental European countries. This network is further expanded through 350 agents around the world.

7.2.6 Locks

Locking devices for everything requiring security are produced by GKN Stenman AB, of Sweden. The company makes car door locks with all visible parts heavily plated to withstand extreme climatic conditions. These are supplied as key operated designs or of the type which can be secured with a catch from the vehicle interior. Ignition locks are also produced as well as steering locks and security devices for fuel tank caps and for trunks. For windows, standard lockable catches are also made.

7.2.7 Fasteners

GKN was probably the world's largest and most comprehensive manufacturer of industrial threaded fasteners until the Group was forced to reduce its capacity and close plants in September 1979 due to:

- Inexpensive foreign imports
- Greater use of adhesives
- A depressed market in the UK.

At that time, GKN decided to phase out by mid-1980 nearly 860 jobs at Darlaston, West Midlands, and 178 at Pembroke Dock in South Wales. It also decided to sell the other nuts and bolts plant, at Atherton, Greater Manchester, and in October 1979 sold the Firth Cleveland Fastenings Plant to Armstrong Equipment. Also in 1979, the industrial fastener distribution activities were relocated to Wednesbury, in the West Midlands, in what is the largest industrial fastener warehouse in Europe, with comprehensive computer facilities. As a result of these actions, the 10,000-strong workforce of GKN Industrial Fasteners Division was reduced by over 10 percent.

In addition to fasteners, however, the division also produces a number of other products, as follows:

- Close-tolerance hot upset forgings, such as engine push rods (where GKN is Europe's largest manufacturer)
- Small cold-forged parts
- Cold extrusions and pressings
- Miniature zinc die castings and injection moldings.

It also offers a comprehensive metal-finishing service including the fashionable black finishes on chrome and stainless steel.

The range of products extends from cold forged main bearing and con-rod bolts, through valve spring caps, tappet adjusting screws and wheel studs to diesel injector sleeves (cold extruded in copper) and steering and suspension ball pins and assemblies. GKN "Nyloc" and "Cleveloc" self-locking nuts have largely supplanted traditional methods of securing steering and suspension assemblies.

About 40 percent of the production of GKN's Smethwick factories in England is given over to the manufacture of the "Supadriv" cross slot screw, first launched by the Group in 1978. With a recessed cross-slot design, this allows ease of application, particularly under angled driving conditions, and will take paint without causing the screwdriver to slip. The recess can

also be forged more easily than its complex predecessor, the "Posidriv." In January 1980, it was announced that six licenses for the production of the "Supadriv" had been sold in the U.S. and two in Japan, in contracts worth over £1 million a year.

7.2.8 Powder Metallurgy

GKN Powder Metallurgy companies have been world leaders in this field from the first component produced by GKN Bound Brook—a seven-tooth gear—in 1944. The companies are now engaged in large-scale production of camshaft and crankshaft sprockets and pulleys, oil pump rotors and gears, fan and water pump pulley hubs, clutch and automatic gearbox components, brake and suspension parts and many other smaller items such as starter motor pole shoes and bushes, windshield wiper window winder and adjustable seat mechanism components. Two companies in the UK—GKN Bound Brook Ltd. and Firth Cleveland Sintered Products Ltd.—supplement production plants in Italy, the U.S., India and Japan.

Acquisition of the Sheepbridge Group in the UK in 1979 also increased capacity for and extended the range of powdered metal components, filters and friction materials used in the automotive industry. Sheepbridge also makes 70 percent of the cylinder liners for diesel engines used in the UK, 25 percent of the pistons, and 30 percent of the piston rings. The engine parts are mainly for trucks. Facilities include a range of powder metallurgy presses with capacities from 4 to 750 tons.

7.2.9 Steel

The GKN Group is the largest user of steel in the United Kingdom and part of its requirements are produced within the Group. In 1976, the Group commissioned a new rod mill at Cardiff which has potential output of 600,000 tons of wire rod and coiled bar a year. A £ 47.5 million investment program has recently been completed at the Group's steel facility at Brymbo in North Wales, where some 429,000 ingot tons were produced in 1979. An order has also been placed by the Lincoln plant for a 16,000-ton screw press which will be the largest forging press in the UK. It is due to be commissioned in 1982.

Much of the output of the GKN's Rolled and Bright Steel capacity goes to manufacturers in the automotive industry in the form of bars, hot and cold rolled strip, standard and special sections, and wire. Black and bright drawn bars are also supplied in a variety of steel alloys. In the flat strip range, spring steel is included, and among the special sections are wheel rim designs and vehicle door hinge sections. Firth Cleveland Steel Strip Ltd. produces steel strip for clutch pressure plates.

7.3 SALES AND EMPLOYMENT

The following is a summary of GKN's sales and employment statistics.

7.3.1 Sales

External sales for the GKN Group as a whole totaled 1,961 million in 1979 (1978—1,755 million). An analysis of these sales within and into those countries which are the major markets of the Group is given in Table 7-1.

TABLE 7-1. GKN GROUP SALES BY MAJOR MARKET (£ MILLION)

	Sales Within	Sales Into	Total	
United Kingdom	1,100	7		1,107
Overseas:				
West Germany	138	30	168	
U.S.	50	72	122	
France	61	35	96	
India	71	7	78	
Sweden	20	37	57	
Italy	23	27	50	
Other Countries			283	
				854
				1,961

As shown in Table 7-2, in 1979 total U.K. sales accounted for 56 percent of GKN's business. With the selective support of the Group's interests in automotive components and distribution networks, particularly in North America, this figure is expected to fall significantly by 1982. By then, over 50 percent of its revenue is expected to be earned from overseas activities.

7.3.2 Employment

Despite the decision to develop in new markets, two-thirds of GKN's labor force is in the UK. As shown in Table 7-2, 14 percent is employed in Continental Europe and 15 percent is employed in Asia. The remaining 5 percent is employed in Australia, Africa and America. The new plants in the United States will result in a build-up of employment in America.

TABLE 7-2. EMPLOYMENT BY GKN GROUP, 1979

	Number	%
Europe		
United Kingdom	69,115	66
Rest of Europe	14,631	14
Asia	15,170	15
Australia	974	1
Africa	2,483	2
America	1,951	2
	104,324	100

7.4 DISTRIBUTION/DEVELOPMENT STRATEGY

In 1977 GKN began a substantial redevelopment program to take stock of its future in the "post oil crisis" era. At this time, the Group had become an unwieldy conglomerate involving 120 separately identifiable businesses. In order to develop a central strategic leadership, senior levels of management were reorganized to (1) ensure that planning came from the center, and (2) improve communications laterally within the Group. All the operating companies remained profit centers, however, with routine management decisions made at the lowest applicable level.

The identifiable businesses selected for development were particularly automotive components and industrial and wholesale distribution. Apart from steel stockholding, where GKN is already the largest in the UK with over 20 percent of the market, all of the wholesale business has been defined as an area of "maximum support." The main business areas chosen by GKN and the geographic strategy it is also pursuing are closely related.

Historically, GKN's market has been Commonwealth-based, but now the emphasis is increasingly oriented towards Europe and particularly North America with the intention to reduce UK operations by 15 percent between now and mid-1981. As a consequence of this selective development strategy, those parts of the business which do not fit into the scheme are also being divested, as in the case of its nuts and bolts operations, and some of its traditional steel-making resources. The divestment program will probably involve about 12 percent of GKN's net assets.

On the other hand, as part of its selective development strategy, the Group recently announced two major acquisitions in the UK, one in France, and two in the U.S. Apart from the investment in two new plants in the U.S. for the production of constant velocity joints, GKN announced the takeover of Parts Industries Corporation of Memphis, Tennessee, in February 1979. Some 75 percent of Parts Industries' annual sales of $100 million are drawn from the automotive aftermarket. The Corporation offers a range of 100,000 parts—mostly U.S. components for U.S. vehicles—but GKN aims to sell its own products as well as those of UK and European competitors through the network. Parts Industries has 16 major distribution centers around America, together with 4,000 linked retail outlets and 37 self-managed aftermarket shops.

In the mid-1970s GKN planned to acquire Sachs AG in Germany, an important producer of clutches. GKN had built up a 25-percent financial stake but full control was blocked by the German Cartel Office. The shares were sold to Commerzbank. Following the sale of its interest in Sachs, GKN increased its holding in another German motor component firm, Uni-Cardan, from 60 percent to 82 percent in April 1979. In the middle of 1979, the Group announced its plans to take over Sheepbridge Engineering, of Chesterfield, England, with interests primarily in the production of components for diesel engines and making and distributing replacement parts. The company's subsidiary Advance Motor Supplies also owned 100 wholesale depots handling engine components, which was more than GKN's exsiting distribution network in this field.

In August, GKN moved further into the automotive parts distribution business by buying Armstrong Equipment's 120 wholesale and retail auto parts outlets in the UK, distributing batteries, auto-electric and friction

materials. In the following month, negotiations began with Unilever to buy a majority stake in Unigep, a French distributor of automotive and industrial components. Unigep has 26 outlets throughout France. Finally, at the end of February 1980, GKN and the Maremont Corporation of Chicago, Illinois, reached a final agreement on the sale of 80 percent of Maremont's Worldparts Division to GKN. Renamed Worldparts Corporation, it specializes in the wholesale distribution of automotive aftermarket components and accessories.

The logic in this move into the distribution field is two-fold. First, it extends the vertical integration process whereby GKN produces the raw materials, manufactures the parts, and then distributes them, not only to the equipment manufacturers, but also to garages selling to the replacement market. Second, the automotive parts aftermarket is an area of strong growth in its own right. As already described, in the context of falling levels of production in the motor industries of Europe and North America, this strategy has been supplemented by the identification of growth areas in the automotive industry, e.g., front-wheel-drive configurations, with expansion of production facilities for related components. Finally, this approach has been carried out within GKN's policy of overseas expansion, with reference particularly to North America

7.5 PRODUCT DEVELOPMENT

Product development is the responsibility of each division of the Group within the technical field allocated to it, and each division and line company has appropriate design and development staff, test facilities and equipment to carry out this work. The divisions are supported by the extensive facilities of the GKN Group Technological Centre in Wolverhampton, England, with 300 technical staff. Data acquisition systems for determining the conditions met in service, advanced computer-aided techniques to achieve optimum performance, weight and cost objectives, stress analysis and fatigue life studies are some of the technological support services provided.

Currently, the company is working on lightweight materials, including carbon fiber, which might be suitable for automotive components at some time. GKN is also designing lightweight axles and suspension parts which would allow trucks to carry heavier loads, while doing less damage to roads and being safer than current

heavy-duty trucks. The company has been having discussions with big truck operators and some of its manufacturing customers with the aim of establishing a club of "Supertruck" manufacturers. However, GKN is unlikely to move into truck manufacture on its own account.

GKN Laycock has also been developing its range of overdrive systems, following the rise in gasoline costs and the search for greater economy. In July 1979, it introduced an overdrive for automatic cars, and is now attempting to revive interest in the device among all European vehicle manufacturers. The unit is already fitted to the Driumph Dolomite, the Spitfire, MGB and Volvo cars, as well as a number of 1-ton vans.

7.6 FINANCIAL STATUS

The most serious setback for GKN in 1979 was the engineering unions' industrywide prolonged strike in the United Kingdom, which is estimated to have reduced profits by some £15 million. The continued strength of sterling also affected some export sales from the UK, particularly to the U.S. Surplus on trading was £115.9 million (1978—£96.3 million). This included:

- £2.2 million (1978—£1.5 million) attributable to companies acquired during the year
- £10 million (1978—£7 million) estimated realized stock profits
- total depreciation of £66 million (1978—£61.4 million) of which £22.4 million (1978—£19.9 million) was additional depreciation for inflation over and above the amount written off historical values.

For United Kingdom companies, surplus as a percentage of sales was 4.9 percent (1978—4.6 percent), and for overseas companies 8.2 percent (1978—7.4 percent).

Profits before tax for 1979 amounted to £101.4 million (1978—£87.3 million), including £18 million (1978—£12.9 million) contribution from associated companies. The overall tax charge as a percentage of pre-tax profits was 44 percent (1978—48 percent). After deducting the profit attributable to outside shareholders, earnings of the year amounted to £51.3 million (1978—£40.4 million).

On December 31, 1979, total borrowings amounted to £ 365 million against a limit, calculated in accordance with the provisions of the Articles of Association, of £ 861 million. The £44.2 million proceeds of sale of the interest in John Lysaght (Australia) Ltd., held on deposit at the balance sheet date, have since been applied in reduction of borrowings.

An analysis of the Group's cash flow situation is shown in Table 7-3.

Over the five-year period from 1975 to 1979, the key financial indicators of the GKN Group have varied as shown in Table 7-4.

The principal activities of the GKN Group contributed to turnover and profit in 1978 and 1979 as shown in Table 7-5.

TABLE 7-3. GKN: CONSOLIDATED SOURCE AND APPLICATION OF FUNDS

	1979 (£m)	1978 (£m)
Source of funds		
Surplus on trading before depreciation	181.9	157.7
Interest payable, less receivable	(32.5)	(21.9)
Dividends from associated companies	2.5	2.1
Sales of associated company investments and subsidiaries	90.5	3.6
Total source of funds	242.4	141.5
Application of funds		
Fixed assets, less disposals	95.4	71.8
Acquisition of subsidiaries and other investments	28.5	41.3
Working capital:		
Stocks	64.5	11.3
Debtors less creditors	10.4	7.2
Dividends paid to:		
shareholders of GKN Ltd	26.3	23.5
outside shareholders	2.6	2.0
Taxation paid	42.1	29.9
Other applications (net)	2.5	1.6
Total application of funds	272.3	185.4
Net cash out flow	29.9	43.9
Financed by		
Movement in net short term borrowings	(36.3)	49.3
Movement in term loans	68.8	0.5
Net borrowings of subsidiaries acquired/sold	(10.1)	1.4
Currency variations	7.5	(7.3)
	29.9	43.9

TABLE 7-4. GKN: FIVE-YEAR FINANCIAL RECORD (£ MILLION)

Consolidated profit	1979	1978	1977	1976	1975[1]
Turnover	1961.0	1754.7	1639.2	1501.2	1214.2
Surplus on trading (after total depreciation).	115.9	96.3	83.1	107.9	80.9
Investment income and interest receivable	3.4	1.7	2.0	3.0	1.9
Interest payable	(35.9)	(23.6)	(24.8)	(23.7)	(19.9)
Share of profits of associated companies	18.0	12.9	12.0	10.5	6.8
Profit of the year before taxation	101.4	87.3	72.3	97.7	69.7
Taxation (see note below)	(44.2)	(41.6)	(31.7)	(35.5)	(47.1)
Profit attributable to outside shareholders' interests	(5.9)	(5.3)	(4.8)	(5.3)	(2.5)
Earnings of the year	51.3	40.4	35.8	56.9	20.1
Earnings of the year before additional depreciation	75.0	61.7	56.4	72.9	36.1
Total depreciation charged	66.0	61.4	56.8	47.6	41.9
Capital expenditure	108.6	85.3	70.8	67.1	63.6
Surplus on trading to turnover	5.9%	5.5%	5.1%	7.2%	6.7%
Assets employed					
Fixed assets	579.1	521.9	483.3	457.2	401.0
Investments	43.5	118.4	141.0	140.6	102.4
Stocks	518.0	438.3	420.7	422.1	295.3
Debtors less creditors, current taxation and dividends	(19.8)	10.1	(24.6)	(35.4)	(22.3)
Liquid resources	98.3	39.9	36.9	28.4	35.5
	1219.1	1128.6	1057.3	1012.9	811.9

Note: Taxation. The taxation charge on profits of the year and deferred taxation (included in deferred liabilities and credits) for 1975 are on a full liability basis and are therefore not comparable with subsequent years.

TABLE 7-5. GKN: ANALYSIS BY PRINCIPAL CLASSES OF BUSINESS

	Turnover			Surplus on Trading		
	1979		1978	1979		1978
	%	m	m	%	m	m
Automotive components	33	696	637	44	51	47
Wholesale and industrial distribution	18	388	311	15	17	9
General steels	10	214	214	3	3	(1)
Special steels and forgings	11	239	208	12	14	14
Fasteners	7	151	161	6	7	6
Industrial services	6	135	83	9	11	10
Other activities	15	325	314	11	13	11
	100	2148	1928	100	116	96
Less intra-group sales		187	173			
		1961	1755			

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