1

ECONOMICS OF THE INDUSTRY

HIGHLIGHTS

Company Concentration and Diversification
■
Major Rubber Companies
■
Company Performance and Profitability
■
Employment and Wages
■
Productivity
■
Capital Expenditures
■
Research and Development
■
Distribution
■
Imports and Exports
■
Forecast and Outlook

The U.S. rubber industry is comprised of three tiers—elastomers, tires and non-tire fabricated rubber goods. Within each product group are several sub-groups. For example, elastomers may be divided into natural rubber, nearly all of which is imported, and more than a dozen types of synthetic rubber, which are produced from petroleum and its derivatives. Likewise, tires may be categorized according to their use on automobiles, light trucks, heavy trucks, and a variety of off-road vehicles from construction equipment to golf carts. The non-tire fabricated rubber goods sector is by far the most diverse and includes hose, conveyor belting, gaskets, seals, shoe soles and heels, sporting goods and latex gloves and condoms, to name just a few.

Rubber may be better understood in comparison with plastics. Like plastics, rubber consists of long, chain-like molecules called polymers from the Greek poly, meaning many and mer, meaning parts. Both plastics and rubbers are impermeable to air and moisture and some types even to petroleum oil and chemicals. But whereas plastics tend to be rigid or semi-rigid, rubber is flexible and elastic, meaning that it can be stretched two or more times its original dimensions and will recover its original size and shape. That is why rubber polymers are often referred to as elastomers. This unique property is what makes rubber useful for all sorts of articles that require the ability to flex, stretch or to be compressed and to return quickly to their original form.

To be useful, rubber must be compounded with carbon black and a number of other ingredients to optimize its properties. It is then molded, extruded or otherwise shaped into the finished articles, often in combination with plastics, metals or fabrics for strength and rigidity. For example, tires consist of synthetic fibers and steel wire in addition to a variety of elastomers. Likewise, coated rubber goods, footwear, rubber rollers, wiper blades, belting, hoses, golf and tennis balls, and motor mounts are combined with other materials. Often adhesives are used to bond metal or fabric to the rubber material. Some gaskets and seals, and golf grips, railroad crossing pads, con-

Table 1-1. SHIPMENTS OF SYNTHETIC ELASTOMERS, TIRES, AND OTHER FABRICATED RUBBER PRODUCTS 1997-2005

Thousand dollars

Year	Synthetic Elastomers	Tires and tire related products	Non-tire rubber products
1997	6,153,708	14,728,525	20,026,670
1998	5,342,742	14,318,766	26,303,089
1999	5,571,073	13,949,657	26,781,576
2000	5,835,814	14,620,417	28,107,448
2001	5,204,008	13,429,328	25,563,943
2002	5,782,311	13,402,211	24,065,989
2003	5,985,590	15,351,544	23,426,666
2004	6,103,510	15,861,242	25,273,039
2005	6,696,453	16,374,627	26,943,809

Source: *Census of Manufactures* and *Annual Survey of Manufactures*

Table 1-2. NATURAL & SYNTHETIC RUBBER CONSUMPTION IN TIRES AND OTHER FABRICATED RUBBER PRODUCTS 1997 - 2006

Thousand lbs

	Tires			Other Rubber Products		
Year	Natural	Synthetic	Total	Natural	Synthetic	Total
1997	1,770,311	2,440,517	4,210,828	531,314	2,006,206	2,537,520
1998	1,900,384	2,508,860	4,409,244	650,363	1,937,863	2,588,226
1999	1,759,288	2,493,427	4,252,716	701,070	2,028,252	2,729,322
2000	2,087,777	2,652,160	4,739,937	546,746	2,175,962	2,722,708
2001	1,662,285	2,625,705	4,287,990	485,017	1,430,800	1,915,817
2002	1,763,698	2,332,490	4,096,188	685,637	1,845,269	2,530,906
2003	1,809,995	2,215,645	4,025,640	568,792	2,030,457	2,599,249
2004	1,840,859	2,200,213	4,041,072	681,228	2,004,001	2,685,230
2005	1,862,906	2,314,853	4,177,759	692,251	1,995,183	2,687,434
2006	1,776,925	2,306,035	4,082,960	579,816	2,105,414	2,685,230

Source: *International Rubber Study Group*

doms, and gloves are among the rubber goods used without being combined with other products.

Table 1-1 shows the value of synthetic elastomer, tire and other fabricated rubber product shipments from 1997 through 2005. The data indicates that this is a mature industry that is growing more slowly than the economy in general. The value of synthetic elastomer shipments increased only 8.8% over this eight year period, while tire shipments increased 11.2% and other fabricated rub-

Table 1-3. GLOBAL & U.S. SYNTHETIC RUBBER CONSUMPTION

	Million lbs		
Year	Global	U.S.	U.S. %
2000	15,190.1	4,367.4	28.8
2005	16,484.2	3,979.4	24.1
2010 (est.)	19,215.8	3,955.2	20.6

Source: *International Institute of Synthetic Rubber Producers*

Table 1-4. U.S. RUBBER CONSUMPTION 1997-2005

	Consumption in Tires (thousand lbs)		Consumption in Non-Tire Applications (thousand lbs)	
Year	All Tires	Automobile Tires	All Non-Tire	Automobile Non-Tire
1997	4,568,056	4,248,292	2,855,035	1,142,014
1998	4,856,866	4,516,885	2,885,900	1,154,360
1999	4,709,154	4,379,513	2,339,144	935,658
2000	4,740,019	4,408,218	2,619,136	1,047,654
2001	4,288,064	3,987,899	2,017,264	806,906
2002	4,519,553	4,203,184	2,087,813	835,125
2003	4,336,566	4,033,007	2,244,344	897,738
2004	4,283,654	3,983,799	2,678,662	1,071,465
2005	4,100,668	3,813,621	2,561,815	1,024,726

Source: *Ward's Auto*

ber products increased 7.6%, counting from 1998. This data also illustrates the much higher value of tires and other fabricated rubber goods compared with elastomers.

Table 1-2 shows the consumption of natural and synthetic rubber in tires and in other fabricated rubber products from 1997 through 2006. This data shows even more clearly that there has been little, if any growth in the U.S. rubber manufacturing industry in the last ten years. It also shows the continuing importance of natural rubber, a renewable resource, both in tires and in non-tire rubber goods.

A look at the difference between U.S. and global synthetic rubber consumption (Table 1-3) shows that, while global consumption increased 8.5% from 2000 to 2005, U.S. consumption actually decreased 8.9% during the same period. This trend is expected to continue, with global synthetic rubber consumption increasing 16.6% between 2005 and 2010, while U.S. synthetic rubber consumption decreases 0.6%. The U.S. share of global synthetic rubber consumption will therefore drop from 28.8% in 2000 to 20.6% in 2010.

Table 1-4 compares the consumption of natural and synthetic rubber in tires and non-tire fabricated products over the period from 1997 through

2005. The decreased consumption in both tire and non-tire rubber product manufacturing reflects the general movement of manufacturing industries from the United States to other countries. It also indicates the importance of automotive manufacturing to rubber consumption. While it is no surprise that 93% of tires are used in automobiles, it is noteworthy that approximately 40% of non-tire fabricated rubber products are also used in automobiles.

With so much rubber used in automobiles, it is necessary to consider U.S. automobile production as a key indicator of rubber industry performance. As Table 1-5 shows, total automobile production in the U.S. actually decreased 1.5% from 1997 to 2005. This reflects the same movement abroad of manufacturing seen earlier.

COMPANY CONCENTRATION AND DIVERSIFICATION

The concentration of U.S. rubber industry production varies significantly by industry segment. Elastomer production and tire manufacturing are concentrated within a relatively small number of companies, while non-tire rubber goods manufacture is dispersed among a large number of smaller concerns.

Concentration ratios for the synthetic rubber, tire and five non-tire industry segments in 2002 are shown in Table 1-6. Of the 133 synthetic rubber producers in 2002, the four largest accounted for nearly half and the twenty largest for over 90% of all synthetic rubber production. Concentration was even greater in the tire industry. Among 112 manufacturers, the four largest produced more than 75% and the eight largest produced over 90% of all tires manufactured in the U.S.

In the non-tire segment the overall picture is reversed, though some sub-segments are highly concentrated and others highly diversified. Only 58 firms were involved in rubber and plastics footwear manufacture in 2002 and the four largest of these controlled approximately 70% of the market. Rubber hose and belting manufacture were somewhat less concentrated, in that the four largest of 187 companies in this sub-segment produced 44% and the largest fifty almost 92% of shipments. On the other hand, there were 1,750 companies in the gasket, packing and sealing device, mechanical rubber goods and miscellaneous fabricated rubber product categories. The four largest companies in each of these sub-segments produced only 2%-30% percent and the fifty largest companies only 60%-75% of output.

Table 1-5. U.S. AUTOMOBILE PRODUCTION

Year	Passenger Car	Light Truck	Medium/Heavy Truck	Total
1997	5,993,921	5,858,937	337,717	12,130,575
1998	5,554,373	6,073,281	375,009	12,002,663
1999	5,637,949	6,953,539	433,490	13,024,978
2000	5,542,217	6,836,822	394,675	12,773,714
2001	4,879,119	6,287,892	257,678	11,424,689
2002	5,018,777	6,998,383	262,422	12,279,582
2003	4,510,469	7,317,159	259,400	12,087,028
2004	4,229,625	7,370,909	359,820	11,960,354
2005	4,321,272	7,200,904	424,477	11,946,653

Source: *Ward's Auto*

Table 1-6. CONCENTRATION RATIOS FOR THE RUBBER INDUSTRY 2002[1]

NAIC	Product	No. of companies	Four largest companies	Eight largest companies	Twenty largest companies	Fifty largest companies
325212	Synthetic rubber	133	43.0%	65.9%	92.9%	98.1%
326211	Tires and inner tubes	112	77.2	92.7	97.9	99.7
316211	Rubber and plastics footwear	58	70.7	86.2	96.6	99.9
32622	Rubber and plastic hose and belting	187	44.3	57.3	77.9	91.9
339991	Gaskets, packing and sealing devices	528	31.0	44.0	59.0	73.0
326291	Mechanical rubber goods	494	22.1	34.1	58.3	76.4
326299	Fabricated rubber products, NEC	729	20.1	30.0	44.3	60.5

[1] Latest data available; the concentration ratios for 2007 will be published in 2009.
Source: *Census of Manufactures*

Notwithstanding the high degree of diversification in the non-tire rubber segment, the trend throughout the rubber industry has been toward greater concentration through mergers, acquisitions and the elimination of those companies that do not adapt to changes in technology and the increasing pressure from U.S. and foreign competition. This is dramatically illustrated by the rubber and plastics footwear sub-segment, where the largest four companies controlled only 38% of shipments in 1992 but 70.7% in 2002. In the mechanical rubber goods sub-segment the number of companies has been reduced from 560 to 494 and the share of shipments for the largest fifty of these companies has increased form 65% to 76.4% over the last ten years.

The rate of mergers and acquisitions in the rubber industry, as in other segments of the U.S. economy, accelerated during the 1980s and 1990s. The same factors that caused increased merger activity in the economy at large, such as globalization and the desire to achieve economies of scale, were at work in the rubber industry. In addition, two actions by the "Big 3" automakers and their Tier 1 suppliers to increase efficiency and reduce costs made it increasingly difficult for small rubber fabricators to do business as before. One was a reduction in the overall supplier base. The other was the purchase of assemblies that incorporated rubber, plastic and metal components. Finally, as rubber became a low profit commodity, much of the capital invested in the industry left in search of more lucrative returns.

MAJOR RUBBER COMPANIES

Table 1-7 lists the leading U.S. producers of synthetic rubber, many of their synthetic rubber producing facilities, the capacity (in metric tons) and the type(s) of rubber produced at each. With the exception of Goodyear and a few other tire companies, most synthetic rubber producers do not fabricate tires, hose, belting or other rubber products, but are only in the business of producing

Table 1-7. LEADING PRODUCERS OF SYNTHETIC RUBBER IN 2005

Producer	Location	Capacity	Types[1]
3M Company	Decatur, AL	2,500	FKM/FFKM
Advanced Resins, Inc.	Grand Junction, CO	2	BR
American Synthetic	Louisville, KY	180	BR, SSBR
Chemtura Corporation	Geismar, LA	91	EPM/EPDM
Chemtura Corporation	Shelbyville, KY	n/a	n/a
Dow Chemical	Plaquemine, LA	100	EPM/EPDM
Dow Chemical	Seadrift, TX	90	EPM/EPDM
Dow Corning	Elizabethtown, KY	n/a	RTV Silicone
Dow Corning	Midland, MI	n/a	VMQ, FVMQ
DuPont	Ponchartrain, LA	100	CR
DuPont	Beaumont, TX	34,500	CSM
DuPont	Wilmington, DE	n/a	FFKM
DuPont	Deepwater, NJ	3,000	FKM
ExxonMobil Chemical	Baton Rouge, LA	330	EPM/EPDM, IIR
ExxonMobil Chemical	Baytown, TX	106	IIR
Firestone Polymers LLC	Lake Charles, LA	180	SSBR
Firestone Polymers LLC	Orange, TX	145	BR
General Electric	Waterford, NY	2,700	VMQ
Goodyear Tire & Rubber	Beaumont, TX	450	BR, IR
Goodyear Tire & Rubber	Houston, TX	354	ESBR
ISP Elastomers	Port Neches, TX	290	ESBR
Lanxess	Orange, TX	239	BR, EPDM, NBR, SBR
Lanxess	Sarnia, Canada	110	IIR
Lion Copolymer LLC	Baton Rouge, LA	150	SBR, NBR
Morton International	Moss Point, MS	9,100	Polysulfide
Rhone-Poulenc USA	Lakewood, NJ	n/a	VMQ
Wacker Silicones Corp.	Adrian, MI	n/a	VMQ
Zeon Corporation LP	Houston, TX	3	NBR
Zeon Corporation LP	Louisville, KY	35	NBR
Zeon Corporation LP	Louisville, KY	5,300	ACM
Zeon Corporation LP	Hattiesburg, MS	10,900	ECO

Source: *International Institute of Synthetic Rubber Producers*
1. For a key to rubber type abbreviations, see Chapter 2, Technology and Raw Materials

rubber, plastics and possibly rubber or plastic compounds.

Table 1-8 ranks the leading U.S. producers of tires and non-tire fabricated rubber goods according to their total sales in 2005. North American rubber sales in dollars and as a percentage of total sales for each company are also shown. This group, with sales of $46,102 million, accounted for 89.5% of U.S. rubber goods shipments of $51,527.4 million. Not surprisingly, five tire companies occupy the top five positions on this list. Their combined North American rubber sales of