Ohio | Department of Development

Policy Research and Strategic Planning Office
A State Affiliate of the U.S. Census Bureau

The Ohio Polymers Industry:

Rubber and Plastic Resins and Products, and Related Machinery

May 2010

Ted Strickland, Governor of Ohio
Lee Fisher, Lt. Governor of Ohio
Lisa Patt-McDaniel, Director, Ohio Department of Development

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THE OHIO POLYMERS INDUSTRY:

Rubber and Plastic Resins and Products, and Related Machinery

MAY 2010

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Lisa Patt-McDaniel, Director

Dear Fellow Ohioan:

Ohio prides itself on its cutting-edge Polymer Industry. More than $5 billion in Gross Domestic Product is added to Ohio's economic engine by Ohio's polymer group of plastics, rubbers and resins manufacturers. This is the largest value for any state in the nation. Exports exceeded $1.3 billion in the last year. Employment is greater than 80,000 jobs in 1,150 establishments across the state. The economic numbers clearly demonstrate why Ohio is proud of its Polymer Industry.

The Polymer Group is widely distributed across the State -- seventy-six of our 88 counties have at least one polymer establishment. There is a natural concentration in Northeast Ohio with Summit, Stark, Portage, Lake, Geauga, Lorain, and Cuyahoga counties having large numbers of firms and employment in the polymer sector.

Our Department works closely with industry groups like PolymerOhio and the Ohio University System to provide assistance to individual firms and communities in our Polymer Group. Polymers were born through innovation here in Ohio and we continue to support and invest in that future.

Ohio's diverse industry base makes our State a global market leader. This diversity is complemented by a business environment that facilitates professional success and an environment outside of work that allows for personal fulfillment. Ohio's unique combination of life and work amenities makes our State a place where you can achieve your professional and personal aspirations.

I invite you to review the attached report to further your understanding of Ohio's large and diverse economy. We welcome your input. If you have any questions or comments, please contact John Magill, our Department's Chief Strategic Officer at (614) 466-2116.

Sincerely,

Lisa Patt-McDaniel
Director

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EXECUTIVE SUMMARY

- The latest available data show $5.08 billion worth of plastic and rubber products (NAICS 326) were made in Ohio, once again leading the nation as judged by Gross Domestic Product data for states from the U.S. Bureau of Economic Analysis. (2008)

- Factories in Ohio ranked first in manufacturing rubber products (3262) and second in plastic products (3261) based on the Census Bureau's 2008 Annual Survey of Manufactures value-added figures.

- Exports are an important market for rubber and plastic product makers, rising from $1.07 billion 2001 to $1.37 billion in 2009. NAFTA partners Canada and Mexico are the largest foreign market, combining for $873.5 million of purchases in 2009. China (excluding Hong Kong and Macau) is the fastest growing market for Ohio's exports.

- Twenty-nine companies on Fortune magazine's U.S.-1,000 or Global-500 lists have polymers industry operations in Ohio; seven of them have their world headquarters here: A. Schulman, Cooper Tire & Rubber, Eaton, Goodyear Tire & Rubber, Owens-Illinois, Parker-Hannifin, and PolyOne.

- The latest available data also show 1,150 rubber and plastic industry establishments in Ohio employed more than 81,100 people; those figures represent over 7 percent of the U.S. industry's establishments and over 8 percent of its workforce according to the Census Bureau's County Business Patterns, and indicate the industry's concentration here.

- Seventy-Six counties have at least one industry establishment, with the majority in 12 counties: Ashtabula, Butler, Cuyahoga, Franklin, Geauga, Hamilton, Lake, Lorain, Montgomery, Portage, Stark, and Summit; a large portion of industry employment is in those counties.

- Goodyear is the largest polymers industry employer in Ohio with almost 3,100 people; other companies employing at least 1,000 include Cooper Tire & Rubber, Eaton, and Yamashita Rubber.

- International investment is important, with 44 companies from 13 foreign nations employing more than 8,000 people in Ohio making rubber and plastic products as well as resins and synthetic rubber; five of them were on Fortune's Global-500 list. Yamashita Rubber is the largest with more than 1,000 workers.

- Seventy-three companies announced 78 major industry investments in Ohio from 2007 through 2009. Planned expenditures approached $1.5 billion, and over 2,500 new jobs are anticipated when the projects are completed, as reported by Policy Research and Strategic Planning (2010).

- The advantages of locating in Ohio include proximity to customers and suppliers (both of raw materials and production machinery), a well-developed, multi-modal transportation network, and a knowledgeable work force. In addition, Ohio's Third Frontier helps in a variety of ways to link the research capabilities of universities with entrepreneurial efforts in the development of new materials and technologies.

- The Center for Multifunctional Polymer Nanomaterial and Devices (CMPND) at the Ohio State University is developing and scaling-up a new generation of light-weight, high-strength, insulation-efficient, and fire-resistant polymeric foams using innovative nanomaterials and supercritical fluids technology. The global market for polymeric foams is estimated at $13 billion. Several major and start-up companies in Ohio are collaborating with CMPND and The Ohio State University to enable products that have zero-ozone depleting and global warming blowing agents, use 100 percent recycled polymers, increase insulation values, and decrease weight and manufacturing costs.

- People working in Ohio's polymers industry averaged $40,300 in pay according to the latest County Business Patterns (the national average was a little less than $41,700). This is the aggregate result of the higher wages paid in rubber products (3262) – particularly new tire production (326211) – offsetting the lower wages in all other plastic products (326199).

- The proportion of capital expenditures in Ohio from 1999 through 2008 for the manufacture of both plastic (3261) and rubber (3262) products typically has equaled or exceeded the proportions of value-added from Ohio, indicating companies' continuing commitment to manufacturing here.

- Two trends in the maturing polymers industry are the consolidation of producers (particularly resin makers) and the globalization of operations.

- While growth of rubber and plastic resins and products is expected in the near term, the industry's expansion in production and capacity utilization levels is directly tied to the housing market (and associated consumer durables) and motor vehicle sales. Furthermore, high prices for oil and natural gas, which are both feedstock and energy source for the industry, will remain a major challenge for the industry. Mergers and acquisitions are expected to resume with economic recovery.

- While real growth in the output of plastic products (3261) is forecast to be faster than average over the decade of 2006-2016, the volume of rubber products (3262) manufactured may grow only slightly.

DESCRIPTION OF OHIO'S POLYMERS INDUSTRY

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Ted Strickland, Governor
Lee Fisher, Lt. Governor

Lisa Patt-McDaniel, Director

Ohio Polymers Industry
Notable Establishments*

KEY

- Notable Establishment*
- Interstate Route
- U.S. Route 30
- Ohio County

*Establishment believed to employ 500 or more

Source:
Selectory® Business Database, Harris, a division of D&B®

Prepared by:
Policy Research and Strategic Planning,
Ohio Department of Development
May 2010

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Ohio Department of Development

NOTABLE POLYMERS INDUSTRY MANUFACTURERS

Twenty-nine companies on Fortune magazine's U.S.-1,000 or Global-500 lists have polymer industry establishments in Ohio. Seven of them maintain their world headquarters in Ohio: A. Schulman, Cooper Tire & Rubber, Eaton, Goodyear Tire & Rubber, Owens Corning, Parker-Hannifin, and PolyOne. Goodyear is the largest industry employer in Ohio with almost 3,100 people. Other companies employing at least 1,000 include Cooper Tire & Rubber, Eaton, and Yamashita Rubber.[1]

The map above shows the locations of the 13 establishments with at least 500 employees. The list below includes the Fortune companies with at least 50 people at a site as well as other companies employing 500 or more people in Ohio and having at least 50 people at a site. It is organized by NAICS code and includes the city where the site is located. Manufacturing rubber and plastic resins and products may not be the principal business of some companies on the list, but the sites of such companies are included because the primary NAICS codes of the specific establishments define them as part of the industry. See Table A1 for the list organized by company.

Industry Group/Company/Subsidiary or Division	Primary NAICS	City	Jobs at Site^
32521: Resins & synthetic rubber			
A Schulman, Inc.*	325211	Akron	202
A Schulman, Inc.*	325211	Akron	77
A Schulman, Inc.*	325211	Bellevue	200
A Schulman, Inc.*	325211	Sharon Center	50
Bayer AG/Bayer Materialscience [sic] LLC	325211	Hebron	150
Chevron Corp.*--ConocoPhillips*/Chevron Phillips Chemical Co.	325211	Marietta	172
Delphi Automotive Systems LLC*	325211	Ravenna	74
Dow Chemical Co.*/Rohm & Haas Co.	325211	Cincinnati	180
E I du Pont de Nemours & Co.*[1]	325211	Circleville	444
Eaton Corp.*	325211	Aurora	200
Illinois Tool Works, Inc.*	325211	Cincinnati	130
PolyOne Corp.*	325211	Avon Lake	73
325991: Custom compounding of purchased resins			
Dow Chemical Co.*--Corning Corp.*/Multibase, Inc.	325991	Akron	85

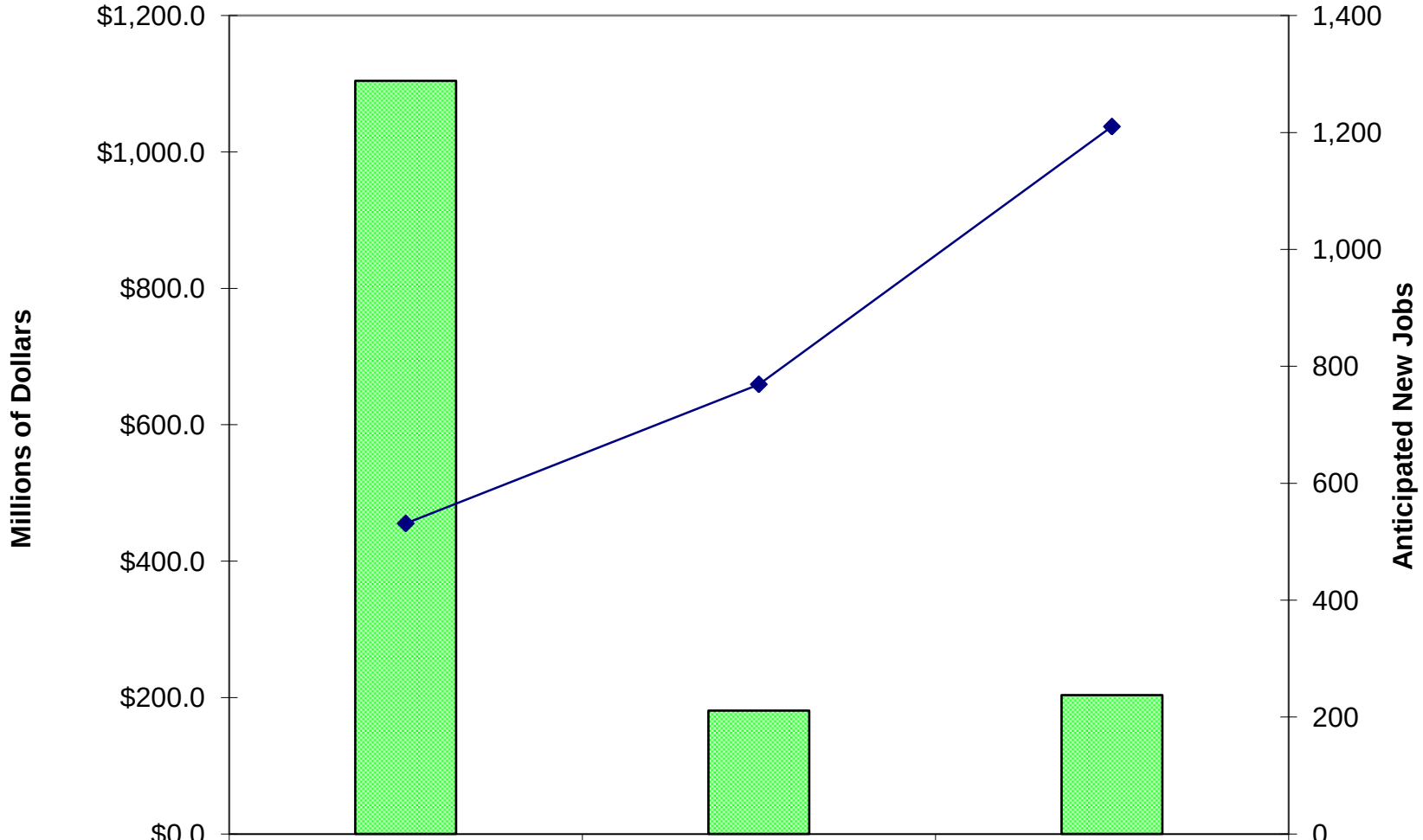
Industry Group/Company/Subsidiary or Division	Primary NAICS	City	Jobs at Site^
32611: Plastic packaging materials & unlaminated film & sheet			
E I du Pont de Nemours & Co.*/Liqui-Box Corp.	326111	Worthington	65
E I du Pont de Nemours & Co.*/Liqui-Box Corp.	326111	Ashland	120
Dow Chemical Co.*	326113	Findlay	150
Dow Chemical Co.*	326113	Hebron	105
32612: Plastic pipe, pipe fitting, & unlaminated profile shapes			
Eaton Corp.*/Eaton Inoac Co.	326121	Fremont	400
Advanced Drainage Systems, Inc.	326122	Hilliard	80
Advanced Drainage Systems, Inc.	326122	Hamilton	100
Advanced Drainage Systems, Inc.	326122	Wooster	52
Advanced Drainage Systems, Inc./Hancor, Inc.	326122	Findlay	330
Advanced Drainage Systems, Inc./Hancor, Inc.	326122	Findlay	100
Parker-Hannifin Corp.*	326122	Kent	90
Sumitomo Corp.*/Cantex, Inc.	326122	Aurora	60
Thomas & Betts Corp.*	326122	Bowling Green	110
32613: Laminated plastic plate, sheets, and shapes			
Parker Hannifin Corp.*	32613	Ravenna	250
32615: Urethane & other foam products			
Dow Chemical Co.*	32615	Ironton	175
32616: Plastic bottles			
Johnson Controls, Inc.*/Johnson Controls Interiors LLC	326160	Greenfield	250
Plastipak Packaging, Inc.	326160	Jackson Center	500
Plastipak Packaging, Inc.	326160	Medina	200
Silgan Holdings, Inc.*/Silgan Plastics Corp.[2]	326160	Port Clinton	150
Silgan Holdings, Inc.*/Silgan Plastics LLC	326160	Ottawa	200
32619: Other plastic products			
Cincinnati Machines, Inc. (f.k.a. Milacron, Inc.)	326191	Batavia	900

Industry Group/Company/Subsidiary or Division	Primary NAICS	City	Jobs at Site^
32619: Other plastic products (continued)			
3M Co.*	326199	Elyria	170
Advanced Drainage Systems, Inc./Hancor, Inc.	326199	Findlay	70
ALCOA, Inc.*/ALCOA Home Exteriors, Inc.	326199	Sidney	250
Compagnie de Saint-Gobain*/Saint-Gobain Abrasives	326199	Aurora	200
Compagnie de Saint-Gobain*/Saint-Gobain Performance	326199	Ravenna	99
Crane Plastics Co., LLC/Crane Plastics Manufacturing	326199	Columbus	250
Crane Plastics Co., LLC/Crane Plastics Siding LLC	326199	Columbus	300
Crane Plastics Co., LLC/Timbertech Ltd. LLC	326199	Wilmington	365
Crown Holdings, Inc.*/Crown Cork & Seal Co., Inc.	326199	Lancaster	90
E I du Pont de Nemours & Co.*/Liqui-Box Corp.	326199	Upper Sandusky	120
Eaton Corp.*	326199	Mantua	210
Fortune Brands, Inc.*/Fypon Ltd.	326199	Archbold	200
Illinois Tool Works, Inc.*	326199	Bryan	270
Illinois Tool Works, Inc.*	326199	Toledo	60
International Automotive (f.k.a. a Lear Corp. plant)	326199	Huron	700
JCIM US LLC	326199	Bryan	500
JCIM US LLC	326199	Wauseon	200
Liberty Partners LP/Step2 Co. LLC	326199	Perrysville	270
Liberty Partners LP/Step2 Co. LLC	326199	Streetsboro	500
MeadWestvaco Corp.*/Calmar, Inc.	326199	Washington CH	330
Molded Fiber Glass Cos.	326199	Ashtabula	685
Myers Industries, Inc.	326199	Middlefield	90
Myers Industries, Inc.	326199	Akron	73
Myers Industries, Inc./Buckhorn, Inc.	326199	Milford	73
Myers Industries, Inc./WEK Industries, Inc.	326199	Jefferson	186
Newell Rubbermaid, Inc.*/Rubbermaid	326199	Mogadore	415
Owens Corning*/Fibreboard Corp.	326199	Toledo	200
Ply Gem Industries, Inc./Great Lakes Window, Inc.	326199	Walbridge	600
Toledo Molding & Die, Inc.	326199	Tiffin	310
Toledo Molding & Die, Inc.	326199	Delphos	130

Industry Group/Company/Subsidiary or Division	Primary NAICS	City	Jobs at Site^
32619: Other plastic products (continued)			
Toledo Molding & Die, Inc.	326199	Toledo	120
Toledo Molding & Die, Inc.	326199	Toledo	60
32621: Tires			
Cooper Tire & Rubber Co., Inc.*	326211	Findlay	60
Cooper Tire & Rubber Co., Inc.*	326211	Findlay	1,000
Goodyear Tire & Rubber Co.*	326211	Akron	3,000
32622: Rubber & plastic hoses & belts			
Cooper-Standard Automotive, Inc.*	326220	Bowling Green	500
Cooper-Standard Automotive, Inc.*	326220	Bowling Green	350
Eaton Corp.*	326220	Van Wert	900
Eaton Corp.*/Aeroquip-Vickers, Inc.	326220	Cleveland	220
Myers Industries, Inc.	326220	Wadsworth	120
Tokai Rubber Industries Ltd./DTR Industries, Inc.	326220	Bluffton	750
32629: Other rubber products			
Bridgestone Corp.*/Bridgestone APM Co.	326291	Upper Sandusky	100
Bridgestone Corp.*/Firestone Polymers LLC	326299	Akron	73
Compagnie de Saint-Gobain*/Saint-Gobain Performance	326299	Akron	200
Solutia, Inc.*/Flexsys America LP	326299	Akron	65
Yamashita Rubber Co., Ltd./YUSA Corp.	326299	Washington CH	1,046

Notes: * - a Fortune U.S. 1,000 or global 500 company.
^ - "Jobs…" figures are thought to be the best available at the time of publication, but their accuracy cannot be guaranteed.
1 – jobs figure is from Willis (2010).
2 – jobs figure is from WTVG-TV/DT (2010), and the plant will close in 2010.
Sources: Fortune (2009), Harris (2009), Lexis-Nexis (2009), Willis (2010), WTVG-TV/DT (2010).

Investment Announcements in Ohio's Polymers Industry, 2007-2009



	2007	2008	2009
Intended Investments	$1,104.4	$181.0	$203.8
Anticipated New Jobs	531	769	1,210

Source: Policy Research & Strategic Planning

RECENT EXPANSION AND ATTRACTION ANNOUNCEMENTS

Seventy-eight major investments by 73 companies in Ohio's polymers industry were recorded by this office (Policy Research and Strategic Planning) from 2007 through 2009. Planned expenditures approached $1.5 billion. Currently, 2,510 new jobs are anticipated when the projects are completed. The chart above shows that almost one-half of anticipated new jobs – 1,200-plus – were announced in 2009. The chart also shows that intended investments were greatest in 2007. This is due primarily to Goodyear's intension to invest $890 million. Without that single announcement, the investment total for 2007 would be $214.4 million (still the largest of the three years), and the three-year total would be $599.2 million.

While Goodyear dominated investment activity during the three-year period, other companies planned notably large investments. These include Titan Tire – $125 million, Bridgestone – $100 million, and Buckeye Silicon – $50 million. Other companies investing at least $10M include A Schulman, CCL Auto-Sleeve, Clopay Plastic Products, Cooper Tire & Rubber, Next Generation Films, Revere Plastics, Sigma USA, and Veyance Technologies. Titan Tire anticipates adding 150 new jobs when its project is completed – the largest number by any company.

If Goodyear's $890 million is excluded from the nearly $1.5 billion total, then $344.1 million of the remaining $599.2 million is intended for rubber products (NAICS 3262), notably tires (32621 – $259.5 million). (Including Goodyear raises the rubber products total to $1.23 billion.) All other rubber products (3262-9) garnered $84.6 million in investments. $217.9 million was planned for plastic products (3261), with $116.6 million going for all other plastic products (326199) alone. $37.2 million was planned for resin and synthetic rubber production (32521) and custom compounding (325991). However, over 1,800 of the 2,500 anticipated new jobs are in the plastics group.

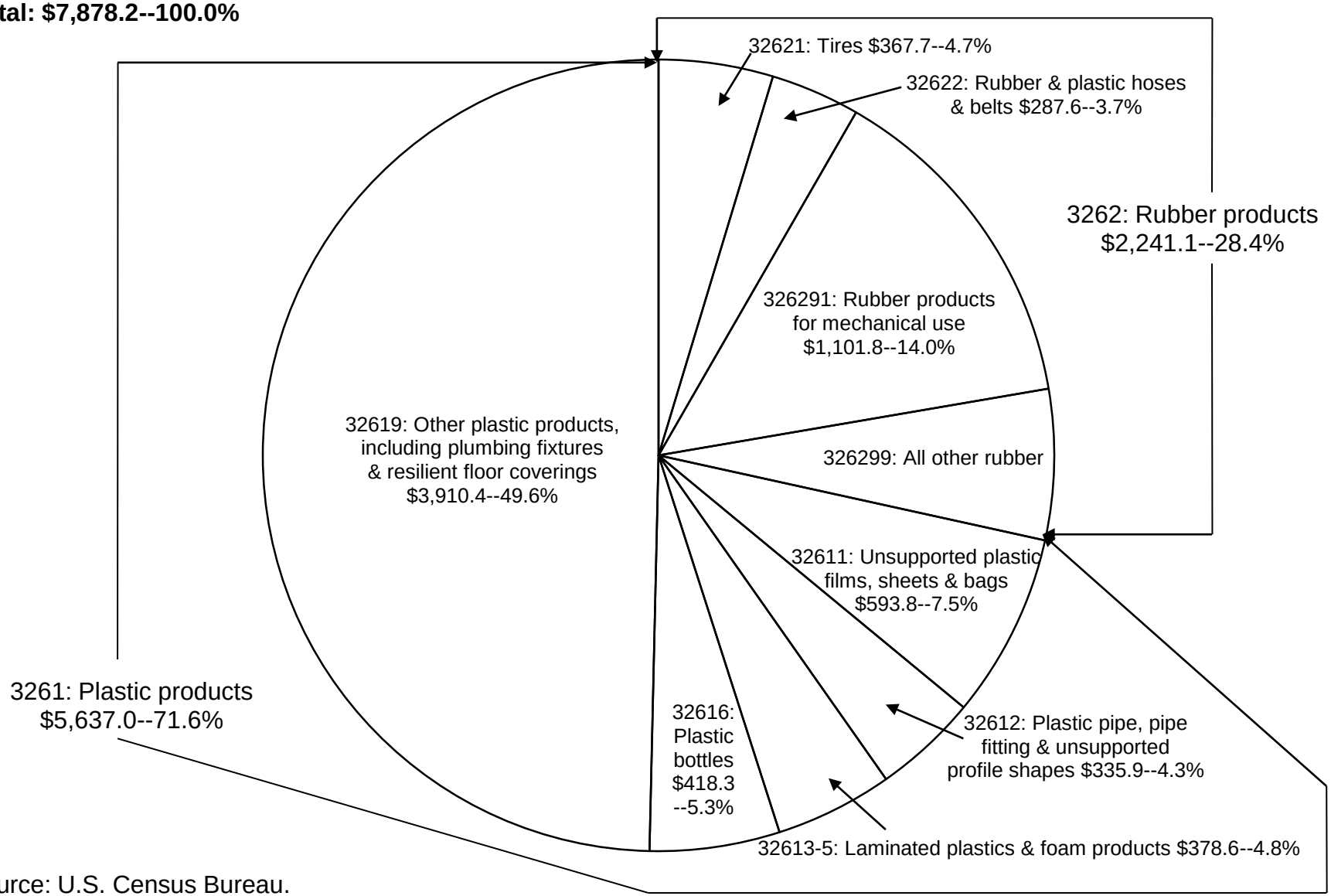
These counts are derived from a list of major investments compiled by Policy Research & Strategic Planning (2010). To be included, a major investment must meet at least one of the following criteria: 20,000 square feet of new space; $1 million to be spent for land, building(s), or equipment; or 50 new jobs. Many of the major investments are phased-in over two or three years, with production and employee counts following after project completion. The data are not comparable with Census Bureau data on capital expenditures.

See Table A2

Value-Added by Sub-group in Ohio's Plastic & Rubber Products Industry (NAICS 326): 2002

(in millions, except percentages)

Total: $7,878.2--100.0%



Source: U.S. Census Bureau.

THE COMPOSITION OF OHIO'S POLYMERS INDUSTRY: VALUE-ADDED

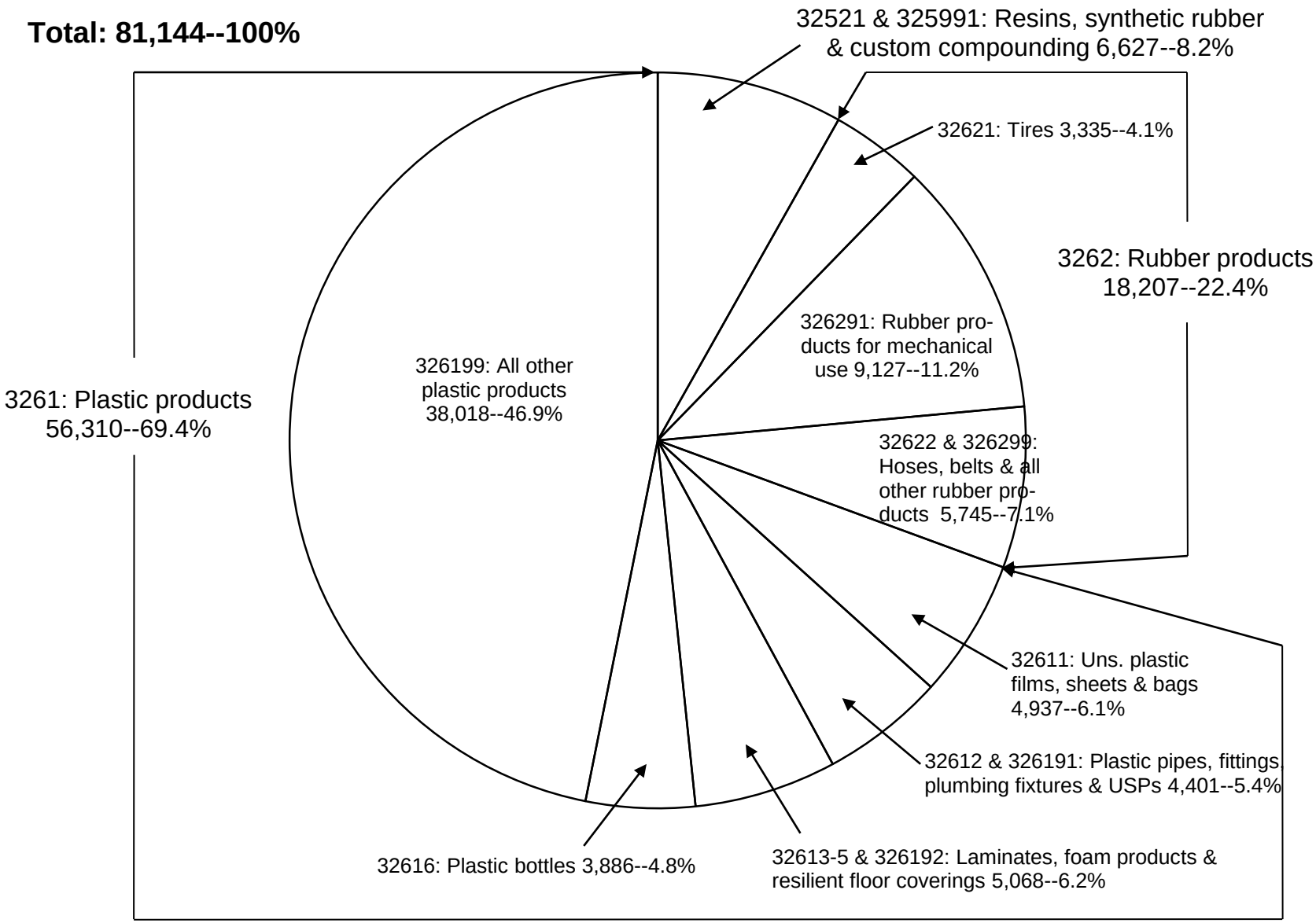
Value-added data from the 2002 Census of Manufactures provide both insight into the composition of the polymers industry in Ohio and a basis for comparisons with other states and the country as a whole.[2]

The chart above illustrates the relative distribution of plastic and rubber products output (NAICS 326) by industry subgroup(s) and some of the larger industries. Almost one-half of industry production in the state consists of making the huge variety of other plastic products (32619). (Making plastic plumbing fixtures and resilient floor coverings – 326191-2 – comprise less than 1 percent of industry output.) Other plastic industries or subgroups – unsupported films, sheets and bags (32611), pipes, pipe fittings and unsupported profile shapes (32612), laminated and foam products (32613-5), and bottles (32616) – together comprise 21.9 percent of value-added. Altogether, plastic products (3261) represented 71.6 percent of output in 2002. Rubber products (3262) were the other 28.4 percent of output, with rubber products for mechanical use (326291) about one-half of that. Tires, hoses, belts, and all other rubber products round out major industry production.

Data from the 2008 Annual Survey of Manufactures (the most recent) show Ohio ranked second in the nation in plastic products (3261), first in rubber products (3262), and second in the combination of the two groups (U.S. Bureau of the Census, 2010).

See Tables A3 & A4

Employment in Ohio's Polymers Industry



Source: U.S. Census Bureau

THE COMPOSITION OF OHIO'S POLYMERS INDUSTRY: EMPLOYMENT

1,150 establishments employed more than 81,100 people in Ohio's polymers industry according to the latest comprehensive data. Nearly seven-tenths of the industry employees – 56,300 – worked in the plastic products group (NAICS 3261). The plastic products group is, in turn, largely comprised of the all other plastic products industry (326199) with 39,300 people at 524 establishments. The size of this one industry dwarfs all other constituent industries. Like value-added data cited in the preceding section, the numbers are indicative of the diversity of plastic products made here.

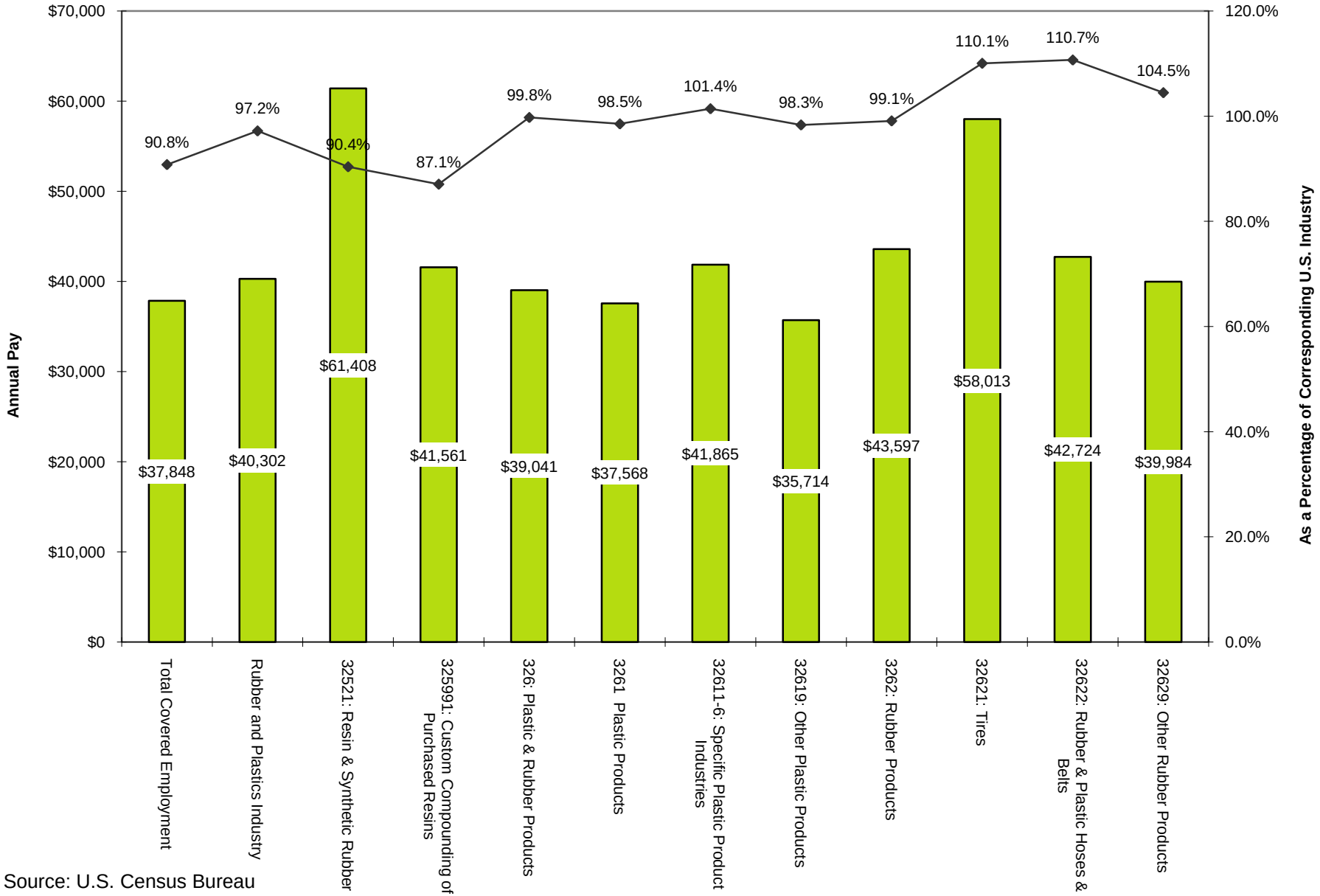
About 18,200 people – two of every nine in the industry – worked in the rubber products group (3262). The largest single industry in the group (and exceeded only by all other plastic products) is rubber products for mechanical use (e.g., in machinery or transportation equipment, 326291). It had 9,100 workers – one-half the group and one-ninth of the industry total. The production and custom compounding of plastic resins and synthetic rubber (32521 and 325991) occupied an estimated 6,600 workers, or one-twelfth of industry employment here.

More than seven and eight percent of the industry's establishments and jobs in America are located in Ohio. The overall concentration of industry here is obvious when compared with Ohio's portions of all private non-farm establishments and employment – 3.5 percent and 4.0 percent. The most concentrated portion of the industry is the rubber group, particularly rubber products for mechanical use (18.8 percent of establishments, 24.4 percent of employment), rubber and plastic hoses and belts (32622: 8.2 percent and 10.4 percent), and all other rubber products (326299: 10.2 percent and 11.4 percent). Although many other constituent industries are concentrated here, the production of plastic bottles (32616), resilient floor coverings (326192), and custom compounding of resins are the only plastics industries with at least 10 percent of the corresponding national employment totals located in the state.

See Table A5

Ohio Department of Development

Pay in Ohio's Polymers Industries



Source: U.S. Census Bureau

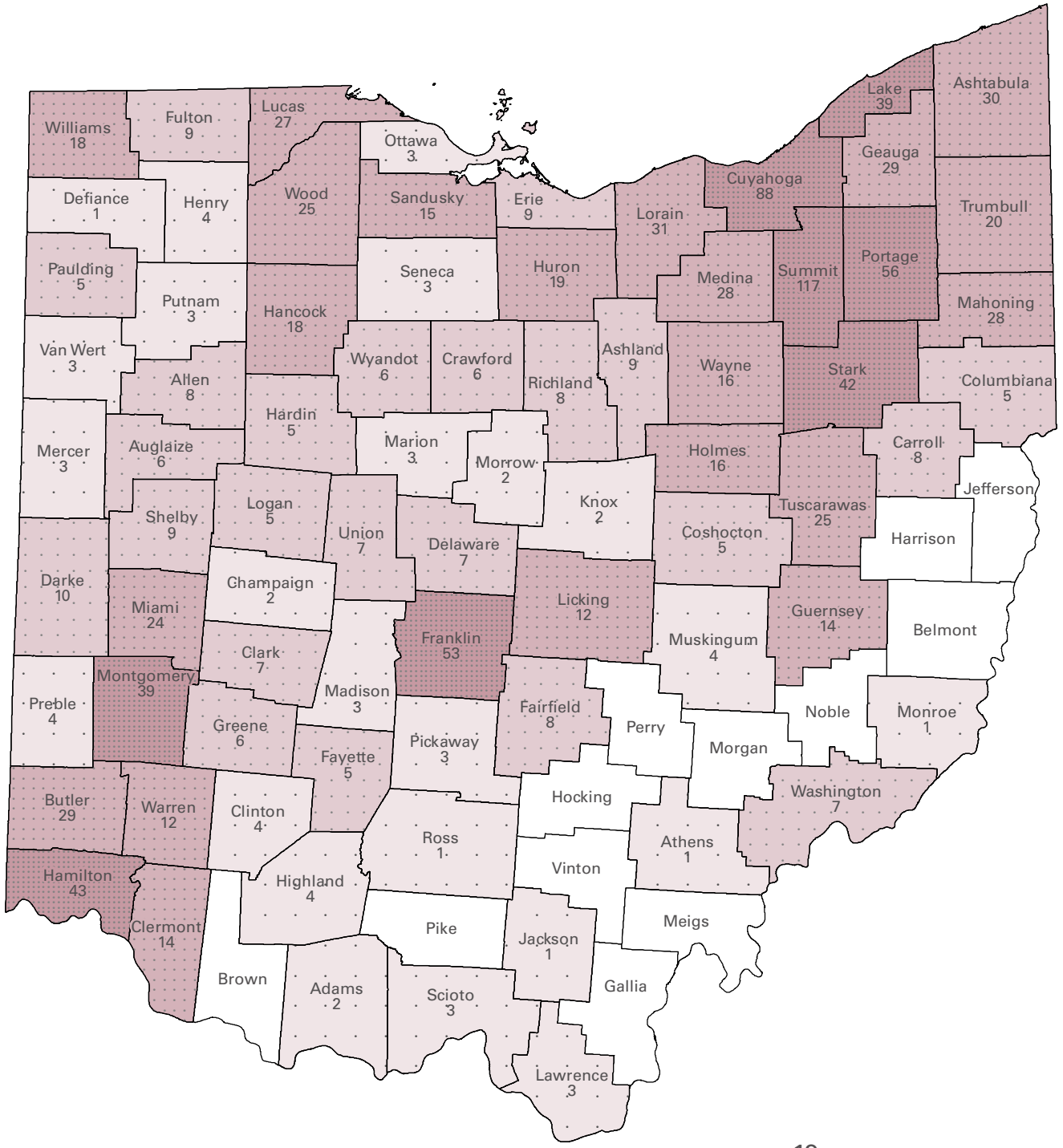
INDUSTRY PAY

The chart above shows that annual pay in Ohio for all non-agricultural private sector employees averaged more than $37,800 (U.S. Bureau of the Census, 2009a). People employed in the state's polymers industry averaged $40,300, but there is much variation within. Pay was greatest in resin and synthetic rubber production (NAICS 32521, $61,400). Pay was higher in the rubber products group (3262, almost $43,600) than the plastic products group (3261, $37,500-plus). The higher average of the former reflects the pay in tires (32611, $58,000) in particular, but pay in the other subgroups – rubber and plastic hoses and belts (32622) and other rubber products (32629) – also was greater than the industry mean. Those in the custom-compounding of purchased resins (325991) about $41,500.

Generally, pay in the specified plastic product subgroups and industries (32611-6, $41,800-plus) was greater than pay in the residual-but-huge all other plastic products (32619, $35,700). Appendix table A6 shows more detail as well as exceptions to this generalization.

Mean industry pay in Ohio was 97.2 percent of the national average. This largely reflects comparable pay in the plastic products group and its constituent industries; many were within a few points of the corresponding national averages. Where pay in Ohio notably departed from the national averages was in the rubber products group and in resin and synthetic rubber production and custom compounding. Earnings in the rubber products group – particularly tires – were greater than the corresponding national average. On the other hand, resin and synthetic rubber production and custom compounding earnings were less than the corresponding national averages. Again, appendix table A6 shows more detail and exceptions to these generalizations.

See Table A6



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Ohio Polymers Industry
Establishments by County

Number of Establishments in County

- None
- 1 - 4
- 5 - 10
- 11 - 35
- 36 - 117

Source:
2007 County Business Patterns,
U.S. Census Bureau

Prepared by:
Policy Research and Strategic Planning,
Ohio Department of Development
April 2010

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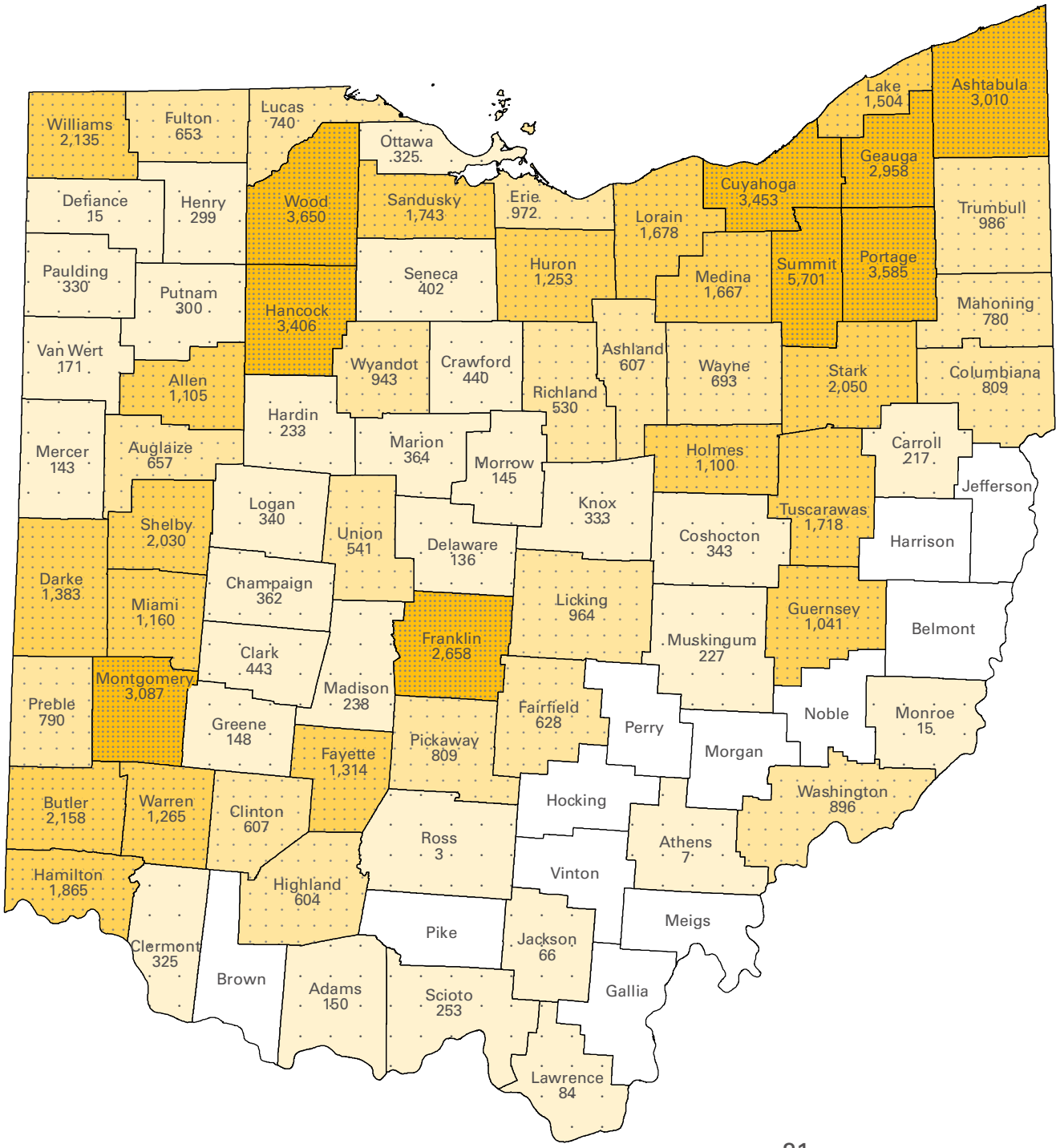
THE DISTRIBUTION OF INDUSTRY ESTABLISHMENTS IN OHIO

The map above illustrates the distribution of the 1,150 polymers industry establishments across Ohio according to the latest County Business Patterns data. Seventy-six counties had at least one industry establishment. However, the majority could be found in 12 counties: Summit – 117, Cuyahoga – 88, Portage – 56, Franklin – 53, Hamilton – 43, Stark – 42, Montgomery and Lake – 39 each, Lorain – 31, Ashtabula – 30, and Butler and Geauga – 29 each. Seven more counties had at least 20 establishments, 11 had 10 to 19 establishments, 22 counties had five to nine, and 24 counties had from one to four establishments.

Counties with an establishment making plastic or rubber products did not necessarily have a resin or rubber producing or compounding plant, but counties with at least one resin or rubber producing or compounding establishment (NAICS 32521 or 325991) almost always had at least one establishment making plastic or rubber products (326). The exceptions to the latter were Defiance and Van Wert.

Another way to look at the map is to focus on Summit and the surrounding counties: Cuyahoga, Geauga, Medina, Portage, Stark and Wayne. These seven combine to form an area with 376 establishments, nearly one-third of the polymers industry in Ohio. While polymers establishments are widely diffused across the state, this fact is consistent with the view that the Akron region is the Polymer Valley.

See Table A7



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Ohio Polymers Industry

Employment by County*

Number of Employees in County*

- None
- 1 - 499
- 500 - 999
- 1,000 - 2,499
- 2,500 - 5,701

*Most employment figures are, or incorporate, estimates

Source:
2007 County Business Patterns,
U.S. Census Bureau

Prepared by:
Policy Research and Strategic Planning,
Ohio Department of Development
April 2010

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THE DISTRIBUTION OF INDUSTRY EMPLOYMENT IN OHIO

Employment seems less concentrated than the distribution of establishments with 14 counties accounting for the majority of the industry jobs in Ohio. Summit topped the list with 5,700. Ashtabula, Cuyahoga, Hancock, Montgomery, Portage and Wood followed – each with jobs numbering between 3,000 and 3,700. Six counties are thought to have had from 2,000 to nearly 3,000 jobs: Butler, Franklin, Geauga, Shelby, Stark and Williams. Fourteen counties each had between 1,000 and 2,000 jobs, 19 had between 500 and 1,000, and 30 had less than 500.[3]

Similar to the preceding section, Summit and the surrounding counties are estimated to have had about 20,100 industry jobs – perhaps 25 percent of industry employment in the state. Excluding these counties, no other combination of seven counties forming one continuous area in Ohio had such a high percentage of industry employment.

See Table A7

FOREIGN INVESTMENT IN OHIO

Foreign investment in Ohio is part of the globalization about which industry analysts write (e.g., O'Reilly, 2010). Forty-four foreign-based companies have subsidiaries in Ohio's polymers industry; five are on Fortune's Global-500 list. All of the companies are listed below, along with the countries where the home office is located, their Ohio subsidiaries, and the estimated number of employees here. Sometimes a parent company will have more than one subsidiary here, or have more than one establishment with the same name. In either instance, only the total employment by the parent is shown. Yamashita Rubber is the largest employer with over 1,000 employees. Altogether, the 44 companies employ more than 8,000 people in Ohio.

Ultimate Foreign Parent	Parent Country	Ohio Subsidiar(y/ies)	Industry Side	Total Jobs^
Amcor Ltd.	Australia	Amcor PET Packaging USA, Inc.	Plastics	33
Bayer AG*	Germany	Bayer Materialscience [sic] LLC	Plastics	150
Bridgestone Corp.*	Japan	Firestone Polymers LLC and Bridgestone APM Co.	Rubber	173
Compagnie de Saint-Gobain*	France	Saint-Gobain Abrasives and Saint-Gobain Performance	Both	499
De Ruijter International BV	Netherlands	De Ruijter International USA	Rubber	10
Deceuninck NV	Belgium	Deceuninck N.A. LLC	Plastics	325
Fletcher Building, Ltd.	New Zealand	Formica Corp.	Plastics	20
Freudenberg & Co. KG	Germany	Freudenberg-Nok General	Plastics	65
Fukuvi Chemical Industry Co.	Japan	Fukuvi USA, Inc.	Plastics	65
Gebruder Rochling KG	Germany	Rochling Glastic Composites	Plastics	200
Henkel AG & Co. KGaA	Germany	Henkel Corp.	Plastics	14
Huhtamaki Oyj	Finland	Huhtamaki Plastics, Inc.	Plastics	350
Knauf Gips KG	Germany	Ultimate Building Systems Ltd.	Plastics	20
Kumi Kasei Co., Ltd.	Japan	Kamco Industries, Inc.	Plastics	370
Lanxess AG	Germany	Lanxess Corp. and Rhein Chemie Corp.	Rubber	140
Meteor Gummiwerke KH Badje	Germany	Meteor Sealing Systems LLC	Rubber	155
Mitsui Chemicals, Inc.	Japan	Advanced Composites, Inc.	Plastics	220
Molten Corp.	Japan	Molten N. America Corp.	Rubber	410

Ultimate Foreign Parent	Parent Country	Ohio Subsidiar(y/ies)	Industry Side	Total Jobs^
Morbern, Inc.	Canada	Morbern USA	Plastics	12
Nifco, Inc.	Japan	Nifco America Corp.	Plastics	312
Nissei Plastic Industrial Co.	Japan	Nissei America, Inc.	Plastics	3
Nissen Chemitec Corp.	Japan	Nissen Chemitec America, Inc.	Plastics	250
Nova Chemicals, Inc.	Canada	Nova Chemicals, Inc.	Plastics	56
Rexam PLC	United Kingdom	Graham Packaging and Precise Technology, Inc.	Plastics	313
Ritrama SPA	Italy	Ritrama, Inc.	Plastics	67
Schutz-Werke GmbH & Co KG	Germany	Schutz Container Systems, Inc.	Plastics	50
Scott Bader Commonwealth Ltd.	United Kingdom	Scott Bader, Inc.	Plastics	8
Shin-Etsu Chemical Co. Ltd.	Japan	Shincor Silicones, Inc.	Rubber	59
SMS GmbH	Germany	Hycomp, Inc.	Plastics	70
Societe d'Investissement Familiale SA	France	Johnsonite, Inc.	Plastics	450
Solvay SA	Belgium	Solvay Advanced Polymers LLC	Plastics	180
Somprema Holding	France	Soprema USA, Inc.	Rubber	30
Steinhaus Gesellschaft MIT	Germany	Tema Isenmann, Inc.	Plastics	4
Storopack Hans Reichenecker GmbH	Germany	Storopack, Inc.	Plastics	50
Sumitomo Corp.*	Japan	Cantex, Inc.	Plastics	60
ThyssenKrupp AG*	Germany	Krupp Rubber Machinery	Rubber	2
Tigers Polymer Corp.	Japan	Tigerpoly Manufacturing, Inc.	Plastics	350
Tokai Rubber Industries Ltd.	Japan	DTR Industries, Inc.	Rubber	750
Trelleborg AB	Sweden	Sorbothane, Inc.	Rubber	183
Windsor Mold, Inc.	Canada	Trelleborg Wheel Systems Autoplas, Inc.	Plastics	50
Woodbridge Foam Corp.	Canada	Woodbridge Group	Rubber	150
Yamashita Rubber Co., Ltd.	Japan	YUSA Corp.	Rubber	1,046
Yokohama Rubber Co., Ltd.	Japan	SAS Rubber Co.	Rubber	135
Zhongding Group	China	Zhongding USA	Rubber	218

Notes: ^ - "Jobs" figures are thought to be the best available at the time of publication, but their accuracy cannot be guaranteed; * - a Fortune Global 500 company. Sources: Fortune (2009), Harris (2009), Lexis-Nexis (2009).

The foreign parent companies are headquarters in 13 nations. Fourteen are Japanese, 12 are German, four each are Canadian or British, three are French, and two are Belgian. Australia, China, Finland, Italy, the Netherlands, New Zealand and Sweden each are home to one. The vast majority of the companies focus on the plastics side of the industry, but some with more than one establishment here may have operations on both the plastics and rubber sides. A few produce resins or synthetic rubber.

THE ADVANTAGES OF LOCATING IN OHIO

The polymers industry is concentrated in Ohio (Policy Research & Strategic Planning, 2009) for a number of reasons in addition to the origin of the modern rubber industry in Northeast Ohio (Prat, 1998).

- The suppliers are close. A significant portion of oil- and natural gas refinery output – the principal raw materials for resin and synthetic rubber production – occurs in the region from New Jersey through Illinois (O'Reilly, 2002); coal and coal-products, secondary sources for resin and synthetic rubber production, also are produced in the region stretching from Virginia and Pennsylvania through Illinois (U.S. Bureau of the Census, 2009b).

- The polymers industry in Ohio is also close to its major customers – often other manufacturers. Manufacturing is a relatively large part of Ohio's economy, and industries that are larger consumers of rubber products – motor vehicles, food processing, printing, and industrial machinery (Prat, 1990) – are concentrated in Ohio (Policy Research & Strategic Planning, 2009).

- Ohio's central location, concentration of rail and major highways, and borders on major waterways make it well suited for distributing polymer products to customers. Overall, probably one-half of rubber and plastic resins are shipped by truck, with most of the remainder divided between rail and water. Small portions are shipped by rail/truck intermodal, air cargo, and pipeline (O'Reilly, 2010: 25).

- Innovations from research and development (R & D) activities drive the expanding markets for rubber and plastic products. Regions in which industrial R & D activities are concentrated have a comparative advantage over other regions for future technological change, new products, and new industries (Malecki, 1981). Considerable R & D is done near corporate headquarters, in particular research that is basic and not related to product lines (Shanahan, et.al., 1985). As previously noted, Ohio is corporate headquarters for many companies in the polymers industry. Furthermore, the concentration of R & D activity in a small geographic area also provides an environment for entrepreneurial ventures. "Many of the small to medium-size polymer manufacturing firms in the [Akron] region were established by people previously employed in polymer-related… industries" (Shanahan, et.al., 1985: 168).

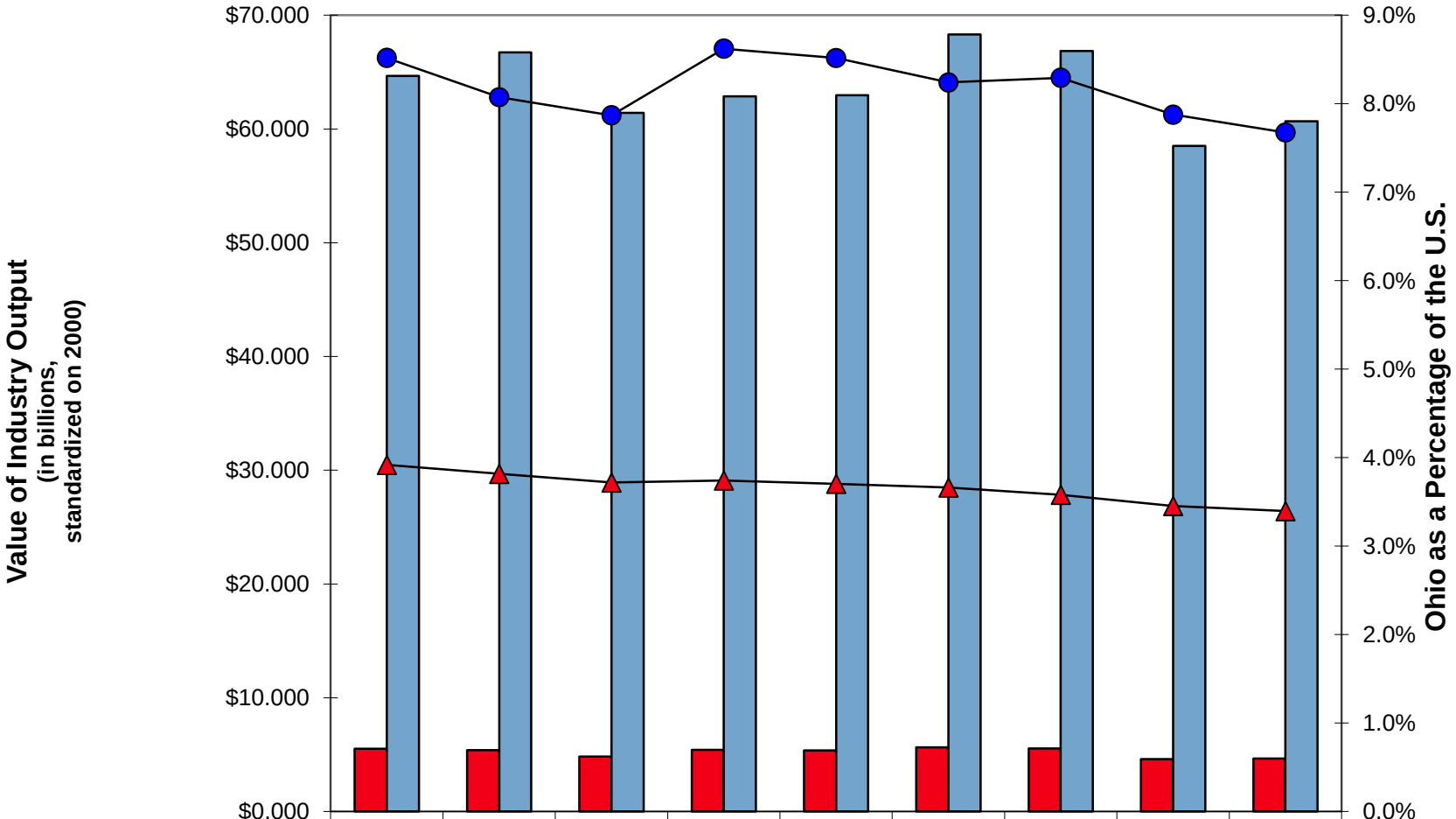
- R & D at universities may focus on industrial applications as well as basic research. This is evident from the many programs at over a dozen universities covering all aspects of polymer-related expertise from basic science through industrial applications and process engineering to technical training and quality control. Training in these fields extends from universities to community colleges, vocational centers, and even some secondary schools.

- The State of Ohio's Third Frontier program helps link the research capabilities and activities at universities with private sector entrepreneurs interested in commercial development of new materials and technologies. Support may take the form of grants, loans or tax incentives. The new companies may initially be located at a number of local centers.

TRENDS

Ohio Department of Development

Plastic & Rubber Products Industry (NAICS 326) Output and Its Concentration in Ohio, 1999-2007



	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Ohio: P&RP Output	$5.508	$5.387	$4.833	$5.421	$5.362	$5.629	$5.545	$4.609	$4.657
U.S. P&RP Output	$64.662	$66.728	$61.420	$62.874	$62.959	$68.314	$66.861	$58.515	$60.680
Ohio Total GDP--Percent of U.S.	3.9%	3.8%	3.7%	3.7%	3.7%	3.7%	3.6%	3.5%	3.4%
Ohio P&RP GDP--Percent of U.S.	8.5%	8.1%	7.9%	8.6%	8.5%	8.2%	8.3%	7.9%	7.7%

Source: U.S. Bureau of Economic Analysis.

* - Preliminary

GROSS DOMESTIC PRODUCT

The gross domestic product is the net value of goods and services provided by people using capital in the United States, and the U.S. Bureau of Economic Analysis publishes estimates of each state's contribution to it by industry. In this regard, Ohio has ranked first in the nation in manufacturing plastic and rubber products (NAICS 326) during the latest nine years for which data are available (1999-2007, U.S. Bureau of Economic Analysis, 2009).

Real changes in economic output – i.e., the volume(s) of goods produced and services provided – can be discerned only after accounting for inflation. The chart above illustrates these changes in the volumes of plastic and rubber products: factory output in Ohio has fluctuated between $4.6 and $5.7 billion. Although there is no consistent trend, output in 2007 was 15.5 percent lower than in 1999. This pattern of growth and reduction over the years is consistent with a cyclicality seldom seen in the industry.[4]

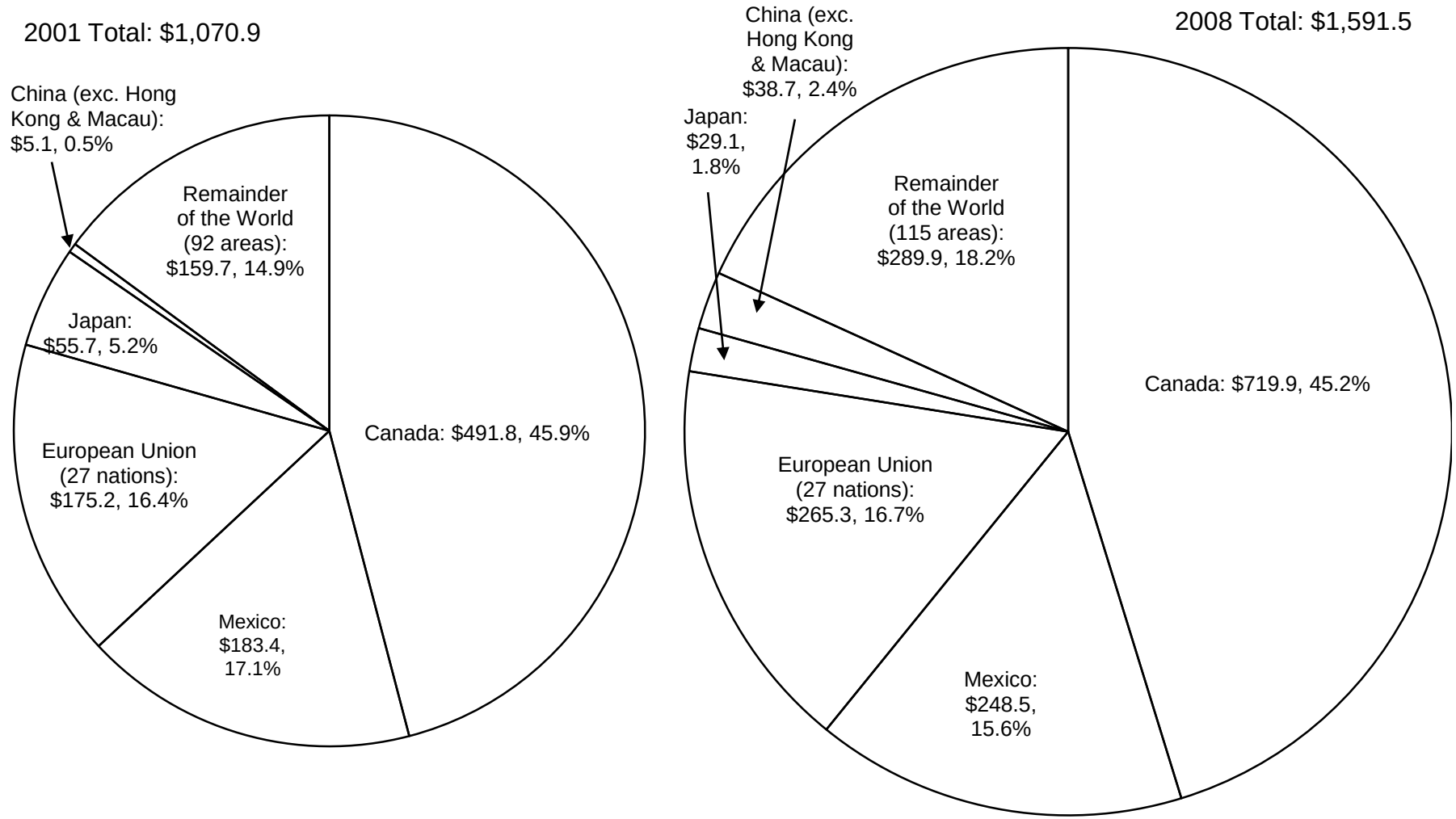
What happened in Ohio is similar to what happened in the industry across the country in the cycles of expansion and contraction, but changes here were not in lock-step with the nation as a whole. The net change in U.S. industry output was a reduction in volume of 6.2 percent.

Data in the chart above also indicate the concentration of the industry in Ohio: between 7.7 and 8.6 percent of the plastic and rubber products made in America came from plants in Ohio, while the portion of total U.S. gross domestic product GDP originating here fell from 3.9 to 3.4 percent. The year-to-year ratio of these percentages showed a net increase from 1999 to 2007. This increase reflects the continuing relative importance of the industry in Ohio's economy despite its apparent net contraction. (Even though the industry in Ohio contracted relatively more than across the nation, the rest of the national economy grew faster than rest of Ohio's economy.)

See Table A8

Exports of Plastic and Rubber Products (NAICS 326) from Ohio

in millions of dollars



Sources: European Union, International Trade Administration

EXPORTS

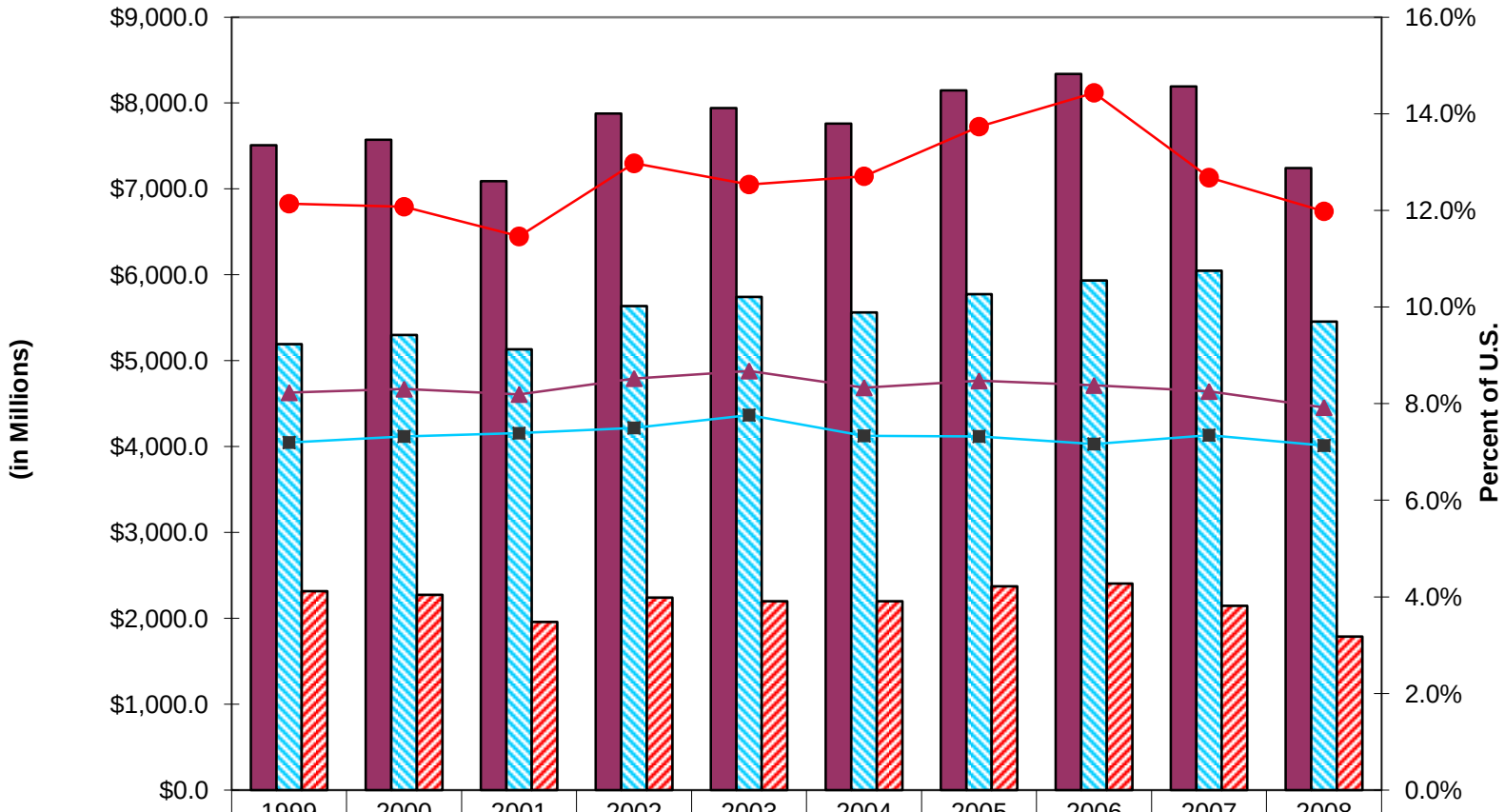
Exports of plastic and rubber products (NAICS 326) are an increasingly important part of production in Ohio. The chart above illustrates their growth from a total of $1.07 billion in 2001 to $1.59 billion in 2008. After adjusting for inflation, this is a real increase of 16 percent.[5] At least three-fifths of the exports have been – and still are – to NAFTA partners Canada and Mexico. The portion of exports to Canada showed little net change, but the portion of exports to Mexico fell slightly. At the same time, exports from Ohio to the European Union nations grew a little faster than exports to Mexico, making the European Union the second largest foreign market for manufacturers here.

The chart also shows the increasing importance of other markets. Perhaps most notably, exports to China (excluding Hong Kong and Macau) grew from $5.1 billion in 2001 to $38.7 billion in 2008 – an inflation-adjusted increase of 495.9 percent, and exports to the Remainder-of-the-World (except Japan) rose from $159.7 to $289.9 billion – a real increase of 41.7 percent. The two combined received 20.6 percent of exports from Ohio in 2008. This contrasts with the change in exports to Japan. Exports fell from $55.7 to $29.1 billion, a drop of 59.2 percent after adjusting for inflation. Japan was the destination of 1.8 percent of exports in 2008. This general shift in exports to developing nations – which might include some in the European Union – is consistent with the national trend noted by O'Reilly (2010: 10), who thinks it is due to the higher birth rates, industrialization, and/or improving living standards in such nations.[6]

Evidence of how things changed with the recession is seen in 2009 in Appendix Table A9. Total exports fell 13.6 percent from $1.59 to $1.37 billion. Furthermore, exports to all of the areas shown above fell without exception. The declines of exports to Canada and China – between eight and nine percent – were relatively less than to other markets. However, O'Reilly (2010: 6) thinks exports will improve in 2010.

See Table A9

Value Added in Ohio's Plastic and Rubber Products Industry (NAICS 326): 1999-2008



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total: Both	$7,509.5	$7,573.1	$7,090.4	$7,878.2	$7,942.5	$7,759.7	$8,146.9	$8,338.2	$8,191.4	$7,243.2
Total: Plastic Products	$5,194.2	$5,300.4	$5,132.7	$5,637.0	$5,743.2	$5,562.2	$5,773.2	$5,935.0	$6,045.6	$5,454.7
Total: Rubber Products	$2,315.4	$2,272.6	$1,957.7	$2,241.1	$2,199.3	$2,197.5	$2,373.7	$2,403.3	$2,145.8	$1,788.5
Percentage: Both	8.2%	8.3%	8.2%	8.5%	8.7%	8.3%	8.5%	8.4%	8.3%	7.9%
Percentage: Plastic Products	7.2%	7.3%	7.4%	7.5%	7.8%	7.3%	7.3%	7.2%	7.3%	7.1%
Percentage: Rubber Products	12.1%	12.1%	11.5%	13.0%	12.5%	12.7%	13.7%	14.4%	12.7%	12.0%

Source: U.S. Census Bureau

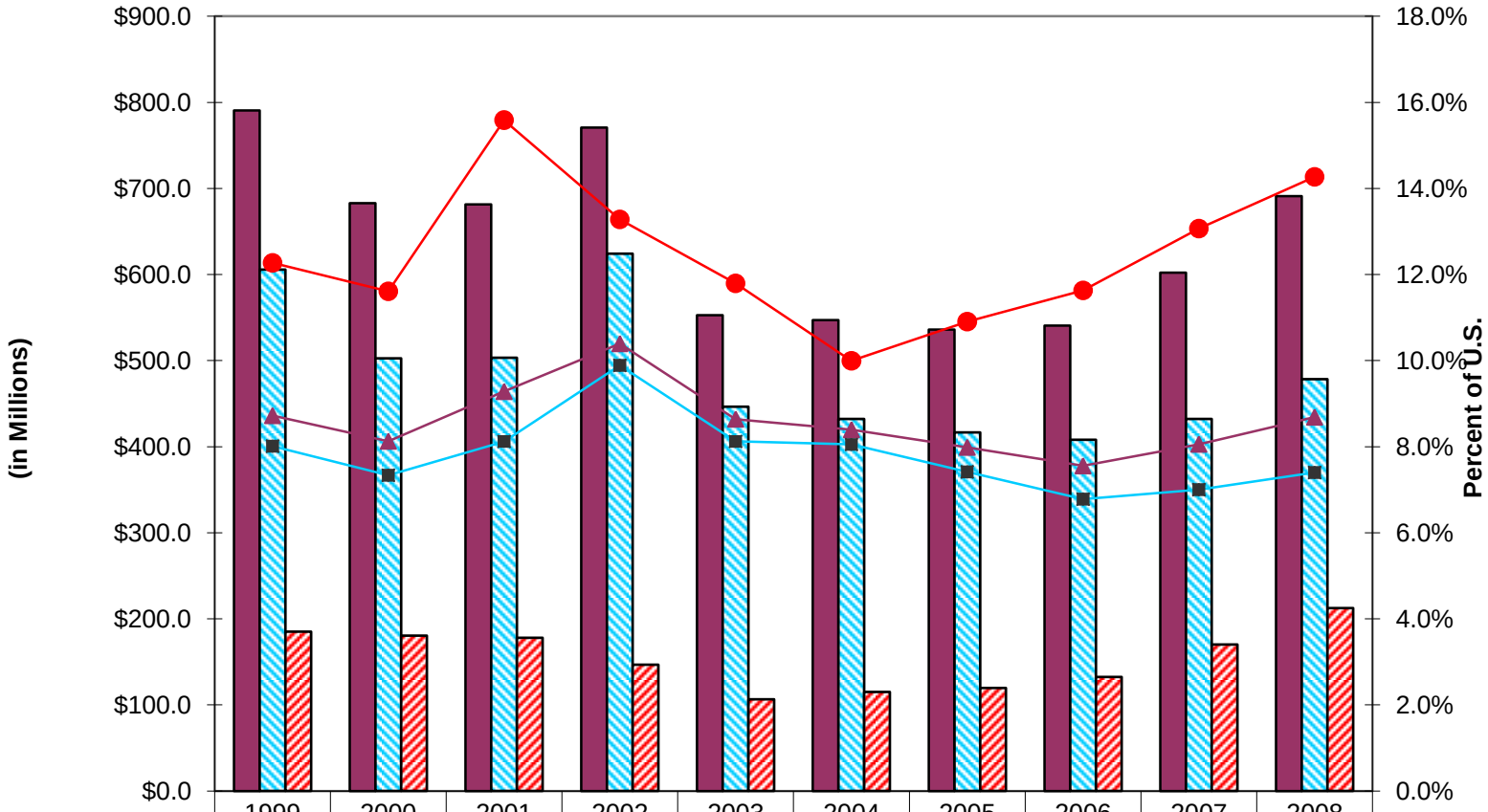
VALUE-ADDED BY GROUP

Value-added data provide additional insight not available with gross domestic product data by focusing on the two groups within the major industry: plastic products (NAICS 3261) and rubber products (3262). The chart above shows that plastic products are the far-larger portion of industry output in Ohio, growing from $5.1 billion in 2001 to $6.0 billion in 2007 before dropping to $5.5 billion in 2008. Value-added in rubber products rose from less than $2.0 billion in 2001 to $2.4 billion in 2006, and fell below $1.8 billion in 2008. (These figures have not been adjusted for inflation.) On average, 71.8 percent of the industry output in Ohio has been plastic products, compared to 28.2 percent rubber products.

GDP data in the preceding section indicated the concentration of the industry in Ohio. The chart above shows that this concentration is greater in the rubber products group than the plastics products group. On average, 12.7 percent of the nation's value-added in the rubber products group originated in Ohio, while 7.3 percent of its value-added in plastic products came from the state. The percentages fluctuated during this time period, but there does not appear to be any trend away from production in Ohio of either plastic or rubber products. The declining percentage of rubber products coming from Ohio after 2006 may is consistent with reduced tire output due to the recession (Levy, 2009: 24), and the concentration of the motor vehicle in Ohio (Policy Research and Strategic Planning, 2009).

See Table A10

Capital Expenditures in Ohio's Plastic and Rubber Products Industry: (NAICS 326) 1999-2008



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total: Both	$790.7	$682.8	$681.3	$770.8	$552.8	$547.1	$536.1	$540.7	$602.1	$691.1
Total: Plastic Products	$605.6	$502.5	$503.4	$624.2	$446.5	$432.2	$416.7	$408.2	$432.1	$478.5
Total: Rubber Products	$185.1	$180.3	$177.9	$146.6	$106.4	$114.9	$119.5	$132.5	$170.1	$212.6
Percentage: Total	8.7%	8.1%	9.3%	10.4%	8.6%	8.4%	8.0%	7.6%	8.1%	8.7%
Percentage: Plastic Products	8.0%	7.3%	8.1%	9.9%	8.1%	8.1%	7.4%	6.8%	7.0%	7.4%
Percentage: Rubber Products	12.3%	11.6%	15.6%	13.3%	11.8%	10.0%	10.9%	11.6%	13.1%	14.3%

Source: U.S. Census Bureau

CAPITAL EXPENDITURES BY GROUP

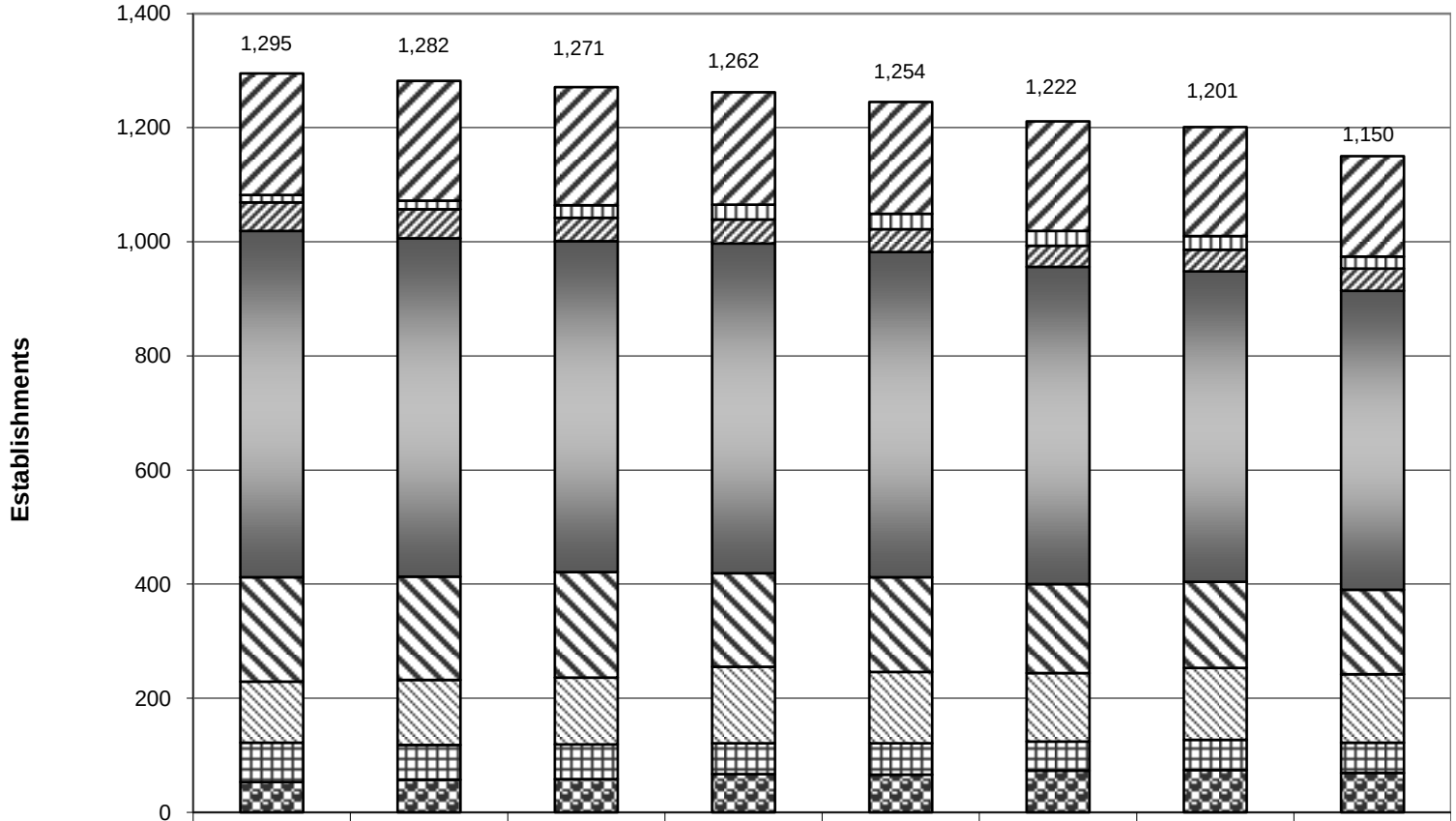
Capital expenditures are funds spent for buildings and equipment used in manufacturing. The chart above shows capital expenditures in Ohio for plastic and rubber products manufacturing (NAICS 326) fluctuating between $790.7 and $536.1 million. Except for a spike in 2002, expenditures declined from 1999 to 2005, after which they rose. On average, 75.8 percent of expenditures went for plastic products manufacturing (3261), and the year-to-year changes for plastic and rubber products (326) largely reflect that. However, expenditures for rubber products manufacturing have risen since 2003, and surpassed 1999's peak in 2008. (No adjustments have been made for inflation.)

The chart above also shows that capital expenditures in Ohio for plastic and rubber products manufacturing (326) ranged from 7.6 to 10.4 percent of national expenditures in any one year, and averaged 8.6 percent. Again, these figures represent the combined portions of capital expenditures in the plastic products group (3261), which averaged 7.8 percent of the nation, and the rubber products group (3262), which averaged 12.5 percent of the nation.

It is interesting to note that the proportions of capital expenditures in Ohio by companies during 1999-2008 nearly equal the proportions of value-added originating here. On average, 7.8 percent of national capital expenditures for plastic products manufacturing were made in Ohio, while 7.3 percent of value-added by the group came from Ohio. Similarly, 12.5 percent of capital expenditures for rubber products manufacturing were made here, and 12.7 percent of value-added came from the state. The near-equality of these ratios indicates industry companies' continued intentions to make plastic and rubber products in Ohio.[6]

See Tables A10 & A11

Establishment Trends in Ohio's Polymers Industry: 2000-2007



	2000	2001	2002	2003	2004	2005	2006	2007
32629: Other Rubber Products	213	210	207	197	196	192	191	176
32622: Rubber & Plastic Hoses & Belts	13	15	22	26	27	26	24	21
32621: Tires	50	51	41	42	40	37	38	39
32619: Other Plastic Products	607	593	580	578	570	556	544	524
32612/3/4/6: Laminates, Pipes, PS & Bottles	183	181	185	164	166	156	151	148
32611/5: Uns. F-S-B, + Foam Prdcts (exc. PS)	107	114	117	134	125	120	126	120
325911: Cstm Cmpndng of Prchsd Rsns	69	61	61	54	55	51	53	53
32521: Resin & Synthetic Rubber	53	57	58	67	66	73	74	69

Source: U.S. Census Bureau.

ESTABLISHMENTS

The chart above shows that the number of polymers industry establishments in Ohio declined more or less gradually from 1,295 in 2000 to 1,150 in 2007. This change masks a number of divergent trends in the various constituent industries. The number of plants in some industries was greater in 2007 than in 2000; these include plastic resin production (NAICS 325211), foam production other than PS (32615), and rubber and plastic hoses and belts (32622). However, the decreases in other industries – notably the custom compounding of purchased resins (325991), plastic laminates (32613), PS foam (32614), bottles (32616), other plastic products (32619), tires (32621) and other rubber products (32629) – more than offset the gains.

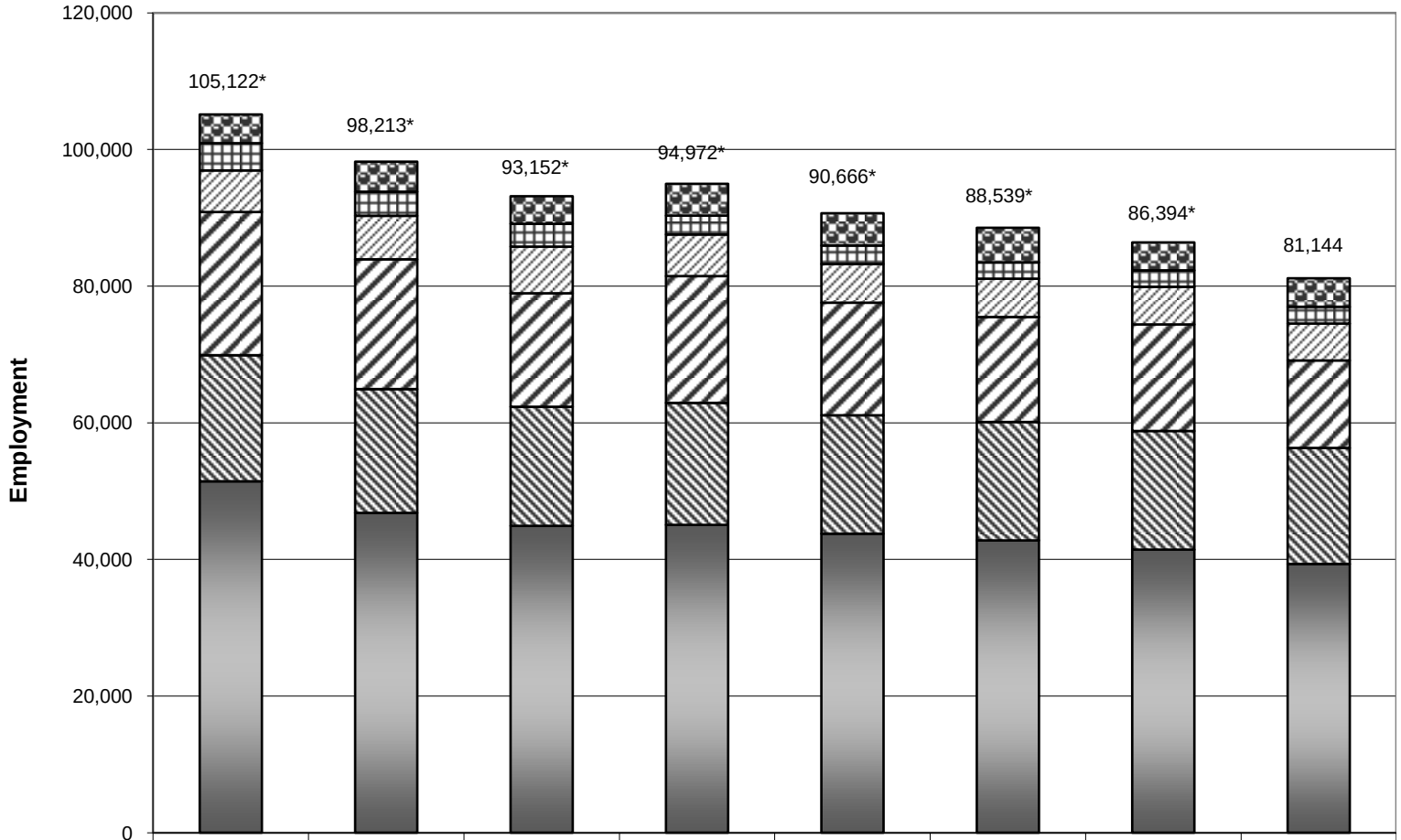
What was happening in Ohio was similar to what was happening across America. Resin producing plants (325211), foam production other than PS (32615), and rubber and plastic hose and belts (32622) increased. The number of tire-makers (32621) and other rubber products (32629), plastic laminates (32613), bottles (32616), PS foam (32614), other plastic products (32619) and custom compounding (325991) establishments all fell. Overall, the total number of polymers industry establishments in America declined at a rate essentially the same as that in Ohio. It's also worth noting that the numbers of industry establishments in Ohio and across the country have declined at faster rates than the overall rates for manufacturing establishments.

Trends in Ohio occasionally diverged from the rest of the country. Two examples include synthetic rubber production (325212) – four fewer plants in Ohio, but national number only fluctuated – and unsupported films-sheets-bags (32611) – little net change in Ohio, but fewer nationally. Appendix tables A12a and A12b show more details for specific industries.

See Tables A12a & A12b

Ohio Department of Development

Employment Trends in Ohio's Polymers Industry: 2000-2007



	2000	2001	2002	2003	2004	2005	2006	2007
32521: Resin & Synthetic Rubber*	4,203	4,394	4,031	4,661	4,730	5,070	4,087	4,170
325991: Cstm Cmpndng of Prchsd Rsns	3,986	3,529	3,344	2,757	2,697	2,382	2,403	2,457
32621-2: Specific Rubber Products	6,091	6,367	6,827	6,091	5,667	5,616	5,514	5,401
32629: Other Rubber Products	20,958	18,996	16,610	18,551	16,479	15,362	15,598	12,806
32611-6: Specific Plastic Products	18,456	18,125	17,432	17,863	17,333	17,332	17,365	16,973
32619: Other Plastic Products	51,428	46,802	44,908	45,049	43,760	42,777	41,427	39,337

Source: U.S. Census Bureau. Note: * - Employment figure may incorporate an estimate.

EMPLOYMENT

Employment in Ohio's polymers industry slide almost without interruption from 105,100 in 2000 to 81,100 in 2007. This is a loss of almost 24,000 jobs, or 23.8 percent. These summary figures largely reflect the experience of the two largest subgroups: other plastic products (NAICS 32619, down almost 12,100 jobs, or 23.5 percent), and other rubber products (32629, down more than 8,100 jobs, or 38.9 percent). Fifteen hundred jobs – 38.4 percent – were lost in the custom compounding purchased resins (325991), and more than 1,000 jobs – 51.7 percent – making laminated products (32613) disappeared.

The job trends were not uniformly bad, though. Employment in Ohio increased by at least 100 jobs in each of these industries: resin production (325211), unsupported plastic film and sheet (326112-3), plastic pipe and pipe fittings (326122), non-styrene foam products (32615), and resilient floor coverings (326192).

The big things that happened in Ohio were part of national trends: employment in other plastic and rubber products fell by 19.2 and 37.9 percent respectively. One-fifth of the jobs in the custom compounding of purchased resins were lost, and three-eighths of jobs making laminated products vanished. Overall, 18.4 percent of America's polymer industry jobs have been lost in seven years. Polymers industry job losses in Ohio and for the nation as a whole have been nearly proportional with the overall losses of manufacturing jobs, but on both counts, the job losses in Ohio have been proportionately greater (the low twenties vs. the high teens).

More current data show that job losses have continued with the recession that began in 2007. The number of jobs in Ohio in the plastics group was estimated at 47,000 in 2007, 44,500 in 2008, and 38,100 in 2009, while estimates for the rubber group were 17,400 in 2007, 16,300 in 2008, and 13,900 in 2009. No more detailed information is available (U.S. Bureau of Labor Statistics, 2010).[8]

See Tables A13a & A13b

Ohio Department of Development

OVERVIEW AND FORECASTS

AN OVERVIEW OF THE INDUSTRY

Plastic and synthetic rubber resins (NAICS 32521) share some common chemical and production characteristics. However, companies creating and using those resins have had somewhat different experiences over the years due, at least in part, to differences in the markets that they serve.

Although plastics products (3261) are closely tied to national and international economic growth, the production of plastic resins typically has grown at a faster-than-average pace: 5 percent per year from 1991 through 2000 (O'Reilly, 2003). Overall production appears to have fallen in 2002, but this probably reflects only the absence of data for thermoplastic polyester production. Growth had definitely resumed by 2004, but production fell in 2005 due to post-hurricane plant outages as well as reduced consumer demand. Plastics production rebounded in 2006 and continued through 2007. The average annual increase in production from 2000 through 2007 was 2.38 percent per year. However, output fell almost 12 percent in 2008 during the recession (based on O'Reilly, 2002, 2010). Year-to-date production for the first nine months of 2009 was 3.7 percent lower than the corresponding period in 2008 (O'Reilly, 2010: 8).

Plastic resin production grew at a faster-than-average pace for many years because plastics replaced metal, glass, wood and paper in many products due to superior performance characteristics such as moisture, corrosion, fracture, and, within limits, temperature resistance. Other advantages include a high strength-to-weight ratio, ease of design and fabrication, and parts consolidation. These characteristics have meant reduced costs of one kind or another: capital requirements, material and energy consumption, longer service life, and greater flexibility in production set-ups (National Bureau of Standards and Battelle Columbus Laboratories, 1983; Office of Technology Assessment, 1988; Shea, 1990; Weizer and Hayes, 1998). However, high prices for oil and natural gas (which are both fuel and raw materials), as well as technical innovations with competing materials, may reduce or eliminate the cost advantage of plastics and make other materials more appealing.

The widely varied uses of plastics mean that no one market is overwhelmingly important for the industry (like motor vehicles for the rubber products group). The three largest market segments for plastics are packaging (bags, bottles, food containers – 32 percent), consumer and institutional goods (kitchenware, toys, sporting goods, medical products – 21 percent), and building and construction materials (structures, pipes, conduits, fittings – 17 percent). Other notable segments are exports – 16 percent, transportation equipment – four percent, furniture and furnishings – four percent, electronic appliances and their components – two percent, adhesives, ink and coatings – one percent. All other uses comprise three percent. The dominance and steady demand of the packaging, consumer, and institutional segments – 53 percent – reduce business cycles fluctuations characteristic of the building, construction and transportation equipment segments (O'Reilly, 2010: 31).

The most commonly used thermoplastic resins include polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), polystyrene (PS), polyesters – including polyethylene terephthalate (PET or PETE), and polyamide (nylon), and their uses vary by market segment. For example, the building and construction segment uses 70 percent of PVC and much of thermoset production. (Thermoplastics can be reheated; thermosets cannot.) The consumer and institutional segment uses 53 percent of PS production, while the packaging segment uses 45 percent of PE production. On the other hand, PP usage is not dedicated to any one segment. Having noted this, it also is true that market segments use more than one type of resin. For example, the packaging, consumer and institutional segments use PE, PP, and PS, and construction uses PS as well as PVCs and thermosets (O'Reilly, 2010: 31-32). These observations may be recast by industries within the plastic products group (NAICS 3261). The film, sheet, and bag industry (32611) is a notable user of PE and PP; the pipe, pipefittings and unsupported profile shapes industry (32612) uses PE and PVC; the plastic bottles industry (32616) uses PE, PET, PVC, and PS; and the fixtures, floor covering, and others industry (32619) uses PE, PP, PVC, and PS. (See the Industry Definition and Polymer Primer sections in the Appendices for more details and examples.)

With a number of resins made to serve diverse markets, it seems that the resin industry is fragmented. Indeed, O'Reilly notes that "[t]here are numerous plastics producers, with many focusing on just one or two product lines" (2010: 31). Yet, he also notes that only three to seven companies have significant positions in national production of any one of the five largest volume resins: PE, PP, PVC, PS, and polyesters. This is illustrated by the following list wherein names of major manufacturers found more than once have been *highlighted*.

PE: Chevron Phillips Chemical (the Chevron-ConocoPhillips joint venture), Dow Chemical, Equistar (a division of Access Industries), *ExxonMobil Chemical*, *Formosa Plastics*, the *INEOS Group*, and Westlake Chemical;
PP: *ExxonMobil Chemical*, *Formosa Plastics*, the *INEOS* Group, LyondellBasell (another division of Access Industries), Sunoco, and *Total SA*;
PVC: *Formosa Plastics*, Georgia Gulf, Occidental Petroleum, and Sintech;
PS: Americas Styrenics (the Dow Chemical-Chevron Phillips Chemical joint venture), the *INEOS*-NOVA[9] joint venture, and *Total SA*;
Polyesters: DAK Americas (the Alfa SAB de CV subsidiary), Eastman Chemical, Koch Industries' Invista BV, the Mossi & Ghisolfi Group, Nan Ya Plastics (a division of Formosa Plastics), and Wellman (LexisNexis, 2009; O'Reilly, 2010: 15, 31-32).

While thermoplastic resin production is not truly oligopolistic – 21 different names are listed above (not counting parent companies), with two appearing twice and two appearing thrice – the dominance of specific product lines by a relatively small number of large, vertically integrated, multi-national companies is apparent.[10]

This is partially explained by the characteristics of the industry: it is capital- and energy-intensive, and subject to extensive governmental regulation.[11] Large plant sizes are necessary for economies of scale in production, and the technology is complex. Long lead times usually are needed when establishing new facilities or upgrading or replacing old ones. After local authorities have been notified and zoning and environmental approval obtained, there is the time required for design, construction and start-up. Investments in utilities, storage, and distribution also are required, as are sophisticated safety and environmental equipment. Such long lead times make it difficult for companies to make short-term changes in capital spending to match significant changes in demand (O'Reilly, 2010: 23-25).

In addition to the characteristics mentioned above, companies considering entering the field may also be deterred by customer loyalty. Customers are often reluctant to change suppliers or raw materials because a new product must be tested, and testing may be expensive (O'Reilly, 2010: 25-26). In contrast to resin producers, the manufacture of specific plastic products is diffused among many companies of varying sizes.

The dominance of resin production by a relatively small number of companies is concomitant with two related industry trends: globalization and consolidation. Plastic resin production became a global industry as companies pursued opportunities in the high-growth emerging markets, often following the manufacturing companies that they supplied. Larger, geographically diversified customers want suppliers who can meet their needs on a global basis, and the largest resin companies now have operations in many countries (O'Reilly, 2010: 10-13). (Setting-up operations in a foreign country also is a way to circumvent trade barriers (O'Reilly, 1997a).) However, globalization leads to competition at home as well as abroad, as foreign-based companies invest in America. Resin producers have used a variety of strategies to reduce costs, grow, and remain competitive as the industry matures. They began reducing costs in the 1990s by closing plants and cutting jobs; then they improved production processes by refining how materials are handled at every step, working with customers from order-placement through shipment (O'Reilly, 1997a). They also have grown by acquiring facilities or product lines of others. O'Reilly (2010: 13) observes that

> "When companies merge, the surviving larger company can reduce costs in such areas as overhead, selling, and manufacturing. It can also achieve greater efficiencies in procurement and establish best practices for manufacturing and logistics. Most transactions are relatively small, involving individual product lines or plants. Companies seeking growth within maturing industry sectors may make acquisitions to achieve production or marketing efficiencies. Those that are divesting businesses usually do so because they're unwilling to make the investments needed to remain competitive, or because they want to focus on other businesses with better sales growth opportunities.[12]

Other factors driving industry consolidation include increasing capital requirements for technology, quality controls, meeting environmental standards, and the higher costs of research and development (O'Reilly, 2010: 26).[13]

Like plastics, "[s]ynthetic rubber has become ubiquitous. People rely on synthetic rubber products for safety in areas ranging from the highway to the doctor's office. As a result of the great resistance to corrosion, poor electrical conductivity, and ability to flex and regain shape, synthetic rubber uses continue to grow as technology advances" (Yoder, 2000: 12.1). Synthetic rubber production surpassed natural rubber production by the early 1960s (Wikipedia, 2010).

Synthetic rubber is a mature industry. Industrial advances from the 1980s onward have involved existing polymers more often than new ones. Like the plastic resins industry, it also is characterized by high entry costs and low profit margins, and is dominated by large firms. The pressure to increase quality and efficiency while reducing costs motivated some mergers and acquisitions (Yoder, 2000).

Unlike the plastic side of the industry, the rubber side (NAICS 325212 and most of 3262) is largely dependent on one industry: motor vehicles. Historically, 62 percent of synthetic rubber production was for tires, and another eight was used for automotive mechanical goods (Yoder, 2000) such as belts, bushings, gaskets, hoses, motor mounts, and window and door moldings and seals (Levy, 2009: 24). Of the remaining 30 percent, eight was incorporated into plastics, six was used for non-automotive mechanical goods, and five for building and construction. All other applications – notably healthcare – accounted for the remaining 11 percent (Yoder, 2000).

As judged by value-added, new tire production (NAICS 326211) was the largest single industry in the rubber group (U.S. Bureau of the Census, 2005c). In turn, 84.2 percent of tire production in 2002 was for use on motor vehicles (U.S. Bureau of the Census, 2005d). According to Modern Tire Dealer, a trade publication cited by Levy (2009: 23), nearly 45 million tires were shipped to motor vehicle assemblers as original equipment in 2008 for cars and light trucks, and another 229 million were delivered as replacements. Sales in 2009 were lower. Despite their low profit margins (when compared with per-unit replacement sales) and smaller percentage of total sales, sales to motor vehicle assemblers are important for several reasons. They help replacement sales because owners tend to replace tires with the same brand. This provides a larger market share than possible with replacements alone, and the greater economies of scale reduce per-unit operating costs. Sales to assemblers also incur lower distribution and advertising expenses (Levy, 2009: 24). Partial

Like the plastic resins industry, the tire industry is highly capital intensive; R & D, production technology, and operations are very expensive. Consequently, the industry is dominated by a small number of vertically integrated giants; Bridgestone/Firestone, Goodyear, and Michelin together account for about one-half of worldwide tire production (Levy, 2009: 10). (The vertical integration does not extend into distribution and retail sales. Other large companies dominate this part of the business.) Tire manufacturers in N. America face a number of challenges: overcapacity (which limits pricing power), competition from low cost manufacturers, and significant increases in the costs of raw materials: synthetic and natural rubber, chemicals, crude oil, reinforcement components, carbon black (Levy, 2009: 6). However, the bright spot in tire sales has been the increased demand for speed-rated radials. Such tires perform better than conventional radials, but their faster wear rate means replacements must be made more frequently (Levy, 2009: 24).

Manufacturers of belts, hoses, motor mounts, bushings, window and door moldings and seals, and other rubber parts (NAICS 32622, 32629) for the motor vehicle industry closely resemble other parts manufacturers in their market participation and fortunes. Original equipment manufacturers are tied more to the fluctuations of new vehicle sales. The non-tire part of the rubber industry is divided between large, diversified conglomerates and many small specialists. Carlisle, Cooper Tire & Rubber and Newell Rubbermaid are examples of the former with operations in Ohio.

Many resin and synthetic rubber producers have embraced the Internet as a way to improve the efficiency of procurement and distribution (O'Reilly, 2010: 25).

THE NEAR AND LONG TERM FORECASTS

A number of factors affect the outlook for the resin and synthetic rubber subgroup (NAICS 32521). These include trends in key end-use markets, the cost and availability of raw materials, foreign competition, technical advancements, and the competition of specific plastics with one another and alternative materials. These factors are somewhat interconnected.

The key end-use markets are packaging, building and construction, consumer and institutional products, and transportation equipment. These markets in turn are affected by trends in GDP, population growth, and consumer spending. Reflecting the consensus at Standard and Poor's, O'Reilly (2010: 4-6) expects the recovery of the chemical industry (including resin and synthetic rubber production) that began in the second half of 2009 to continue in 2010. However, the industry will still be operating at capacity rates below pre-recession levels. "[I]t may take several years for the industry to fully recover from the steep declines over the past two years" (O'Reilly, 2010: 5). This is due in particular to continuing weakness in the housing market (and the associated purchases of consumer durables such as appliances, carpeting, furniture, etc.) and motor vehicle sales. On the positive side, prices for oil and natural gas are well off their peaks in 2008, although they are still above their lows of earlier in the decade, and could rise slightly in 2010. Levy (2009: 24) predicts tire production will increase from 2009 levels with increased vehicle production and a likely increase in miles driven. Economic recovery also means that mergers and acquisitions probably will increase in 2010 (O'Reilly, 2010: 13).

At least some of the trends mentioned earlier are expected to continue into the foreseeable future. These include new resin production facilities in the Middle East and Asia, because natural gas is inexpensive in the former and rapidly growing markets are in the latter. Consequently, less capital will be invested stateside (O'Reilly, 2010: 19). The prices of oil and natural gas are volatile; when they are high, the competitiveness of producers in America is diminished. Under those circumstances, exports may be reduced, imports increased, and/or factories closed with associated jobs losses (O'Reilly, 2010: 18-19).

The long-term outlook for plastic and rubber products manufacturing (326) is for above average growth in output – about 3.6 percent annually. This incorporates the even faster-than-average rate of 4.1 percent forecast for plastic products (3261) and the below average rate of .3 percent of rubber products (3262) manufacturing (Figueroa and Woods, 2007).

The predicted output growth for the plastic and rubber products industry is not expected to lead to more jobs. Instead, a number of factors – including greater productivity – may lead to an overall net loss of jobs. Figueroa and Woods (2007) predicted national employment in the rubber group would fall 28.6 percent, from 159,300 in 2006 to 113,800 in 2016, more than offsetting the expected 2.0 percent gain from 637,600 to 650,500 in the plastics group. The Ohio Dept. of Job and Family Services' Labor Market Information division (ODJFS/BLMI, 2008) projected plastics group employment to fall 4.7 percent, from 49,300 to 47,000, rubber group employment to drop 37.8 percent, from 19,600 to 12,200, during the same time.[14]

See Table A14

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APPENDICES

Ohio Department of Development

DETAILED TABLES

Table A1: Notable^ Polymer Industry Manufacturers in Ohio, 2009

Parent/Company/Division	Primary NAICS	City	Jobs" Total	Jobs" at Site
3M Co.*	326199	Elyria		170
A Schulman, Inc.*			544	
A Schulman, Inc.	325211	Akron		202
A Schulman, Inc.	325211	Akron		77
A Schulman, Inc.	325211	Akron		15
A Schulman, Inc.	325211	Bellevue		200
A Schulman, Inc.	325211	Sharon Center		50
Advanced Drainage Systems, Inc.			827	
Advanced Drainage Systems, Inc.	326122	Hamilton		100
Advanced Drainage Systems, Inc.	326122	Hilliard		80
Advanced Drainage Systems, Inc.	326122	London		35
Advanced Drainage Systems, Inc.	326122	London		30
Advanced Drainage Systems, Inc.	326122	Napoleon		30
Advanced Drainage Systems, Inc.	326122	Wooster		52
Hancor Holding Corp./Hancor, Inc.	326122	Findlay		330
Hancor Holding Corp./Hancor, Inc.	326122	Findlay		100
Hancor Holding Corp./Hancor, Inc.	326199	Findlay		70
ALCOA, Inc.*/ALCOA Home Exteriors, Inc.	326199	Sidney		250
Bayer AG*/Bayer Materialscience LLC	325211	Hebron		150
Bridgestone Corp.*			173	
Bridgestone APM Co.	326291	Upper Sandusky		100
Firestone Polymers LLC	326299	Akron		73
Chevron Corp.*-ConocoPhillips*/Chevron Phillips Chemical Co.	325211	Marietta		172
Cincinnati Machines, Inc. (f.k.a. Milacron, Inc.)	326191	Batavia		900
Compagnie de Saint-Gobain*			499	
Saint-Gobain Abrasives	326199	Aurora		200
Saint-Gobain Performance	326299	Akron		200
Saint-Gobain Performance	326199	Ravenna		99
Cooper Tire & Rubber Co., Inc.*			1,072	
Cooper Tire & Rubber Co., Inc.	326211	Findlay		1,000

Table A1: Notable^ Polymer Industry Manufacturers in Ohio, 2009

Parent/Company/Division	Primary NAICS	City	Jobs" Total	Jobs" at Site
Cooper Tire & Rubber Co., Inc.* (continued)				
Cooper Tire & Rubber Co., Inc.	326211	Findlay		60
Cooper Tire & Rubber Co., Inc.	326211	Findlay		12
Cooper-Standard Automotive, Inc.*			850	
Cooper-Standard Automotive, Inc.	32622	Bowling Green		500
Cooper-Standard Automotive, Inc.	32622	Bowling Green		350
Crane Plastics Co., LLC			915	
Crane Plastics Manufacturing	326199	Columbus		250
Crane Plastics Siding LLC	326199	Columbus		300
Timbertech Ltd. LLC	326199	Wilmington		365
Crown Holdings, Inc.*/Crown Cork & Seal Co., Inc.	326199	Lancaster		90
Delphi Automotive Systems LLC*	325211	Ravenna		74
Dow Chemical Co.*			751	
-Corning Corp.*/Dow Corning Corp./Multibase, Inc.	325991	Akron		85
Dow Chemical Co.	325211	Dayton		16
Dow Chemical Co.	326113	Findlay		150
Dow Chemical Co.	326113	Hebron		105
Dow Chemical Co.	32615	Ironton		175
Poly-Carb, Inc.	325211	Solon		40
Rohm & Haas Co.	325211	Cincinnati		180
E I du Pont de Nemours & Co.*			749	
E I du Pont de Nemours & Co.[1]	325211	Circleville		444
Liqui-Box Canada, Inc./Liqui-Box Corp.	326111	Ashland		120
Liqui-Box Canada, Inc./Liqui-Box Corp.	326111	Worthington		65
Liqui-Box Canada, Inc./Liqui-Box Corp.	326199	Upper Sandusky		120
Eaton Corp.*			1,930	
Aeroquip-Vickers, Inc.	32622	Cleveland		220
Eaton Corp.	325211	Aurora		200
Eaton Corp.	326199	Mantua		210
Eaton Corp.	32622	Van Wert		900

Table A1: Notable^ Polymer Industry Manufacturers in Ohio, 2009

Parent/Company/Division	Primary NAICS	City	Jobs" Total	Jobs" at Site
Eaton Corp.* (continued)				
Eaton Inoac Co.	326121	Fremont		400
Fortune Brands, Inc.*/Fypon Ltd.	326199	Archbold		200
Goodyear Tire & Rubber Co.*			3,091	
Goodyear Dunlop Tires North	326211	Shelby		45
Goodyear Tire & Rubber Co.	32622	Marysville		6
Goodyear Tire & Rubber Co.	326211	Akron		3,000
Wingfoot Commercial Tire Systems	326212	Brunswick		40
Illinois Tool Works, Inc.*			480	
Illinois Tool Works, Inc.	325211	Cincinnati		130
Illinois Tool Works, Inc.	326199	Bryan		270
Illinois Tool Works, Inc.	326199	Chardon		20
Illinois Tool Works, Inc.	326199	Toledo		60
International Automotive (f.k.a. a Lear Corp. plant)	326199	Huron		700
JCIM US LLC			700	
JCIM US LLC	326199	Bryan		500
JCIM US LLC	326199	Wauseon		200
Johnson Controls, Inc.*/Johnson Controls Interiors LLC	32616	Greenfield		250
Liberty Partners LP			770	
Step2 Co. LLC	326199	Perrysville		270
Step2 Co. LLC	326199	Streetsboro		500
MeadWestvaco Corp.*/Calmar, Inc.	326199	Washington Court House		330
Molded Fiber Glass Cos.	326199	Ashtabula		685
Myers Industries, Inc.			542	
Buckhorn, Inc.	326199	Milford		73
Myers Industries, Inc.	326199	Akron		73
Myers Industries, Inc.	326199	Middlefield		90
Myers Industries, Inc.	32622	Wadsworth		120
WEK Industries, Inc.	326199	Jefferson		186
Newell Rubbermaid, Inc.*/Rubbermaid	326199	Mogadore		415

Table A1: Notable^ Polymer Industry Manufacturers in Ohio, 2009

Parent/Company/Division	Primary NAICS	City	Jobs" Total	Jobs" at Site
Owens Corning*/Fibreboard Corp.	326199	Toledo		200
Parker-Hannifin Corp.*			340	
Parker-Hannifin Corp.	326122	Kent		90
Parker-Hannifin Corp.	32613	Ravenna		250
Plastipak Holdings, Inc.			700	
Plastipak Packaging, Inc.	32616	Jackson Center		500
Plastipak Packaging, Inc.	32616	Medina		200
Ply Gem Industries, Inc./Great Lakes Window, Inc.	326199	Walbridge		600
PolyOne Corp.*	325211	Avon Lake		73
Silgan Holdings, Inc.*			350	
Silgan Plastics Corp.[2]	32616	Port Clinton		150
Silgan Plastics LLC	32616	Ottawa		200
Solutia, Inc.*/Flexsys America LP	326299	Akron		65
Sumitomo Corp.*/Cantex, Inc.	326122	Aurora		60
Thomas & Betts Corp.*	326122	Bowling Green		110
Tokai Rubber Industries Ltd./DTR Industries, Inc.	32622	Bluffton		750
Toledo Molding & Die, Inc.			620	
Toledo Molding & Die, Inc.	326199	Delphos		130
Toledo Molding & Die, Inc.	326199	Tiffin		310
Toledo Molding & Die, Inc.	326199	Toledo		120
Toledo Molding & Die, Inc.	326199	Toledo		60
Yamashita Rubber Co., Ltd./YUSA Corp.	326299	Washington Court House		1,046

Notes: ^ - "Notable" only means companies on Fortune's U.S. 1,000 or Global 500 lists, or employing at least 500 people in Ohio.
" - The jobs figures are thought to be the best available at the time of publication, but their accuracy cannot be guaranteed.
* - A Fortune U.S. 1,000 or Global 500 company.
1 - Employment figure from Willis (2010).
2 - Jobs figure is from WTVG-TV/DT (2010); the plant is closing in 2010.

Table A1: Notable^ Polymer Industry Manufacturers in Ohio, 2009

Parent/Company/Division	Primary NAICS	City	Jobs" Total	Jobs" at Site

Sources: Fortune (2009), Harris (2009), Lexis-Nexis (2009), Willis (2010), WTVG-TV/DT (2010).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 5/10).

Table A2: Expansion and Attraction Announcements in Ohio's Polymers Industry, 2007-2009

Year	Company	City or Township	NAICS Code	Product	New or Expanded	Announced Investment	Anitcipated New Jobs	Space (Sq. Ft.)
2007	Ampac Packaging LLC	Springdale	326111	Plastic bags	Expanded	$4,100,000	30	
2007	B&B Plastics Recycling	Columbus	325211	Plastics materials	New	$1,700,000		88,000
2007	BEAR Materials/Renegade	Springboro	326199	Composites	New	$4,800,000	30	25,000
2007	Bilco Co.	Zanesville	326199	Plastic molders	Expanded	$2,000,000	25	
2007	Biltrite Industries	Findlay	325991	Rubber compounding	Expanded	$8,750,000	15	10,000
2007	Boltaron Performance Products	Newcomerstown	326113	Plastic products	Expanded	$3,000,000		
2007	du Pont/Liqui-Box	Ashland	326111	Packaging	Expanded	$3,600,000	25	32,600
2007	Durable Corp.	Norwalk	326299	Rubber products	Expanded	$3,000,000		30,000
2007	Ferriot, Inc.	Akron	326199	Plastic siding	Expanded	$4,900,000	50	
2007	General Films	Covington	326113	Plastic film	Expanded	$3,500,000		
2007	Goodyear Tire & Rubber Co.	Akron	326211	Tires	Expanded	$890,000,000		
2007	Johnson Brothers Rubber Co.	West Salem	326291	Rubber products	Expanded	$1,400,000		
2007	Myers Industries / Akro-Mils	Sandusky	326199	Petri dishes	Expanded	$1,500,000	30	
2007	Next Generation Films	Lexington	326113	Plastic film	Expanded	$10,000,000	30	
2007	Nibco, Inc.	Franklin	326191	Plastic pipe	New			80,000
2007	Plastic Recycling Technology	Spring Creek Twp.	325211	Plastic pellets	New	$2,000,000	25	416,000
2007	Plastikos Corp.	Batavia	326199	Thermoformed plastics	Expanded	$1,250,000	11	
2007	Renegade Materials Corp.	Springboro	326199	Plastic products	New	$1,500,000		25,000
2007	Ring Container	Sidney	326199	Plastic products	New	$4,000,000		115,000
2007	Silgan Plastics	Ottawa	32616	Plastic bottles	Expanded	$7,000,000	5	
2007	Sonoco Products Co.	Obetz	32616	Plastic bottles	New	$14,700,000	30	
2007	Titan Tire Corp.	Bryan	326211	Tires	Expanded	$125,000,000	150	220,000
2007	Veyance Technologies	Fairlawn	326299	Rubber products	New	$4,900,000	70	10,000
2007	Wright Materials Research Co.	Beavercreek	326199	Composites	New	$1,800,000	5	12,000
2007 Subtotals:						$1,104,400,000	531	1,063,600

Table A2: Expansion and Attraction Announcements in Ohio's Polymers Industry, 2007-2009

Year	Company	City or Township	NAICS Code	Product	New or Expanded	Announced Investment	Anitcipated New Jobs	Space (Sq. Ft.)
2008	A Schulman	Akron	325211	Plastic additives	Expanded	$10,500,000	80	164,000
2008	Advanced Plastic Systems	Gahanna	326199	Plastic products	Expanded			20,000
2008	Bridgestone	Akron	326211	Tires	Expanded	$100,000,000		240,000
2008	buyCastings.com	Miamisburg	326199	Foam casting patterns	New	$1,500,000	65	
2008	CCL Auto-Sleeve	Stow	326111	Packaging	New	$13,500,000	52	57,000
2008	Cobra Plastics	Macedonia	326199	Plastic products	Expanded	$3,000,000		65,000
2008	Composite Advantage	Dayton	326199	Composites	New	$1,200,000	60	25,000
2008	Custom Molded Products LLC	Wilmington	326199	Plastic products	New	$2,300,000		146,000
2008	Heritage Plastics, Inc.	Carrollton	326122	Plastic pipe	Expanded	$5,000,000		
2008	International Mulch Co.	Twinsburg	326299	Rubber mulch	New	$2,000,000		100,000
2008	Kenton Plastics	Kenton	326199	Plastic products	Expanded	$1,400,000	17	
2008	Kurz-Kasch. Inc.	Miamisburg	326199	Composites	Expanded	$1,000,000	200	
2008	New Specialty Resins, Inc.	Sylvania Twp.	325211	Plastic products	New	$3,500,000	25	
2008	Nibco, Inc.	Lebanon	326191	Plastic pipe	Expanded			130,000
2008	Norandex	Hudson	326199	Exterior siding	New	$1,000,000		
2008	Phoenix Technologies International LLC	Bowling Green	32616	Plastic bottles	Expanded	$2,000,000	7	
2008	Precision Fab Products, Inc.	Versailles	326299	Foam rubber products	Expanded	$700,000	3	32,000
2008	RTS Cos.	Austinburg Twp.	326199	Plastic products	Expanded		65	40,000
2008	Sigma USA	Jefferson	326199	Plastic products	New	$10,200,000	145	
2008	Speed North America, Inc.	Wooster	326199	Plastic filaments	New	$4,200,000	50	60,000
2008	Veyance Technologies	Marysville	32622	Conveyor belts	Expanded	$18,000,000		24,000
2008 Subtotals:						$181,000,000	769	1,103,000

Table A2: Expansion and Attraction Announcements in Ohio's Polymers Industry, 2007-2009

Year	Company	City or Township	NAICS Code	Product	New or Expanded	Announced Investment	Anitcipated New Jobs	Space (Sq. Ft.)
2009	AcuTemp	Moraine	326199	Plastic products	Expanded	$5,100,000	100	25,000
2009	A-D Technologies	Elyria	326199	Plastic conduits	Expanded	$2,300,000	30	210,000
2009	ADISCO, Inc.	Kettering	326199	Plastic products	New	$5,000,000	56	
2009	Buckeye Silicon	Toledo	326291	Silicon rubber products	New	$50,000,000	100	
2009	Carroll Manufacturing & Sales	Avon	326112	Food packaging	Expanded	$1,500,000		
2009	Clopay Plastic Products	Troy	326199	Garage doors	Expanded	$11,000,000		26,000
2009	Composite Technologies Co.	Dayton	326199	Plastic products	Expanded	$2,900,000	50	
2009	Cooper Tire & Rubber Co.	Findlay	326211	Tires	Expanded	$34,500,000	100	
2009	CSP of Ohio	Conneaut	326199	Composite auto parts	Expanded	$2,300,000	100	
2009	Diamond Polymers, Inc.	Akron	325211	Resins	Expanded	$2,000,000	10	86,000
2009	DimcoGray Corp.	Centerville	326199	Plastic handles	Expanded	$3,500,000		
2009	Dow Chemical	Allen Twp.	326113	Plastic film	Expanded	$8,000,000	21	
2009	Harmony Systems	Piqua	326199	Plastic products	Expanded	$1,450,000	59	20,000
2009	Kraton Performance Polymers, Inc.	Belpre	325212	Synthetic rubber	Expanded	$7,000,000		
2009	Mercury Plastics, Inc.	Middlefield Twp.	326199	Plastic products	Expanded	$2,000,000	48	
2009	Next Dimension Composites	Jefferson	326199	Composites for windows	New	$1,300,000	25	30,000
2009	Next Generation Films	Lexington	326113	Plastic film	Expanded	$20,000,000		75,000
2009	PAC Worldwide	Middletown	32611	Protective mailers	Expanded	$2,500,000	35	
2009	PF Polymers	Lima	325211	Resin compounding	New	$1,700,000	60	150,000
2009	Plastics R Unique, Inc.	Wadsworth	326111	Plastic bags	New		40	100,000
2009	Profile Plastics	Canton	326121	Extruded plastics	Expanded	$1,500,000		48,000
2009	Revere Plastics, Inc.	Clyde	326199	Plastic parts	Expanded	$10,000,000	25	50,400
2009	Roppe Corp.	Fostoria	326299	Flooring materials	Expanded	$4,600,000	33	
2009	RPP Containers	Sycamore Twp.	326199	Plastic products	New	$500,000	10	45,000
2009	RTS Cos.	Ashtabula	326199	Plastic products	Expanded	$700,000		21,000
2009	Silgan Plastics	Ottawa	32616	Plastic bottles	Expanded	$1,400,000		
2009	TH Plastics, Inc.	Findlay	326199	Plastic products	New	$4,600,000	85	
2009	Venture Plastics	Newton Falls	326199	Plastic products	Expanded	$1,000,000		
2009	Vinylmax	Hamilton	326199	Vinyl windows	Expanded	$1,500,000	25	
2009	WebCore Technologies	Miamisburg	326199	Composites	Expanded	$1,300,000	32	
2009	WEK Industries, Inc.	Jefferson	326199	Plastic auto parts	Expanded	$1,500,000	50	
2009	Wicor Americas, Inc.	Urbana	326199	Electrical insulation	New	$10,000,000	110	
2009	Wilbert, Inc.	Bellevue	326199	Plastic products	Expanded	$1,100,000	6	
2009 Subtotals:						$203,750,000	1,210	886,400
Grand Totals:						$1,489,150,000	2,510	3,053,000

Source: Policy Research & Strategic Planning (2010).

Prepared by: Policy Research and Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 3/10).

Table A3: Distribution of Value-Added in Ohio's Plastic and Rubber Products Industry, 2002

NAICS Code	Industries	Value-Added (in millions)	Percent Distribution
	Rubber and Plastics Industry	n.a.	n.a.
32521	Resin & Synthetic Rubber	D	n.a.
325211	Plastic Materials & Resins	D	n.a.
325212	Synthetic Rubber	D	n.a.
325991	Custom Compounding of Purchased Resins	$288.5	n.a.
326	Plastic & Rubber Products	$7,878.2	100.0%
3261	Plastic Products	$5,637.0	71.6%
32611	Uns. Plastic Films, Sheets & Bags	$593.8	7.5%
326111	Uns. Plastic Bags	$149.3	1.9%
326112	Uns. Plastic Packaging Film & Sheet	$104.7	1.3%
326113	Uns. Plastic Film & Sheet (Exc. Packaging)	$339.9	4.3%
32612	Plastic Pipe, Pipe Fitting & Uns. Profile Shapes	$335.9	4.3%
326121	Uns. Plastic Profile Shapes	$169.7	2.2%
326122	Plastic Pipes & Pipe Fittings	$166.2	2.1%
32613	Laminated Plastic Plate, Sheet & Shapes	$132.3	1.7%
32614	Polystyrene Foam Products	$102.0	1.3%
32615	Foam Products (Exc. Polystyrene)	$144.2	1.8%
32616	Plastic Bottles	$418.3	5.3%
32619	Other Plastic Products	$3,910.4	49.6%
326191	Plastic Plumbing Fixtures	$56.0	0.7%
326192	Resilient Floor Coverings	$13.4	0.2%
326199	All Other Plastic Products	$3,841.0	48.8%

Table A3: Distribution of Value-Added in Ohio's Plastic and Rubber Products Industry, 2002

NAICS Code	Industries	Value-Added (in millions)	Percent Distribution
3262	Rubber Products	$2,241.1	28.4%
32621	Tires	$367.7	4.7%
326211	Tires (Exc. Retreading)	$344.8	4.4%
326212	Tire Retreading	$23.0	0.3%
32622	Rubber & Plastic Hoses & Belts	$287.6	3.7%
32629	Other Rubber Products	$1,585.8	20.1%
326291	Rubber Products for Mechanical Use	$1,101.8	14.0%
326299	All Other Rubber Products	$484.0	6.1%

Notes: D - suppressed to maintain confidentiality; n.a. - not available, not applicable.

Source: U.S. Bureau of the Census (2005c).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 10/05).

Table A4: Value-Added in the Plastic and Rubber Products Industry by Group, 2008 (in millions)

Area	Industry Group^ 326	3261	3262
U.S.	$91,431.2	$76,502.7	$14,928.6
Alabama	$1,883.0	$1,393.9	$489.1
Alaska	$0.0	$0.0	$0.0
Arizona*	$834.0	$764.4	$69.6
Arkansas	$1,274.5	$897.4	$377.1
California	$7,550.8	$6,664.5	$886.3
Colorado*	$476.6	$466.0	$10.5
Connecticut*	$858.8	$779.2	$79.6
Delaware*	$251.8	$219.4	$32.5
District of Columbia	$0.0	$0.0	$0.0
Florida	$1,511.0	$1,355.2	$155.8
Georgia	$3,379.9	$2,470.1	$909.8
Hawaii	$0.0	$0.0	$0.0
Idaho*	$191.9	$189.0	$2.9
Illinois	$5,880.0	$5,091.6	$788.3
Indiana	$3,723.0	$3,348.7	$374.3
Iowa	$1,609.7	$1,011.3	$598.4
Kansas	$1,727.6	$1,419.0	$308.7
Kentucky	$1,999.2	$1,827.7	$171.5
Louisiana	$570.1	$329.1	$241.0
Maine*	$357.3	$334.6	$22.7
Maryland*	$671.3	$595.6	$75.8
Massachusetts*	$2,133.6	$2,013.8	$119.8
Michigan	$4,355.4	$3,964.7	$390.7
Minnesota	$1,693.2	$1,557.1	$136.0
Mississippi	$1,096.6	$518.5	$578.1
Missouri	$1,700.0	$1,324.6	$375.4
Montana	$0.0	$0.0	$0.0
Nebraska	$437.2	$296.0	$141.1
Nevada*	$395.9	$362.3	$33.6
New Hampshire	$506.0	$402.3	$103.7
New Jersey	$2,095.6	$1,879.9	$215.6
New Mexico	$0.0	$0.0	$0.0
New York	$3,042.5	$2,573.9	$468.6
North Carolina	$4,376.3	$3,273.0	$1,103.3
North Dakota	$0.0	$0.0	$0.0
Ohio	$7,243.2	$5,454.7	$1,788.5
Oklahoma	$1,397.1	$954.0	$443.1
Oregon*	$592.0	$524.3	$67.7
Pennsylvania	$4,901.8	$4,343.8	$558.0
Rhode Island*	$363.6	$356.8	$6.8
South Carolina	$3,355.5	$2,582.9	$772.6
South Dakota	$188.5	D	D
Tennessee	$2,835.3	$1,963.3	$872.0
Texas	$5,644.0	$5,370.9	$273.1
Utah*	$487.5	$455.0	$32.5
Vermont	$149.9	D	D
Virginia	$2,407.2	$1,960.5	$446.7
Washington*	$1,024.5	$980.1	$44.5
West Virginia*	$387.3	$315.0	$72.2
Wisconsin	$3,531.9	$3,265.8	$266.2
Wyoming	$0.0	$0.0	$0.0

Notes: $0.0. - may only indicate that the area and industry combination was too small to be covered by the survey; figures may not sum to totals due to rounding; ^ - no data available for resin and synthetic rubber production (NAICS 32521) or the custom compounding of purchased resins (325991); * - value-added for rubber products (3262) estimated by subtraction.

Source: U.S. Bureau of the Census (2010).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300 or 614/466-2116 (DL, 4/10).

Table A5: Establishments and Employment in the Polymers Industry, Ohio and U.S., 2007

NAICS Codes	Short Title	Ohio			U.S.			Ohio as a Percent of the U.S.	
		Establishments	Employment	Mean per Establishment	Establishments	Employment	Mean per Establishment	Establishments	Employment
	Total Covered Employment	270,299	4,782,141	17.7	7,705,018	120,604,265	15.7	3.5%	4.0%
	Rubber and Plastics Industry	1,150	81,144	70.6	15,770	947,079	60.1	7.3%	8.6%
32521*	Resin & Synthetic Rubber	69	4,170	60.4	949	69,654	73.4	7.3%	6.0%
325211	Plastic Materials & Resins	63	3,676	58.3	799	61,199	76.6	7.9%	6.0%
325212	Synthetic Rubber	6	494	82.3	150	8,455	56.4	4.0%	5.8%
325991	Custom Compounding of Purchased Resins	53	2,457	46.4	588	21,942	37.3	9.0%	11.2%
326	Plastic & Rubber Products	1,028	74,517	72.5	14,233	855,483	60.1	7.2%	8.7%
3261	Plastic Products	792	56,310	71.1	12,054	707,972	58.7	6.6%	8.0%
32611*	Uns. Plastic Films, Sheets & Bags	82	4,937	60.2	1,363	97,545	71.6	6.0%	5.1%
326111	Uns. Plastic Bags	19	1,184	62.3	384	29,894	77.8	4.9%	4.0%
326112	Uns. Plastic Packaging Film & Sheet	14	884	63.1	277	23,753	85.8	5.1%	3.7%
326113	Uns. Plastic Film & Sheet (Exc. Packaging)	49	2,869	58.6	702	43,898	62.5	7.0%	6.5%
32612	Plastic Pipe, Pipe Fitting & Uns. Profile Shapes	77	3,835	49.8	1,031	49,680	48.2	7.5%	7.7%
326121	Uns. Plastic Profile Shapes	45	2,002	44.5	603	28,092	46.6	7.5%	7.1%
326122	Plastic Pipes & Pipe Fittings	32	1,833	57.3	428	21,588	50.4	7.5%	8.5%
32613	Laminated Plastic Plate, Sheet & Shapes	24	1,011	42.1	284	10,718	37.7	8.5%	9.4%
32614	Polystyrene Foam Products	24	1,073	44.7	554	32,229	58.2	4.3%	3.3%
32615	Foam Products (Exc. Polystyrene)	38	2,231	58.7	648	34,825	53.7	5.9%	6.4%
32616	Plastic Bottles	23	3,886	169.0	394	32,863	83.4	5.8%	11.8%
32619	Other Plastic Products	524	39,337	75.1	7,780	450,112	57.9	6.7%	8.7%
326191	Plastic Plumbing Fixtures	23	566	24.6	537	24,391	45.4	4.3%	2.3%
326192	Resilient Floor Coverings	6	753	125.5	60	4,831	80.5	10.0%	15.6%
326199	All Other Plastic Products	495	38,018	76.8	7,183	420,890	58.6	6.9%	9.0%
3262	Rubber Products	236	18,207	77.1	2,179	147,511	67.7	10.8%	12.3%
32621	Tires	39	3,335	85.5	649	57,964	89.3	6.0%	5.8%
326211	Tires (Exc. Retreading)	9	2,895	321.7	129	49,756	385.7	7.0%	5.8%
326212	Tire Retreading	30	440	14.7	520	8,208	15.8	5.8%	5.4%
32622	Rubber & Plastic Hoses & Belts	21	2,066	98.4	256	19,781	77.3	8.2%	10.4%
32629	Other Rubber Products	176	12,806	72.8	1,274	69,766	54.8	13.8%	18.4%
326291	Rubber Products for Mechanical Use	100	9,127	91.3	531	37,472	70.6	18.8%	24.4%
326299	All Other Rubber Products	76	3,679	48.4	743	32,294	43.5	10.2%	11.4%

Note: * - Ohio's industry employment in this sub-group should be considered estimates; Exc. - excluding; Uns. - unsupported.

Source: U.S. Bureau of the Census (2009a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 2/10).

Table A6: Employment and Pay in the Polymers Industry, Ohio and U.S., 2007

NAICS Codes	Short Title (2002)	Ohio Employ-ment	Ohio Annual Payroll (000)	Ohio Mean Pay per Worker	U.S. Employ-ment	U.S. Annual Payroll (000)	U.S. Mean Pay per Worker	Ohio Means as Percentages of U.S. Means
	Total Covered Employment	4,782,141	$180,992,383	$37,848	120,604,265	$5,026,778,232	$41,680	90.8%
	Rubber and Plastics Industry	81,144	$3,270,293	$40,302	947,079	$39,265,276	$41,459	97.2%
32521*	Resin & Synthetic Rubber	4,170	$256,073	$61,408	69,654	$4,732,036	$67,936	90.4%
325211	Plastic Materials & Resins	3,676	$222,960	$60,653	61,199	$4,222,347	$68,994	87.9%
325212	Synthetic Rubber	494	$33,113	$67,030	8,455	$509,689	$60,283	111.2%
325991	Custom Compounding of Purchased Resins	2,457	$104,984	$42,729	21,942	$1,055,557	$48,107	88.8%
326	Plastic & Rubber Products	74,517	$2,909,236	$39,041	855,483	$33,477,683	$39,133	99.8%
3261	Plastic Products	56,310	$2,115,458	$37,568	707,972	$26,989,224	$38,122	98.5%
32611*	Uns. Plastic Films, Sheets, & Bags	4,937	$226,577	$45,894	97,545	$4,399,588	$45,103	101.8%
326111	Uns. Plastic Bags	1,184	$51,013	$43,085	29,894	$1,197,718	$40,065	107.5%
326112	Uns. Plastic Packaging Film & Sheet	884	$40,050	$45,305	23,753	$1,112,473	$46,835	96.7%
326113	Uns. Plastic Film & Sheet (Exc. Packaging)	2,869	$135,514	$47,234	43,898	$2,089,397	$47,597	99.2%
32612	Plastic Pipe, Pipe Fitting, & Uns. Profile Shapes	3,835	$140,153	$36,546	49,680	$2,023,492	$40,731	89.7%
326121	Uns. Plastic Profile Shapes	2,002	$79,688	$39,804	28,092	$1,147,929	$40,863	97.4%
326122	Plastic Pipes & Pipe Fittings	1,833	$60,465	$32,987	21,588	$875,563	$40,558	81.3%
32613	Laminated Plastic Plate, Sheet, & Shapes	1,011	$65,022	$64,315	10,718	$478,294	$44,625	144.1%
32614	Polystyrene Foam Products	1,073	$39,062	$36,404	32,229	$1,203,631	$37,346	97.5%
32615	Foam Products (Exc. Polystyrene)	2,231	$91,147	$40,855	34,825	$1,276,612	$36,658	111.4%
32616	Plastic Bottles	3,886	$148,622	$38,245	32,863	$1,261,835	$38,397	99.6%
32619	Other Plastic Products	39,337	$1,404,875	$35,714	450,112	$16,345,772	$36,315	98.3%
326191	Plastic Plumbing Fixtures	566	$23,485	$41,493	24,391	$776,614	$31,840	130.3%
326192	Resilient Floor Coverings	753	$40,919	$54,341	4,831	$255,575	$52,903	102.7%
326199	All Other Plastic Products	38,018	$1,340,471	$35,259	420,890	$15,313,583	$36,384	96.9%
3262	Rubber Products	18,207	$793,778	$43,597	147,511	$6,488,459	$43,986	99.1%
32621	Tires	3,335	$193,473	$58,013	57,964	$3,055,152	$52,708	110.1%
326211	Tires (Exc. Retreading)	2,895	$179,213	$61,904	49,756	$2,771,851	$55,709	111.1%
326212	Tire Retreading	440	$14,260	$32,409	8,208	$283,301	$34,515	93.9%
32622	Rubber & Plastic Hoses & Belts	2,066	$88,268	$42,724	19,781	$763,451	$38,595	110.7%
32629	Other Rubber Products	12,806	$512,037	$39,984	69,766	$2,669,856	$38,269	104.5%
326291	Rubber Products for Mechanical Use	9,127	$365,095	$40,002	37,472	$1,416,856	$37,811	105.8%
326299	All Other Rubber Products	3,679	$146,942	$39,941	32,294	$1,253,000	$38,800	102.9%

Note: * - Ohio's industry employment and pay in this sub-group should be considered estimates; Exc. - excluding; Uns. - unsupported.

Source: U.S. Bureau of the Census (2009a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 2/10).

Table A7: Establishments and Employment in Ohio's Polymers Industry, by County, 2007

Area Name	Estab-lishments	Employ-ment*	Area Name	Estab-lishments	Employ-ment*	Area Name	Estab-lishments	Employ-ment*
Ohio	1,150	81,144	Greene	6	148	Morrow	2	145
			Guernsey	14	1,041	Muskingum	4	227
Adams	2	150	Hamilton	43	1,865	Noble	0	0
Allen	8	1,105	Hancock	18	3,406	Ottawa	3	325
Ashland	9	607	Hardin	5	233	Paulding	5	330
Ashtabula	30	3,010	Harrison	0	0	Perry	0	0
Athens	1	7	Henry	4	299	Pickaway	3	809
Auglaize	6	657	Highland	4	604	Pike	0	0
Belmont	0	0	Hocking	0	0	Portage	56	3,585
Brown	0	0	Holmes	16	1,100	Preble	4	790
Butler	29	2,158	Huron	19	1,253	Putnam	3	300
Carroll	8	217	Jackson	1	66	Richland	8	530
Champaign	2	362	Jefferson	0	0	Ross	1	3
Clark	7	443	Knox	2	333	Sandusky	15	1,743
Clermont	14	325	Lake	39	1,504	Scioto	3	253
Clinton	4	607	Lawrence	3	84	Seneca	3	402
Columbiana	5	809	Licking	12	964	Shelby	9	2,030
Coshocton	5	343	Logan	5	340	Stark	42	2,050
Crawford	6	440	Lorain	31	1,678	Summit	117	5,701
Cuyahoga	88	3,453	Lucas	27	740	Trumbull	20	986
Darke	10	1,383	Madison	3	238	Tuscarawas	25	1,718
Defiance	1	15	Mahoning	28	780	Union	7	541
Delaware	7	136	Marion	3	364	Van Wert	3	171
Erie	9	972	Medina	28	1,667	Vinton	0	0
Fairfield	8	628	Meigs	0	0	Warren	12	1,265
Fayette	5	1,314	Mercer	3	143	Washington	7	896
Franklin	53	2,658	Miami	24	1,160	Wayne	16	693
Fulton	9	653	Monroe	1	15	Williams	18	2,135
Gallia	0	0	Montgomery	39	3,087	Wood	25	3,650
Geauga	29	2,958	Morgan	0	0	Wyandot	6	943

Note: * - All employment figures should be considered estimates. The fact that the total for the county figures - 80,739 - is a little less than the estimated state total of 81,144 means that the county estimates tend to be slightly low.

Source: U.S. Bureau of the Census (2009a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 1/10).

Table A8: Total and Industry Gross Domestic Product for Ohio and the U.S.: 1999-2007 (in billions, except percentages)

Industry Titles	Gross Domestic Product (standardized on 2000) 1999	2000	2001	2002	2003	2004	2005	2006	2007*	Percent Change/ Difference 1999-2007
Ohio: Total	$368.482	$372.006	$365.735	$373.457	$378.719	$387.436	$390.602	$387.345	$388.281	5.4%
Percent Change from Prior Year	n.a.	1.0%	-1.7%	2.1%	1.4%	2.3%	0.8%	-0.8%	0.2%	
NAICS 326: Plastic & Rubber Products	$5.508	$5.387	$4.833	$5.421	$5.362	$5.629	$5.545	$4.609	$4.657	-15.5%
Percent Change from Prior Year	n.a.	-2.2%	-10.3%	12.2%	-1.1%	5.0%	-1.5%	-16.9%	1.0%	
NAICS 326 as a Percentage of Total	1.49%	1.45%	1.32%	1.45%	1.42%	1.45%	1.42%	1.19%	1.20%	-0.30%
U.S.: Total	$9,404.250	$9,749.100	$9,836.580	$9,981.850	$10,225.700	$10,580.200	$10,912.200	$11,218.800	$11,439.200	21.6%
Percent Change from Prior Year	n.a.	3.7%	0.9%	1.5%	2.4%	3.5%	3.1%	2.8%	2.0%	
NAICS 326: Plastic & Rubber Products	$64.662	$66.728	$61.420	$62.874	$62.959	$68.314	$66.861	$58.515	$60.680	-6.2%
Percent Change from Prior Year	n.a.	3.2%	-8.0%	2.4%	0.1%	8.5%	-2.1%	-12.5%	3.7%	
NAICS 326 as a Percentage of Total	0.69%	0.68%	0.62%	0.63%	0.62%	0.65%	0.61%	0.52%	0.53%	-0.16%
Ohio as a Percentage of U.S.:										
Total	3.9%	3.8%	3.7%	3.7%	3.7%	3.7%	3.6%	3.5%	3.4%	-0.5%
NAICS 326: Plastic & Rubber Products	8.5%	8.1%	7.9%	8.6%	8.5%	8.2%	8.3%	7.9%	7.7%	-0.8%
Industry Concentration Ratio - Ohio::U.S.	2.17	2.12	2.12	2.30	2.30	2.25	2.32	2.28	2.26	0.09

Notes: * - preliminary; n.a. - not available.

Source: U.S. Bureau Economic Analysis (2009).

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Table A9: Exports of Plastic and Rubber Products (NAICS 326) from Ohio to the World (in millions of dollars, except percentages)

Partners	Year 2001	2002	2003	2004	2005	2006	2007	2008	2009	Inflation-Adjusted[2] Growth 2001-2008
World Total	$1,070.9	$1,047.3	$1,139.6	$1,241.5	$1,278.9	$1,282.5	$1,409.5	$1,591.5	$1,374.5	16.0%
NAFTA	$675.2	$640.9	$678.3	$698.9	$760.6	$783.8	$851.2	$968.4	$873.5	11.9%
Canada	$491.8	$529.6	$558.7	$542.6	$602.7	$588.9	$628.9	$719.9	$656.1	14.3%
Mexico	$183.4	$111.3	$119.6	$156.3	$157.9	$194.9	$222.3	$248.5	$217.4	5.8%
European Union (27 nations*)	$175.2	$164.6	$200.3	$214.2	$217.0	$223.9	$253.9	$265.3	$199.0	18.2%
Japan	$55.7	$58.8	$55.7	$58.8	$50.8	$37.2	$31.4	$29.1	$23.6	-59.2%
China (exc. Hong Kong & Macau)	$5.1	$6.7	$12.8	$13.0	$17.1	$22.4	$31.2	$38.7	$35.5	495.9%
Remainder of the World[1]	$159.7	$176.2	$192.4	$256.7	$233.4	$215.3	$241.9	$289.9	$242.9	41.7%

Notes: * - Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France (including Guadeloupe, French Guiana, Martinique and Reunion), Germany, Greece, Hungary, Ireland, Italy, Lativa, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal (including the Azores and Madeira), Romania, Slovakia, Slovenia, Spain (including the Canary Islands), Sweden and the United Kingdom (including Gibraltar).

Exc. - excluding.

1 - Hong Kong, Macau, and at least 151 other areas - including American territories.

2 - Adjustment made using the producer price index from the U.S. Bureau of Labor Statistics (2010).

Source: European Union (2010), International Trade Administration (2010), U.S. Bureau of Labor Statistics (2010).

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Table A10: Trends in Value-Added for Ohio and the U.S.: 1999-2008 (in millions of current dollars)

Area Name / NAICS: Title	Year										1999-2008 Averages
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Ohio:											
326: Plastic & Rubber Products	$7,509.5	$7,573.1	$7,090.4	$7,878.2	$7,942.5	$7,759.7	$8,146.9	$8,338.2	$8,191.4	$7,243.2	$7,767.3
3261: Plastic Products	$5,194.2	$5,300.4	$5,132.7	$5,637.0	$5,743.2	$5,562.2	$5,773.2	$5,935.0	$6,045.6	$5,454.7	$5,577.8
Percentage of Industry	69.2%	70.0%	72.4%	71.6%	72.3%	71.7%	70.9%	71.2%	73.8%	75.3%	71.8%
3262: Rubber Products	$2,315.4	$2,272.6	$1,957.7	$2,241.1	$2,199.3	$2,197.5	$2,373.7	$2,403.3	$2,145.8	$1,788.5	$2,189.5
Percentage of Industry	30.8%	30.0%	27.6%	28.4%	27.7%	28.3%	29.1%	28.8%	26.2%	24.7%	28.2%
U.S.:											
326: Plastic & Rubber Products	$91,276.4	$91,221.9	$86,558.0	$92,462.0	$91,535.6	$93,150.6	$96,161.7	$99,527.8	$99,247.7	$91,431.2	$93,257.3
3261: Plastic Products	$72,203.2	$72,402.7	$69,475.4	$75,188.6	$73,988.4	$75,853.5	$78,877.5	$82,877.8	$82,321.3	$76,502.7	$75,969.1
Percentage of Industry	79.1%	79.4%	80.3%	81.3%	80.8%	81.4%	82.0%	83.3%	82.9%	83.7%	81.5%
3262: Rubber Products	$19,073.2	$18,819.2	$17,082.5	$17,273.5	$17,547.1	$17,297.1	$17,284.2	$16,650.0	$16,926.4	$14,928.6	$17,288.2
Percentage of Industry	20.9%	20.6%	19.7%	18.7%	19.2%	18.6%	18.0%	16.7%	17.1%	16.3%	18.5%
Ohio as a Percentage of the U.S.:											
326: Plastic & Rubber Products	8.2%	8.3%	8.2%	8.5%	8.7%	8.3%	8.5%	8.4%	8.3%	7.9%	8.3%
3261: Plastic Products	7.2%	7.3%	7.4%	7.5%	7.8%	7.3%	7.3%	7.2%	7.3%	7.1%	7.3%
3262: Rubber Products	12.1%	12.1%	11.5%	13.0%	12.5%	12.7%	13.7%	14.4%	12.7%	12.0%	12.7%

Sources: U.S. Bureau of the Census (2003a-2007a, 2010).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300 or 614/466-2116 (DL, 4/10).

Table A11: Trends in Capital Expenditures for Ohio and the U.S.: 1999-2008 (in millions of current dollars)

Area Name / NAICS: Title	Year										1999-2008 Averages
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Ohio:											
326: Plastic & Rubber Products	$790.7	$682.8	$681.3	$770.8	$552.8	$547.1	$536.1	$540.7	$602.1	$691.1	$639.5
3261: Plastic Products	$605.6	$502.5	$503.4	$624.2	$446.5	$432.2	$416.7	$408.2	$432.1	$478.5	$485.0
Percentage of Industry	76.6%	73.6%	73.9%	81.0%	80.8%	79.0%	77.7%	75.5%	71.8%	69.2%	75.8%
3262: Rubber Products	$185.1	$180.3	$177.9	$146.6	$106.4	$114.9	$119.5	$132.5	$170.1	$212.6	$154.6
Percentage of Industry	23.4%	26.4%	26.1%	19.0%	19.2%	21.0%	22.3%	24.5%	28.2%	30.8%	24.2%
U.S.:											
326: Plastic & Rubber Products	$9,067.2	$8,403.7	$7,341.0	$7,415.2	$6,399.4	$6,517.7	$6,715.8	$7,158.4	$7,474.9	$7,957.4	$7,445.1
3261: Plastic Products	$7,558.7	$6,851.0	$6,199.6	$6,311.3	$5,497.5	$5,368.2	$5,620.2	$6,018.8	$6,173.6	$6,467.6	$6,206.7
Percentage of Industry	83.4%	81.5%	84.5%	85.1%	85.9%	82.4%	83.7%	84.1%	82.6%	81.3%	83.4%
3262: Rubber Products	$1,508.5	$1,552.7	$1,141.4	$1,103.8	$902.0	$1,149.4	$1,095.5	$1,139.7	$1,301.3	$1,489.8	$1,238.4
Percentage of Industry	16.6%	18.5%	15.5%	14.9%	14.1%	17.6%	16.3%	15.9%	17.4%	18.7%	16.6%
Ohio as a Percentage of the U.S.:											
326: Plastic & Rubber Products	8.7%	8.1%	9.3%	10.4%	8.6%	8.4%	8.0%	7.6%	8.1%	8.7%	8.6%
3261: Plastic Products	8.0%	7.3%	8.1%	9.9%	8.1%	8.1%	7.4%	6.8%	7.0%	7.4%	7.8%
3262: Rubber Products	12.3%	11.6%	15.6%	13.3%	11.8%	10.0%	10.9%	11.6%	13.1%	14.3%	12.5%

Sources: U.S. Bureau of the Census (2003a-2007a, 2010).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300 or 614/466-2116 (DL, 4/10).

Table A12a: Polymers Industry Establishment Trends in Ohio: 2000-2007

NAICS Code	Shorter Industry Title	2000	2001	2002	2003	2004	2005	2006	2007	Changes: 2000-2007 Number	Percent
11-92	Total	270,509	269,944	271,181	270,255	271,733	270,968	269,914	270,299	-210	-0.1%
31-33	Manufacturing	17,704	17,597	17,189	17,082	16,887	16,617	16,401	16,174	-1,530	-8.6%
32521/991 + 326	Rubber and Plastics Industry	1,295	1,282	1,271	1,262	1,254	1,222	1,201	1,150	-145	-11.2%
32521	Resin & Synthetic Rubber	53	57	58	67	75	84	74	69	16	30.2%
325211	Plastic Materials & Resins	43	46	49	58	66	73	65	63	20	46.5%
325212	Synthetic Rubber	10	11	9	9	9	11	9	6	-4	-40.0%
325991	Custom Compounding of Purchased Resins	69	61	61	54	55	51	53	53	-16	-23.2%
326	Plastic & Rubber Products	1,173	1,164	1,152	1,141	1,124	1,087	1,074	1,028	-145	-12.4%
3261	Plastic Products	897	888	882	876	861	832	821	792	-105	-11.7%
32611	Uns. Plastic Films, Sheets, & Bags	80	85	85	94	88	84	89	82	2	2.5%
326111	Uns. Plastic Bags	21	24	23	23	20	19	20	19	-2	-9.5%
326112	Uns. Plastic Packaging Film & Sheet	10	11	10	16	16	14	16	14	4	40.0%
326113	Uns. Plastic Film & Sheet (Exc. Packaging)	49	50	52	55	52	51	53	49	0	0.0%
32612	Plastic Pipe, Pipe Fitting, & Uns. Profile Shapes	77	76	75	78	84	83	80	77	0	0.0%
326121	Uns. Plastic Profile Shapes	50	48	49	46	49	49	47	45	-5	-10.0%
326122	Plastic Pipes & Pipe Fittings	27	28	26	32	35	34	33	32	5	18.5%
32613	Laminated Plastic Plate, Sheet, & Shapes	45	42	41	25	27	25	23	24	-21	-46.7%
32614	Polystyrene Foam Products	34	34	41	34	30	24	25	24	-10	-29.4%
32615	Foam Products (Exc. Polystyrene)	27	29	32	40	37	36	37	38	11	40.7%
32616	Plastic Bottles	27	29	28	27	25	24	23	23	-4	-14.8%
32619	Other Plastic Products	607	593	580	578	570	556	544	524	-83	-13.7%
326191	Plastic Plumbing Fixtures	29	31	25	22	23	23	23	23	-6	-20.7%
326192	Resilient Floor Coverings	4	3	3	4	4	5	6	6	2	50.0%
326199	All Other Plastic Products	574	559	552	552	543	528	515	495	-79	-13.8%
3262	Rubber Products	276	276	270	265	263	255	253	236	-40	-14.5%
32621	Tires	50	51	41	42	40	37	38	39	-11	-22.0%
326211	Tires (Exc. Retreading)	10	11	10	11	12	10	9	9	-1	-10.0%
326212	Tire Retreading	40	40	31	31	28	27	29	30	-10	-25.0%
32622	Rubber & Plastic Hoses & Belts	13	15	22	26	27	26	24	21	8	61.5%
32629	Other Rubber Products	213	210	207	197	196	192	191	176	-37	-17.4%
326291	Rubber Products for Mechanical Use	126	124	123	110	111	108	106	100	-26	-20.6%
326299	All Other Rubber Products	87	86	84	87	85	84	85	76	-11	-12.6%

Note: Exc. - Except.

Source: U.S. Bureau of the Census (2002, 2003b-2007b, 2008, 2009a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 2/10).

Table A12b: Polymers Industry Establishment Trends in the U.S.: 2000-2007

NAICS Code	Shorter Industry Title	2000	2001	2002	2003	2004	2005	2006	2007	Changes: 2000-2007 Number	Percent
11-92	Total	7,070,048	7,095,302	7,200,770	7,254,745	7,387,724	7,499,702	7,601,160	7,705,018	634,970	9.0%
31-33	Manufacturing	354,498	352,619	344,341	341,849	339,083	333,460	331,062	331,355	-23,143	-6.5%
32521/991 + 326	Rubber and Plastics Industry	17,802	17,479	16,980	16,621	16,484	16,282	16,123	15,770	-2,032	-11.4%
32521	Resin & Synthetic Rubber	746	783	858	954	944	976	944	949	203	27.2%
325211	Plastic Materials & Resins	597	621	695	802	791	817	791	799	202	33.8%
325212	Synthetic Rubber	149	162	163	152	153	159	153	150	1	0.7%
325991	Custom Compounding of Purchased Resins	764	715	660	648	654	599	587	588	-176	-23.0%
326	Plastic & Rubber Products	16,292	15,981	15,462	15,019	14,886	14,707	14,592	14,233	-2,059	-12.6%
3261	Plastic Products	13,588	13,367	13,004	12,652	12,571	12,455	12,341	12,054	-1,534	-11.3%
32611	Uns. Plastic Films, Sheets, & Bags	1,460	1,440	1,395	1,472	1,471	1,411	1,402	1,363	-97	-6.6%
326111	Uns. Plastic Bags	499	491	457	446	422	402	402	384	-115	-23.0%
326112	Uns. Plastic Packaging Film & Sheet	160	162	171	278	290	289	285	277	117	73.1%
326113	Uns. Plastic Film & Sheet (Exc. Packaging)	801	787	767	748	759	720	715	702	-99	-12.4%
32612	Plastic Pipe, Pipe Fitting, & Uns. Profile Shapes	1,141	1,125	1,092	1,068	1,067	1,048	1,027	1,031	-110	-9.6%
326121	Uns. Plastic Profile Shapes	695	683	653	636	639	624	595	603	-92	-13.2%
326122	Plastic Pipes & Pipe Fittings	446	442	439	432	428	424	432	428	-18	-4.0%
32613	Laminated Plastic Plate, Sheet, & Shapes	426	417	377	284	281	284	279	284	-142	-33.3%
32614	Polystyrene Foam Products	569	566	551	538	523	522	543	554	-15	-2.6%
32615	Foam Products (Exc. Polystyrene)	608	610	610	595	596	628	653	648	40	6.6%
32616	Plastic Bottles	481	459	459	416	409	407	407	394	-87	-18.1%
32619	Other Plastic Products	8,903	8,750	8,520	8,279	8,224	8,155	8,030	7,780	-1,123	-12.6%
326191	Plastic Plumbing Fixtures	552	535	529	543	537	535	526	537	-15	-2.7%
326192	Resilient Floor Coverings	40	41	51	57	60	57	64	60	20	50.0%
326199	All Other Plastic Products	8,311	8,174	7,940	7,679	7,627	7,563	7,440	7,183	-1,128	-13.6%
3262	Rubber Products	2,704	2,614	2,458	2,367	2,315	2,252	2,251	2,179	-525	-19.4%
32621	Tires	868	838	707	722	692	656	663	649	-219	-25.2%
326211	Tires (Exc. Retreading)	160	161	149	153	145	138	138	129	-31	-19.4%
326212	Tire Retreading	708	677	558	569	547	518	525	520	-188	-26.6%
32622	Rubber & Plastic Hoses & Belts	217	228	257	270	276	277	260	256	39	18.0%
32629	Other Rubber Products	1,619	1,548	1,494	1,375	1,347	1,319	1,328	1,274	-345	-21.3%
326291	Rubber Products for Mechanical Use	705	666	644	573	553	544	548	531	-174	-24.7%
326299	All Other Rubber Products	914	882	850	802	794	775	780	743	-171	-18.7%

Note: Exc. - Except.

Source: U.S. Bureau of the Census (2002, 2003b-2007b, 2008, 2009a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 2/10).

Table A13a: Polymers Industry Employment Trends in Ohio: 2000-2007

NAICS Code	Shorter Industry Title	2000	2001	2002	2003	2004	2005	2006	2007	Changes: 2000-2007 Number	Percent
11-92	Total	5,001,980	4,932,943	4,743,151	4,770,283	4,762,205	4,762,618	4,825,510	4,782,141	-219,839	-4.4%
31-33	Manufacturing	988,612	936,161	829,456	838,725	814,662	792,783	787,946	761,167	-227,445	-23.0%
32521/991 + 326	Rubber and Plastics Industry*	105,122	98,213	93,152	94,972	90,666	88,539	86,394	81,144	-23,978	-22.8%
32521	Resin & Synthetic Rubber*	4,203	4,394	4,031	4,661	4,730	5,070	4,087	4,170	-33	-0.8%
325211	Plastic Materials & Resins*	3,368	3,559	3,160	3,995	4,063	4,498	3,507	3,676	308	9.1%
325212	Synthetic Rubber*	835	835	871	666	666	572	580	494	-341	-40.8%
325991	Custom Compounding of Purchased Resins	3,986	3,529	3,344	2,757	2,697	2,382	2,403	2,457	-1,529	-38.4%
326	Plastic & Rubber Products	96,933	90,290	85,777	87,554	83,239	81,087	79,904	74,517	-22,416	-23.1%
3261	Plastic Products	69,884	64,927	62,340	62,912	61,093	60,109	58,792	56,310	-13,574	-19.4%
32611	Uns. Plastic Films, Sheets, & Bags	4,875	5,181	5,003	5,378	5,262	5,022	4,910	4,937	62	1.3%
326111	Uns. Plastic Bags	1,429	1,621	1,335	1,410	1,368	1,207	1,228	1,184	-245	-17.1%
326112	Uns. Plastic Packaging Film & Sheet	782	782	794	892	865	822	878	884	102	13.0%
326113	Uns. Plastic Film & Sheet (Exc. Packaging)	2,664	2,778	2,874	3,076	3,029	2,993	2,804	2,869	205	7.7%
32612	Plastic Pipe, Pipe Fitting, & Uns. Profile Shapes	3,851	3,927	3,072	3,518	3,822	4,135	4,198	3,835	-16	-0.4%
326121	Uns. Plastic Profile Shapes	2,293	2,260	1,844	1,998	2,175	2,070	2,265	2,002	-291	-12.7%
326122	Plastic Pipes & Pipe Fittings	1,558	1,667	1,228	1,520	1,647	2,065	1,933	1,833	275	17.7%
32613	Laminated Plastic Plate, Sheet, & Shapes	2,095	1,918	1,788	1,043	866	807	886	1,011	-1,084	-51.7%
32614	Polystyrene Foam Products	1,550	1,389	1,247	1,106	1,083	995	1,070	1,073	-477	-30.8%
32615	Foam Products (Exc. Polystyrene)	1,934	1,644	2,352	2,527	2,370	2,485	2,402	2,231	297	15.4%
32616	Plastic Bottles	4,151	4,066	3,970	4,291	3,930	3,888	3,899	3,886	-265	-6.4%
32619	Other Plastic Products	51,428	46,802	44,908	45,049	43,760	42,777	41,427	39,337	-12,091	-23.5%
326191	Plastic Plumbing Fixtures*	723	734	641	639	547	558	551	566	-157	-21.7%
326192	Resilient Floor Coverings*	248	143	143	143	199	609	662	753	505	203.6%
326199	All Other Plastic Products	50,457	45,925	44,124	44,267	43,014	41,610	40,214	38,018	-12,439	-24.7%
3262	Rubber Products	27,049	25,363	23,437	24,642	22,146	20,978	21,112	18,207	-8,842	-32.7%
32621	Tires	3,683	4,053	4,456	3,718	3,179	3,261	3,138	3,335	-348	-9.4%
326211	Tires (Exc. Retreading)	3,314	3,588	3,996	3,182	2,722	2,746	2,747	2,895	-419	-12.6%
326212	Tire Retreading	369	465	460	536	457	515	391	440	71	19.2%
32622	Rubber & Plastic Hoses & Belts	2,408	2,314	2,371	2,373	2,488	2,355	2,376	2,066	-342	-14.2%
32629	Other Rubber Products	20,958	18,996	16,610	18,551	16,479	15,362	15,598	12,806	-8,152	-38.9%
326291	Rubber Products for Mechanical Use	13,756	12,935	11,554	13,100	11,153	10,397	10,863	9,127	-4,629	-33.7%
326299	All Other Rubber Products	7,202	6,061	5,056	5,451	5,326	4,965	4,735	3,679	-3,523	-48.9%

Notes: Exc. - Except. * - Employment figures may be, or incorporate, estimates.

Source: U.S. Bureau of the Census (2002, 2003b-2007b, 2008, 2009a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 2/10).

Table A13b: Polymers Industry Employment Trends in the U.S.: 2000-2007

NAICS Code	Shorter Industry Title	2000	2001	2002	2003	2004	2005	2006	2007	Changes: 2000-2007 Number	Percent
11-92	Total	114,064,976	115,061,184	112,400,654	113,398,043	115,074,924	116,317,003	119,917,165	120,604,265	6,539,289	5.7%
31-33	Manufacturing	16,473,994	15,950,424	14,393,609	14,132,020	13,821,976	13,667,337	13,631,683	13,320,172	-3,153,822	-19.1%
32521/991 + 326	Rubber and Plastics Industry	1,160,473	1,100,625	1,018,745	1,020,132	1,000,078	995,995	991,856	947,079	-213,394	-18.4%
32521	Resin & Synthetic Rubber	76,517	72,565	70,229	76,046	70,171	72,753	69,461	69,654	-6,863	-9.0%
325211	Plastic Materials & Resins	64,899	61,065	59,840	65,514	61,135	63,993	60,912	61,199	-3,700	-5.7%
325212	Synthetic Rubber	11,618	11,500	10,389	10,532	9,036	8,760	8,549	8,455	-3,163	-27.2%
325991	Custom Compounding of Purchased Resins	27,449	25,557	22,909	22,694	21,807	21,133	21,553	21,942	-5,507	-20.1%
326	Plastic & Rubber Products	1,056,507	1,002,503	925,607	921,392	908,100	902,109	900,842	855,483	-201,024	-19.0%
3261	Plastic Products	845,247	803,846	744,673	746,211	739,197	739,862	740,254	707,972	-137,275	-16.2%
32611	Uns. Plastic Films, Sheets, & Bags	111,704	108,464	100,385	105,208	102,710	100,952	101,725	97,545	-14,159	-12.7%
326111	Uns. Plastic Bags	40,860	39,680	35,891	33,608	33,774	32,443	32,978	29,894	-10,966	-26.8%
326112	Uns. Plastic Packaging Film & Sheet	15,614	15,399	15,190	24,066	23,390	24,691	24,198	23,753	8,139	52.1%
326113	Uns. Plastic Film & Sheet (Exc. Packaging)	55,230	53,385	49,304	47,534	45,546	43,818	44,549	43,898	-11,332	-20.5%
32612	Plastic Pipe, Pipe Fitting, & Uns. Profile Shapes	50,200	49,083	45,458	49,263	50,219	51,198	50,957	49,680	-520	-1.0%
326121	Uns. Plastic Profile Shapes	27,331	26,482	25,514	28,142	29,751	29,644	29,360	28,092	761	2.8%
326122	Plastic Pipes & Pipe Fittings	22,869	22,601	19,944	21,121	20,468	21,554	21,597	21,588	-1,281	-5.6%
32613	Laminated Plastic Plate, Sheet, & Shapes	17,239	16,695	12,910	10,764	11,515	10,622	11,063	10,718	-6,521	-37.8%
32614	Polystyrene Foam Products	33,394	31,503	30,520	31,631	31,646	30,711	32,756	32,229	-1,165	-3.5%
32615	Foam Products (Exc. Polystyrene)	37,940	35,645	33,653	31,834	33,682	36,609	36,765	34,825	-3,115	-8.2%
32616	Plastic Bottles	37,488	35,655	35,168	33,901	33,281	32,507	32,773	32,863	-4,625	-12.3%
32619	Other Plastic Products	557,282	526,801	486,579	483,610	476,144	477,263	474,215	450,112	-107,170	-19.2%
326191	Plastic Plumbing Fixtures	22,508	20,732	21,348	24,366	25,290	27,229	27,607	24,391	1,883	8.4%
326192	Resilient Floor Coverings	5,267	5,060	4,845	5,228	4,795	4,631	5,225	4,831	-436	-8.3%
326199	All Other Plastic Products	529,507	501,009	460,386	454,016	446,059	445,403	441,383	420,890	-108,617	-20.5%
3262	Rubber Products	211,260	198,657	180,934	175,181	168,903	162,247	160,588	147,511	-63,749	-30.2%
32621	Tires	74,325	72,481	68,862	66,587	64,007	62,621	62,478	57,964	-16,361	-22.0%
326211	Tires (Exc. Retreading)	66,133	63,931	60,905	58,188	55,064	54,323	53,985	49,756	-16,377	-24.8%
326212	Tire Retreading	8,192	8,550	7,957	8,399	8,943	8,298	8,493	8,208	16	0.2%
32622	Rubber & Plastic Hoses & Belts	24,502	23,553	22,201	22,101	22,148	21,713	21,307	19,781	-4,721	-19.3%
32629	Other Rubber Products	112,433	102,623	89,871	86,493	82,748	77,913	76,803	69,766	-42,667	-37.9%
326291	Rubber Products for Mechanical Use	61,186	55,000	49,038	50,124	44,968	42,912	41,319	37,472	-23,714	-38.8%
326299	All Other Rubber Products	51,247	47,623	40,833	36,369	37,780	35,001	35,484	32,294	-18,953	-37.0%

Note: Exc. - Except.

Source: U.S. Bureau of the Census (2002, 2003b-2007b, 2008, 2009a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 2/10).

Table A14: Projections for Plastic and Rubber Products Employment*, Ohio and the U.S.: 2006-2016

NAICS Code	Shorter Industry Title	Jobs		Changes: 2006-2016	
		Actual 2006	Projected 2016	Number	Percent
Ohio	Total	5,842,100	6,132,800	290,700	5.0%
31-33	Manufacturing	795,500	654,700	-140,800	-17.7%
326	Plastic and Rubber Products	68,900	59,200	-9,700	-14.1%
3261	Plastic Products	49,300	47,000	-2,300	-4.7%
3262	Rubber Products	19,600	12,200	-7,400	-37.8%
U.S.	Total	150,620,100	166,220,300	15,600,200	10.4%
31-33	Manufacturing	14,197,300	12,694,500	-1,502,800	-10.6%
326	Plastic and Rubber Products	796,900	764,300	-32,600	-4.1%
3261	Plastic Products	637,600	650,500	12,900	2.0%
3262	Rubber Products	159,300	113,800	-45,500	-28.6%

Note: * - Projections have not been made for resin and synthetic rubber production (NAICS 32521), nor for custom compounding of purchased resins (325991).

Sources: Figueroa and Woods (2007), ODJFS-BLMI (2008).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116 (DL, 2/10).

Industry Definition and Examples of Products

Beginning in 1997, the nation's industry statistics have been collected under the North American Industry Classification System (NAICS) (Office of Management and Budget, 1998). Establishments producing goods or services sufficiently alike are classified in the same *industry*, and assigned a six-digit code number. Closely related industries form an *industry group*. The first four digits of the industry code indicate the group to which the industries belong. (A five-digit code defines a *subgroup* when it subsumes more than one six-digit code; otherwise, it defines an industry.) In turn, the first three digits indicate the major industry of which the groups are a part. In this report the polymers industry is defined as the combination of one subgroup, one specific industry, and one major industry: *resin and synthetic rubber manufacturing* (NAICS 32521), *custom compounding of purchased resins* (325991), and *plastic and rubber products manufacturing* (326). Definitions and examples of specific industry products follow.

32521 Resin and Synthetic Rubber.

325211 Plastic Materials and Resins. Examples include nonvulcanizable elastomers. Plants may also mix or blend their own resins on a customized or standard basis.

325212 Synthetic Rubber. Examples include vulcanizable elastomers. Rubber adhesives are excluded from the industry.

325991 Custom Compounding of Purchased Resins. Resins made elsewhere are mixed or blended. Reformulated resins from recycled plastic products also are included.

326 Plastic and Rubber Products. Establishments in this sub-sector make goods from plastic resins and raw and synthetic rubber. Plastic and rubber products are included in this sub-sector because both are elastomers manipulated with similar technologies. (Individual products are classified as one or the other based on their proportions when blended. See the next section.) Goods combining plastic and rubber products with other material are classified outside of the Industry because different technologies are used to produce them. Examples of the latter include rubber and plastic footwear, furniture, and cloth or paper laminated with plastics.

3261 Plastic Products. These are intermediate and final goods made from new and/or recycled resins. Common technologies in this group include casting and various types of molding: blowing, compressing, extruding, and injecting.

32611 Unsupported Plastic Films, Sheets, and Bags.

326111 Unsupported Plastic Bags. Resins are processed into bags and/or coat or laminate film and sheet into bags. Manufacturers also may print on the bags.

326112 Unsupported Plastic Packaging Film and Sheet.

326113	Unsupported Plastic Film and Sheet (Except Packaging). This industry produces films and unlaminated sheets for purposes other than packaging.
32612	Plastic Pipe, Pipe Fitting, and Unsupported Profile Shapes.
326121	Unsupported Plastic Profile Shapes. Non-rigid profile shapes such as rods, tubes, and sausage casings are examples.
326122	Plastic Pipes and Pipe Fittings. The pipes and fittings are rigid.
32613	Laminated Plastic Plate, Sheet, and Shapes. Laminating generally involves bonding or impregnating the material with resins and compressing them under heat. Laminating packaging material is classified elsewhere in the Industry. Coating or laminating non-plastic materials such as paper or cloth is classified outside of the Industry.
32614	Polystyrene Foam Products. The food containers used by many restaurants for take-out orders are just one example of this industry's products.
32615	Foam Products (Except Polystyrene). Urethane is the principal resin used in industry products.
32616	Plastic Bottles. Other containers are classified elsewhere in the Industry.
32619	Other Plastic Products.
326191	Plastic Plumbing Fixtures. Examples include bathtubs, hot tubs, portable toilets, shower stalls, and urinals. Fiberglass may be incorporated. Plastic pipes and fittings are classified elsewhere in the Industry. Assembling plastic components into plumbing fixtures such as faucets is classified outside of the Industry.
326192	Resilient Floor Coverings. Products may be either sheets or tiles.
326199	All Other Plastic Products. Examples include air mattresses, inflatable boats, bowls and their lids, clothes hangers, gloves, hardware, siding, trash containers, and non-foam cups and dinnerware.
3262	Rubber Products. Products may be intermediate or final, and come from natural, synthetic, or reclaimed rubber. Common technologies used in this group include vulcanization, cementing, molding, extruding, and lathe cutting.
32621	Tires.
326211	Tires (Except Retreading). New tires and inner tubes of all shapes and sizes are included. Most tires are produced for the motor vehicle industry.
326212	Tire Retreading. The feature distinguishing this industry from tire repair service is the reliance on assembly line operations. Retreads are used by commercial trucks and aviation, school buses, and off-road vehicles included in agricultural, industrial, and mining equipment. These markets are much smaller than the market for passenger cars and non-commercial light trucks.

32622	Rubber and Plastic Hoses and Belts. Plants making garden hoses from purchased hose are included.
32629	Other Rubber Products.
326291	Rubber Products for Mechanical Use. Products are typically used in transportation equipment, machinery, and other equipment. Tubes are classified elsewhere in the Industry.
326299	All Other Rubber Products. Examples include balloons, bath and doormats, birth control devices, combs, inflatable life rafts, latex foam rubber, reclaimed rubber, rubber bands, and tubes (except extruded, lathe-cut, and molded). Rubberized fabrics, and rubber clothing accessories (e.g., bathing caps), gloves, toys, and gaskets, packing, and sealing devices are classified outside of the Industry.

A Polymer Primer

In the general manufacturing processes for plastics and synthetic rubbers (SRs), the raw materials – natural gas, petroleum, and coal tar – are refined, distilled and/or fractionated to produce gases, light oils, middle fractions, and heavy oils. These materials may be mixed with substances such as ammonia or formaldehyde, or further chemically decomposed to yield intermediates. Intermediates are catalyzed into *monomers*. More specifically, the olefins in natural gas – ethane, propane and butane – are separated and steam-cracked to yield ethylene, propylene and butadiene. Aromatics, particularly benzene and xylenes, are derived primarily from petroleum, but may also be produced from coal tar or olefin operations using steam cracking. Styrene and phenol are the two most common derivatives from benzene, while xylenes are used in producing esters (compounds formed by eliminating water and bonding an alcohol with an organic acid). These monomers are finally catalyzed into *polymers*. Polymers are strings of petrochemical monomers. Polyethylene (PE), polypropylene (PP), polystyrene (PS), and polyester are chains of ethylene, propylene, styrene, and ester monomers. Initial outputs take various forms: pellets, flakes, granules, powders, liquid resins, sheeting, and film (O'Reilly, 2010: 23, 29-32; Prat, 1993; Standard & Poor's, 1994).

The production of plastic resins and SRs is more complex than described above. Examples abound, but a few illustrate the point. About three-fourths of ethylene output is used to make PE, polyvinyl chloride (PVC), and PS, with an additional portion used in SR production. About one-half of propylene output is used to produce PP; propylene also is used to make intermediate chemicals that, in turn, are used to make acrylonitrile-butadiene-styrene (ABS) and polyesters (thermoplastics) as well as phenolics and urea (thermosetting resins). About two-thirds of butadiene production is used to make SRs, which, in turn, are used in tires and other fabricated rubber products; butadiene also is used in manufacturing nylon and ABS resins. In addition to styrenes and phenols, benzene also is used to make epoxy, polyurethanes, nylon and SR's; and xylenes also are used to make vinyl resins (O'Reilly, 2010: 29-32).

Plastics may be grouped by a variety of characteristics, but the most basic and familiar one is whether they are thermoplastics or thermosets. Thermoplastics can be re-softened by reheating, and therefore can be reused. On the other hand, thermosets are heat resistant to a point, but reheating them to higher temperatures destroys the cross-linked polymers that at their cores. (However, thermosets may be ground up and reused as filler.) Major thermoplastics, ranked in descending order of production volume and with their common uses, include:

PE – including high and low density varieties:
- HDPE: detergent bottles and milk jugs;
- LDPE and LLDPE: dry-cleaning and produce bags, trash can liners, and food storage containers;

PP: drinking straws, bottle caps and food containers; also parts in appliances and motor vehicles;
PVC and copolymers (polymers made by alternating two different monomers in sequence): plumbing pipes and guttering, flooring, outdoor furniture, shower curtains, window frames, shrink-wrap, water bottles, and containers for salad dressings and liquid detergents; poly-vinylidene chloride (PVDC) is a related plastic used for food packaging (Saran wrap);
PS – straight and rubber-modified: in foam form – packaging pellets, cups, meat trays, and clamshell take-away food containers; in non-foam form – tableware and cutlery;
Thermoplastic polyester, including polyethylene terephthalate (PET or PETE): films, jars, synthetic fibers such as Dacron, bottles for carbonated drinks, microwavable packaging, and cooking oils; teflon is a closely related plastic used for low friction and heat resistant applications such as water slides and frying pans; and
Polyamide (nylon): in fiber form – fabrics, toothbrush bristles and fishing lines; in block form – gears, bearings, bushings, and other mechanical parts.

Other notable thermoplastics include ABS and polycarbonate (PC). ABS is light and rigid, yet is good for shock absorbance. It is used in pipes, golf club heads, motor vehicle body parts, protective head-gear, electronic equipment cases such as monitors, printers and keyboards, and toys (e.g., Lego bricks). PCs are used in CDs, DVDs, riot shields, security windows, traffic lights, lenses and eyeglasses. Bayblend mixes ABS and PC, creating a stronger plastic used in cars. Thermoplastics have accounted for at least 90 percent of the total weight of plastics production for years, and continue to have the more-promising growth prospects (O'Reilly, 2010: 31; Wikipedia, 2010).

Common thermosets, ranked descending order of production volume, include:
Phenolic (Bakelite): phenolics have been largely replaced by cheaper and less brittle plastics, but they are still used in applications requiring heat-resistant and insulating properties such as electronic circuit boards;
Urea, as part of blown polyureathane: mattresses, furniture padding, and thermal insulation; as part of non-blown polyureathane: coatings, printing rollers, and a component of spandex;
Epoxies: used in coatings, adhesives and composite materials such as fiberglass and carbon fiber; and
Melamine: produced from urea, it is used in kitchen utensils and plates; it is the main ingredient in Formica.

Thermosets are relatively mature products, with at least two-thirds of demand tied to construction and consumer durables (O'Reilly, 2010: 32; Wikipedia, 2010).

Plastics and SRs use some of the same molecules, but they may be classified as one or the other based of the amounts of polymers comprising them. For example, a compounded resin with at least 50 percent butadiene is classified as a SR, but one with less than 50 percent butadiene is classified as a plastic. However, the key distinction between plastics and SRs is that the latter are vulcanized elastomers. Adding sulfur and "cooking" the mixture cross-links the polymers, increasing their resiliency and strength, and giving them elastic and yield properties similar to natural rubber. This converts the rubber hydrocarbon from a thermoplastic into a thermoset. (Natural rubber is mostly latex, or isoprene, with some impurities. Its properties also are improved by further processing, including vulcanization.) Plastics are non-vulcanizable elastomers (Parker, 1984; Standard & Poor's, 1989; Wikipedia, 2010). The most common SRs are butadiene and sty-rene-butadiene rubber (BR and SBR), chloroprene, isobutylene-isoprene, and ethylene-propylene (co- and terpolymers). The tire industry uses about 76 percent of SBR production (Yoder, 2000). SRs also are used in inner tubes, laboratory tubes, hoses, plumbing fixtures, gaskets, mechanical belts and seals, gloves, footwear, scuba diving equipment, inflatable boats, mouse pads, orthopedic braces, adhesives, solid rocket propellant, and radar absorbent material (Wikipedia, 2010). Plastics and SRs also are classified by their production characteristics. Commodity resins are produced in high volumes at low cost. PEs, PVCs, PPs, PSs, and SRs such as those including butadiene and propylene are examples. The primary cost determinant is the price of the feedstock. Engineered resins are custom designed for specific require-ments. They are produced in low volumes, with engineering services a large part of their higher cost (O'Reilly, 2010: 23).

Finished plastic products typically include a combination of additives. Processing-aids improve the compounding and molding of resins. They include lubricants, which enhance resin flow and mold release, and compensate for imperfections in the machinery and resins, and anti-blocking agents, which prevent layers of film from sticking together. Modifiers in-crease the materials' flexibility or (if rubber-based) stress resistance. Extenders are a broad class of materials used to ensure the stability of resins during processing or prolong the useful life of the product. Extenders include antioxidants, anti-static agents, biocides, flame-retardants, and heat and light stabilizers. Colorants may be used. Additives are sold mostly to resin producers and compounders. PVCs use the greatest portion of these additives, but PEs, PSs, and PPs use significant amounts of antioxidants (O'Reilly, 1997b, 1999, 2003).

Recent high prices for oil and natural gas have spurred an interest in developing alternative and renewable – i.e. bio-based – sources for resin and additive production. One product from this research is the development of polylactic acid (PLA), a polymer derived from corn sugars with properties similar to petroleum-based resins. PLA may be processed with standard equipment and output as films or fibers as well as molded into parts. International Paper uses it to coat paper cups. Another line of inquiry is evaluating dandelions as source for natural rubber (Ohio Dept. of Agriculture, 2010; Ohio State University, 2010).

NOTES:

1 Total company employment figures for the polymers industry include the sites employing less than 50 people. The complete list for companies appears in appendix table A1.

2 2007 Census of Manufactures data for Ohio are still unavailable as we go to press. 2002 value-added data for plastic resin and synthetic rubber production and the custom compounding of purchased resins have been suppressed to maintain confidentiality. The calculation of value-added typically starts with the value of shipments (products manufactured plus receipts for services rendered) and subtracts the cost of materials, supplies, containers, fuel, purchased electricity, and contract work. The result is adjusted by adding the value of merchandising operations and the net change in finished goods and work-in-progress between the beginning and end of year inventories. Value-added avoids the duplication in the value of shipments figure resulting from the use of products of some establishments as material by others. Value-added is considered the best available measure for comparing the relative economic importance of manufacturing among industries and geographic areas. The Bureau of Economic Analysis starts with the Census Bureau's value-added figures when estimating gross domestic product for a major manufacturing industry, but goes on to subtract additional costs – e.g., the value of purchased services – in calculating the industry's net output. (This is why gross domestic product figures are smaller than value-added.) Value-added data, though, are available where gross domestic product data are not.

3 Employment figures for almost all of the counties with industry establishments should be regarded as more or less rough estimates because the Census Bureau does not disclose precise figures if doing so would violate the confidentiality of respondents. The Bureau merely provides a range encompassing the jobs figure for the establishment(s) in the county under such circumstances. The figures in the text and tables A5-A7 are the result, at least in part, of an estimation technique thought to be fairly accurate on average. Thirteen counties were mentioned in the preceding text; Hamilton is the 14th and last county needed to account for the majority of industry jobs in Ohio.

4 Net growth or contraction in industries showing cyclical changes in output may be a function of the starting and ending times chosen. Therefore, caution is warranted when trying to discern trends.

5 The figures shown in the chart have not been adjusted for inflation. The 16 percent figure was calculated after adjusting them for inflation by using the U.S. Bureau of Labor Statistics (2010) producer price index values for the industry.

6 Although O'Reilly (2010) was writing about the chemical industry (NAICS 325), the observation may apply by extension because plastic and rubber products (326) are made from resins and synthetic rubber (32512) and custom-compounded resins (325991).

7 A significant part of capital expenditures by companies in Ohio stays in the state. Ohio is the leading source of plastics- and rubber-working machinery (NAICS 33322). Judging by the value of shipments in 2002, 20.4 percent – or $626.7 million – of new machinery used by the polymers industry came from Ohio. $409.0 million – 65.3 percent – of that industry figure was comprised of shipments of plastics-working machinery and equipment, excluding patterns and molds (3332201). Rubber-working machinery and equipment, excluding tire molds (3332203), was valued at $100.7 million, or 16.1 percent. However, that $100.7 million represented 47.9 percent of all such rubber-working goods made in America, while the $409 million was 17.2 percent of plastics-working goods. In both cases, Ohio was the leading source of such machinery (U.S. Bureau of the Census, 2005d).

The Census statistics cited above convey the concentration of the industry here, but do not indicate the variety of machinery and equipment made in the state for manufacturing synthetic rubber, plastic resins, and the myriad products. There are molds and machines for working plastics and rubber, including new and retread tires. They may come off an assembly line or be custom made. There are dozens of companies in Ohio making such products, most of which are small. The largest employ over 100 people each, and include Kurz-Kasch, Liqui-Box, Master Industries, and Milacron (Harris, 2009).

8 Numbers from the Bureaus of Labor Statistics and the Census differ due to different methodologies.

9 In July, 2009, NOVA Chemicals was acquired by International Petroleum Investment, a concern wholly owned by the Emirate of Abu Dhabi (O'Reilly, 2010: 14-15).

10 The dominance is more pronounced when considering parent companies. From that perspective, there are only 19 names. Five appear twice (Access Industries, Chevron-ConocoPhillips, Dow Chemical, ExxonMobil and Total), one three times (INEOS), and one four time (Formosa Plastics).

11 The regulation of resin producers stems from their frequent work with hazardous materials. The rules contribute to worker safety, public health, and environmental protection. Chemical companies (including others in addition to resins and rubber producers) developed techniques to reduce, treat, handle and dispose of hazardous waste largely in response to tighter restrictions on emissions of harmful compounds. They also have developed a voluntary, self-regulatory program to improve health, safety and environmental performance – in part to avoid more onerous regulations as well as to improve their public images. Indeed, toxic chemical releases have been reduced 83 percent between 1988 and 2007 as overall production from 1988 to 2008 rose 45 percent (O'Reilly, 2010: 21). Major laws affecting the industry include the Clean Air Act, the Clean Water Act, the Resource Conservation and Recov-ery Act, the Toxic Substance and Control Act, and the Comprehensive Environmental Response Compensation and Liability Act (a.k.a., the Superfund program) (O'Reilly, 2010: 25).

12 Two examples illustrating some of these principles are found in Ohio. Hexion Specialty Chemicals was formed by the merger of Borden Chemical, Resolution Specialty Materials and Resolution Performance Products in 2005, and has made acquisitions since. Dow Chemical's purchase of Rohm and Hass is another. Specialty chemical produc-tion is more resilient in downturns and less energy- and capital-intensive (O'Reilly, 2010: 16-17).

13 The nature of research and development (R & D) varies by product. Specialized products are designed to meet the requirements of specific customers, and basic or exploratory R & D activities are an intrinsic part of their creation. On the other hand, R & D for high-volume commodity products focuses on reducing feedstock, energy and labor cost by improving production processes (O'Reilly, 2010: 23). Other R & D efforts are geared toward improving the performance of existing resins by alloying and blending resins, or incorporating non-plastic materials in plastic re-sins to create composites. New uses of plastics are mentioned in the popular media; examples can be found at Scientific American's website – www.sciam.com – by searching on keywords "plastic" and "rubber."

14 Projecting employment levels for industries is difficult; the most recent data from the U.S. Bureau of Labor Statistics (2010) estimated 38,100 plastic group jobs in Ohio in 2009, part of 505,200 such jobs across the nation. Both are less than what was predicted for 2016. Whether jobs will be regained in an economic recovery and how many they will number in 2016 remains to be seen.

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