Ohio | Department of Development

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

# THE OHIO MOTOR VEHICLE INDUSTRY

## February 2009

**Ted Strickland,** Governor of Ohio
**Lee Fisher,** Lt. Governor of Ohio
Director, Ohio Department of Development

Ohio | Department of Development

Ted Strickland, Governor
Lee Fisher, Lt. Governor

Mark Barbash, Interim Director

Dear Fellow Ohioan:

The Motor Vehicle Industry is facing an unprecedented global transition -- and Ohio, second in the nation for vehicle production, is directly impacted by these changes. From assembly plants to plastic fasteners, Ohio's manufacturers serve the motor vehicle industry, and a wide variety of business sectors depend upon the industry for their revenues.

This report outlines the size, location, and trends of the motor vehicle facilities located in our state. Three-year trends are provided whenever possible. There are detailed profiles on Honda, General Motors, Ford, and Chrysler, as well as an analysis of national trends that will be impacting the big assemblers and the hundreds of Ohio-based suppliers. An Input-Output model of Ohio's economy suggests that more than 370,000 people depend upon the motor vehicle cluster for their jobs and income.

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 a high quality of life that allows for personal fulfillment. Ohio's unique combination of life and work amenities makes our state a place where you can achieve true professional and personal balance.

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,

Mark Barbash
Interim Director
Ohio Department of Development

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# THE OHIO MOTOR VEHICLE INDUSTRY

# FEBRUARY 2009

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## TABLE OF CONTENTS

Page

**Executive Summary** - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 1

**Description of Ohio's Motor Vehicle Industry** 4

The Motor Vehicle Industry's Impact on Ohio's Economy- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 5

Ohio's Strategic Position in Motor Vehicle Assembly 7

Notable Motor Vehicle Industry Manufacturers in Ohio- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 10

Recent Expansion and Attraction Announcements 20

The Concentration of the Industry in Ohio: Gross Domestic Product and Value-Added- - - - - - - - - - - - - - - - - - - - - 22

The Composition of Ohio's Motor Vehicle Industry: Value-Added 24

Three-Year Summaries of Light Vehicle Production in Ohio- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 26

Motor Vehicle Parts: Powertrain and Stamping Operations 29

Motor Vehicle Parts: Other Suppliers - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 32

The Composition of Ohio's Motor Vehicle Industry – Employment at the Plants 36

Industry Wages - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 38

The Distribution of Industry Establishments in Ohio 40

The Distribution of Industry Employment in Ohio- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 42

Foreign Investment in Ohio 43

**Trends** - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 48

Employment 50

Gross Domestic Product- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 52

Value-Added by Ohio’s Motor Vehicle Industry 54

Light Vehicle Production in Ohio and the U.S.- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 56

Capital Expenditures for Ohio’s Motor Vehicle Industry 58

Establishments - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 60

**U.S. Industry Analysis and Outlook** 62

Balance of Trade Trends - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 64

Market Share Trends 68

Recent Trends in Industry Operations - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 70

Technologies in Production Processes and Vehicles 74

The Near and Longer Term Outlooks- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 79

**Assembler Profiles** 82

Chrysler LLC- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 84

Ford Motor Co. 86

General Motors Corp.- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 88

Honda Motor Co. 92

Navistar International Corp. and PACCAR, Inc.- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 94

**Appendices** 95

**Detailed Tables**- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 96

Table A1: Notable Motor Vehicle Companies in Ohio, 2008 97
Table A2: Expansion and Attraction Announcements in Ohio’s Motor Vehicle Industry, 2005-2008 - 105
Table A3: Value-Added in Ohio’s Motor Vehicle Industry, 2002 109
Table A4: Detailed Light Vehicle Assembly Capacity and Production in Ohio- - - - - - - - - - - - - - - - - 111
Table A5: Motor Vehicle Industry Establishments and Employment, Ohio and the U.S., 2006 113

**Detailed Tables** - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 96

Table A6: Motor Vehicle Industry Employment and Pay, Ohio and the U.S., 2006 - - - - - - - - - - - - - 115
Table A7: Establishments and Employment in Ohio's Motor Vehicle Industry, by County, 2006 117
Table A8a: Motor Vehicle Industry Employment Trends in Ohio, 1998-2006- - - - - - - - - - - - - - - - - - 119
Table A8b: Motor Vehicle Industry Employment Trends in the U.S., 1998-2006 120
Table A9: Total and Motor Vehicle Industry Gross Domestic Product, Ohio and the U.S., 1997-2006 121
Table A10: Trends in Value-Added by Group for Ohio and the U.S., 1997-2006 122
Table A11: Light Vehicle Production Trends in Ohio and the U.S., 1987-2007- - - - - - - - - - - - - - - - - 123
Table A12: Trends in Capital Expenditures by Group for Ohio and the U.S., 1997-2006 124
Table A13a: Motor Vehicle Industry Establishment Trends in Ohio, 1998-2006- - - - - - - - - - - - - - - - - 125
Table A13b: Motor Vehicle Industry Establishment Trends in the U.S., 1998-2006 126
Table A14: Exports as a Percentage of Imports – Motor Vehicles, Engines and Parts by Area and Type, 1997-2007 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 127
Table A15a: U.S. Sales of Imported and Domestic Light Vehicles, 1988-2007 129
Table A15b: Percentages of U.S. Sales of Imported and Domestic Light Vehicles, 1988-2007- - - - - - 131
Table A16: Projections of Motor Vehicle Industry Employment, Ohio and the U.S., 2006-2016 133

**NAICS Codes: Industry Definition and Examples**- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 134

**Glossary** 142

**Notes** - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 139

**Sources and References Cited** 145

## EXECUTIVE SUMMARY

- Ohio is at the center of the motor vehicle industry – 74.5 percent of N. American light vehicle production is in Ohio or within 500 miles (805 kilometers) of its borders.

- Approximately 20 percent of the state's manufacturing activity is related to motor vehicle production. With the inclusion of non-manufacturing activities, the total economic output associated with the motor vehicle cluster equals 6.7 percent of Ohio's output.

- At least 17 different models totaling over 1,748,000 light vehicles came from Ohio's seven high-volume light vehicle plants during 2007 – nearly one-sixth of U.S. output and second only to Michigan. These include over 200,000 each of some of the nation's best-selling models: Accords, Cobalts, and Jeeps.

- The three plants assembling cars made 870,000 vehicles – 22.2 percent of U.S. output and second only to Michigan.

- The six plants assembling light trucks made over 878,000 vehicles – about 12.5 percent of U.S. output, and third after Missouri and Michigan.[1]

- 47 companies on Fortune's U.S. 1,000 or Global 500 lists have industry plants in Ohio; six of these maintain world headquarters here.

- Honda is the largest motor vehicle industry manufacturer in Ohio with nearly 12,000 employed in manufacturing operations, followed by General Motors with over 9,100, Ford at almost 8,000, and Cerberus Capital Management (which has the plurality stake in Chrysler and owns Tower Automotive) with 3,700; 21 more companies employ at least 1,000 people here.

- Parts suppliers are smaller but numerous; the 370 tier-1 supplier establishments in Ohio are 9.8 percent of such establishments in N. America, ranking third only to Michigan and Ontario among the surrounding states and provinces.

- 1107,200 people were employed at assembly and supplier plants in 2007, down 28.9 percent from 150,800 in 2000, according to data from ODJFS/LMI; from December, 2007, to December, 2008, employment in the parts group slipped another 1,000, and employment at assembly plants dropped 5,300.

- The industry is diffused across the state – 76 counties have at least one such establishment, but five of every nine jobs were located in Cuyahoga, Hancock, Logan, Lucas, Montgomery, Richland, Shelby, Summit, Trumbull and Union counties.

- The greatest concentrations of industry employment in Ohio occur in metal stamping (21.9 percent of the U.S.) and air-conditioning and brake systems (both 18.4 percent).

- Dozens of companies (or their subsidiaries) from 12 foreign nations employ over 44, 000 people in assembly and parts production in Ohio; 13 of them are on Fortune's Global 500 list.

- Ohio was second in the nation in value-added to motor vehicles and parts during the 1997-2006 period; these strong rankings explain the state's overall position of second in the motor vehicle industry.

- Overall capital expenditures for the industry in Ohio were roughly proportional to value-added during the 1997-2006 period.

- 152 industry investment announcements by 114 companies during the most current three year period (2005-2008) totaling $3.0 billion were recorded by the Ohio Department of Development.

- The latest available data show that overall motor vehicle industry wages/salaries in Ohio – almost $53,500 per year – are $17,000 higher than the overall average for all non-agricultural employment; average wages/salaries within the industry range from $36,400-plus in tire retreading to $70,000 in light vehicle assembly.

# DESCRIPTION OF OHIO'S MOTOR VEHICLE INDUSTRY

Ohio | Department of Development

# THE MOTOR VEHICLE INDUSTRY'S IMPACT ON OHIO'S ECONOMY

## OHIO'S MOTOR VEHICLE CLUSTER

| Industry (NAICS Code) | Output[1] (Billions) | Value Added[1] (Billions) | Employment (Thousands) | Compensation[2] (Billions) |
|---|---|---|---|---|
| Motor vehicles (3361) | $38.4 | $4.7 | 27.7 | $3.2 |
| Motor vehicle Bodies & Trailers (3362) | $5.5 | $0.7 | 9.6 | $0.7 |
| Motor vehicle Parts (3363) | $33.2 | $8.5 | 89.1 | $7.2 |
| Other related industries (32621 & 335911) | $1.2 | $0.4 | 4.4 | $0.3 |
| **Motor vehicle industry subtotal** | **$78.3** | **$14.3** | **130.8** | **$11.4** |
| Other manufacturing industries | $6.6 | $2.3 | 26.7 | $1.5 |
| Non-manufacturing goods (including utilities) | $1.1 | $0.6 | 4.8 | $0.2 |
| **Supporting goods subtotal** | **$7.7** | **$2.9** | **31.5** | **$1.7** |
| **Goods-production subtotal** | **$86.0** | **$17.2** | **162.3** | **$13.1** |
| Transportation and wholesale | $2.8 | $1.6 | 26.3 | $1.0 |
| Retail | $1.9 | $1.2 | 29.9 | $0.6 |
| Business services | $9.9 | $5.4 | 70.1 | $2.9 |
| Personal and social services | $7.3 | $4.5 | 85.1 | $3.4 |
| **Service-providing subtotal** | **$21.9** | **$12.7** | **211.4** | **$7.9** |
| **Total motor vehicle cluster[3]** | **$108.0** | **$30.1** | **371.1** | **$20.0** |
| **Totals** | **$902.4** | **$447.4** | **6,677.8** | **$263.9** |
| **Percent of state total[3]** | **11.9** | **6.7** | **5.5** | **7.5** |

Notes: 1 – Output values indicate of the volume of industry transactions. However, these numbers contain large amounts of duplication since products of some industries are used as materials by others. Value-added estimates avoid some of the duplication inherent in sales data. 2 – Includes the value of benefits as well as wages and salaries. 3 – Subtotals do not sum to totals due to rounding error. Percentages also may reflect rounding error.

Source: Minnesota IMPLAN Group (2008).

- The Ohio motor vehicle industry directly employed 130,800 workers – 16.3 percent of all manufacturing employees in the state.

- A broader view of the industry's role in the economy takes into account a cluster of industries supplying capital equipment, parts, and materials, as well as providing services.

  - An estimated 26,700 Ohio workers made various goods that were incorporated into motor vehicles, bodies, trailers and parts, or were used in the process. Examples of the former include windshields and windows, springs, nuts, bolts, bearings, valves, electronic parts, paints and metal coatings, adhesives, and sealing devices. These were often made of steel, aluminum, glass, rubber, plastics or other chemical products. Examples of the latter include capital equipment and paperboard products.

  - 4,800 more jobs in construction and utility industries depended on presence of the motor vehicle industry here. Altogether, 162,300 jobs in Ohio were directly related to motor vehicle production.

- Additional industries outside of goods production are part of the motor vehicle cluster.

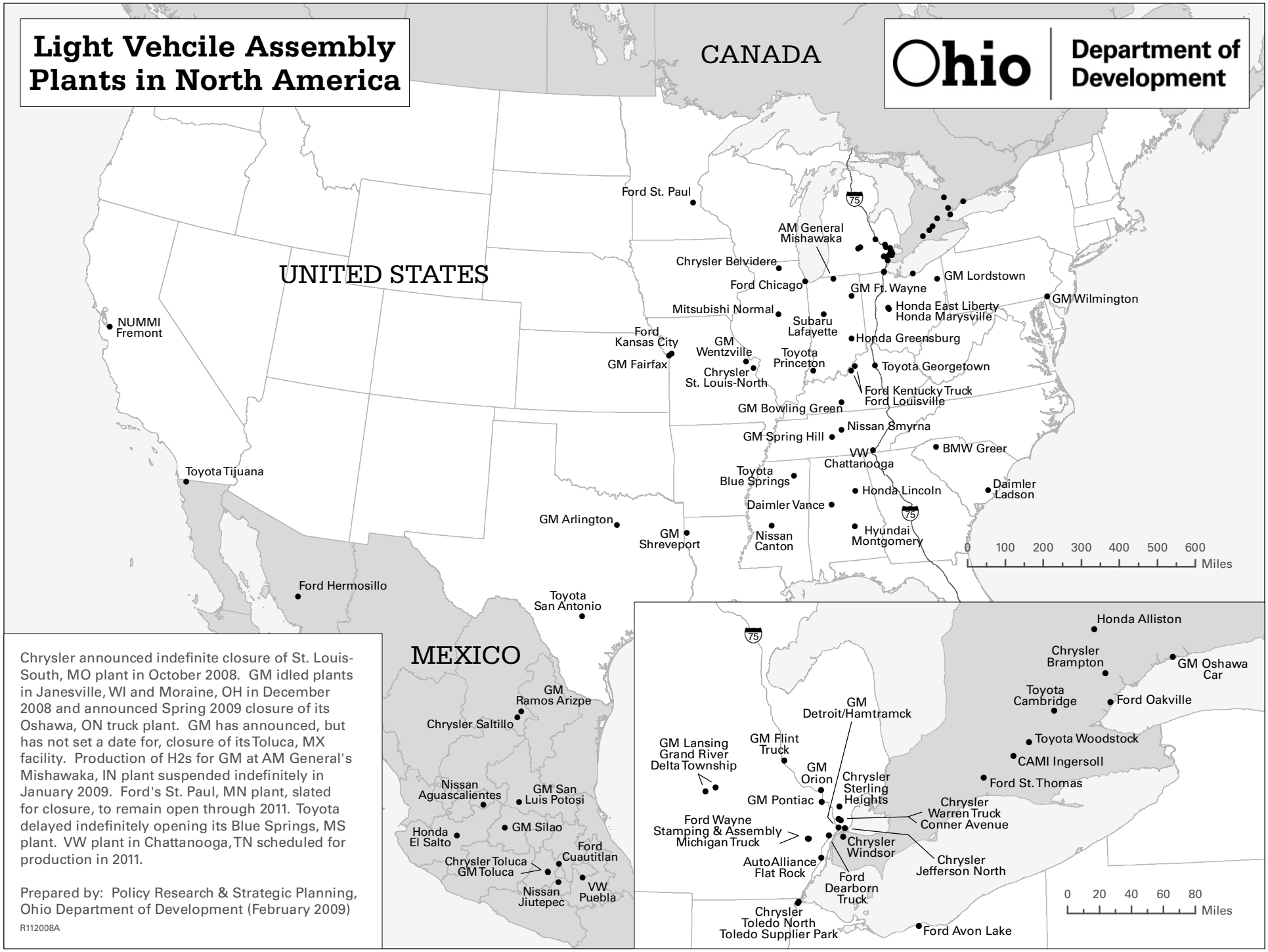
  - Industries within the transportation, wholesale and retail sectors employ employed 56,200 people in the sale and use of motor vehicles, bodies, trailers and parts, including tires and fuel.

  - Industries providing business, personal and social services associated with motor vehicles employed an additional 155,200. Altogether, 211,400 jobs in services sectors – more than the manufacturing subtotal – were concerned with motor vehicles, bodies, trailers and parts and their use.

Combining the impact of the manufacturing and service clusters means that a total of 5.5 percent of all Ohio workers – 371,100 of 6,677,800 – depended on the motor vehicle industry cluster for their livelihood. The value of the goods and services provided amounted to 6.7 percent of the economy. Yet these figures may under estimate the ultimate importance of motor vehicles because they exclude the ripple effect created by the purchases these workers make.

# Light Vehcile Assembly Plants in North America

Ohio Department of Development




Chrysler announced indefinite closure of St. Louis-South, MO plant in October 2008. GM idled plants in Janesville, WI and Moraine, OH in December 2008 and announced Spring 2009 closure of its Oshawa, ON truck plant. GM has announced, but has not set a date for, closure of its Toluca, MX facility. Production of H2s for GM at AM General's Mishawaka, IN plant suspended indefinitely in January 2009. Ford's St. Paul, MN plant, slated for closure, to remain open through 2011. Toyota delayed indefinitely opening its Blue Springs, MS plant. VW plant in Chattanooga, TN scheduled for production in 2011.

Prepared by: Policy Research & Strategic Planning, Ohio Department of Development (February 2009)

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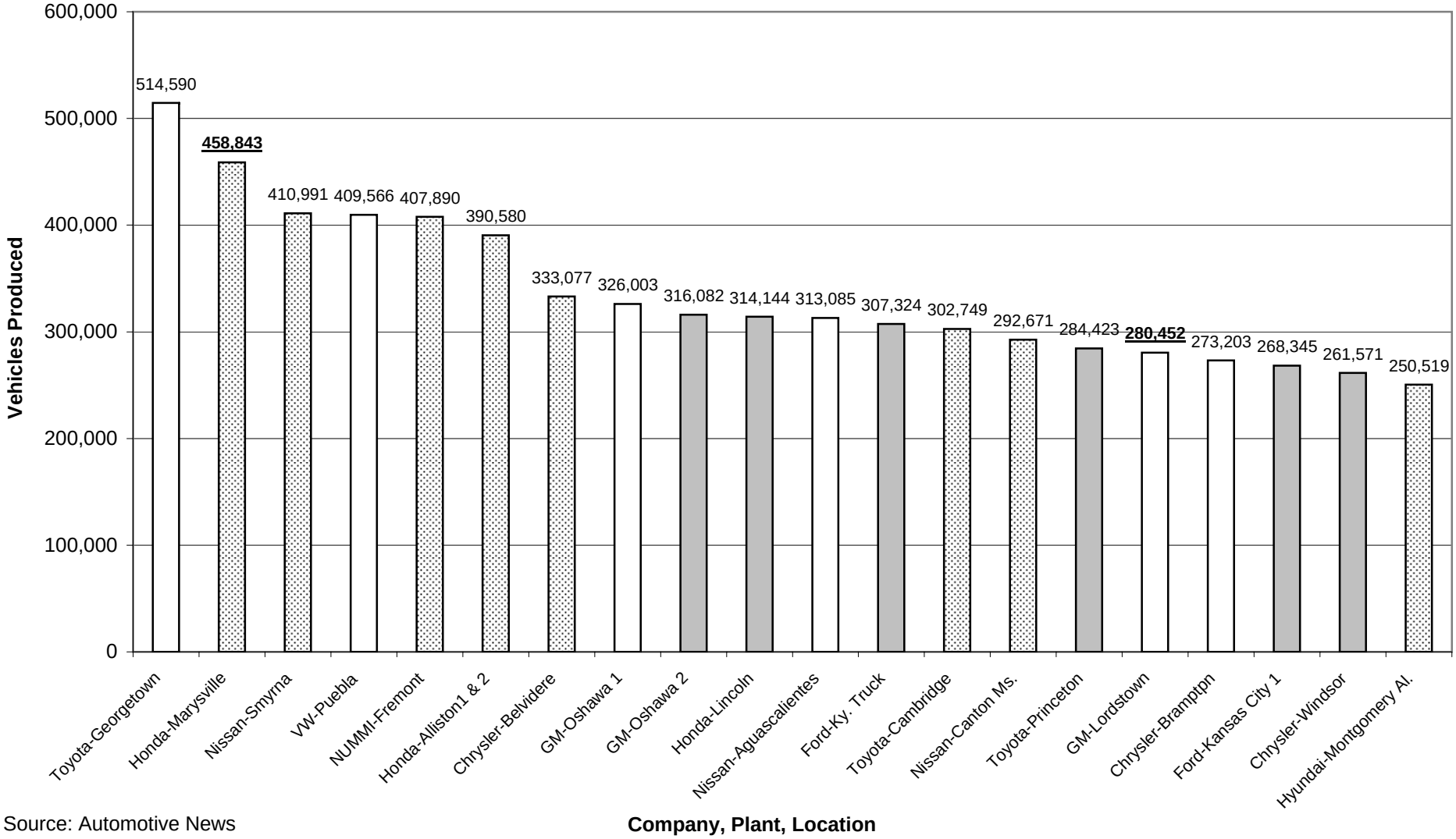
# N. American Light Vehicle Production in 2007:

**82-Plant Total - 15,138,011**

**The 20 Highest-Volume Plants Are Listed Below**

White: Cars  Gray: Light Trucks  Dots: Both




Source: Automotive News

Ohio | Department of Development

**Ted Strickland**, Governor

**Lee Fisher**, Lt. Governor
Director, Ohio Department of Development

# Leading Establishments* in Ohio's Motor Vehicle Industry

## Establishment Location

- ■ Chrysler
- ▲ Ford
- ✖ General Motors
- ● Honda
- ● Other

*Establishments employing 500 or more
**Replaced Toledo South and Stickney

Prepared by:
Ohio Department of Development
Policy Research and Strategic Planning
January 2009

R112008A

## NOTABLE MOTOR VEHICLE INDUSTRY MANUFACTURERS IN OHIO

Forty-seven companies on Fortune magazine's U.S.-1,000 or Global-500 lists have motor vehicle industry establishments in Ohio. Six of them maintain their world headquarters here: Cooper Tire & Rubber, Dana, Eaton, Goodyear Tire & Rubber, Thor Industries, and Worthington Industries. Honda is the largest industry employer with just under 12,000 people in manufacturing operations. (Honda's total employment in Ohio is about 15,000 when research and development and other activities are included. An additional 6,000-plus are employed at companies Honda describes as affiliates.) General Motors (GM) follows with over 9,100 (12,600 when non-manufacturing activities are included), and Delphi, its former parts division, is believed to have around 3,000. Ford employs almost 8,000, and 3,375 work for Chrysler.[2] Other companies employing at least 1,000 in Ohio include ArvinMeritor, Behr & Co., the Commercial Vehicle Group, Cooper Tire & Rubber, the Cypress Group's Cooper-Standard Automotive, Dana, Eaton and Goodyear Tire & Rubber (both include corporate headquarters), Honeywell International, International Automotive Components, Johnson Controls, Navistar International, PACCAR's Kenworth division, PPG Industries, PSA Peugeot-Citreon's Faurecia Exhaust Systems, Qualitor, Showa, Shiloh Industries, Tenneco, Tokai Kogyo, and YUSA.

Establishments with non-motor vehicle industry NAICS codes have been included when their specific products are used by the industry. Examples include Daimler AG's diesel engine rebuilding plant, GM-Isuzu's DMAX facility, Ford's and GM's foundries, and the glass and automotive finishes from PPG.

The map above shows the locations of the 71 manufacturing establishments with 500 or more 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 in Ohio and having at least 50 people at a site.[3] It is organized by NAICS code and includes the city where the site is located. Assembly or parts operations may not be the primary businesses of some of the companies on the list, but their sites are included because their primary NAICS codes or products their clients buy make them as part of the industry.

| Parent/Company/Division | Primary NAICS | City | Jobs at Site^ |
|---|---|---|---|
| Transportation equipment industry codes: | | | |
| 33611: Automobiles and Light-Duty Motor Vehicles | | | |
| BAE Systems*/BAE Systems Survivability Systems | 336111 | Fairfield | 250 |
| BAE Systems*/BAE Systems Survivability Systems/Centigon USA | 336111 | Fairfield | 90 |
| GM*[6]/Lordstown Complex: Assembly and Metal Center[11] | 336111/33637 | Lordstown | 2,756 |
| Honda*/E. Liberty Assembly Plant[6] | 336111 | E. Liberty | 2,500 |

| Parent/Company/Division | Primary NAICS | City | Jobs at Site^ |
|---|---|---|---|
| 33611: Automobiles and Light-Duty Motor Vehicles (continued) | | | |
| Honda*/Marysville Assembly Plant[6] | 336111 | Marysville | 5,300 |
| Honda affiliate:[13] Jefferson Industries | 336111 | W. Jefferson | 370 |
| Honda affiliate:[13] Toyo Denso/Weastec | 336111 | Seaman | 59 |
| Visteon* | 336111 | Springfield | 61 |
| Chrysler*[3, 6]/Toledo North Assembly Plant | 336112 | Toledo | 1,275 |
| Chrysler*[3, 6]/Toledo Supplier Park[4] | 336112 | Toledo | 500 |
| Ford*[6]/Ohio Assembly Plant | 336112 | Avon Lake | 2,300 |
| 33612: Heavy Duty-Trucks[14] | | | |
| Navistar International*/International Truck & Engine (Lagonda) | 33612 | Springfield\| | |
| Navistar International*/International Truck & Engine (Urbana Rd.) | 33612 | Springfield\|→ | 1,000-1,400 |
| Navistar International*/International Truck & Engine (W. County Line) | 33612 | Springfield\| | |
| PACCAR*/Kenworth[14] | 33612 | Chillicothe | 1,000-1,500 |
| 3362: Motor Vehicle Bodies and Trailers | | | |
| Commercial Vehicle Group[5] | 336211 | Norwalk | n.a. |
| Commercial Vehicle Group/Trim Systems Operating | 336211 | Chillicothe | 178 |
| Johnson Controls* | 336211 | Dayton | 500 |
| Qualitor/International Brake Industries | 336211 | Lima | 153 |
| Temasek Holding/Kidron | 336211 | Kidron | 500 |
| AB Volvo*-Hitachi*/Euclid-Hitachi Heavy Equipment | 336212 | Cleveland | 457 |
| Berkshire-Hathaway*/Scott Fetzer/Stahl | 336212 | Cardington | 107 |
| Berkshire-Hathaway*/Scott Fetzer/Stahl | 336212 | Wooster | 150 |
| Thor Industries*/Airstream | 336213 | Jackson Center | 350 |
| 33631: Motor Vehicle Gasoline Engines and Engine Parts | | | |
| Dover*/Dover Diversified/Wiseco Piston | 336311 | Mentor | 265 |
| Honda*/Honda Foundry/Celina Aluminum Precision Technology | 336311 | Celina | 480 |

| Parent/Company/Division | Primary NAICS | City | Jobs at Site^ |
|---|---|---|---|
| 33631: Motor Vehicle Gasoline Engines and Engine Parts | | | |
| Atlas Industries | 336312 | Fremont | 134 |
| Atlas Industries | 336312 | Gibsonburg | 302 |
| 33631: Motor Vehicle Gasoline Engines and Engine Parts (continued) | | | |
| Atlas Industries | 336312 | Tiffin | 96 |
| Ford*[6]/Cleveland Engine Plant 1[8] | 336312 | Brook Park | 0 |
| Ford*[6]/Cleveland Engine Plant 2 | 336312 | Brook Park | 813 |
| Ford*[6]/Lima Engine Plant | 336312 | Lima | 730 |
| Honda*/Anna Engine Plant[6] | 336312 | Anna | 2,800 |
| ThyssenKrupp*/ThyssenKrupp Atlas[1] | 336312 | Fostoria | 80 |
| 33632: Motor Vehicle Electrical and Electronic Equipment | | | |
| ATC Group | 336321 | Geneva | 100 |
| ATC Group/ATC Lighting & Plastics | 336321 | Geneva | 60 |
| ATC Group/ATC Lighting & Plastics/Advanced Technology | 336321 | Geneva | 250 |
| ATC Group/ATC Lighting & Plastics/Lighting Products | 336321 | Andover | 155 |
| ATC Group/ATC Lighting & Plastics/Lighting Products | 336321 | Andover | 84 |
| Stanley Electric/Stanley Electric US | 336321 | London | 780 |
| Delphi* | 336322 | Warren | 120 |
| Honda affiliate:[13] Toyo Denso/Weastec | 336322 | Greenfield | 158 |
| Honda affiliate:[13] Toyo Denso/Weastec | 336322 | Hillsboro | 222 |
| Magna International*/Decoma International | 336322 | Toledo | 100 |
| Mitsubishi Electric*/Mitsubishi Electric Automotive America | 336322 | Mason | 422 |
| Stoneridge | 336322 | Mansfield | 500 |
| 33633: Motor Vehicle Steering and Suspension Components | | | |
| Honda affiliate:[13] Yamada Mfg./Yamada N. America | 33633 | S. Charleston | 350 |
| Showa/American Showa | 33633 | Blanchester | 530 |

| Parent/Company/Division | Primary NAICS | City | Jobs at Site^ |
|---|---|---|---|
| 33633: Motor Vehicle Steering and Suspension Components | | | |
| Showa/American Showa | 33633 | Sunbury | 600 |
| ThyssenKrupp*/ThyssenKrupp Bilstein of America[1] | 33633 | Hamilton | 200 |
| 33634: Motor Vehicle Brake Systems | | | |
| Aisin Seiki*, et.al./ADVICS N. America/ADVICS Mfg. Ohio | 33634 | Lebanon | 625 |
| Cooper-Standard Automotive* | 33634 | New Lexington | 352 |
| 33634: Motor Vehicle Brake Systems (continued) | | | |
| Dana*/Coupled Products | 33634 | Upper Sandusky | 355 |
| Eaton* | 33634 | Cleveland | 200 |
| Honda affiliate:[13] Nissin Kogyo/Nissin Brake Ohio (f.k.a. Findlex) | 33634 | Findlay | 670 |
| Qualitor/Hebco Products | 33634 | Bucyrus | 862 |
| 33635: Motor Vehicle Transmissions and Parts | | | |
| ArvinMeritor | 33635 | Newark | 600 |
| Ford*[6]/Sharonville Transmission Plant | 33635 | Cincinnati | 1,478 |
| GM*[6]/GMPT Toledo Transmission | 33635 | Toledo | 1,663 |
| Honda affiliate:[13] Atsumitec/Ada Technologies | 33635 | Ada | 60 |
| Honda*/Russell's Point Transmission Plant[6] | 33635 | Russell's Point | 900 |
| Honda affiliate:[13] Kaneta Kogyo/Bucyrus Precision Tech | 33635 | Bucyrus | 189 |
| 33636: Motor Vehicle Seating and Interior Trim | | | |
| Honda affiliate:[13] TS Trim Industries, Inc. | 33636 | Athens | 360 |
| International Automotive Components | 33636 | Sidney | 350 |
| Johnson Controls*/Johnson Controls Interiors | 33636 | Oberlin | 250 |
| Magna International*/Intier Automotive Seating | 33636 | Strongsville | 60 |
| Taichi-S[15]/Tachi-S Engineering USA/Setex | 33636 | St. Marys | 600 |

| Parent/Company/Division | Primary NAICS | City | Jobs at Site^ |
|---|---|---|---|
| 33637: Motor Vehicle Metal Stampings | | | |
| American Trim | 33637 | Sidney | 600 |
| ArcelorMittal*/Dofasco/Powerlasers | 33637 | Pioneer | 115 |
| Chrysler*[3, 6]/Twinsburg Stamping Plant | 33637 | Twinsburg | 900 |
| Commercial Vehicle Group[5] | 33637 | Shadyside | n.a. |
| Ernie Green Industries/Florida Production Engineering | 33637 | New Madison | 230 |
| Ford*[6]/Walton Hills Stamping Plant | 33637 | Walton Hills | 607 |
| GM*[6]/GMPT Parma | 33637 | Parma | 1,040 |
| GM*[6]/Mansfield Metal Center | 33637 | Mansfield | 1,593 |
| Honda affiliate:[13] TS Tech/TS Tech N. America | 33637 | Reynoldsburg | 88 |
| 33637: Motor Vehicle Metal Stampings (continued) | | | |
| Honda affiliate:[13] Yanagawa Seiki/YSK | 33637 | Chillicothe | 250 |
| Magna International*/Decoma International/Decoma Systems Integration | 33637 | Toledo | 100 |
| Magna International*/Decoma International/Norplas Industries | 33637 | Northwood | 100 |
| Midway Products Group/Findlay Products | 33637 | Findlay | 200 |
| Midway Products Group/P & A Industries | 33637 | Findlay | 200 |
| Midway Products Group/Progressive Stamping | 33637 | Ottoville | 250 |
| M-Tek | 33637 | Upper Sandusky | 600 |
| Shiloh Industries | 33637 | Valley City | 1,200 |
| Tower Automotive[6]/Tower Automotive Operations USA I | 33637 | Bluffton | 217 |
| Worthington Industries*/Gerstenslager | 33637 | Wooster | 537 |
| 33639: Other Motor Vehicle Parts | | | |
| Behr/Behr Dayton Thermal Products[2] | 336391 | Dayton | 1,400 |
| Cooper-Standard Automotive* | 336391 | Archbold | 240 |
| ArvinMeritor | 336399 | Cleveland | 81 |
| ArvinMeritor | 336399 | Kenton | 800 |
| Blackhawk Automotive Plastics | 336399 | Salem | 680 |

| Parent/Company/Division | Primary NAICS | City | Jobs at Site^ |
|---|---|---|---|
| 33639: Other Motor Vehicle Parts | | | |
| Blackstone Group LP/ TRW Automotive Holdings* | 336399 | Cleveland | 50 |
| Blackstone Group LP/ TRW Automotive Holdings*[6] | 336399 | Fayette | 210 |
| Blackstone Group LP/ TRW Automotive Holdings* | 336399 | Toledo | 55 |
| Chrysler*[3, 6]/Toledo Machining Plant | 336399 | Perrysburg | 700 |
| Commercial Vehicle Group[5] | 336399 | New Albany | 125 |
| Commercial Vehicle Group/Trim Systems Operating | 336399 | New Albany | 80 |
| Dana* | 336399 | Maumee | 100 |
| Dana* | 336399 | Toledo | 300 |
| Dana*/Coupled Products | 336399 | Wharton | 200 |
| Delphi* | 336399 | Dayton | 1,200 |
| Delphi* | 336399 | Dayton | 700 |
| Delphi* | 336399 | Kettering | n.a. |
| Delphi* | 336399 | Vienna | 120 |
| Delphi* | 336399 | Warren | 99 |
| Delphi* | 336399 | Warren | 500 |
| Delphi* | 336399 | Warren | 200 |
| Delphi* | 336399 | Youngstown | 100 |
| Eaton*-Inoac | 336399 | Fremont | 400 |
| Ernie Green Industries/Marion Industries | 336399 | Marion | 753 |
| F-Tech/F&P America Mfg. | 336399 | Troy | 650 |
| Ford*[6]/Automotive Components Holding (f.k.a. a Visteon* plant)[9] | 336399 | Sandusky | 1,000 |
| Hayes Lemmerz International* | 336399 | Akron | 230 |
| Hitachi*/Hitachi Metals America/AAP St. Marys | 336399 | St. Marys | 470 |
| Honda affiliate:[13] KTH Parts Industries | 336399 | Saint Paris | 770 |
| Honda affiliate:[13] KTH Parts Industries/Kalida Mfg. | 336399 | Kalida | 250 |
| Honda affiliate:[13] Nihon Plast/Neaton Auto Products | 336399 | Eaton | 705 |
| Honda affiliate:[13] Tanaka Seimitsu Kogyo/FT Precision | 336399 | Fredericktown | 200 |
| Honda affiliate:[13] TS Tech/TS Tech N. America/TS Tech USA | 336399 | Reynoldsburg | 400 |

| Parent/Company/Division | Primary NAICS | City | Jobs at Site^ |
|---|---|---|---|
| 33639: Other Motor Vehicle Parts (continued) | | | |
| Honda affiliate:[13] Yachiyo Industry/AY Mfg. | 336399 | Columbus | 200 |
| Honda affiliate:[13] Yutaka Giken/Cardington Yutaka Technologies | 336399 | Cardington | 750 |
| Honeywell International, Inc.* | 336399 | Fostoria | 900 |
| Honeywell International, Inc.* | 336399 | Greenville | 325 |
| INA Holding Schaffler/LuK/LuK Clutch Systems | 336399 | Wooster | 980 |
| International Automotive Components | 336399 | Wauseon | 600 |
| Johnson Controls*/Johnson Controls Interiors | 336399 | Northwood | 170 |
| Kongsberg Automotive Holdings/Kongsberg Driveline Systems II | 336399 | Van Wert | 750 |
| Lear*[7] | 336399 | Zanesville | 300 |
| Magna International*/Decoma International/Decoma Modular Systems | 336399 | Toledo | 100 |
| Magna International*/Intier Automotive Seating | 336399 | Warren | 250 |
| Modine Mfg.* | 336399 | Pemberville | 250 |
| Morioku/Greenville Technology | 336399 | Greenville | 672 |
| Pacific Industrial/Pacific Industries USA/Pacific Mfg. Ohio | 336399 | Fairfield | 500 |
| Pacific Industrial/Pacific Industries USA/Takumi Stamping | 336399 | Fairfield | 150 |
| Parker Hannifin Corp.* | 336399 | Wickliffe | 271 |
| PSA Peugeot-Citreon*/Faurecia Exhaust Systems | 336399 | Franklin | 400 |
| PSA Peugeot-Citreon*/Faurecia Exhaust Systems | 336399 | Toledo | 1,200 |
| PSA Peugeot-Citreon*/Faurecia Exhaust Systems | 336399 | Troy | 300 |
| Sankei Giken/Newman Technology | 336399 | Mansfield | 850 |
| Sanoh Industrial/Sanoh America (f.k.a. Hisan) | 336399 | Findlay | 733 |
| Sanoh Industrial/Sanoh America (f.k.a. Hisan) | 336399 | Mt. Vernon | 224 |
| Tenneco* | 336399 | Kettering | 400 |
| Tenneco* | 336399 | Milan | 450 |
| Tenneco* | 336399 | Napoleon | 404 |
| Tokai Kogyo/Green Tokai | 336399 | Brookville | 600 |
| Tower Automotive[6]/Tower Automotive Operations USA I | 336399 | Bellevue | 163 |
| Toyota*/Taiho Kogyo/Taiho of America | 336399 | Tiffin | 100 |

| Parent/Company/Division | Primary NAICS | City | Jobs at Site^ |
|---|---|---|---|
| The Related Industries: | | | |
| 32621: Tires | | | |
| Cooper Tire & Rubber*[6] | 326211 | Findlay | 1,192 |
| Goodyear Tire & Rubber*[12] | 326211 | Akron | 3,000 |
| | | | |
| 335911: Storage Batteries | | | |
| Johnson Controls*/Battery Group | 335911 | Holland | 456 |
| | | | |
| Miscellaneous establishments whose products become parts of motor vehicles: | | | |
| Commercial Vehicle Group/Trim Systems Operating | 31332 | Dublin | 240 |
| PPG Industries* | 32551 | Cleveland | 602 |
| PPG Industries* | 32551 | Crestline | 700 |
| PPG Industries* | 32551 | Delaware | 465 |
| Illinois Tool Works*/Tomco | 326199 | Bryan | 270 |
| International Automotive Components | 326199 | Fremont | 304 |
| International Automotive Components | 326199 | Huron | 700 |
| Textron*/Kautex[7] | 326199 | Wilmington | 160 |
| Toledo Molding & Die | 326199 | Delphos (Allen) | 130 |
| Toledo Molding & Die | 326199 | Delphos (Van Wert) | 85 |
| Toledo Molding & Die | 326199 | Tiffin | 310 |
| Cooper-Standard Automotive* | 32622 | Bowling Green | 500 |
| Cooper-Standard Automotive* | 32622 | Bowling Green | 350 |
| Teleflex* | 32622 | Grand River | 56 |
| Tokai Kogyo/DTR Industries | 32622 | Bluffton | 750 |
| Bridgestone*/Bridgestone AMP | 326291 | Upper Sandusky | 100 |
| YUSA | 326291 | Washington C.H. | 1,046 |
| Asahi Glass/AGC Automotive[1] | 327215 | Bellefontaine | 500 |
| Asahi Glass-PPG Industries*/Belletech (a joint venture with PPG*)[1] | 327215 | Bellefontaine | 150 |
| Guardian Industries | 327215 | Millbury | 225 |

| Parent/Company/Division | Primary NAICS | City | Jobs at Site^ |
|---|---|---|---|
| Guardian Industries | 327215 | Upper Sandusky | 500 |
| Ford*[6]/Cleveland Casting Plant[7] | 331511 | Brook Park | 1,067 |
| GM*[6]/GMPT Defiance Foundry | 331511 | Defiance | 1,493 |
| Dana*/Daido Metal | 331525 | Bellefontaine | 372 |
| Daimler*/Detroit Diesel Remanufacturing | 333618 | Byesville | 500 |
| GM*[6]/DMAX[10] (a joint venture with Isuzu Motors*) | 333618 | Moraine | 600 |
| Cummins*/Cummins Filtration/Kuss | 333999 | Findlay | 280 |

Notes: ^ – figures from Harris (2008) unless otherwise noted, sites with less than 50 jobs excluded; * – a Fortune U.S. 1,000 or Global 500 company; 1) jobs figure from LexisNexis (2008); 2) jobs figure is not current, but is latest available; 3) Daimler AG retains 19.9 percent of Chrysler, and Fiat recently acquired a 35 percent stake from Cerberus Capital; 4) perhaps 1,700 more work at the site, but only 500 work for Chrysler; 5) jobs figure from Burns (2009); 6) jobs figures from company website or ODOD (2008) sources; 7) scheduled to close in 2009; 8) may reopen in 2009; 9) jobs figure from Zelm (2008); 10) Dirr (2008a) reported 876; 11) jobs figures combined for Lordstown assembly and metal fabrication plants; second shift will be cut in 2009, leaving only 1,400 in assembly (Gearino, 2009); (12) jobs figure from Crain's Cleveland Business (2008) includes headquarters; 13) list compiled from Honda's and others' websites; 14) no one credible figure available; 15) Nissan* own 12 percent; n.a. – not available.

See Table A1

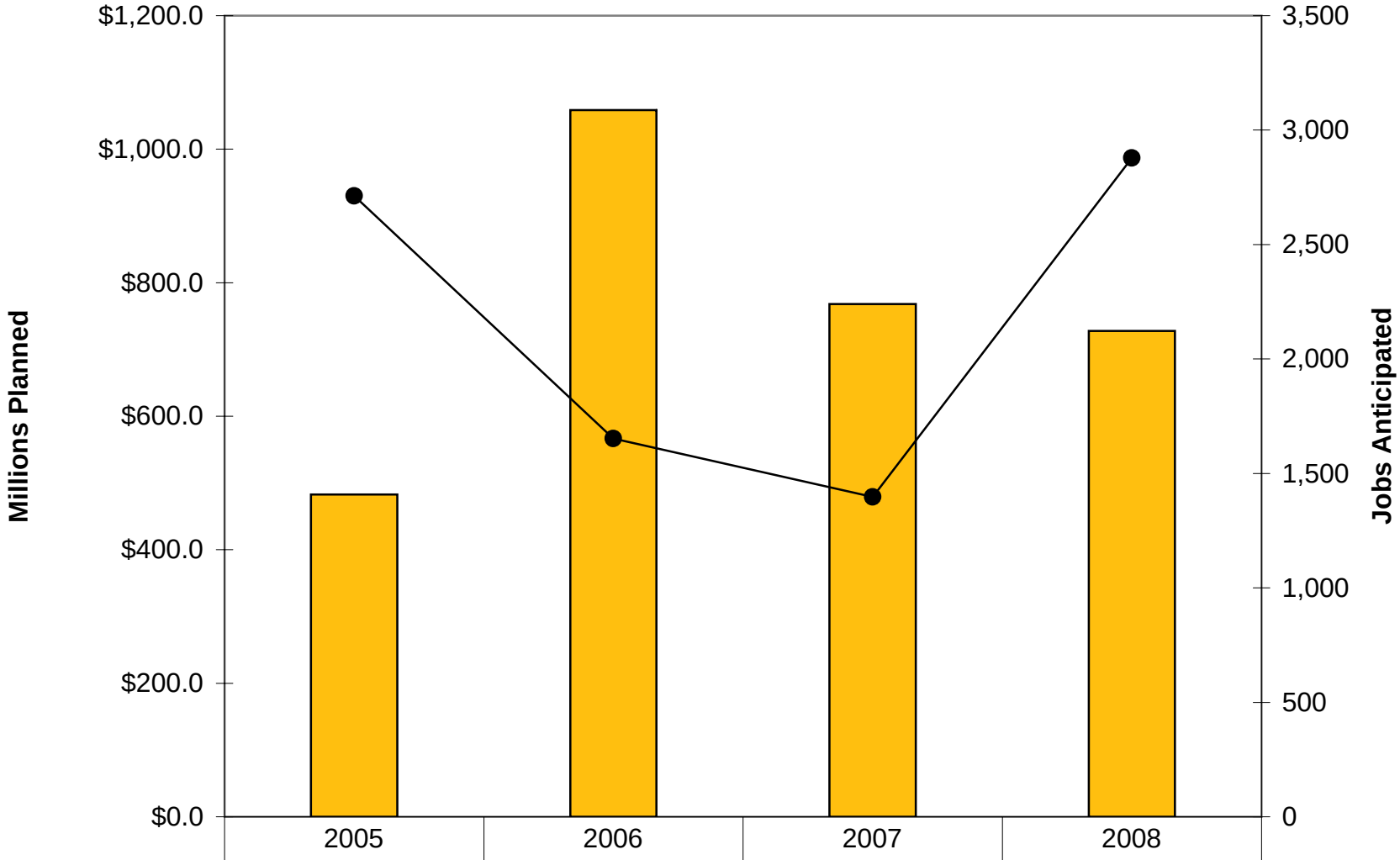
Sources: Blade Staff (2008), Burns (2009), Crain's Cleveland Business (2008), Dirr (2008a), Gearino (2009), Harris (2008), Jarman (2008), Lexis-Nexis (2008), ODOD (2008), Schoenberger (2008d), Zelm (2008), and various company websites.

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 1-800-848-1300, or 614-466-2116 (DL, 1/09).

Ohio Department of Development

# Investment Announcements in Ohio's Motor Vehicle Industry, 2005-2008

Four-Year Totals: $3,037.4 Million; 8,640 Jobs




| | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|
| Millions Planned | $482.8 | $1,058.7 | $768.1 | $727.8 |
| New Jobs Anticipated | 2,713 | 1,652 | 1,397 | 2,878 |

Source: Policy Research & Strategic Planning

## RECENT EXPANSION AND ATTRACTION ANNOUNCEMENTS

From 2005 through 2008 the Ohio Dept. of Development recorded 152 investment announcements by 114 companies in the state's motor vehicle industry totaling $3 billion (B). Over 8,600 new jobs and 6.36 million (M) square feet of space are anticipated when the projects are completed. The vast majority of these – $2.6B, almost 6,700 jobs, and 5.1M square feet – are in the parts group (NAICS 3363 and products specifically for motor vehicles from non-transportation equipment industries). Over $397M is being invested in assembly and chassis plants (NAICS 3361), with the remaining $36.2M for establishments making bodies and trailers (NAICS 3362). Almost 35 percent of the investment – $1.06B – occurred in 2006. One-third of the anticipated new jobs were announced in 2008.

General Motors Corp. (GM) led all assemblers in Ohio by investing almost $1.5B during the four-year period.[4] Ford followed with $277M. Honda invested $116.9M, with its affiliates collectively adding another $98.9M. PACCAR's Kenworth division planned investments totaled $68M, and Cerberus, which owns Chrysler and Tower Automotive, planned to invest $32.6M. Thirty parts companies announced investments of at least $10M during the last four years, but only Bridgestone planned over $100M.

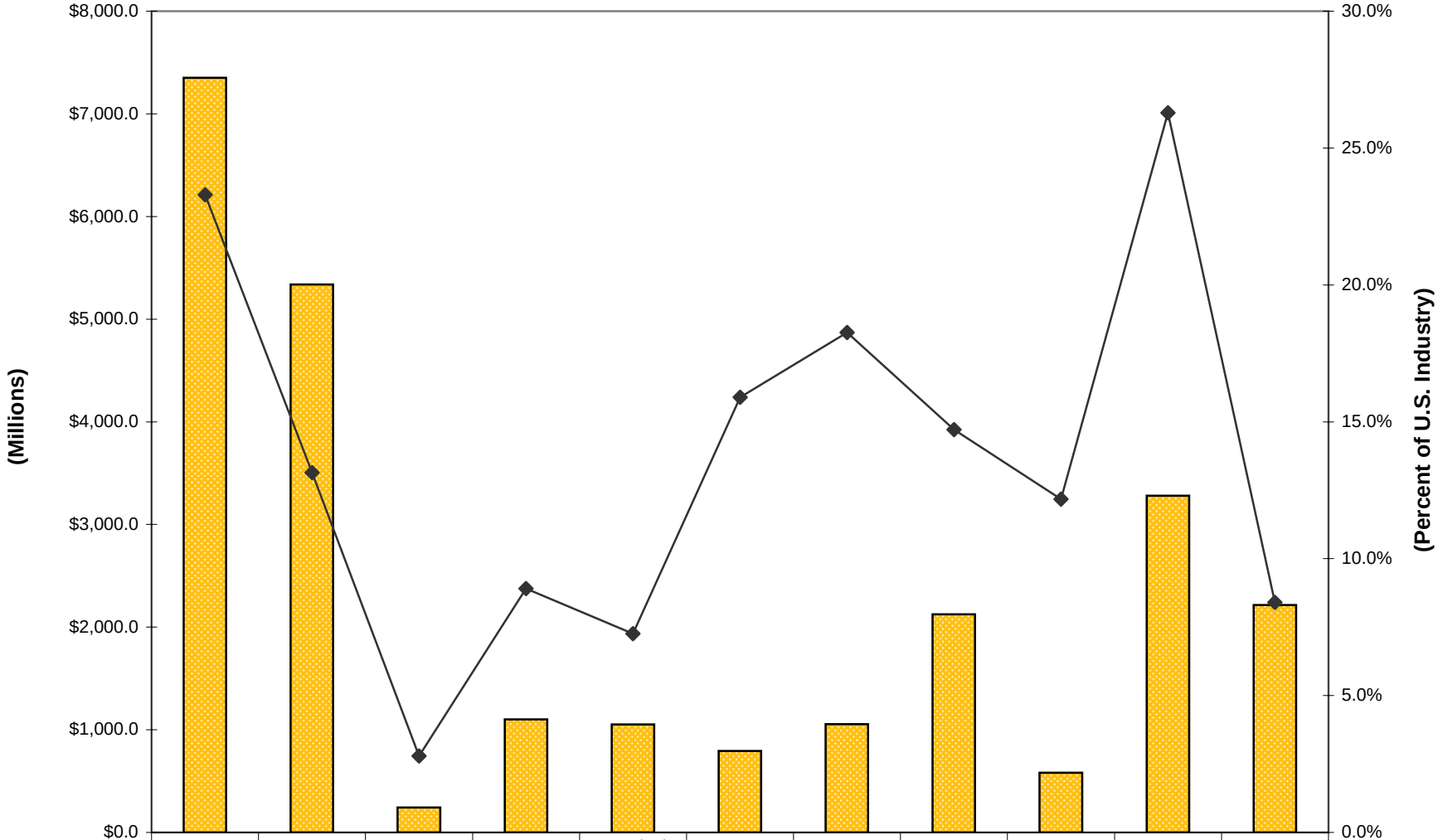
Assemblers also made nine of the 10 largest individual investments during 2005-2008. The largest was $462.8M for GM's transmission plant in Toledo in 2006. The company followed that with another $332M for the same plant in 2007, and $317M for its Lordstown assembly plant in 2008. All of the remaining top 10 investments were for parts operations. Kenworth and Honda announced smaller investments in their assembly plants.

These counts are part of the Ohio Private Investment Survey annually compiled by Policy Research & Strategic Planning (2008, 2009). A major investment must meet at least one of the following criteria: 20,000 square feet of new space; $1M to be spent for land, building(s), or equipment; or 50 new jobs. Many of the major investments are phased in over a two-to-three year cycle, with production and employee counts phased in after project completion.

See Table A2

Ohio Department of Development

# Value-Added by Subgroup in Ohio's Motor Vehicle Industry, 2002




| | Cars & Heavy-Duty Trucks | Light Trucks | Bodies & Trailers | Parts: Gas Engns. | Parts: Elec'l & Elec'c Eqpt. & Strg. Batt. | Parts: Steering & Spnsn. | Parts: Brake Systems | Parts: Trnsmsn. & Power Train | Parts: Seating & Interior Trim | Parts: Stamping | Parts: Tires & Others |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Value-Added in Ohio | $7,350.0 | $5,336.7 | $244.0 | $1,100.4 | $1,051.3 | $792.4 | $1,053.4 | $2,124.0 | $581.8 | $3,278.9 | $2,214.5 |
| Percent of U.S. | 23.3% | 13.1% | 2.8% | 8.9% | 7.3% | 15.9% | 18.3% | 14.7% | 12.2% | 26.3% | 8.4% |

Source: U.S. Census Bureau

## THE CONCENTRATION OF THE INDUSTRY IN OHIO: GROSS DOMESTIC PRODUCT AND VALUE-ADDED

While gross domestic product data from the U.S. Bureau of Economic Analysis (2008a) show that the motor vehicle industry overall (NAICS 3361-3) is concentrated in Ohio, value-added data provide additional specific information about which segments of the industry are more or less concentrated here. The chart above shows that some industries are exceptionally concentrated in Ohio. These include stamping operations – 26.3 percent of the national total, the combination of cars and heavy-duty trucks – 23.3 percent, brake systems – 18.4 percent, and steering and suspension – 15.9 percent. Other segments are less concentrated here: light trucks – 13.1 percent, seats and interior trim – 12.2 percent, engines and engine parts – 8.9 percent, tires and other parts – 8.4 percent, and electrical and electronic equipment and storage batteries – 7.3 percent.

Data shown separately in table A3 add further detail to the portrait above. It shows that the production of gasoline engines and engine parts (336312) is concentrated in Ohio,[5] but not the production of carburetor, pistons, rings, and valves (336311). The production of other motor vehicle parts (33639) in Ohio is about twice the concentration of tire (32621) production. Finally, the production of motor vehicle bodies (336211) is slightly concentrated in Ohio, but not the production of truck and travel trailers, motor homes, or campers.

The latest available data (2006) from the Annual Survey of Manufactures (ASM) shows that Ohio ranked second only to Michigan in assembly operations and parts production. The state ranked eighth in body and trailer production. Overall, Ohio ranked second in industry production (U.S. Bureau of the Census, 2008a).

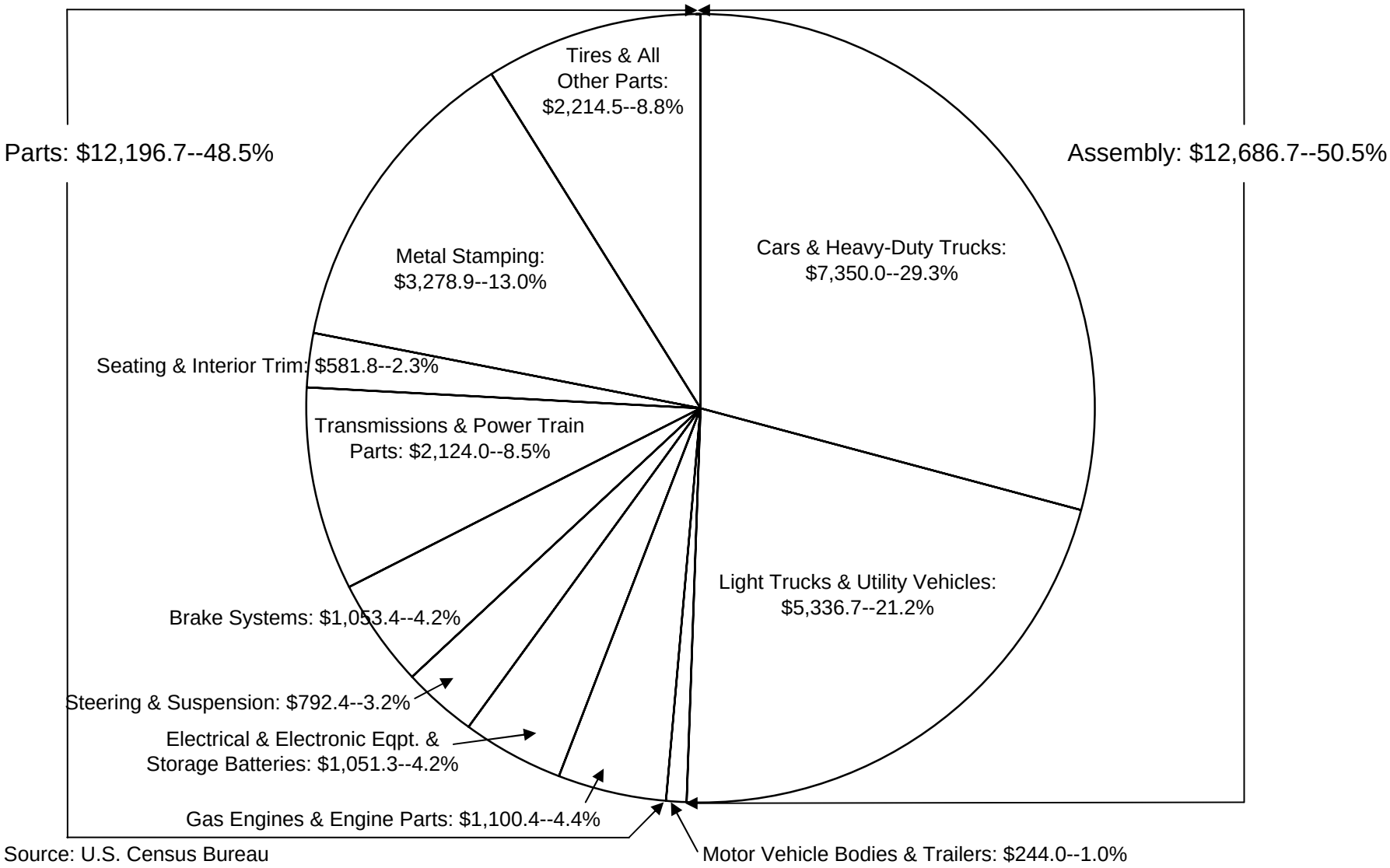
See Table A3

Ohio Department of Development

# Value-Added by Subgroup in Ohio's Motor Vehicle Industry: 2002

(in millions, except percentages)

Total: $25,127.4--100.0%




Source: U.S. Census Bureau

## THE COMPOSITION OF OHIO'S MOTOR VEHICLE INDUSTRY: VALUE-ADDED

Value-added data from the most recent Census of Manufactures provide insight into the composition of the motor vehicle industry in Ohio and a basis for comparisons with other states and the country as a whole.

The chart above illustrates the relative distribution of motor vehicle industry output, usually by industry subgroups. Assembly operations (NAICS 3361) were 50.5 percent of industry production in the state. In turn, assembling light trucks contributed 21.2 percent of industry output, while assembly of cars and heavy-duty trucks combined to add 29.3 percent.[6]

Parts production – including tires and storage batteries – was 48.5 percent of motor vehicle industry output in Ohio. Metal stamping (33637) is the largest industry in the parts group with 13.0 percent of industry output, followed by transmissions and power trains (33635) with 8.2 percent. The remaining industries and sub-groups each comprise less than 5.0 percent of industry value-added in the state, although tires (32621) and other parts (33639) combined are 8.8 percent of the total. Manufacturing bodies and trailers (3362) constitutes just one percent of industry output in Ohio.

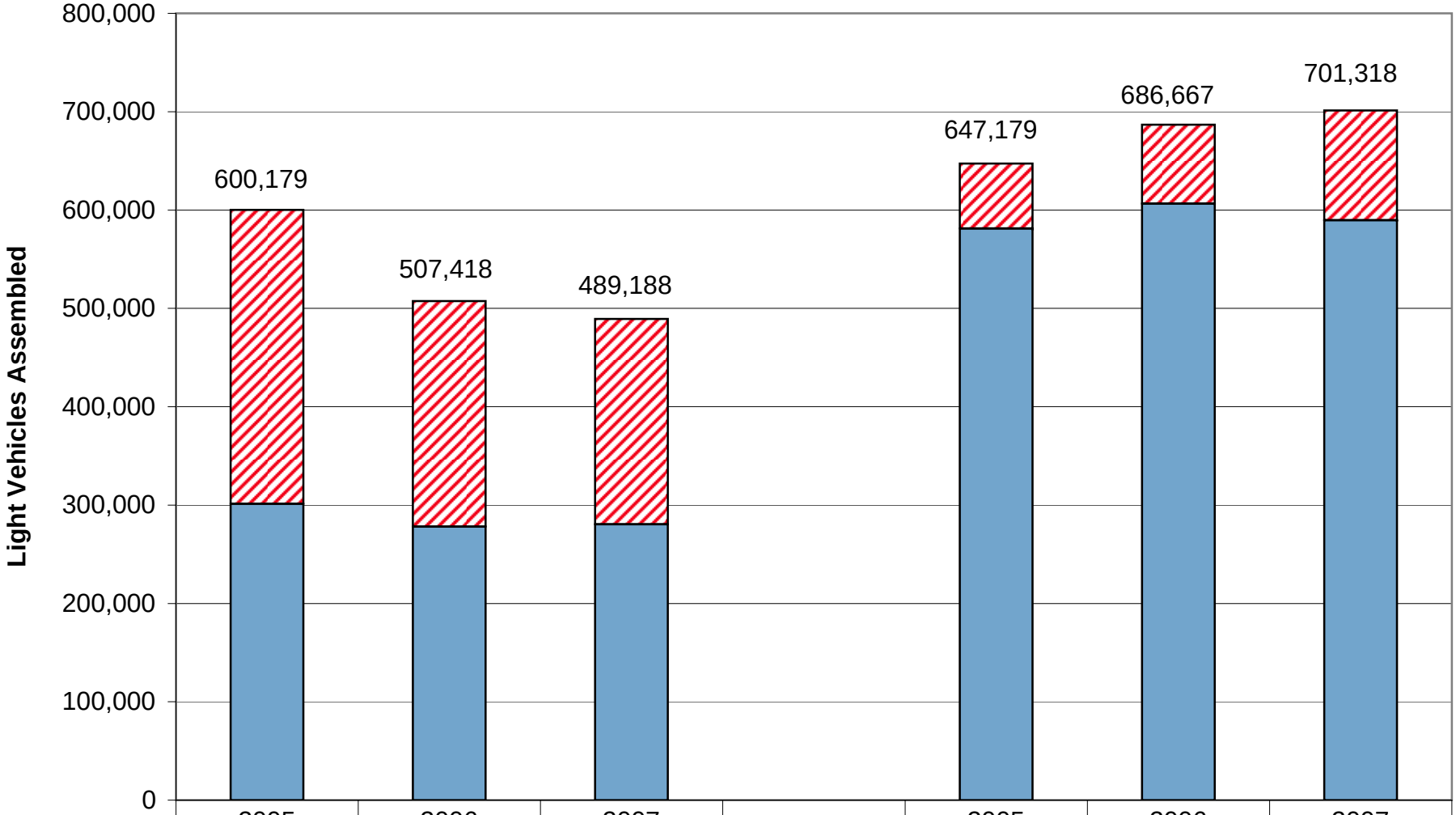
The chart above also illustrates how much of the motor vehicle industry in Ohio is attributable to just six companies. Chrysler, Ford, General Motors, Honda, Navistar International, and PACCAR are high-volume assemblers, producing nearly all of the value-added in assembly operations. They also dominate some of the parts industries. For example, assemblers have long made almost all of their own engines (4.4 percent of value-added), transmissions (8.5 percent of value-added), and do much of their own metal stamping (13 percent of value-added). Therefore, it appears that those six companies were directly responsible for over 60 percent of motor vehicle industry output in Ohio.

See Table A3

Ohio Department of Development

# A Three Year Summary of Light Vehicle Production in Ohio:

## General Motors and Honda




| | 2005 | 2006 | 2007 | | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|
| Light Trucks | 299,020 | 229,242 | 208,736 | | 66,116 | 80,109 | 111,762 |
| Cars | 301,159 | 278,176 | 280,452 | | 581,063 | 606,558 | 589,556 |
| | General Motors | | | | Honda | | |

Source: Ward's

## THREE-YEAR SUMMARIES OF LIGHT VEHICLE PRODUCTION IN OHIO

The charts on the preceding and following pages summarize light vehicle production in Ohio during the last three years by each of the four high-volume assemblers in N. America. Each had one or two assembly plants in Ohio in this time period.

The charts show that Honda is the highest-volume assembler in Ohio, surpassing 701,000 in 2007, and producing more vehicles in all three years than any other assembler. The chart above also shows that the vast majority of vehicles it makes here are cars – at least 581,000 a year. More detailed data in table A4 show that the Accord is the mainstay of Honda's Ohio production with over 350,000 assembled at the company's Marysville plant each year. At least 66,000 Acuras, Honda's near-luxury brand, also were made at Marysville each year. The addition of the RDX crossover vehicle (another type of light truck) in 2006 helped make Marysville the highest-volume assembly plant in the state during this three-year period.

Honda makes more trucks, though, at its E. Liberty plant; combined output of the CR-Vs and Elements ranged from about 61,300 to 86,400. (The chart above shows Honda's total light truck production in Ohio nearly doubling, and playing a key role in the company's growing light vehicle output.) Still, most of the vehicles from E. Liberty are Civics (cars) – at least 133,000 per year. The detailed data in table A4 provide further evidence of E. Liberty's flexibility: 5,460 Accords were assembled there in 2005.

2005 was the first year in recent memory that GM produced more cars than light trucks in Ohio, and the shift continued in 2006 and 2007, with light truck production continuing to fall – about 90,000 vehicles – while car production dropped less – about 21,000. Detailed data in table A4 show that production of Trailblazers and Envoys – the mid-size SUV mainstays at Moraine – dropped by 53,000 and 25,000, respectively. The declining assemblies of other models there, including the termination of the Buick Rainier, were comparatively minor. Production in Moraine terminated in December, 2008, due in part to the recession, higher fuel prices, and the associated drop in demand for SUVs.

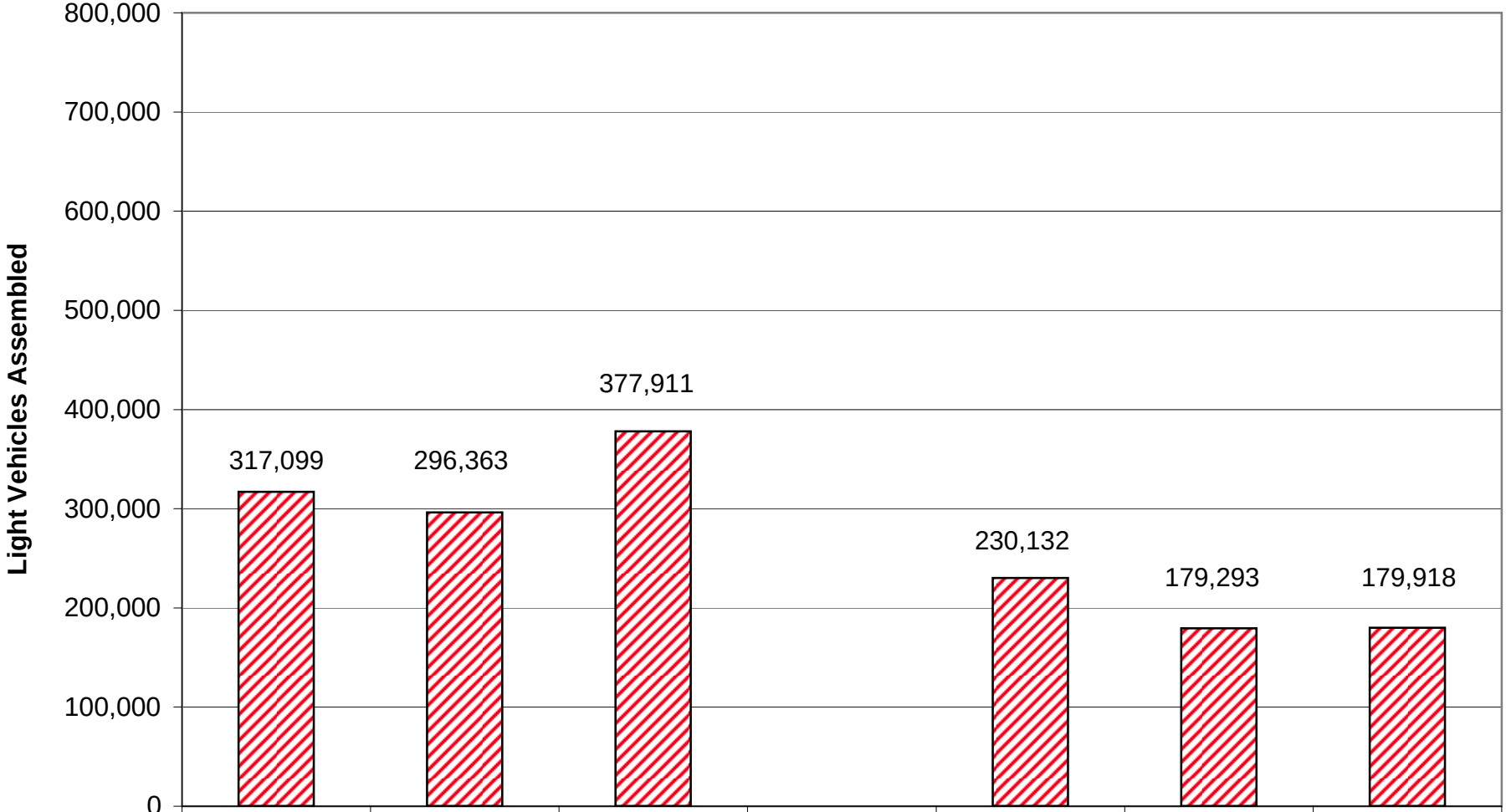
The smaller decline in car production at GM's Lordstown plant is the sum of two different trends. The increase in Pursuit/G5/G4 production of almost 33,000 was more than offset by the drop of 53,000-plus in Cobalt assemblies. (Only the Cobalt is for sale in the U.S.)

See Tables A4 & A11

Ohio Department of Development

# A Three-Year Summary of Light Vehicle Production in Ohio:

## Chrysler and Ford




| | 2005 | 2006 | 2007 | | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|
| Light Trucks | 317,099 | 296,363 | 377,911 | | 230,132 | 179,293 | 179,918 |
| Cars | 0 | 0 | 0 | | 0 | 0 | 0 |
| | Chrysler | | | | Ford | | |

Source: Ward's

The chart above shows that Chrysler and Ford make only light trucks in Ohio. Detailed data in table A4 show that Chrysler's net increase of nearly 60,000 SUVs is the aggregation of different production trends at its two plants in Toledo. The introduction of the Dodge Nitro at its Toledo North plant essentially offset the drop in Jeep Liberties, while the expansion of the Jeep Wrangler Unlimited – well over 72,000 – far out-stripped the net decline of 12,000-plus in Jeep Wrangler production at the Toledo South plant. Toledo's most popular models in 2007 rank as follows: the Nitro, the Liberty, the Wrangler Unlimited, and the Wrangler.

The numbers alone do not convey the substantial changes Ford made in Ohio. Just over 27,000 Mariners (SUVs) were assembled at Avon Lake in 2005 before production was consolidated in Kansas City. The Avon Lake plant was retooled beginning in August that year, and Econoline production shifted from Lorain with the permanent closure of the latter in December (Harbour Consulting, 2006: 44-45; Parker, 2006).

The changes outlined above help explain the changes in summary figures for light vehicle production in Ohio. Total production in Ohio for the three years ranged between 1,669,741 (2006, and the lowest since 1991) and 1,794,589 (2005, and fairly typical of recent years). Production was close to evenly split between cars and light trucks. Car production varied little, with 884,734 assembled in 2006, and 870,008 assembled in 2007. Light truck production ranged from 785,007 in 2006 to 912,367 in 2005.

See Table A4 & A11

# MOTOR VEHICLE PARTS: POWERTRAIN AND STAMPING OPERATIONS IN OHIO

**POWERTRAIN AND STAMPING OPERATIONS BY ASSEMBLERS IN OHIO DURING 2007, FROM AVAILABLE DATA[#]**

| Subject | Chrysler | Ford | GM | Honda | Total* |
|---|---|---|---|---|---|
| Powertrain: | | | | | |
| Engine Plants (in Ohio/in N. America): | 0/6 | 3/7+ | 1/10+ | 1/2 | 5/33+ |
| Engine Models[@] in Ohio: | 0 | 7+ | 2 | 11 | 20+ |
| Engines Produced: | | | | | |
| In Ohio: | 0 | 532,819+[e] | 200,000[e] | 1,090,175 | 1,822,994+[e] |
| In N. America | 2,297,150 | 2,387,812+[e] | 4,340,959[e] | 1,428,226 | 13,486,585+[e] |
| Transmission Plants (in Ohio/in N. America): | 0/3 | 1+/3+ | 1/6 | 1/2 | 3+/15+ |
| Transmission Models[@] in Ohio: | 0 | 1+ | 3 | 1 | 5+ |
| Transmissions Produced: | | | | | |
| In Ohio: | 0 | 363,328+ | 1,061,386 | 869,404 | 2,294,118+ |
| In N. America | 2,075,797 | 1,966,030+ | 3,786,310 | 996,134 | 9,179,985+ |
| Major Stamping Locales (in Ohio/in N. America): | 1/7 | 2/9 | 3/17 | 2/4 | 8/44 |

Notes: # – Data are incomplete and usually refer only to plants participating in Harbour's study: manufacturers of light vehicles with assembly plants in N. America. Medium- or heavy-duty truck parts produced at the same plants may be included in these statistics, but it excludes Daimler's diesel engine remanufacturing plant in Byesville. Also missing are data for Ford's Engine Plant No. 1 in Brook Park, its stamping plant in Maumee (idled in October 2007), and transmission plant in Batavia (closed June 2008). Honda does stamping at its assembly plants. Limited data for GM-Isuzu's DMAX plant in Moraine are available from Wikipedia (2008). Consequently, percentages are not computed because they would be misleading. * – Totals for N. America also include various combinations of other companies: Auto Alliance, CAMI, Hyundai, Nissan, NUMMI, Toyota and Volkswagen. + – plus more not included in Harbour Consulting (2008). @ – Variations on models are not included. e – The number appears to be, or incorporates, an estimate.

Sources: Ford (2008), Harbour Consulting (2008), Harris (2008), Wikipedia (2008).

While many motor vehicle assemblers have divested parts manufacturing operations, they have retained three types: en-gines, transmissions, and stampings. Most assemblers have long made their own engines and transmissions (collectively referred to as powertrains), and use this fact to distinguish their vehicles from competitors' vehicles.[7]

Unfortunately, the data are incomplete. Consequently, the exact role played by powertrain and stamping operations in Ohio is not

known, but it seems to be significant. Honda and Ford appear to be the high-volume engine producers in the state. In 2007, the three lines at Honda's engine plant turned-out about 1,090,000 engines, while Ford's Lima and Cleve-land Plant #2 combined to make almost 533,000. (Ford's Engine Plant #1 was idle for most of 2007, and was not include-ed in Harbour's survey.) Ford made at least seven engine models in Ohio, and Honda made 11. One of Honda's models uses compressed natural gas. The production in Ohio for both companies seems to be a substantial part of their total N. American output (Harbour Consulting, 2008). GM-Isuzu's DMAX made two types of diesel engines in 2007 for light- and medium-duty trucks. The estimate of 200,000 is the latest available (Wikipedia, 2008).

Ironically, engines made in Ohio by Ford and GM are used in vehicles assembled elsewhere, while vehicles assembled in Ohio by Chrysler, Ford and GM have engines made elsewhere (Harbour Consulting, 2008). On the other hand, Honda's plant in Anna supplied the engines used in its Accords, Acuras, Civics, and Elements – all made here. The Anna plant also supplied engines for Honda's Pilot and the Saturn VUE, which are assembled elsewhere (Harbour Consulting, 2006).

GM's Toledo plant made three models of rear wheel drive (RWD) transmissions totaling over 1,061,000 in 2007 – more than any other plant in N. America except Chrysler's in Kokomo. Ford's plant in Sharonville made over 363,000 of one RWD model. Production at its Batavia plant ended. The two lines in Honda's Russells Point plant made over 869,000 front wheel drive transmissions in 2007 (Harbour Consulting, 2008).

Transmissions produced in Ohio are used in some of the vehicles assembled in Ohio, and some assembled elsewhere. Examples of the former include Ford's Econoline van, GM's Moraine-made light trucks, and Honda's light vehicles. Con-versely, vehicles assembled in Ohio may have transmissions produced out of state. Examples of the latter include Jeeps and GM's Cobalt and Pontiac G-series cars (Harbour Consulting, 2008).

All four assemblers had stamping operations in 2007: Chrysler's was in Twinsburg; Ford's were in Maumee (now closed) and Walton Hills; GM's were in Lordstown, Mansfield, and Parma; and Honda's were in E. Liberty and Marysville. As with its engine and transmission plants, Honda follows the newer practice of having stamping plants close to assembly plants to reduce transportation costs and match production to just-in-time requirements. However, as more models are built on one assembly line, stamping plants must make more parts and be able to switch between parts with a minimum of down-time. In effect, such plants edge toward the model characteristic of Chrysler, Ford and GM, who still operate large region-al plants with lots of press lines making parts for multiple assembly plants.[8] Suffice it to note that all want to make better quality parts in higher volume with fewer press lines and less labor. Multiple part stampings, reduction of scrap, higher speeds, and quicker die changes are part of the process. (Chrysler, Ford and GM in particular are upgrading their plants by replacing older tandem and smaller transfer presses with larger transfer and newer progressive presses.) However, stamping operations are complex, and the number of models offered by assemblers varies, so Harbour Consulting (2008) does not offer one over-all measure by which all assemblers may be compared; it merely points to evidence that all four assemblers have improved, but more can be done.

**Other Tier-1 Suppliers* of Motor Vehicle Parts in North America**

| Area | | Chrysler | Ford | GM | Honda | Kenworth | Navistar | Total^ |
|---|---|---|---|---|---|---|---|---|
| Ohio: | Number | 200 | 221 | 239 | 115 | 1 | 15 | 370 |
| | Percent | 8.1% | 7.3% | 8.1% | 8.5% | 4.8% | 11.5% | 3.1% |
| Indiana: | Number | 125 | 152 | 158 | 48 | 0 | 9 | 228 |
| | Percent | 5.1% | 5.0% | 5.4% | 3.5% | 0.0% | 6.9% | 1.9% |
| Kentucky: | Number | 62 | 85 | 82 | 53 | 0 | 2 | 150 |
| | Percent | 2.5% | 2.8% | 2.8% | 3.9% | 0.0% | 1.5% | 1.3% |
| Michigan: | Number | 498 | 509 | 548 | 101 | 1 | 22 | 689 |
| | Percent | 20.2% | 16.9% | 18.6% | 7.5% | 4.8% | 16.8% | 5.9% |
| Ontario: | Number | 244 | 251 | 300 | 73 | 0 | 10 | 372 |
| | Percent | 9.9% | 8.3% | 10.2% | 5.4% | 0.0% | 7.6% | 3.2% |
| Pennsylvania: | Number | 47 | 46 | 54 | 10 | 0 | 5 | 63 |
| | Percent | 1.9% | 1.5% | 1.8% | 0.7% | 0.0% | 3.8% | 0.5% |
| West Virginia: | Number | 4 | 2 | 3 | 3 | 0 | 0 | 6 |
| | Percent | 0.2% | 0.1% | 0.1% | 0.2% | 0.0% | 0.0% | 0.1% |
| North America: | Number | 2,252 | 2,466 | 2,604 | 722 | 21 | 130 | 3,781 |
| | Percent | 91.2% | 81.8% | 88.3% | 53.4% | 100.0% | 99.2% | 32.1% |
| the ELM World: | Number | 2,470 | 3,014 | 2,948 | 1,353 | 21 | 131 | 11,769 |
| | Percent | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

Notes: * - These are establishments.
^ - Includes any motor vehicle assembler any where.

Source: ELM International (2008).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Phone 614/466-2116 (DL, 7/08).

## MOTOR VEHICLE PARTS: OTHER SUPPLIERS

All assemblers deal with independent parts suppliers – also referred to as tier-1 companies – regardless of how many of their own parts they make. ELM International records information on over 11,700 such independent establishments in the world. However, the table above focuses on those supplying parts, modules, and systems to the high-volume assemblers with plants in Ohio: Chrysler, Ford, General Motors (GM), Honda, the Kenworth division of PACCAR, and Navistar. (As in the preceding section, the suppliers located in Ohio are not restricted to shipping to assembly plants in Ohio.) The figures in the table above indicate that there are 370 establishments operating in Ohio. Of those 370, 239 ship to GM, 221 to Ford, 200 to Chrysler, 115 to Honda, 15 to Navistar and one to Kenworth. Summing the counts for these six customers produces a number greater than 370. Therefore, some of the establishments make parts for more than one assembler.

Between seven and nine percent of all tier-1 supply establishments for Chrysler, Ford, GM and Honda are located in Ohio.[9] 11.5 percent of Navistar's suppliers are in Ohio.

The table above also shows counts of suppliers by assembler for the areas surrounding Ohio. Of the six areas, only Michigan has substantially more tier-1 suppliers than Ohio. Ontario has a total of just two more than Ohio.

Some companies concentrate on supplying original equipment to assemblers. These include Dana, Delphi, Goodyear Tire & Rubber, Johnson Controls, Magna International, Superior Industries, Tenneco Automotive, TRW (some of whose establishments were sold to form the Blackstone Group), and Visteon. Other original equipment companies, such as Allied Signal, Eaton, General Electric, 3M, PPG Industries, Textron, and United Technologies, have significant operations, but receive most of their revenue from outside of the motor vehicle industry. This also is true of smaller tier-1 companies listed in ELM's data base. Still other companies make parts that are more likely to be sold in the aftermarket as replace-ments; the largest include ArvinMeritor, Cooper Tire & Rubber, Dana's Echlin division, and Federal-Mogul (Levy, 2008: 6). As previously noted, many of these companies have establishments in Ohio.

Parts companies survive by making a few specialized items requiring a high degree of skill, and doing so more efficiently than assemblers. Their ability to spread research, development, and equipment expenditures over several contracts – as well as selling their expertise to a number of assemblers – gives them a cost advantage over assemblers. They also are less likely to have a unionized labor force. Tier-1 companies try to maintain a diversified supply base – the tier-2 and tier-3 companies – to ensure a steady flow of parts at competitive prices. However, assemblers and tier-1 companies have been occasionally willing to provide financial and managerial assistance to the latter to maintain timely parts production.

Original equipment sales tend to be cyclical because they follow the sales of new vehicles. Aftermarket sales are more

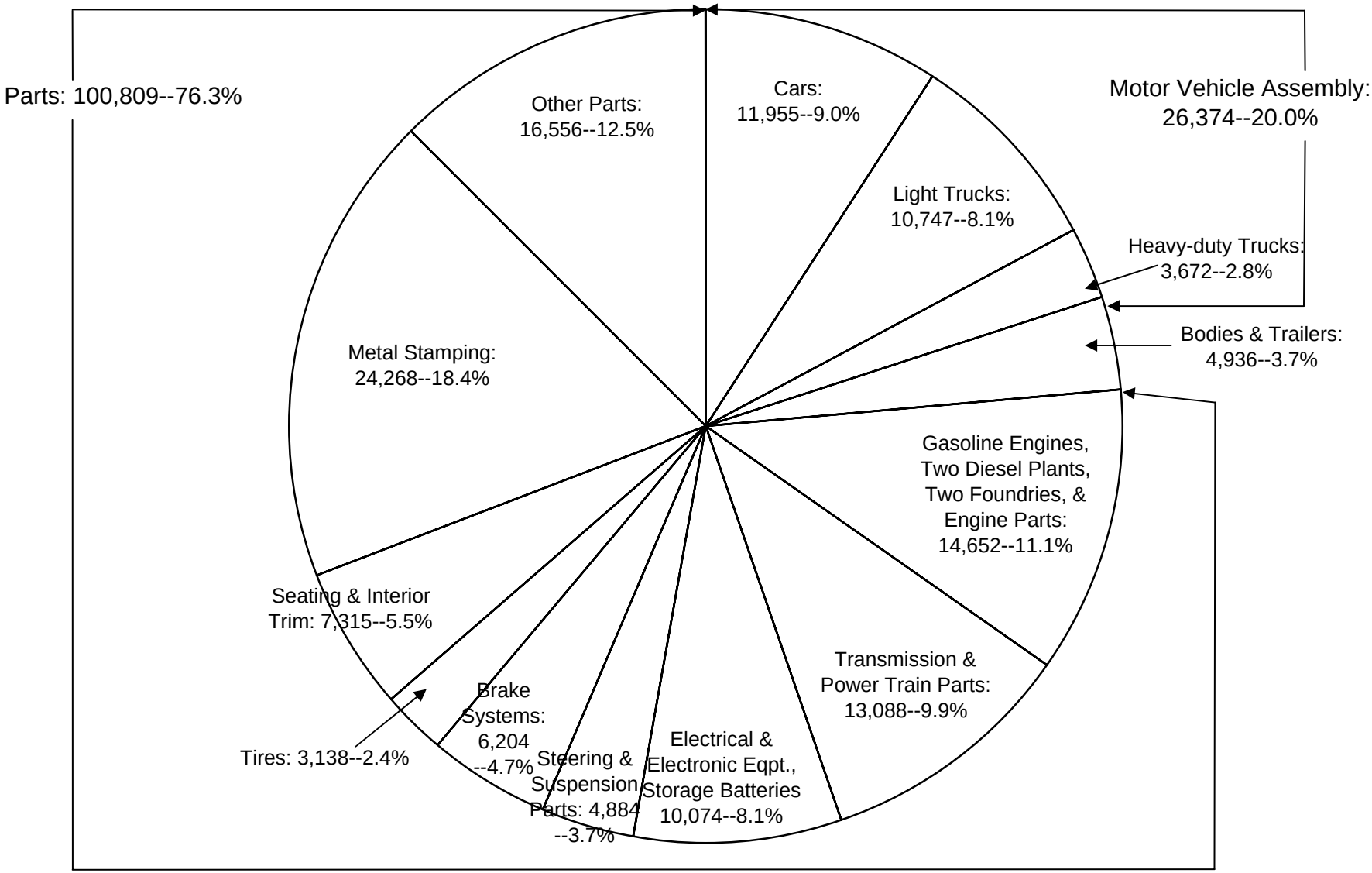
stable than original equipment sales due to the tendency to keep vehicles longer. However, aftermarket sales have been lower than they otherwise would be due to the improved durability of newer original equipment (Levy, 2008: 15-16).

The role of tire makers in the industry is often discussed separately from other parts makers. In 2007, 53 million tires were delivered to assemblers for new light vehicles, with another 241 million shipped as replacements according *Modern Tire Dealer*, an industry publication cited by Levy (2008: 18). The sum of the two figures is a 1.8 percent increase over the 2006 total, with replacement sales more than offsetting the decrease for new vehicles. Despite their low profit mar-gins (when compared with per unit aftermarket sales) and smaller percentage of total sales, original equipment sales are important for several reasons. Original equipment sales help aftermarket sales because owners tend to replace tires with the same brand. In turn, this means a larger market share than could be attained in the aftermarket alone, and greater economies of scale reduce per-unit operating costs. Original equipment sales also reduce distribution and advertising expenses (Levy, 2008: 18).

The tire industry is highly capital intensive. Research and development efforts, production technology, and operations are very expensive. Consequently, the industry is dominated by a small number of vertically integrated giants; Bridgestone, Goodyear, and Michelin together account for about one-half of worldwide tire production (Levy, 2008: 6). (The vertical integration does not extend into distribution and retail sales. Other large companies dominate this part of the business.) Cost pressures and the increased number of niche markets compelled the giants to adopt flexible manufacturing techni-ques. These more sophisticated processes allow producers to economically meet customers' specifications. Global tire makers also pursue technical improvements in their products as a means of drawing attention in a competitive market (Prat, 1998). According to the National Highway Traffic Safety Administration, tires have indeed become better at re-sisting wear. Consumers can search the Administration's website; start with http://www.safercar.gov/.

# Employment in Ohio's Motor Vehicle Industry, 2006

## Estimated Total: 132,119--100%




Sources: Harris, PR&SP, & U.S. Census Bureau

## THE COMPOSITION OF OHIO'S MOTOR VEHICLE INDUSTRY – EMPLOYMENT AT THE PLANTS

The latest detailed data show that about 132,100 people worked in Ohio's motor vehicle industry. The chart above illustrates the distribution of employment within the industry. Over 26,300 – or 20.0 percent – worked at assembly plants (NAICS 3361), and 4,900-plus – 3.7 percent – worked in bodies and trailers (3362). About 100,800 – 76.3 percent – worked in parts industries including tires, storage batteries, and those employed at two foundries and two diesel engine plants (3363, 32621, 335911, 3315 and 333618, respectively). (The detailed data come primarily from the Census Bu-reau's County Business Patterns series. December 2008 data from the state's Labor Market Information division show 20,300 employed at assembly plants – group 3361 – and 71,600 employed in parts – group 3363 only. No further detail is available.)

The largest industry within the parts group was metal stamping (33637) – 24,200-plus jobs, followed by other motor ve-hicle parts (33639) – 16,500-plus; engines and engine parts – 14,600-plus; transmissions and powertrain parts (33635) – close to 13,100; and electrical and electronic equipment and storage batteries (33632 and 335911) – about 10,100. The remaining parts industries each employed less than 10,000, ranging from 2.4 percent to 5.5 percent of the industry total.

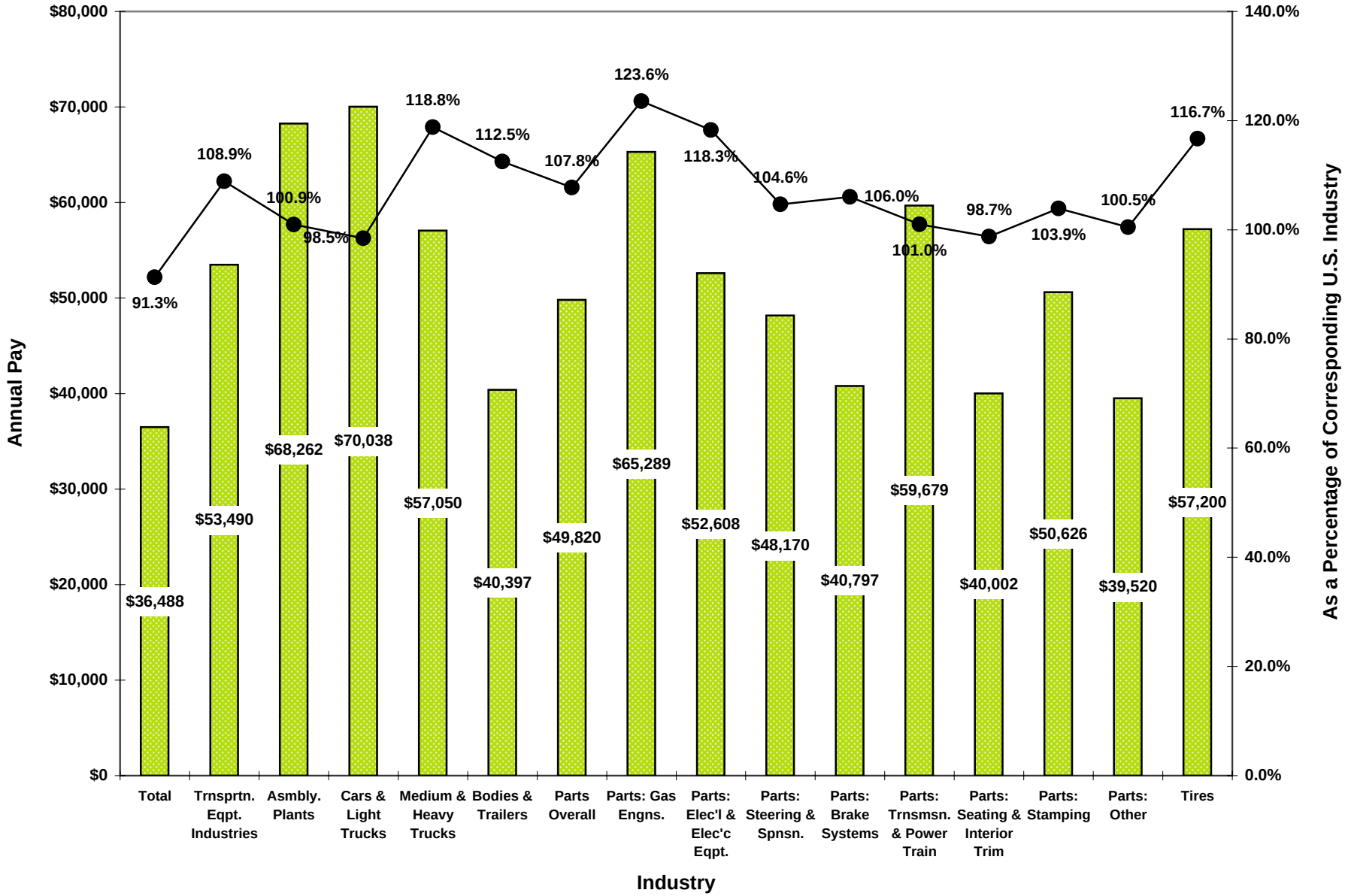
The plurality of jobs in the assembly group – 11,900-plus – were found in car plants (336111), followed by 10,700-plus in light trucks (336112). (Job figures and percentages for the car and light-truck industries are estimates not based on Cen-sus Bureau data.) Well over 3,600 people worked at establishments assembling buses and medium-to-heavy-duty trucks (33612).

Light vehicle assembly plants (33611) are the largest in the industry, averaging over 1,200 employees each. The small-est plants in the industry are those making bodies and trailers, carburetors-pistons-rings-valves (336311), and retreading tires (326212); they typically employ less than 100 people. Heavy-duty truck (33612) and all other parts plants typically employ a few hundred.

Comparisons with national figures are also instructive (and based solely on the five NAICS codes defining the industry). Overall motor vehicle industry employment is concentrated in Ohio, with 11.6 percent of the national industry's workers here. By comparison, 4.0 percent of all employees in the nation (excluding those on farms, at railroads, and in govern-ment) worked in Ohio. Specific industries especially concentrated in Ohio include metal stamping – 21.9 percent of the national industry total, air-conditioning (336391) and brake systems (33634) – 18.4 percent each, car assembly – 15.9 percent, and transmissions – 15.6 percent. On the other hand, employment in motor homes (336213) and travel trailers and campers (336214) is not concentrated here.

See Table A5

# Pay in Ohio's Motor Vehicle Industries: 2006




Source: U.S. Census Bureau

## INDUSTRY WAGES

Census Bureau data charted above show that employees in Ohio's transportation equipment industries (NAICS 3361-3) averaged almost $53,500 in wages and salaries for the latest year available. This figure is 108.9 percent of the corres-ponding national average, and $17,000 above the average for all non-agricultural, non-rail private sector employees in Ohio. There is considerable variation between the three groups: the work at assembly plants (3361) paid over $68,200 per year, while bodies and trailers (3362) paid almost $40,400, and parts (3363) averaged $49,800-plus. These group averages were either very close to or surpassed the corresponding national averages. (The overall average including related industries is not available because the datum for storage batteries has not been released.)

There is substantial variation between the individual industries within the groups. People working at plants assembling cars or light-trucks averaged about $70,000, while those assembling medium- and heavy-duty trucks averaged $57,000-plus. Variation in the parts group was even greater. At one end, gasoline engines (33631) paid the highest – almost $65,300, closely followed by transmissions and power trains (33635) with $59,600-plus. Two other industries averaged between $50,000 and $59,999: stamping (33637) and electrical and electronic equipment (33632). Three more were between $40,000 and $49,999 – steering and suspension (33633), brake systems (33634), and seating and interior trim (33636). Workers in other parts (33639) averaged $39,500-plus. One possible explanation for the higher wages in en-gines, transmissions, and stamping is that many such plants are subdivisions of assemblers, while those in other groups are not.

Employees in the tire industry (32621) average $57,200, which was above the national average. In fact, pay in Ohio in every industry was either very close to the corresponding national average or exceeded it. See the appendix table for further details.

See Table A6

Ohio | Department of Development

**Ted Strickland**, Governor

**Lee Fisher**, Lt. Governor
Director, Ohio Department of Development

# Number of Establishments in Ohio's Motor Vehicle Industry 2006

## Statewide: 661

Establishments in County

- None
- 1 - 4
- 5 - 9
- 10 - 19
- 20 - 77

Sources:
2006 County Business Patterns, U.S. Census Bureau; Harris 2009; and PR&SP

Prepared by:
Ohio Department of Development
Policy Research and Strategic Planning
January 2009

R112008A

## THE DISTRIBUTION OF INDUSTRY ESTABLISHMENTS IN OHIO

The motor vehicle industry is widely distributed across Ohio. The latest available data, mapped above, shows that 661 establishments[10] were found in 76 counties. However, the majority of establishments could be found in 13 counties: Cuyahoga – 77, Franklin – 36, Lucas – 34, Montgomery – 31, Summit – 30, Stark – 22, Hancock – 19, Lorain and Trum-bull – 18 each, Clark – 17, Hamilton – 16, and Richland and Wood – 15 each. Six more counties had 10 to 14 plants each: Allen, Lake, Mahoning, Sandusky, Wayne, and Williams. Twenty-four counties had from five to nine establish-ments, and 33 had from one to four.

It is interesting to note that the eight counties with the 10 high-volume assembly plants – Clark, Logan, Lorain, Lucas, Montgomery, Ross, Trumbull, and Union – had a total of 127 industry establishments. This is a significant portion of the industry – 19.2 percent, but far from the majority. This represents a limit to the concentration of the industry in local areas.

See Table A7

Ohio | Department of Development

**Ted Strickland**, Governor

**Lee Fisher**, Lt. Governor
Director, Ohio Department of Development

# Total Employment in Ohio's Motor Vehicle Industry 2006

## Statewide: 135,899

Employment in County

- None
- 1 - 499
- 500 - 2,499
- 2,500 - 4,999
- 5,000 - 11,890

Sources:
2006 County Business Patterns, U.S. Census Bureau; Harris 2009; and PR&SP

Prepared by:
Ohio Department of Development
Policy Research and Strategic Planning
January 2009

R112008A

## THE DISTRIBUTION OF INDUSTRY EMPLOYMENT IN OHIO

The map above shows the distribution of motor vehicle industry employment by county. The eight counties with high-volume assembly plants – Clark, Logan, Lorain, Lucas, Montgomery, Ross, Trumbull, and Union – had 127 industry es-tablishments (19.2 percent of the total), but about 51,100 industry jobs (37.6 percent of the total). High-volume assembly plants are large employers and may support a number of parts jobs close by. Counties that formed this pattern included Lucas (an estimated 11,800-plus jobs, 4,000 of which were at the assembly plants), Montgomery (also 11,800-plus jobs estimated, with 3,000 at the assembly plant), and Trumbull (10,400-plus jobs estimated, with over 3,800 at the assembly plant).

The other assembly-plant counties have fewer industry jobs, but border counties that have large numbers of parts em-ployees. All of the 5,600 jobs in Union were at the plant, and 3,600-plus parts jobs were in Franklin. Over 1,900 of the nearly 3,300 jobs in Lorain were at the assembly plants, with about 11,000 parts jobs in Cuyahoga. In Logan, over 2,600 of the approximately 4,000 jobs were at the assembly plant, and almost 4,600 parts jobs were in Shelby. 1,500 of 2,100-plus jobs in Clark were at the assembly plant, and Clark borders Montgomery. Ross County, with 1,500 of the 1,800 jobs at the plant, is the exception to this pattern.

Other counties with large numbers of parts jobs included Summit – well over 6,500 (including tires), Richland – 4,300-plus, Hancock – 4,200-plus (including tires), Defiance – 3,100-plus, Erie – 3,000, Wood – 2,700, Allen and Wayne – each over 2,600, Hamilton – 2,400, and Clermont – 2,000-plus. Large stamping and powertrain-related operations frequently were located in these counties. Other counties at least with 1,000 industry jobs include Butler, Champaign, Clinton, Ful-ton, Licking, Madison, Miami, Sandusky, Stark, Warren, Williams, and Wyandot.

Altogether, four counties – Cuyahoga, Lucas, Montgomery and Trumbull – each had over 10,000 jobs, two counties – Summit and Union – had from 5,000 to 9,999 jobs, 27 counties had 1,000 to 4,999 jobs, and 43 counties had from 1 to 999.

See Table A7

Ohio | Department of Development

# FOREIGN INVESTMENT IN OHIO

Dozens of foreign-based companies have subsidiaries and/or joint ventures in Ohio's motor vehicle industry; 13 of them are on Fortune's Global 500 list. The following list identifies them, the countries where the home office is located, their subsidiaries in Ohio, and the total number of employees in the state. Sometimes the arrangements are complex, as evi-denced by Honda's subsidiaries and affiliates in Ohio. The affiliates may be partially owned by Honda, a joint venture between Honda and other companies, or they may be independent but have Honda as their principal customer.

| Foreign Parents | Country | Ohio Subsidiaries | Total Jobs |
|---|---|---|---|
| Ahresty | Japan | Ahresty Wilmington Corp. | 420 |
| Aisin Seiki Co., Ltd.*, et.al. | Japan | ADVICS Mfg. Ohio, Inc. | 625 |
| ArcelorMittal*/Dofasco, Inc. | Luxembourg | Powerlasers Corp. | 115 |
| Asahi Glass Co., Ltd.* | Japan | (total) | 650 |
| | | AGC Automotive[1] | 500 |
| | | Belletech Corp. (a joint venture with PPG*) | 150 |
| Automodular Corp. | Canada | Automodular Corp. | 35 |
| Behr GmbH & Co. | Germany | Behr Dayton Thermal Products, Inc.[2] | 1,400 |
| Bridgestone Corp.* | Japan | Bridgestone APM Co. | 100 |
| Canadian General-Tower Ltd. | Canada | Textileather Corp. | 385 |
| Daimler AG*[3] | Germany | Detroit Diesel | 500 |
| Freudenberg & Co.-NOK Corp. (a joint venture) | Germany-Japan | Freudenberg-NOK | 65 |
| F-Tech, Inc. | Japan | F & P America Mfg., Inc. | 650 |
| GS Electech Co. | Japan | GSW Mfg., Inc. | 412 |
| Hayashi Telempu Co., Ltd. | Japan | Amtex, Inc. | 322 |
| Hitachi Ltd.* | Japan | Hitachi Metals America/AAP St. Mary's Corp. | 470 |
| Hitachi Ltd.*-Volvo AB* (a joint venture) | Japan-Sweden | Euclid-Hitachi Heavy Equipment, Inc. | 457 |
| Honda Motor Co.* | Japan | Honda of America Mfg. Co.[4] | 11,980 |
| Honda Motor Co. affiliates | Japan | (total) | 6,051 |
| Atsumitech Co., Ltd. | | Ada Technologies, Inc. | 60 |
| Hongo Press & Hirata Press | | KTH Parts Industries, Inc. | 770 |
| Kaneta Kogyo Co., Ltd. | | Bucyrus Precision Tech, Inc. | 189 |
| Kikuchi Metal Stamping, et.al. | | Jefferson Industries Corp. | 370 |
| KTH Parts Industries, Inc., et.al. | | Kalida Mfg. Inc. | 250 |
| Nihon Plast Co., Ltd. | | Neaton Auto Products Mfg., Inc. | 705 |
| Nissin Kogyo Co., Ltd. | | Nissin Brake Ohio, Inc. (f.k.a. Findlex Corp.) | 670 |
| Tanaka Seimitsu Kogyo Co., Ltd. | | FT Precision, Inc. | 200 |
| Toyo Denso Co., Ltd. | | Weastec, Inc. | 439 |
| Tokyo Seat Ltd. | | (subtotal) | 848 |
| | | TS Tech Co., Ltd. | 488 |
| | | TS Trim Industries, Inc. | 360 |
| Yachiyo Industry Co., Ltd. | | AY Mfg. Ltd. | 200 |

| Foreign Parents | Country | Ohio Subsidiaries | Total Jobs |
|---|---|---|---|
| Honda Motor Co. affiliates (continued) | | | |
| Yamada Mfg. Co., Ltd. | | Yamada N. America, Inc. | 350 |
| Yanagawa Seiko Co., Ltd. | | YSK Corp. | 250 |
| Yutaka Giken Co, Ltd. | | Cardington Yutaka Technologies | 750 |
| Imasen Electric Industrial Co. | Japan | Imasen Bucyrus Technology, Inc. | 220 |
| INA Holding Schaffler KG/LuK GmbH & Co. | Germany | LuK, Inc. | 980 |
| Ishikawa Gasket Ltd. | Japan | Ishikawa Gasket of America, Inc. | 190 |
| Isuzu Motors Ltd.*-General Motors Corp.*[5] | Japan-U.S. | DMAX | 876 |
| Kasai Kogyo Co., Ltd. | Japan | M-Tek, Inc. | 600 |
| Kongsberg Automotive Holdings ASA | Norway | Kongsberg Driveline Systems II Corp. | 750 |
| Kumi Kasei Co., Ltd. | Japan | Kamco Industries, Inc. | 370 |
| Magna International, Inc.* | Canada | (total) | 750 |
| | | Decoma International (including Norplas) | 400 |
| | | Intier Automotive Seating[6] | 350 |
| Masuda Mfg. Co., Ltd. | Japan | Tomasco Mulciber, Inc. | 460 |
| Meteor Gummiwerke KH Badje GmbH & Co. | Germany | Meteor Sealing Systems LLC | 155 |
| Miba AG | Austria | Miba Bearings US and Miba Sinter USA | 275 |
| Mitsubishi Electric Industrial Corp.* | Japan | Mitsubishi Electric Automotive | 422 |
| Molten Co. | Japan | Molten Corp. | 250 |
| Morioku Co. Ltd. | Japan | Greenville Technology, Inc. | 672 |
| Muro Corp. | Japan | Murotech Ohio Corp. | 60 |
| NHK Spring Co., Ltd. | Japan | New Mather Metals, Inc. | 194 |
| Nippon Seiki Co., Ltd. | Japan | New Sabina Industries, Inc. | 488 |
| Nissen Chemitec, Inc. | Japan | London Industries, Inc. | 250 |
| Pacific Industrial Co., Ltd. | Japan | (total) | 650 |
| | | Pacific Industries U.S.A., Inc./Pacific Mfg. Ohio | 500 |
| | | Pacific Industries U.S.A., Inc./Takumi Stamping | 150 |
| Pioneer Corp. | Japan | Pioneer Automotive Techs | 310 |
| PSA Peugeot Citroen SA* | France | Faurecia Exhaust Systems, Inc. | 1,900 |
| Saia-Burgess Electronics | Switzerland | Saia-Burgess, Inc. | 330 |
| Sankei Giken Kogyo Co., Ltd. | Japan | Newman Technology, Inc. | 850 |
| Sankyo Kogyo Co., Ltd. | Japan | SK Tech, Inc. | 70 |
| Sanoh Industrial Co., Ltd. | Japan | Sanoh America, Inc. (f.k.a. HiSAN, Inc.) | 957 |
| Sekisui Chemical Co., Ltd. | Japan | Sekisui America Corp. | 10 |
| Showa Corp. | Japan | American Showa, Inc. | 1,130 |
| Showa Denko K.K. | Japan | Showa Aluminum Corp. of America | 476 |
| Stanley Electric Co., Ltd. | Japan | Stanley Electric U.S. Co., Inc. | 780 |
| Sumitomo Electric Industries Ltd.* | Japan | Sumitomo Electric Wiring Systems, Inc. | 13 |
| Taichi-S Co., Ltd.[7] | Japan | Taichi-S Engineering USA, Inc./Setex, Inc. | 600 |
| Temasek Holding Pte. Ltd. | Singapore | Kidron, Inc. | 500 |
| TFO Corp. | Japan | TFO Tech Co., Ltd. | 140 |

| Foreign Parents | Country | Ohio Subsidiaries | Total Jobs |
|---|---|---|---|
| ThyssenKrupp AG*[1] | Germany | (total) | 280 |
| | | ThyssenKrupp Atlas, Inc. | 80 |
| ThyssenKrupp AG* (continued) | | ThyssenKrupp Bilstein of America, Inc. | 200 |
| TI Automotive Ltd. | United Kingdom | TI Automotive Group/Fluid Carrying Systems | 318 |
| Tokai Kogyo Co., Ltd. | Japan | (total) | 1,350 |
| | | DTR Industries, Inc. | 750 |
| | | Green Tokai Co., Ltd. | 600 |
| Toyo Roki Mfg. Co., Ltd. | Japan | Filtech, Inc. | n.a. |
| Toyobo Co., Ltd. | Japan | Toyobo Kureha America Co., Ltd. | 29 |
| Toyota Motor Corp.*/Taiho Kogyo Co., Ltd. | Japan | Taiho Corp. of America | 100 |
| Toyota affiliate: Fine Sinter Co. | Japan | American Fine Sinter Co., Ltd. | 125 |
| Trelleborg AB | Sweden | Trelleborg Wheel Systems Americas, Inc. | 163 |
| Valeo SA | France | Valeo Climate Control Corp. | 250-499 |
| Wangxiang Holdings Corp. | China | Powers & Sons LLC | 220 |
| Windsor Mold, Inc. | Canada | (total) | n.a. |
| | | Autoplas | 50 |
| | | Precision Automotive Plastics | 100-249 |
| Woodbridge Group | Canada | Woodbridge Group | 150 |
| Yamashita Rubber | Japan | YUSA Corp. | 1,046 |

Notes: * – a Fortune U.S. 1,000 or Global 500 company; f.k.a. – formerly known as; n.a. – not available; 1 – Jobs figures from LexisNexis (2008); 2 – Jobs figure from 2007, the latest available; 3 – Daimler still owns 19.9 percent of Chrysler; 4 – Jobs figure from ODOD (2008) – additional people are employed at non-manufacturing establishments; 5 – GM owns 60 percent; 6 – Includes jobs at Gra-Mag, a joint venture with Germany's Grammer AG; 7 – Nissan Motor Co. owns 12 percent.
Sources: Fortune (2008), Harris (2008), LexisNexis (2008), ODOD (2008), Office of Strategic Research (2006), Policy Research & Strategic Planning (2008, 2009) and various company websites.

Honda of America Manufacturing is the largest foreign-based company in Ohio's motor vehicle industry, directly employ-ing almost 12,000 at its manufacturing facilities. Over 6,000 more are employed by Honda's affiliates. PSA Peugeot Citroen is the second largest foreign-based employer with 1,900 at its Faurecia subsidiary. Other foreign-based com-panies with at least 1,000 workers in Ohio include Behr (air-conditioning), Showa (steering and suspension components), and Tokai Kogyo (rubber and glass). Except for Honda, the companies listed above are exclusively parts manufacturers. None manufactures trailers or batteries, but one, a Pacific Industrial subsidiary, makes tire values.

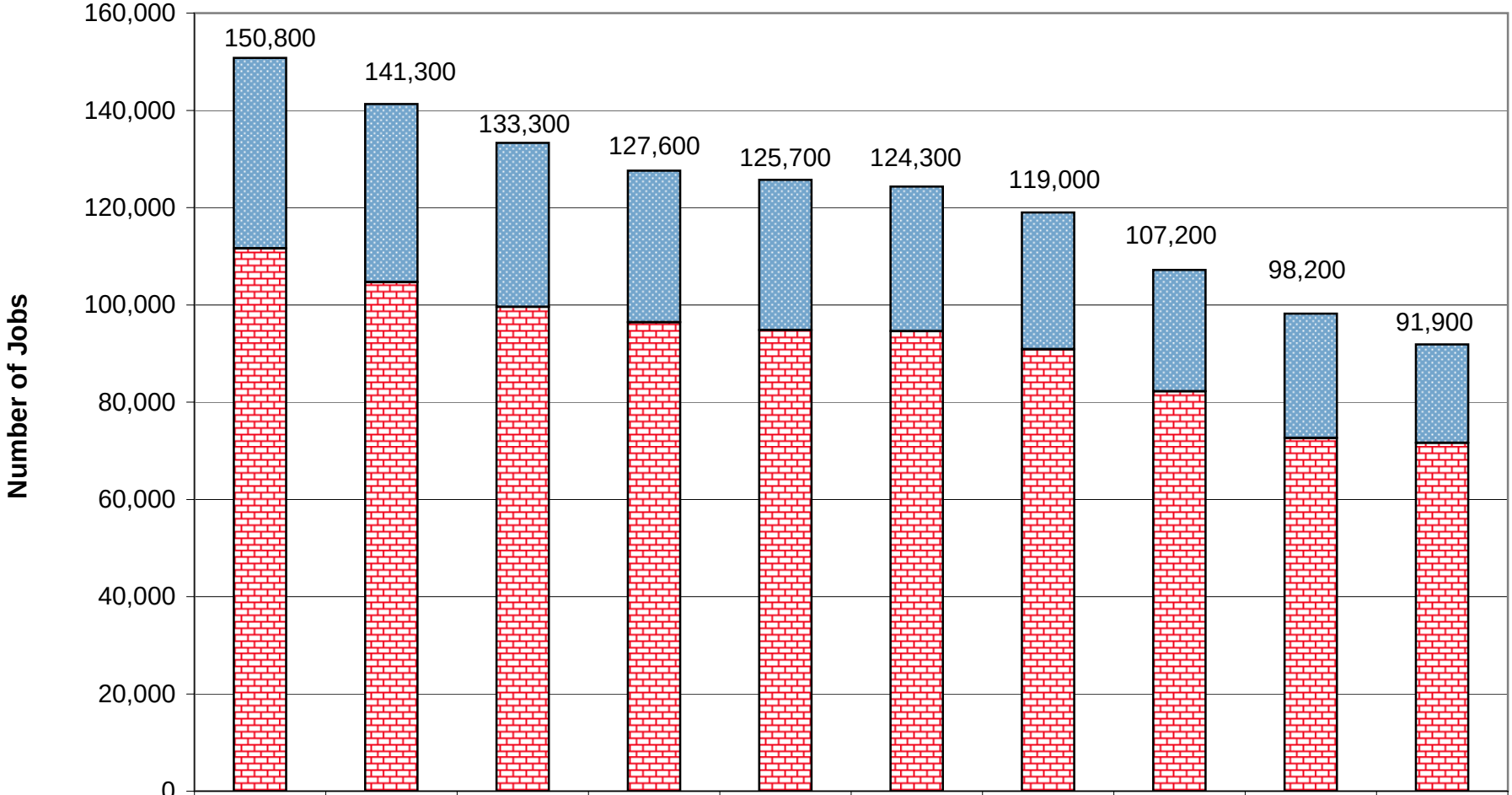
The foreign parent companies or joint venture partners have headquarters in 12 nations. Six are located in Germany, five in Canada, two each in France and Sweden, and one each in Austria, China, Luxembourg, Norway, Singapore, Switzer-land, and the United Kingdom. The remaining ones – close to 60, if all the joint venture partners are included – are Ja-panese. Although exact numbers are not available, Japanese-based companies easily account for the majority of all foreign-based company employment in Ohio's motor vehicle industry.

# TRENDS

Ohio Department of Development

# Employment Trends in Ohio's Motor Vehicle Industry: 2000-2008

## Focusing on Parts & Assembly Plants




| | 2000* | 2001* | 2002* | 2003* | 2004* | 2005* | 2006* | 2007* | 12/2007 | 12/2008 |
|---|---|---|---|---|---|---|---|---|---|---|
| Asmbly. Plnts. | 39,200 | 36,600 | 33,700 | 31,200 | 30,900 | 29,700 | 28,100 | 25,000 | 25,600 | 20,300 |
| MV Parts | 111,600 | 104,700 | 99,600 | 96,400 | 94,800 | 94,600 | 90,900 | 82,200 | 72,600 | 71,600 |

Source: ODJFS/LMI

Note: * - Annual Average

## EMPLOYMENT

The great deal of attention paid to the extraordinary changes in the motor vehicle industry during the last few years re-quires the most current data available. The chart above shows the history and current levels of employment in the two largest motor vehicle industry groups according to ODJFS/LMI (2008-9). Combined employment fell from 150,800 in 2000 to 107,200 in 2007. The greater share of job losses occurred in the larger parts group (NAICS 3363) – from 111,600 to 82,200, but the smaller assembly group (3361) showed a larger percentage decline (36.2 percent). During the latest 12-month period for which data are available (December, 2007, to December, 2008), employment in the assembly group fell from 25,600 to 20,300, and employment in the parts group slipped from 72,600 to 71,600.

The data from County Business Patterns, while time-delayed, permit a more inclusive and detailed description of industry employment changes. Data in table A8a show employment in Ohio's motor vehicle industry held fairly steady around 156,000 from 1998 through 2000. It dropped to less than 123,000 in 2002, bounced back to 133,000-plus in 2003, but slipped to less than 127,000 in 2005. The job losses were concentrated in the two groups mentioned above. The parts group had the greatest absolute net loss – over 20,200 jobs, and the assembly group had the greatest percentage net loss – 26.9 percent.[11] There were fluctuations but little net change in the summary figures for the smaller groups: bodies and trailers (3362) and the related industries.

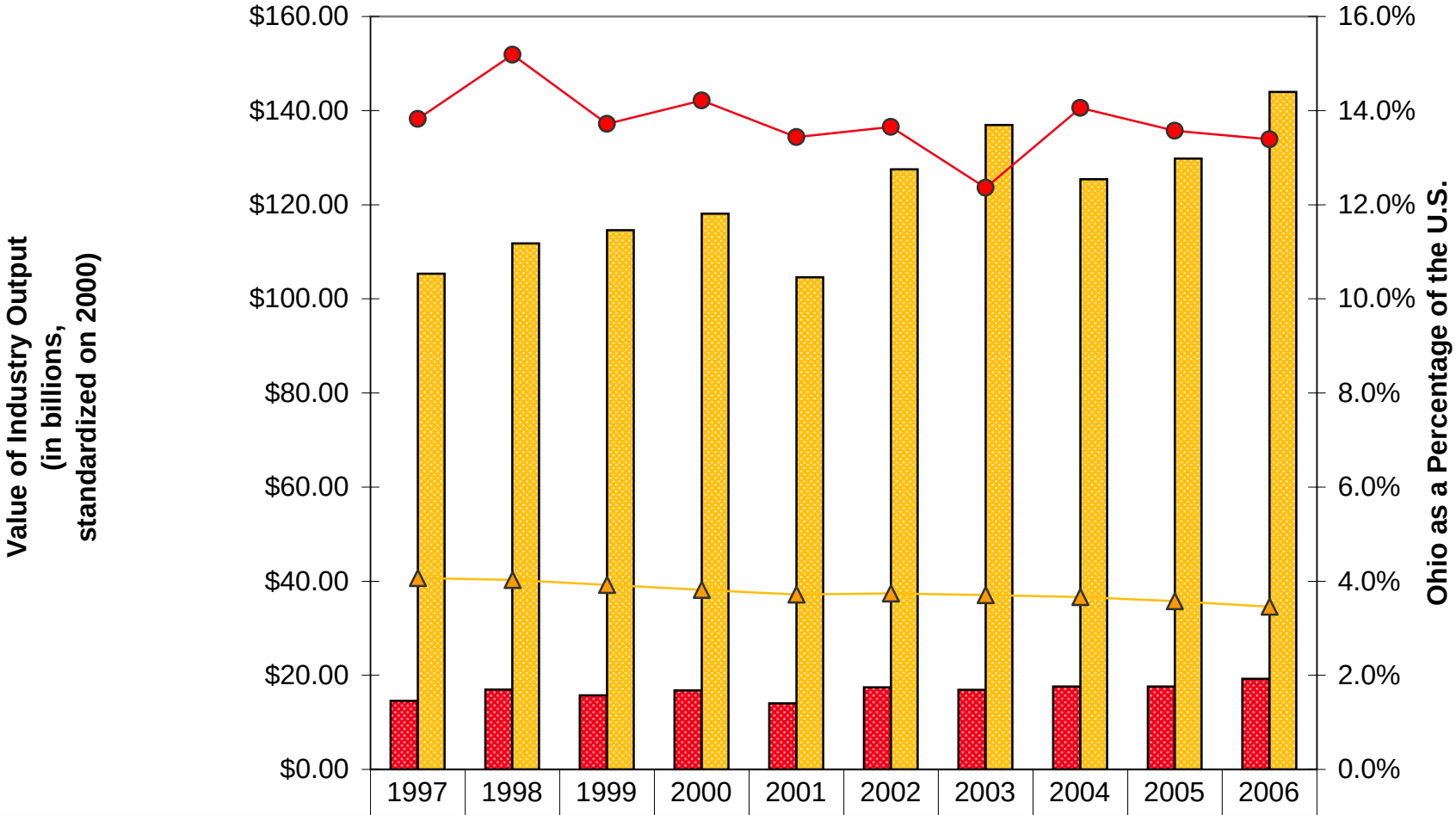
There were exceptions. Most notably, two parts industries saw net gains: employment in seating and interior trim (33636) grew by 55.5 percent, and over 900 jobs were added in transmission and power train parts (33635). A few hundred jobs also were added in truck trailers (336212).

Table A8b shows that the recent history of employment in Ohio is roughly similar to what was happening across the U.S. The industry employment declines were worst in the parts and assembly groups, and jobs were added in seating and in-terior trim. National trends diverged from Ohio in that jobs were added in assembling light trucks (336112) – this follows the shift of increasing light truck sales – and in body and trailer production, particularly motor homes, travel trailers and campers (336213 and 336214). Also unlike Ohio, national employment in the related industries declined.

On the whole, the net loss of jobs in Ohio's motor vehicle industry from 1998 through 2006 was worse than the national average: 19.2 vs. 13.7 percent. However, these losses are no greater than what happened in Ohio's manufacturing sector overall – about 20 percent.

See Tables A8a & A8b

# Motor Vehicle Industry (NAICS 3361-3363) Output and Its Concentration in Ohio, 1997-2006




| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|
| Ohio: MV Output | $14.56 | $16.98 | $15.72 | $16.79 | $14.06 | $17.41 | $16.93 | $17.63 | $17.61 | $19.28 |
| U.S. MV Output | $105.3 | $111.7 | $114.6 | $118.1 | $104.6 | $127.5 | $136.9 | $125.4 | $129.7 | $143.9 |
| Ohio Total GSP--Percent of U.S. | 4.1% | 4.0% | 3.9% | 3.8% | 3.7% | 3.7% | 3.7% | 3.7% | 3.6% | 3.5% |
| Ohio MV GSP--Percent of U.S. | 13.8% | 15.2% | 13.7% | 14.2% | 13.4% | 13.7% | 12.4% | 14.1% | 13.6% | 13.4% |

Source: U.S. Bureau of Economic Analysis

## GROSS DOMESTIC PRODUCT

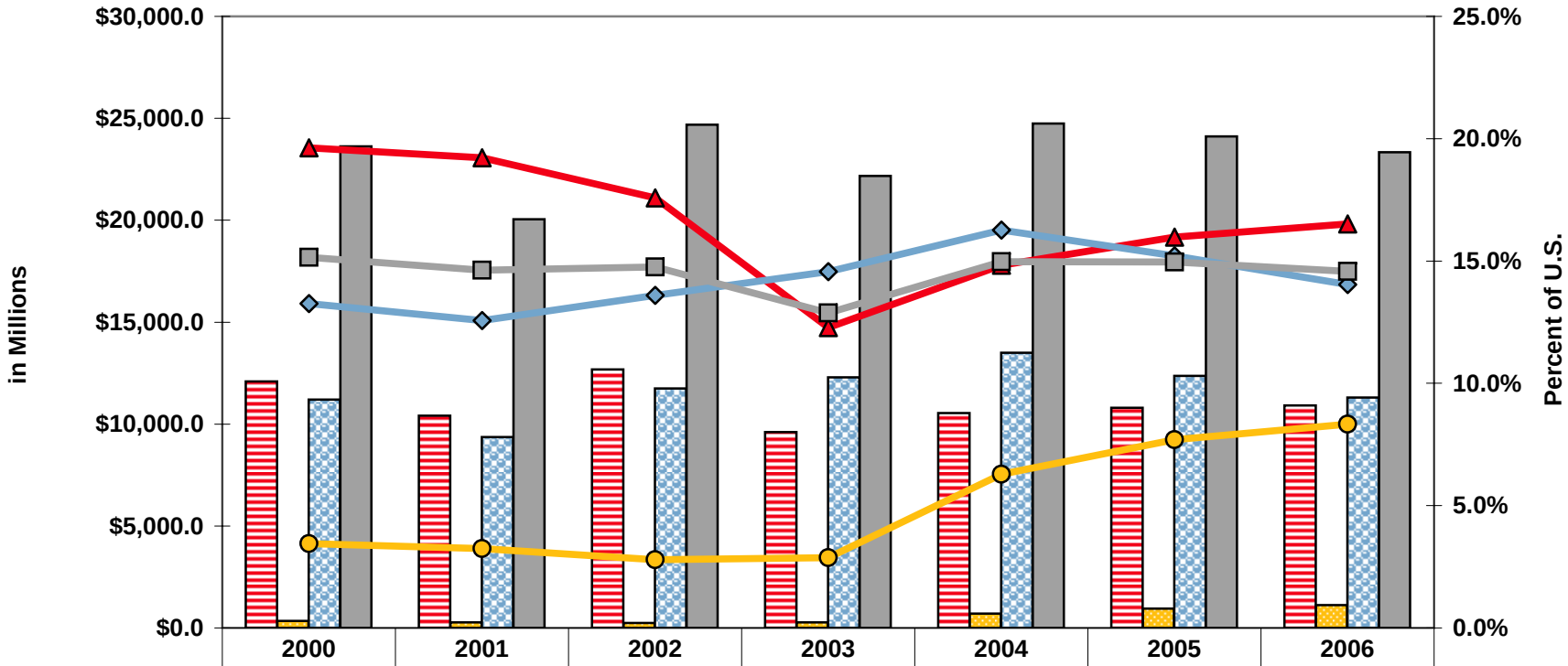
Gross domestic product (GDP) data are summary figures for the net value of goods and services added by the people working in a state and using the capital therein. They are calculated for each industry in every state, including, of course, the motor vehicle industry in Ohio. The chart above illustrates both the concentration of the industry in the state and its cyclical nature. While economic activity in Ohio comprised roughly 3.5 to 4.1 percent of total domestic output from 1997 through 2006, typically 13 to 15 percent of U.S. motor vehicle industry goods (NAICS 3361-3) originated here. Ohio has been second only to Michigan in the output of motor vehicles and equipment (U.S. Bureau of Economic Analysis, 2008a).

After adjusting for inflation, the volume of motor vehicle industry production in Ohio rose 15.3 percent from $14.56 billion (B) in 1997 to $16.79B in 2000, fell 16.3 percent to $14.06B the following year – the lowest level of output in this period – before rebounding 23.9 percent to $17.41B in 2002. Output stayed around $17B until rising to $19.28B in 2006. This pat-tern of rise, fall, and recovery also is seen in the figures for the national industry, and, combined with the relatively consis-tent portion of goods from Ohio, indicates that trends in Ohio's motor vehicle industry largely reflect what was happening throughout the nation. The pronounced swings in output such as these are principally due to consumers' desires to feel comfortable before spending so much money. Sales typically rise during periods of sustained economic growth because jobs are plentiful, and customers feel sufficiently confident making large expenditures. Conversely, sales fall when the economy contracts and the unemployment rate is high. The cost of gasoline and changes in style, engineering, safety and quality are secondary factors affecting sales (Levy, 2008: 15). The availability of credit also is a factor.

The net change in the volume of industry production during this time was an increase of 32.4 percent – slightly less than the industry across the country, but a far faster growth rate than for the state as a whole. This means that the industry re-mains concentrated here, and has become a slightly larger part of the state's economy during this time. However, this change may be only the consequence of the time period covered, and may not indicate any long-term trend.

See Table A9

# Value-Added in Ohio's Motor Vehicle Industry (NAICS 3361-3363) 2000-2006




| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|
| 3361: Assembly | $12,092.3 | $10,408.9 | $12,686.7 | $9,606.0 | $10,541.7 | $10,800.6 | $10,908.5 |
| 3362: Bodies & Trailers | $339.9 | $273.1 | $244.0 | $272.5 | $703.1 | $945.8 | $1,122.4 |
| 3363: Parts | $11,197.9 | $9,362.9 | $11,753.1 | $12,292.3 | $13,504.4 | $12,361.1 | $11,298.8 |
| Total | $23,630.2 | $20,044.9 | $24,683.9 | $22,170.8 | $24,749.2 | $24,107.5 | $23,329.8 |
| 3361: Assembly | 19.6% | 19.2% | 17.6% | 12.3% | 14.8% | 16.0% | 16.5% |
| 3362: Bodies & Trailers | 3.4% | 3.2% | 2.8% | 2.9% | 6.3% | 7.7% | 8.3% |
| 3363: Parts | 13.3% | 12.6% | 13.6% | 14.6% | 16.3% | 15.2% | 14.0% |
| Overall Percentage | 15.1% | 14.6% | 14.8% | 12.9% | 15.0% | 15.0% | 14.6% |

Source: U.S. Census Bureau

## VALUE-ADDED BY OHIO'S MOTOR VEHICLE INDUSTRY

Value-added data provide additional insight because they are available at the group level.[12] The chart and data table above illustrate a number of characteristics of the industry:

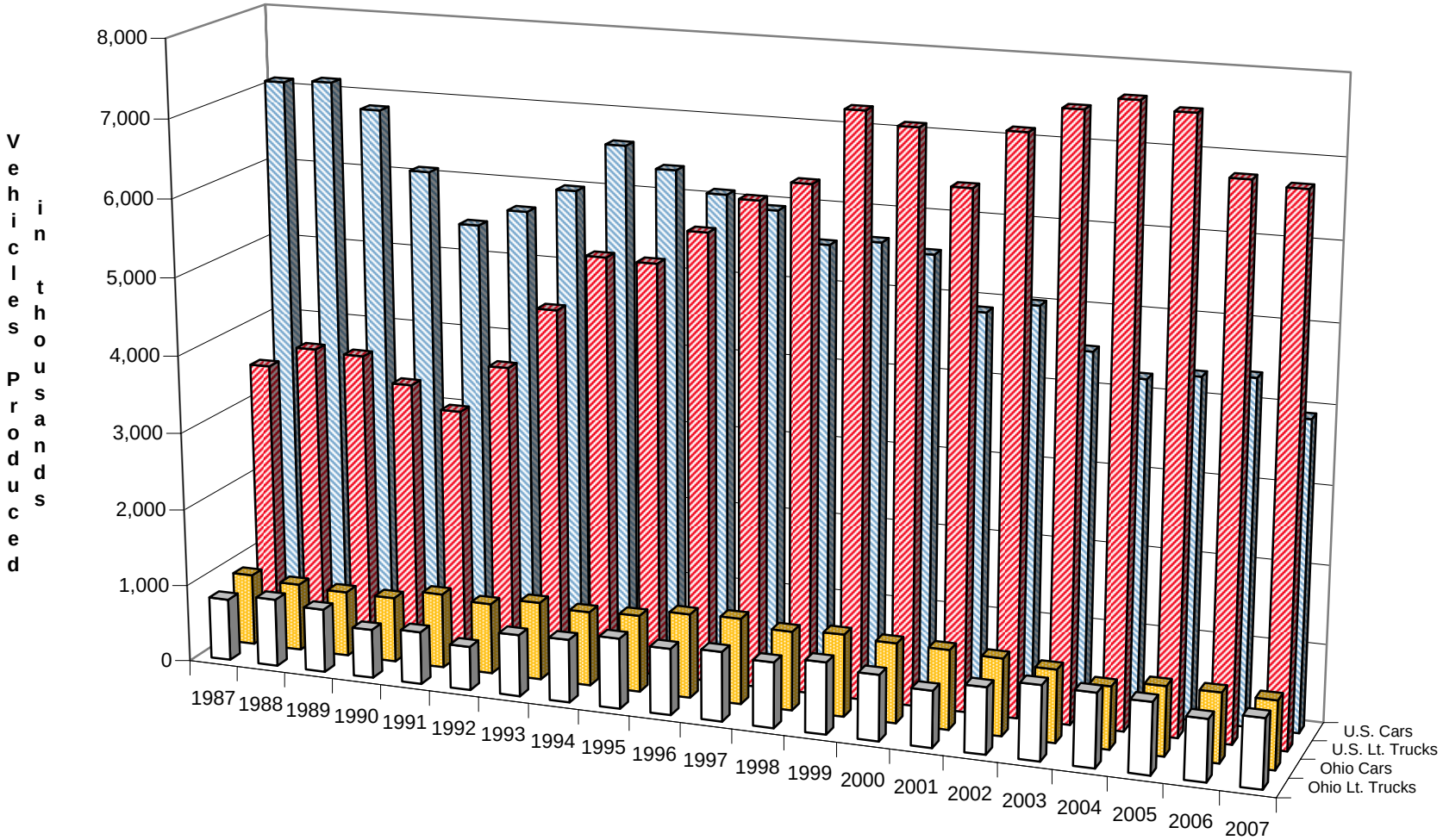
- The industry in Ohio is overwhelmingly comprised motor vehicle assembly and parts operations. In the aggregate, both are multibillion-dollar endeavors. However, neither group dominates the industry. Value-added in assembly operations was $10.9 billion (B) in 2006 – less than value-added in 2000, but above the low point of 2003. Value-added in parts production was almost $11.3B in 2006 – slightly greater than in 2000 and about the middle of the range for the time period shown. (There is no adjustment for inflation, and table A10 shows data back to 1997.) These amounts contrast with the bodies and trailers group, which plays a much smaller role in the industry here.[13]

- Assembly and parts operations are directly dependent on one another, but they do not necessarily change in the same direction from one year to the next; note that value-added at parts plants decreased after 2004, while value-added at assembly plants increased from 2003. This reflects the facts that parts made here may or may not be used in vehicles assembled here, and parts made outside of Ohio may be used by assembly plants here. Parts also are made for the replacement market as well as original equipment.

- The overall concentration of the motor vehicle industry in Ohio reflects the concentration of the two largest groups: assembly and parts operations. The percentage of value-added by assembly operations in Ohio ranged from 12.3 to 19.6 percent of the national total, while parts operations ranged from 12.6 to 16.3 percent of the corresponding total. The corresponding 10-year averages from table A10 are 16.7 and 14.3 percent, both of which are greater than the industry GDP average of 13.9 percent. The 10-year average for bodies and trailers was 4.9 percent.[14]

See Tables A9 & A10

# Light Vehicle Production in Ohio and the U.S., 1987-2007




| | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ohio Lt. Trucks | 803 | 878 | 822 | 631 | 678 | 565 | 796 | 813 | 907 | 855 | 893 | 840 | 918 | 842 | 723 | 848 | 957 | 944 | 912 | 785 | 878 |
| Ohio Cars | 924 | 874 | 846 | 843 | 967 | 915 | 1,006 | 960 | 989 | 1,085 | 1,105 | 1,016 | 1,056 | 1,022 | 1,016 | 990 | 928 | 797 | 882 | 885 | 870 |
| U.S. Lt. Trucks | 3,528 | 3,810 | 3,781 | 3,464 | 3,177 | 3,808 | 4,608 | 5,332 | 5,306 | 5,749 | 6,197 | 6,448 | 7,387 | 7,228 | 6,546 | 7,261 | 7,577 | 7,731 | 7,625 | 6,893 | 6,828 |
| U.S. Cars | 7,100 | 7,137 | 6,825 | 6,078 | 5,440 | 5,667 | 5,982 | 6,601 | 6,340 | 6,083 | 5,934 | 5,554 | 5,638 | 5,542 | 4,879 | 5,019 | 4,510 | 4,230 | 4,321 | 4,367 | 3,924 |

Source: Ward's Communications

## LIGHT VEHICLE PRODUCTION IN OHIO AND THE U.S.

Light vehicle production is the core of the motor vehicle industry, comprising the vast majority of all motor vehicles made. The chart above illustrates the ups and downs of production in Ohio and the U.S. from 1987 through 2007. These fluc-tuations reflect various influences, including economic expansion and contraction, the opening and closing of plants, and changes in companies' product-mixes. In Ohio, the majority of production shifted from light trucks to cars during the mid-1980s as Honda increased production in Marysville and E. Liberty. Cars were the majority of light vehicles produced in Ohio from 1989 through 2002. 2003 was the first year since 1988 in which more light trucks than cars rolled off assembly lines in Ohio. With the exception of 2006, light trucks have been the majority of production since then. This will change with the closure of GM's Moraine plant.

This differs from the national trend. Data in table A11, as well as the chart above, show production shifting from cars to light trucks. Car production comprised 66.8 percent of U.S. light vehicle production in 1987. By 1997, car production was 48.9 percent of the same, and the percentage continued to fall through 2004. It has varied little since then. Explanations for the growth of light truck sales include the relatively low gasoline prices of the time, and light trucks substituting for large cars and station wagons. The car-like amenities and handling characteristics of the light trucks facilitated the substitution. Indeed, many minivans are now based on car platforms. While these reasons explain the greater demand for light trucks, assemblers have been motivated by the higher profit such vehicle sales provide. The substitution of light trucks for large cars was also encouraged by the lower corporate average fuel economy (CAFE) requirements for light trucks (Gott, et.al., 1999). However, the recent rise in gasoline prices is prompting a shift back to car production.

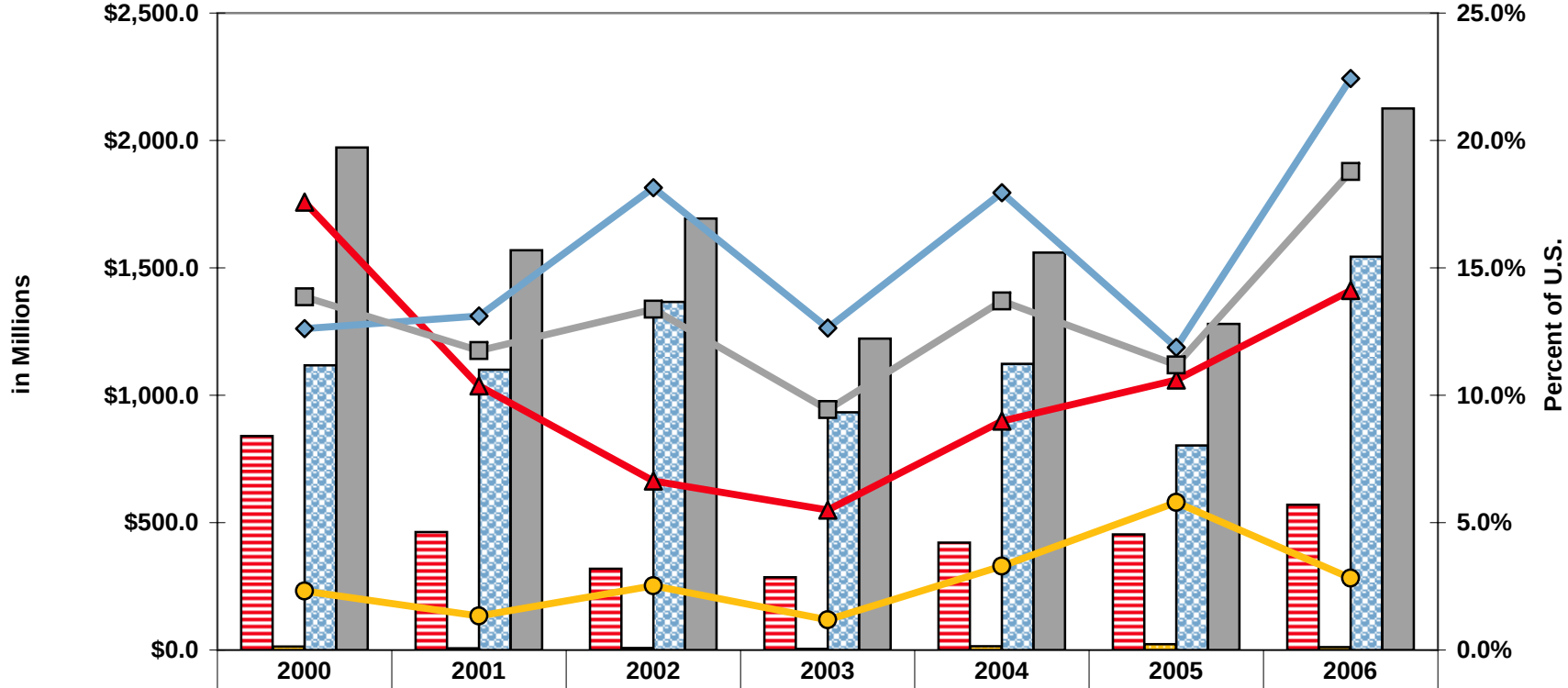
These contrasting shifts of production-mixes mean that Ohio has become a relatively more important source for cars, ris-ing from 13 percent of U.S. output in 1987 to 22.2 percent in 2007. At the same time, the state became a relatively less important source for light trucks. Factories in Ohio produced 23 percent of the nation's light trucks in 1988, but only about 12 percent since 1999. Ohio moved up from third to second rank in car production (after Michigan), but fell from first and second rankings in light truck production to second and third (after Michigan and Missouri).

Throughout this transition, Ohio has typically been the source of one-seventh to one-sixth of light vehicles made in the U.S. The high combined numbers of cars and light trucks easily make Ohio the second-ranked source for light vehicles in the U.S.

See Table A11

Ohio Department of Development

# Capital Expenditures in Ohio's Motor Vehicle Industry (NAICS 3361-3363) 2000-2006




| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|
| 3361: Assembly | $840.2 | $462.6 | $318.6 | $285.3 | $421.3 | $453.8 | $570.5 |
| 3362: Bodies & Trailers | $13.6 | $6.7 | $8.3 | $4.6 | $14.6 | $22.7 | $11.1 |
| 3363: Parts | $1,118.0 | $1,099.9 | $1,366.9 | $932.7 | $1,123.6 | $803.2 | $1,543.9 |
| Total | $1,971.8 | $1,569.2 | $1,693.8 | $1,222.6 | $1,559.5 | $1,279.7 | $2,125.4 |
| 3361: Assembly | 17.6% | 10.4% | 6.6% | 5.5% | 9.0% | 10.6% | 14.1% |
| 3362: Bodies & Trailers | 2.3% | 1.3% | 2.5% | 1.2% | 3.3% | 5.8% | 2.8% |
| 3363: Parts | 12.6% | 13.1% | 18.1% | 12.6% | 18.0% | 11.9% | 22.4% |
| Overall Percentage | 13.9% | 11.8% | 13.4% | 9.4% | 13.7% | 11.2% | 18.8% |

Source: U.S. Census Bureau

## CAPITAL EXPENDITURES FOR OHIO'S MOTOR VEHICLE INDUSTRY

The chart above shows how much money companies have spent purchasing land, buildings, and equipment for produc-tion in Ohio, both in dollars and as a percentage of all such industry expenditures in the nation. Total expenditures fluc-tuated during the years shown, ranging from about $1.2 billion (B) in 2003 to $2.1B in 2006. (Again, there is no adjust-ment for inflation.) These represent any where from 9.4 to 18.8 percent of the industry's annual investments in Ohio. The 10-year average was 13.5 percent (data in table A12 extend back to 1997). Capital expenditures for body and trailer pro-duction in Ohio also vary widely, but seldom exceed $20 million a year.

Most capital expenditures in Ohio – in an average year, about $72 of every $100 spent – are made for parts production; an additional $27 goes into assembly operations, with the remaining $1 for bodies and parts. The actual amounts spent, though, vary from year to year.

Levy (2004) offers an explanation of the up-and-down character of industry investment at the local level. He notes that large capital expenditures are required for product development and launching new models. Companies do this all the time, but models typically are made at just one plant. Consequently, capital expenditures at the local level may be highly variable over the course of the years. This applies not only to assembly plants, but to powertrain and stamping plants as well. Based on the chart above, this certainly appears true for Ohio.[15]

Apart from some notable exceptions, it is hard to argue that companies are abandoning their facilities in Ohio – at least in a relative sense. Short time periods make it difficult to distinguish fluctuations and volatility from genuine trends. Conse-quently, averages may be more useful. In this regard, the figures are fairly close. On average, 14.7 percent of the indus-try's value-added from 1997-2006 originated in Ohio, while industry establishments in Ohio absorbed a comparable 13.5 percent of capital expenditures, and had 12.4 percent of comparable employment in 2006. These varied by group: the figures for assembly plants were 16.7 percent of value-added, 10.3 percent of capital expenditures, and 12.9 percent of jobs, but the corresponding figures for parts plants were 14.3 percent, 15.9 percent, and 14.2 percent.

See Tables A8a, A10 & A12

## ESTABLISHMENTS

Despite recent headlines, the motor vehicle industry is not abandoning all production in Ohio. The chart above shows that the number of industry establishments in Ohio changes over time. It declined from 641 in 1998 to 606 in 2002, and then jumped to 653 by 2004 and has stayed in that neighborhood. While this change is the aggregate result of all the changes in the constituent industries, the chart above shows that is was principally due to a rebound in the number of parts plants (NAICS 3363) as well as a longer-term rise in the number of body and trailer plants (3362). These increases were par-tially offset by a decline in related industry plants. While the total number of assembly plants has risen, the number of high-volume assembly plants fell by one; Ford's Lorain plant closed at the end of 2005. (The data will eventually reflect the fact that GM's Moraine plant closed in December 2008.)

Details in table A13a do not point to any specific industry as the sole mover of changes in the parts group; the number of establishments rose in some and fell in others. However, the most notable change has been the rebound of stamping plants (33637) since 2002. The decreasing number of related industry plants is due to a drop in the number of tire retreading plants (326212).

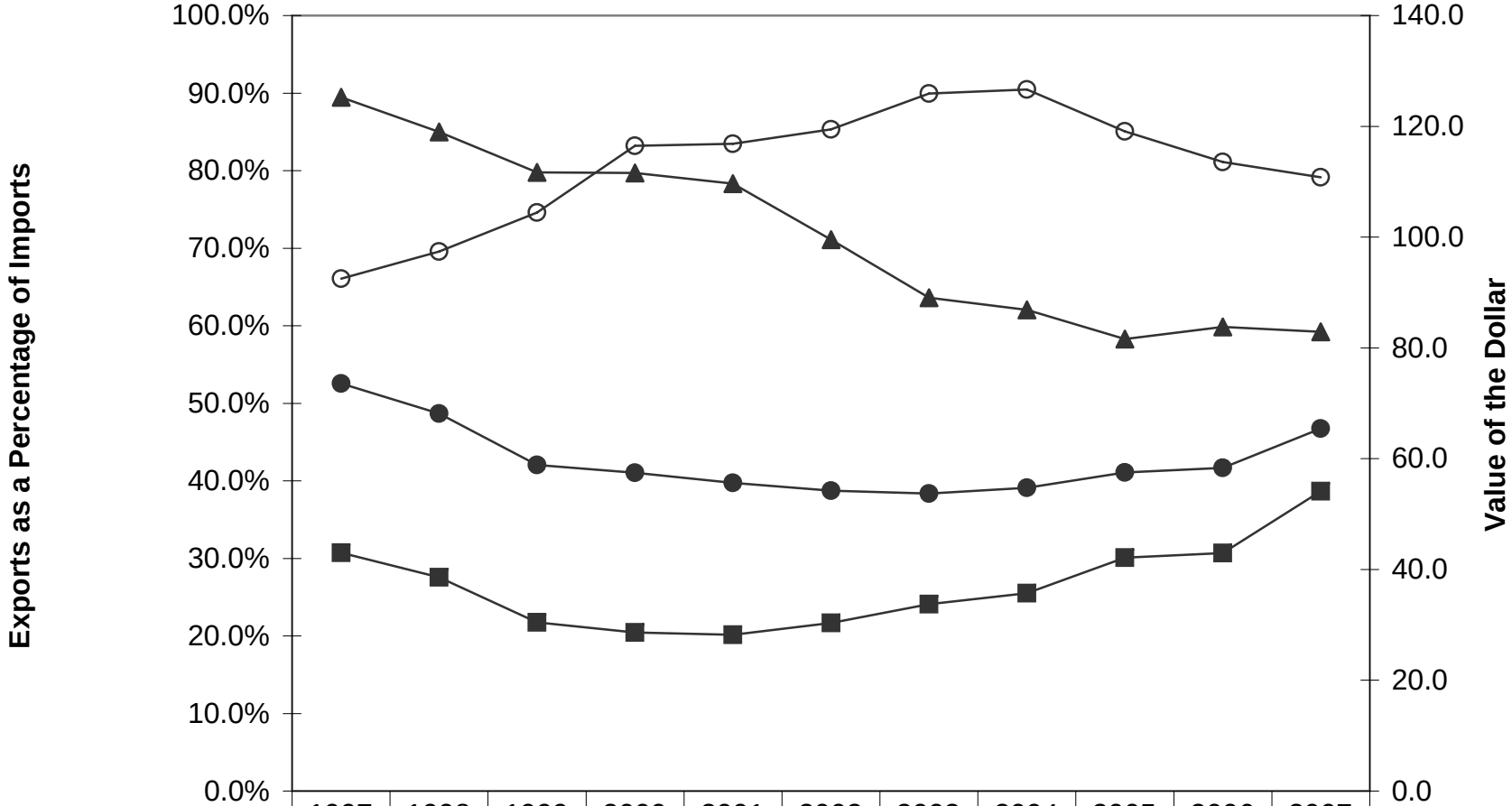
By comparison, the total number of motor vehicle industry establishments in the nation fell almost 600, a net decrease of 6.3 percent. The most notable portions of this decline happened in other motor vehicle electrical and electronic equip-ment (336322) and tire retreading (326212), down 334 and 189 establishments, respectively. Other specific industries losing notable numbers include light vehicles (33611), carburetors-pistons-rings-valves (336311), and brake systems (33634). On the other hand, the number of establishments producing parts for steering and suspension (33633) and seating and interior trim (33636) substantially increased – just not enough to offset the losses.

It is also worth noting that motor vehicle industry establishments, whether in Ohio or across the nation, have faired better than manufacturing establishments in general. The total number of manufacturing establishments in Ohio fell by 9.6 per-cent from 1998 through 2006, only slightly more than the 9.1 percent decline across America.

See Tables A13a & A13b

# U.S. INDUSTRY ANALYSIS AND OUTLOOK

# Exports of Motor Vehicles and Parts and Accessories as a Percentage of Imports and the Value of the Dollar, 1997-2007




| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 52.5% | 48.7% | 42.1% | 41.0% | 39.7% | 38.7% | 38.4% | 39.1% | 41.1% | 41.7% | 46.7% |
| Motor Vehicles | 30.7% | 27.5% | 21.7% | 20.4% | 20.2% | 21.7% | 24.1% | 25.5% | 30.1% | 30.7% | 38.7% |
| Parts and Accessories | 89.5% | 85.0% | 79.8% | 79.7% | 78.3% | 71.1% | 63.6% | 62.0% | 58.3% | 59.8% | 59.2% |
| Index Value of the Dollar | 92.52 | 97.40 | 104.44 | 116.48 | 116.87 | 119.45 | 125.91 | 126.66 | 119.09 | 113.59 | 110.81 |

Sources: U.S. Bureau of Economic Analysis, Federal Reserve Board

## BALANCE OF TRADE TRENDS

The broadest trade measures include parts and accessories as well as motor vehicles (new and used). The common base for comparing (and combining) the two groups is their dollar value. The chart above shows the changes in the U.S. trade deficit in motor vehicles, parts-and-accessories, and the combination of the two ("Total") for 1997 through 2007.[16] Relatively speaking, the Total trade deficit increased 1997 to 2003, indicated by the falling value of exports-as-a-percent-age-of-imports from 52.5 to 38.4 percent. The deficit in motor vehicles has been relatively greater than the deficit in parts and accessories. This is indicated by the much lower ratio of exports-to-imports in vehicles – from 30.7 percent in 1997 to 21.7 percent in 2002. The same ratio for parts and accessories was much higher – up to 89.5 percent in 1997.

One explanation for the changes in trade deficits is the changing value of the dollar. A lower value of the dollar makes American-made goods relatively less expensive for foreigners to buy and foreign goods more expensive for people and companies in American to buy. A higher value has the opposite effects. The substantial increase in the index value of the dollar from 1997 to 2003 appears to have increased the relative Total deficit in exactly in this way. Conversely, the dol-lar's slighter decline since 2004 accompanied a smaller decrease the relative Total deficit. The relationship also is seen in the two components – motor vehicles and parts-and-accessories, although it does not match-up every year.[17]

It should be noted that the effect of currency fluctuations on U.S.-based companies can be complex. The devaluation of Asian currencies aided U.S.-based tire manufacturers by making their principal raw material – natural rubber – less ex-pensive (Prat, 1998). One U.S.-based tire manufacturer even increased production at its Asian plants. The devaluation of Asian currencies made its own products inexpensive imports, thereby decreasing its costs.

Trade agreements can affect levels of trade independently of the dollar's value. The North American Free Trade Agree-ment (NAFTA) has boosted motor vehicle trade among the member countries. It permitted manufacturers to rationalize production, improving productivity and profitability. The effect of NAFTA on U.S.-Canadian trade has been less dramatic than on U.S.-Mexican trade because Canada and the U.S. already had small or no tariffs (Gott, et.al., 1999). However, Mexico's membership in both NAFTA and MERCOSUR links the N. and S. American trade blocks, and its lower costs make it an attractive location for exports to other Latin America nations, not just to the U.S. and Canada (Levy, 1999).

The implementation of NAFTA may also help explain the relative increase in the U.S. industry's trade deficit. While Amer-ican exports to Canada and Mexico increased, imports from those countries increased even more. The most notable in-dustry effect was that more vehicles were imported from Mexico. Levy (2001) argues that the impact of the strong dollar is greater than the effect of NAFTA.

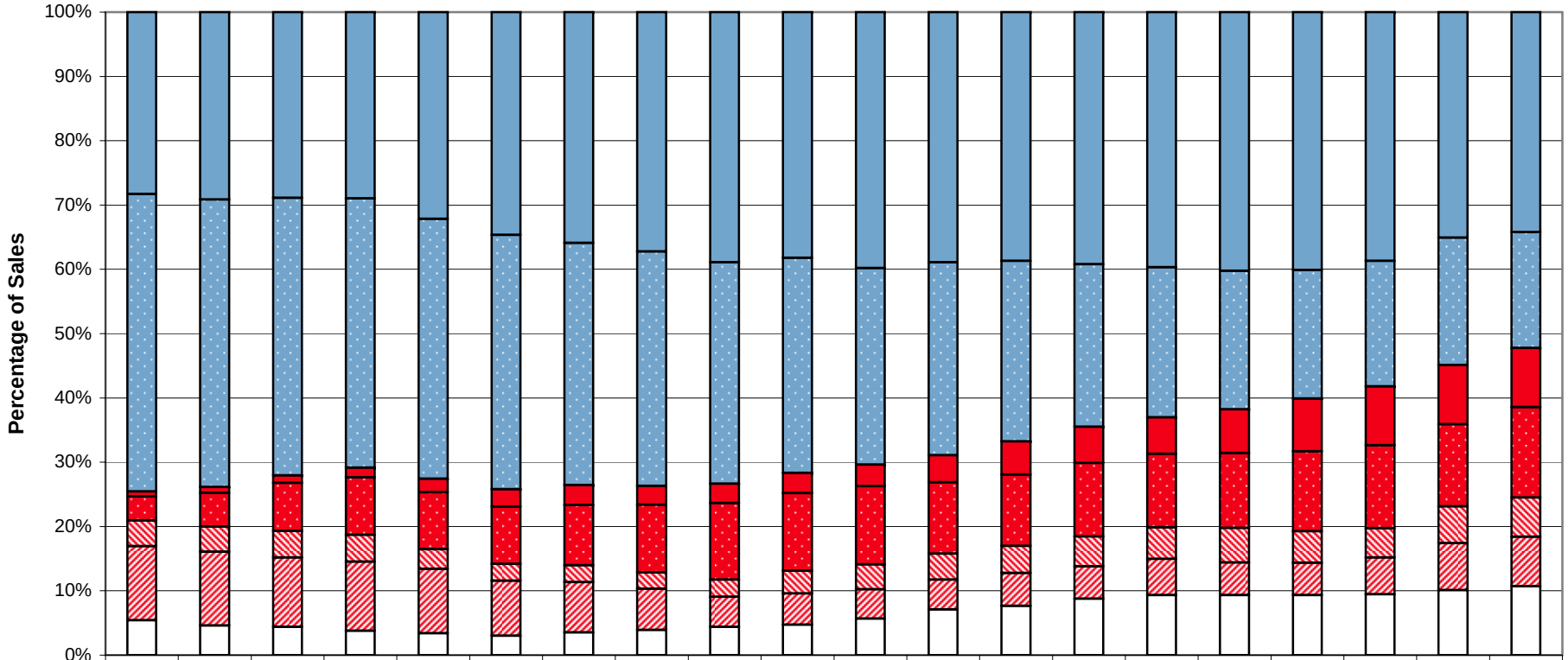
Government policy may have unintended consequences on trade. U.S.-based companies shifted the assembly of some larger (and more expensive) cars to Canada in order to meet the Corporate Average Fuel Economy (CAFE) requirements for vehicles assembled in the U.S. (Adams, 1998). This shows up in the U.S.-Canadian trade statistics. Most of the bi-lateral industry trade with Canada consists of intra-company shipments (Gott, et.al., 1999). The U.S. exports more en-gines and other parts to Canada than it imports from Canada. However, many of those engines and parts come back to the U.S. in vehicles; the U.S. trade deficit with Canada in vehicles more than offsets the surplus in engines, parts and accessories (U.S. Bureau of Economic Analysis, 2008b).

Finally, the growth of industry in a developing country may also affect the balance of trade. Levy (2001) cites China's parts industry as an example. At least some suppliers in China can provide parts at volumes and prices sufficient to at-tract the attention of other parts suppliers (e.g., tier-1 companies), assemblers, or parts distributors in the replacement market.

See Table A14

Ohio Department of Development

# U.S. Market Share Sales Trends in Light Vehicles by Brand & Import Status: 1988 - 2007




| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997* | 1998* | 1999* | 2000* | 2001* | 2002* | 2003* | 2004* | 2005* | 2006* | 2007* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U.S.B.T. | 28.3% | 29.2% | 28.9% | 29.0% | 32.1% | 34.6% | 35.9% | 37.2% | 38.9% | 38.2% | 39.8% | 38.9% | 38.7% | 39.2% | 39.7% | 40.2% | 40.1% | 38.7% | 35.1% | 34.2% |
| U.S.B.C. | 46.3% | 44.7% | 43.2% | 41.9% | 40.4% | 39.6% | 37.7% | 36.4% | 34.5% | 33.4% | 30.6% | 30.0% | 28.1% | 25.3% | 23.3% | 21.5% | 20.0% | 19.5% | 19.8% | 18.0% |
| J.B.D.T. | 0.7% | 0.9% | 1.1% | 1.5% | 2.1% | 2.7% | 3.1% | 2.9% | 3.0% | 3.1% | 3.3% | 4.2% | 5.2% | 5.7% | 5.7% | 6.8% | 8.2% | 9.1% | 9.2% | 9.2% |
| J.B.D.C. | 3.7% | 5.2% | 7.5% | 9.0% | 8.9% | 8.9% | 9.4% | 10.5% | 11.9% | 12.1% | 12.2% | 11.1% | 11.1% | 11.4% | 11.5% | 11.7% | 12.4% | 12.9% | 12.8% | 14.0% |
| J.B.I.T. | 4.0% | 3.9% | 4.1% | 4.2% | 3.1% | 2.6% | 2.6% | 2.5% | 2.7% | 3.5% | 3.9% | 4.1% | 4.3% | 4.6% | 4.9% | 5.4% | 4.9% | 4.6% | 5.7% | 6.1% |
| J.B.I.C. | 11.5% | 11.5% | 10.8% | 10.8% | 10.0% | 8.6% | 7.8% | 6.4% | 4.7% | 4.9% | 4.5% | 4.6% | 5.1% | 5.1% | 5.7% | 5.1% | 5.1% | 5.7% | 7.3% | 7.7% |
| Others | 5.4% | 4.6% | 4.4% | 3.8% | 3.4% | 3.0% | 3.5% | 3.9% | 4.4% | 4.7% | 5.7% | 7.1% | 7.6% | 8.8% | 9.3% | 9.3% | 9.3% | 9.4% | 10.1% | 10.7% |

Source: Ward's. Note: * - 1997 and later years not entirely comparable with earlier years.
Abbreviations used: B - Brand; C - Car; D - Domestic; I - Import; J - Japanese; T - Light Truck; U.S. - United States.

## MARKET SHARE TRENDS

Market share trends are important because sooner or later "Capacity follows market share" (Harbour Consulting, 2006: 11). Starting with the energy crisis in 1973, the U.S. light vehicle market was transformed from a stable oligopoly into the most competitive market in the world as Japanese-brand assemblers captured a significant portion of sales. They did so by offering higher quality products better matching shifting consumer demand. Competition compelled U.S.-brand assem-blers to address both quality and organizational problems. The latter (and their suppliers) restructured their organizations and re-engineered their vehicles (and parts), improving design and quality while reducing costs. Design and quality is-sues are now much less distinguishing. The intensely competitive market limits the pricing power of assemblers. In some cases, new models are priced the same or lower than earlier models even though the former may have more features than the latter (Levy, 2008: 14).[18]

Never-the-less, the struggle for market share continues. The chart above illustrates a number of market share trends in U.S. light vehicle sales during the last 20 years. After fluctuating between 70 percent and 75 percent from 1988 through 1998, the combined share of U.S. brand cars and light trucks (U.S.B.C. and U.S.B.T.) fell below 70 percent of all sales in 1999, and continued to fall each year through 2007, when it was 52.2 percent. The net loss of market share for U.S. brands is the combination of two countervailing trends. Sales of U.S.B.T.s rose from 28.3 percent in 1988 to 40.2 percent in 2003. (U.S.-brand assemblers adapted faster than the competition to changing consumer tastes in this segment, but foreign-brand assemblers are now targeting this market.) However, this was not enough to counter-balance the declining market share of U.S.B.C.s, which fell from 46.3 percent in 1988 to 21.5 percent in 2003. Things took a turn for the worse for U.S.-based assemblers in 2004 when U.S.B.T.s started losing market share – down 6.9 percent, and U.S.B.C.s con-tinued losing market share – down 2 percent. Foreign car brands, whether imported or domestically assembled, have combined for the majority of car sales in America since 2002 (Ward's, 1993-2008).

Some of the market share loss of U.S. brands may be attributed to the changing value of the dollar. Statistics from the Federal Reserve Board (1990, 1993, 1996, 1999, 2004, 2006, 2008) show a net decline in the value of the dollar from 1988 to 1995, after which it steadily rose until 2002, and declined since then. The chart above shows that imports' share of motor vehicle sales (essentially the bottom three blocks of each stacked bar in the chart) fell from 20.9 percent in 1988 to 12.8 percent in 1995, and then grew to 19.8 percent in 2002, with little change until 2006.[19] However, the 7 percent rise in imports' market share does not account for all of the 10.7 percent decline in market share of U.S. brands from 1995 to 2002. Part of the difference is the increased share – 3.6 percent – of Japanese-brand light trucks and cars assembled in N. America (J.B.D.T. and J.B.D.C.) from 1995 to 2002. Appendix table A15b shows the details. Furthermore, the decline in the value of the dollar since 2002 is inconsistent with the increasing share of imports in the same period.

The chart also illustrates the continuing shift of production of Japanese brand vehicles to N. America. In 1988, 4.5 percent of sales in America were of Japanese brand cars and trucks made here, while 15.5 percent belonged to Japanese imports. By 1996, the share of Japanese imports had dropped to 7.4 percent of U.S. sales, while the share of domes-tically made Japanese-brand vehicles had risen to 14.9 percent. Shifting production from Japan to N. America achieved what was intended: circumvent the import quotas of the 1980s and insulate sales from the effects of changing currency values. (The rising value of the yen at the time made imported Japanese vehicles relatively more expensive when com-pared with vehicles produced in the U.S.) Since 1996, though, Japanese imports have risen with the more or less higher value of the dollar to claim 13.8 percent of U.S. sales, while domestically made Japanese vehicles had 23.3 percent of the market in 2007. The total – 37.1 percent – is the largest Japanese-brand share. The corresponding decline in market share of U.S. brands – now 52.2 percent – appears to be concentrated at GM and Ford (Levy, 2008: 3).[20]

Other vehicle makers individually have only toe-holds in the American market – their combined share of sales never sur-passed 7 percent until 1999. The improved design and quality of U.S. vehicles, as well as the declining value of the dol-lar, probably were factors in the decisions by European producers such as Peugeot, Renault, and Fiat to leave the U.S. market (Gott, et.al., 1999: 36-39).[21] Their increasing market share since 1993 is largely consistent with the rising value of the dollar. However, the recent strong value of the Euro hurt sales of European brands in the early part of this decade (Levy, 2004). Under these circumstances, the recent rise of other vehicle makers reflects the growing shares of South Korean producers Daewoo, Hyundai, and Kia. The South Koreans' success was initially based on low prices and extend-ed warranties (Levy, 2001).

The continuing competition for market share has led to much more frequent use of rebates and discounts by dealers and assemblers. "When one manufacturer offers incentives,… the others generally follow suit or risk losing market share" (Levy, 2008: 11). While per-unit costs of vehicles can be lowered by maintaining high demand – which rebates and dis-counts are intended to stimulate, failure to lower costs at the same time simply reduces profit. These practices are less likely with models for which demand is higher (Levy, 2008: 14).[22]

Finally, it has been noted that foreign-based makers of heavy-duty trucks have not threatened their American counterparts with imports for two reasons. First, heavy-duty trucks are not manufactured in many foreign countries because there is little need for such trucks – distances traveled are shorter, and few roads could accommodate them. Second, the few such assemblers have preferred to buy U.S.-based assets rather than establish their own manufacturing facilities. On the other hand, some foreign medium-duty truck makers have made some inroads into the American market with their exports (Wang, 2008: 10-11).

See Tables A15a & A15b

## INDUSTRY OPERATIONS AND RECENT TRENDS

Companies making light vehicles (NAICS 33611) and companies assembling medium- and heavy-duty trucks (NAICS 33612) have a number of characteristics in common despite serving different markets. (The former serve mostly families and individuals, the latter usually serve organizations looking for capital goods.) Both produce their own components or purchase them from independent suppliers. The modules and parts – mostly metal, plastic, rubber and/or glass – are shipped to plants where workers assemble them into vehicles. Companies in both industries engage in the more profit-able – and riskier – activities of leasing and financing. Medium- and heavy-duty truck makers also offer maintenance and repair services (Levy, 2004; Wang, 2008: 8).

Price competition in both industries is intense (Levy, 2008; Wang, 2008: 10), continuing regardless of how well the econ-omy is doing. While both may offer rebates or discounts, the practice is much more frequent among light vehicle assem-blers. This is due to the reduction of trade barriers, the ready availability of information – especially price comparisons, and, in some instances, excess capacity (Levy, 2008: 14). The shear number of light vehicle assemblers operating in N. America probably also is a factor. As mentioned in the preceding section, the light vehicle market has not been an oli-gopoly in decades. Although there are now just four heavy-duty truck assemblers in N. America, the size, knowledge of market choices and the financial soundness of customers counter-balances that concentration (Wang, 2008: 10-11).[23]

Both industries are cyclical, albeit for different reasons. Purchasing a new light vehicle usually is the second largest ex-penditure a person or family makes, and people need to feel confident that they can afford it. As previously noted, new light vehicle sales take-off when the economy is expanding and people feel secure in their employment prospects, but fall dramatically when the economy contracts and the unemployment rate is high (Levy, 2008: 15). Medium- and heavy-duty trucks are capital goods, and as such, purchases lag the economy. Purchases are made to add capacity as well as re-place aging equipment. During times of economic weakness, orders fall or are cancelled. Owners may choose to repair trucks, and fleet operators have even cannibalized idle trucks for spare parts (Wang, 2008: 11).

In other ways, the two industries differ. Heavy-duty trucks usually are customized to suit the buyer's needs.[24] Buyers select engines, transmissions, axles, suspensions, wheels, tires, brake systems, seating and other features based on considerations such as distance per trip, geography, and cargo type. More recent optional features that improve safety and efficiency include GPS-based tracking and communications systems, antilock brakes, and crash-avoidance warning systems. Because trucks are so customized, assemblers concentrate on the design of platforms and rely on suppliers to design the various mechanical and electrical systems that they assemble into a complete vehicle. This lets assemblers maintain the lowest possible fixed cost base and maximizes flexibility for customers. Basic vehicle redesigns may not be made for 10 years. New designs result from breakthroughs such as improved aerodynamics or weight reductions. Parts

suppliers may make interim improvements, and they work with assemblers to meet safety and emissions regulations (Wang, 2008: 10-11).

By contrast, light vehicle makers have sought to shorten model life times to five years. They bring new models to market in about three years, and aim to reduce this to two years. The accelerated pace may be due in part to changing consum-er tastes and regulatory requirements, but the practice also keeps a company's line-up fresh. It has been accomplished by having product designers work with engineers, thereby minimizing redesign work in later development stages (Levy, 2008: 12); work with industrial process designers also minimizes assembly time (Harbour Consulting, 2004).

The motor vehicle industry seems to change daily, perhaps the consequence of the two most important, interrelated in-dustry trends: competition and globalization. Competition increases when companies enter markets around the globe (again, as noted in the preceding section), and emerging markets such as Brazil, Russia and India present opportunities for higher-growth rates for established companies, with the attendant competition for market share. Such markets also are characterized by lower manufacturing costs, which certainly help U.S.-based companies' overall bottom lines. Some companies have closed plants in N. America while opening plants in the high-growth locales to better serve their cus-tomers (Levy, 2008: 7-8).[25]

The industrial process has changed over the years as companies have entered new territories and now compete in mar-kets around the world. The intensified competition compelled companies not only to improve quality, but also to cut costs wherever possible. (Better quality means, among other things, that products last longer, and that less time is needed for routine maintenance.) A number of organizational and technical changes have been made pursuing these goals. The assembly process has been simplified in a number of ways. Vehicles today contain fewer parts than in the past. Fewer parts mean lower production costs, and less likelihood of assembly errors. Simplification also means that the number of stampings required for sheet metal parts such as hoods, trunks, fenders and doors has been reduced (Levy, 2008: 12; Wang, 2008: 10).

Perhaps the most far-reaching change for motor vehicle assemblers (NAICS 33611) has been the shift of work from as-semblers to tier-1 suppliers. Two examples illustrate these changes. In the past, seats were made at the assembly plant from the inventory of components. Now, assemblers order seats from an off-site facility, and have them delivered just-in-time for incorporation into the vehicle. (Suppliers delivering goods in reusable containers reduce waste and pollution costs.) Meeting these demands is easier if suppliers locate close to their customers, as orders are placed daily or even hourly (Levy, 2008: 12). Similarly, the pistons, cylinder liners, connecting rods, and related bearings were made by dif-ferent companies at different locations and shipped to a plant for assembly. Now, a single company has combined the operations, delivering a tested, more reliable system (which it at least helped design) at less cost than before (Gaines, 1999; Levy, 1999).

The first example is simply shifting the work off-site. The second represents the reorganization of the supplier base and its relationship with assemblers. Suppliers are now involved with assemblers in designing, developing, and engineering components and systems (Levy, 2008: 12). They also may assemble the components into modules, and do quality control testing. There are advantages and risks for both with this approach. Pooling organizational resources facilitated and shortened R&D cycles as well as actual production. Shifting these activities to suppliers reduces some investment risks and costs for assemblers while drawing both closer. Under these circumstances, contracts are no longer done annually, but for the life of the model. The contracts stipulate supplier productivity targets offsetting inflation and lowering per-unit costs for the assemblers. In turn, assemblers agree to share the savings they achieve with suppliers. Suppliers are left to decide how to meet assemblers' goals on costs, quality, performance, timing, and features. They can choose their own tier-2 and tier-3 suppliers. These activities are riskier for suppliers, but the rewards may be greater (Levy, 2008: 16). Conversely, failure to meet assemblers' expectations can cost suppliers business. For example, Chrysler withdrew from a deal with Collins & Aikman over price and quality concerns regarding a bumper for its Jeep Liberty (Levy, 2004).

With more invested in suppliers, assemblers and even tier-1 companies have been known to aid their crucial suppliers with staff or loans to avoid costly delays in production (Levy 2008: 15). Delphi received help from GM a couple of years ago (Karush, 2006), and currently is helping some of its tier-2 and tier-3 suppliers (Levy, 2008: 15).

While the relationship between assemblers and tier-1 suppliers may be closer, it is not cozy. Parts suppliers face financial pressures from both customers (who demand lower prices) and suppliers (in the form of higher prices for raw materials) (Levy, 2008: 2).[26] Assemblers also have asked suppliers to share in warranty repair costs (Harbour Consulting, 2004; Levy, 2004). Being squeezed from both ends may force some – particularly smaller ones – into bankruptcy or to other-wise leave the business, especially if they do not receive assistance from assemblers (Levy, 2008: 2).

On the other hand, large parts suppliers also have opportunities overseas with emerging markets. There are two appeal-ing facets: 1) low cost labor for manufacturing and engineering, and 2) rapidly growing local demand. Overseas expan-sion also supports assemblers' efforts to consolidate designs across international markets as well as supplying assem-blers (Levy, 2008: 2).

Assemblers and tier-1 suppliers around the world would like to reduce the number of suppliers with whom they deal to further trim costs and increase efficiency.[27] Indeed, the supplier base is becoming smaller as companies merge or leave the business. Mergers and acquisitions among/by suppliers are done for a number of reasons. A larger size enables the new company to offer more products and/or integrate components into a module, thereby spreading overhead costs and reducing per unit costs. Larger companies also are better able to follow and service their clients around the world, making themselves more valuable to clients and more likely to get contracts. Tier-1 suppliers, in turn, are trying to reduce the

number of their (tier-2) suppliers in order to reduce their own costs and improve efficiency. The result is that the number of suppliers is shrinking as companies either merge or leave the business. Mergers between large firms are not occurring at present, but companies further down the supply chain are being acquired (Levy, 2004).

The downside of the mergers and acquisitions has been the accumulation of large debt loads. The large debt loads, perhaps in combination with other financial obligations and big customers pushing them for reduced prices, lead Delphi, Collins & Aikman, Dana, and Tower Automotive to file for bankruptcy protection. Others may follow because they find themselves in the same situation (Bennett and Assaad, 2006). Still other companies tried to overhaul themselves; for example, Lear obtained bank loans, suspended its dividend, and sold an interior products division to improve its financial position (Staff, 2006).

One consequence of suppliers assuming subassembly work has been the standardization of final assembly procedures for different model vehicles. In other words, when the same modules are used in different models, it is easier if those modules are assembled in the same order regardless of what model is being assembled. Given the tight schedules and close coordination between assemblers and tier-1 and tier-2 suppliers that just-in-time manufacturing requires, standar-dizing the process saves money (Harbour Consulting, 2004). Conversely, the commonality of parts and the standardi-zation of assembly processes enable companies to assemble more models on one line. The key for an assembler's efficient operation then is rapidly and inexpensively making the necessary changes for different models. (An example might be re-programming welding machines instead of swapping them out.)

Harbour Consulting (2004) believes that this results in the more efficient use of facilities. For example, greater demand for one model produced by one plant and little demand for another made at a second plant could lead to overtime at the former and underutilization of labor and equipment at the latter. If the second plant could quickly and easily switch be-tween production setups for the two models, then overtime could be reduced at the first plant and the second plant's fa-cilities would be better utilized. (This also means it is easier to fill niche markets – Durbin, 2006). This can only happen if there is a just-in-time supply system, sufficient commonalities between the two vehicles' components, the assembly se-quences are standardized, and the same equipment can be used for either model with little or no change.

## TECHNOLOGIES IN PRODUCTION PROCESSES AND VEHICLES

Innovative technologies have been an important part of improving productivity at the plant. Examples include computer-aided design, engineering, and manufacturing (CAD/CAE/CAM), the adoption of progressive die presses ("progs") at stamping plants, and the use of the Internet. Computer technology has revolutionized the design process. It used to take 12 workers 12 weeks to produce a clay model of a proposed new vehicle. Today, one designer with CAD equipment and software can produce an animated video in three weeks, and an individual part may be designed in as little as one hour (Levy, 2008: 12). Progs are faster, form multiple parts with one stroke, take less space, and cost less (Harbour & Asso-ciates, 2001). Assemblers and suppliers can use the Internet to communicate more quickly and easily; consolidating supply chain transactions and logistics to a single location can reduce companies' costs.

However, technical innovations are not always panaceas; there may be tradeoffs that come with their adoption. For ex-ample, aluminum wheels may weigh less and work better with rubber than steel, but aluminum costs more per pound than steel. Similarly, progs work better with coiled steel than with steel blanks, and are less effective with aluminum. Prog die changes may take longer than die changes with the tandem presses they replace, and require more training for workers. The Internet website Covinsint, started by GM, Ford and Chrysler as a one-stop bidding shop for suppliers, was sold to Compuware because it did not work as well as envisioned. Compuware kept the name and tried to improve on the com-pany's successes as it competed with other electronic commerce exchanges for business (Harbour & Associates, 2001; Harbour Consulting, 2004). Furthermore, the price transparency of online competitive bidding has put downward pressure on prices and profits for suppliers of commodity items. On the other hand, suppliers of items that are highly engineered or customized have been less affected (Levy, 2008: 12).

Innovative technologies also have been an important part of creating higher quality vehicles. Technical advances have been spurred by consumer demand and/or new government regulations. One notable recent example of this has been the move by the National Highway Traffic Safety Administration (NHTSA) to require electronic stability controls on all new vehicles by 2010. Such devices could save over 10,000 lives per year, and currently are either standard or optional equipment on many vehicles. One NHTSA official said it "could be the greatest safety innovation since the safety belt" (quoted in Thomas, 2006b: D2).[28] Other recent innovations include knee and side air-bags, inflatable curtains, antilock braking systems and tire pressure monitors (Levy, 2008: 10-11).[29] Also noteworthy are the six-speed transmissions re-placing conventional four- and five-speed transmissions; they have fewer parts, weigh less, modestly improve fuel effi-ciency, and perform better when accelerating and moving through traffic (Harbour Consulting, 2006: 170-171).

However, vehicle makers have been caught between conflicting demands from government regulators and consumers. They must comply with standards for safety, fuel consumption and pollution control, each of which impacts vehicle performance. For example,

the easiest way to improve fuel economy is to reduce vehicle weight, but *ceteris paribus*, that reduces safety in a collision, and adding pollution control equipment adds weight to a vehicle. Finally, consumers' desires for larger vehicles (and their larger engines) – only recently diminished – conflict with the government's goal of reducing fuel consumption. The efforts to satisfy conflicting demands force manufacturers to adopt complex solutions[30] that add to a vehicle's cost (Levy, 2008: 13).

Efforts to improve fuel economy and meet emissions requirements have gone beyond improving components to include alternative power sources. Long before the recent rise in gasoline prices, people and organizations inside and outside of the industry have been investigating diesel, ethanol, natural gas[31] and electricity as supplements to, or replacements of, gasoline. Diesel engines are more fuel-efficient than gasoline engines, able to go 25-30 percent farther per gallon be-cause they run on a leaner mixture of fuel and air. That also means, *ceteris paribus*, they emit less $CO_2$ than gasoline engines and accelerate faster. However, these advantages must be weighed against their disadvantages. Diesels cost more for a number of reasons: they have to be sturdier and heavier because they operate at higher pressures, and their fuel injection system is more complex. Diesel fuel is more expensive, and the number of fuel stations is limited. Both engines and fuel must also meet stricter emission standards in America. However, this last problem may be diminishing with the shift to low-sulfur fuel and Honda's recently-patented method of reducing nitrous oxide (Harbour Consulting, 2006: 144-145; Kiley, 2008). Biological (i.e., renewable) sources of diesel fuel are also being investigated (Wikipedia, 2008). Clean-burning diesel engines also are a cheaper option than engines running on natural gas (Heywood, 2006: 62).[32]

The use of ethanol (a.k.a. grain alcohol) as a fuel has a long history (Wikipedia, 2008), even though it becomes a viable supplement-to/replacement-for gasoline on an industrial scale only when the price of oil is greater than $30 per barrel (Rohter, 2006).[33] Ethanol has a higher octane content than gasoline (Green, 2006),[34] and is a renewable energy source (Rohter, 2006; Wikipedia, 2008).[35] Unlike diesels, engines using ethanol are not substantially different from those using gasoline (Green, 2006). In fact, engines running on either gasoline or ethanol – so-called flexible fuel engines – are man-ufactured by the hundreds of thousands (Green, 2006), and the gasohol used in gasoline engines is 10 percent ethanol (Fischetti, 2006). The only technical disadvantages of ethanol are that it is more corrosive than gasoline – which is easily remedied, and that engines running on ethanol are hard to start when cold – which is why it is blended with gasoline. E85 fuel is 85 percent ethanol and 15 percent gasoline.[36]

Alternative fuels have other problems and limits. Choi (2006) cited a University of Minnesota study comparing energy gains and environmental impacts of ethanol and biodiesel that concluded that biodiesel was the better choice. Soybean-based biodiesel fuel returned more energy and produced less greenhouse gases when compared with corn-based ethanol production. It also entailed less nitrogen, phosphorus and pesticide pollution. However, Choi notes one limitation found by the scientists:

"Dedicating all current U.S. corn and soybean production to biofuels, however, would meet only 12 percent of gasoline demand and 6 percent of diesel demand. Prairie grass may provide larger biofuel supplies with greater environmental benefits" (2006: 38). This statistic is consistent with fact that roughly 20 percent of the current U.S. corn crop is converted to ethanol, and that ethanol comprises about 2 percent of U.S. transportation fuel (Heywood, 2006: 62). Heywood adds that ethanol made from residues and waste of plants seldom used as food could be more efficient and produce fewer greenhouse gases. Kammen (2006) comes to a similar conclusion.

The push for renewable fuels has had some unexpected and undesired consequences. "Rising global food prices and shortages have spurred calls in Congress to roll back the federal mandate to blend more ethanol and other biofuels with the gasoline supply. Critics say so much corn is being used for ethanol that there's less available for people and animals to eat, raising prices of everything from tortillas to meat." There are other reasons for increases in food prices, and any roll back is unlikely to occur this year (Mercer, 2008).

Battery-powered vehicles date to the early 20th century. Their initial advantages of fewer moving parts – and, therefore, fewer breakdowns – were out-weighed by their bulk, limited range, lengthy recharge times and slower acceleration rates. In addition, gasoline was cheap, readily available, and easy to transport (Vellequette, 2008e). The disadvantages re-mained significant even in times of expensive gasoline and concerns about pollution (battery-powered vehicles emit no pollutants) and despite battery improvements.

However, things may be changing. Neil (2006) described the changes by comparing GM's EV1, the most advanced bat-tery-powered car from the mid-1990s, with the Tesla Roadster. The EV1 used nickel metal hydride batteries that, under ideal conditions, would last about 150 miles, with a full charge taking eight hours. The Roadster uses lithium-ion batteries that last for 250 miles, with a full charge taking 3.5 hours; and it comes with a portable charging pack so that it does not exclusively rely on its home charging station. The company also claims that the Roadster can accelerate from 0 to 60 miles per hour in four seconds, and has a top speed of 130 mile per hour. However, the sporty Roadster remains relative-ly expensive at $85,000-$100,000, although a sedan for less than $50,000 was anticipated in 2008.

Other companies around the world also are manufacturing battery-powered cars. One example from Ohio is the ZAP Alias. The car had three wheels with two seats side-by-side. Power is provided by rechargeable lithium-ion batteries, with a range exceeding 100 miles and speeds up to 100 miles per hour. The car initially is intended as a second car – the one usually driven less than 30 miles per day (Vellequette, 2008e).[37]

The Detroit Three also are working on battery-powered vehicles. One example is the Chevy Volt; it is an electric vehicle that can go 40 miles under normal driving conditions before the battery pack needs to be recharged. It takes about six hours to recharge the

lithiumion battery pack from a standard 110-volt electrical outlet. The on-board flexible-fuel engine serves only to recharge the batteries; it does not provide power to turn the wheels via a transmission and driveshaft. GM still faces technical challenges and affordability issues in bringing it to market by 2010, and the Volt is expected to face competition from Nissan's electric vehicle (Levy, 2008: 9-10). Chrysler has developed a prototype electric Jeep that gets the equivalent of 50 mpg and has a range of 400 miles (Chavez, 2008).

While battery technology has improved, other issues need to be resolved before battery-powered vehicles are widely adopted. The U.S. lacks the manufacturing capacity for batteries, drive motors and electronic control according to one industry insider cited by Schoenberger (2008b). Other problems that manufacturers and utilities need to address include electric grid capacity, standardizing plugs, safety measures, and locations for recharging stations – public garages, curb-side meters, and workplace parking lots. Public policy supports for electric vehicles are also needed (Business Courier of Cincinnati, 2008).

Fuel cells are the other power source for electric vehicles. They produce electricity as a result of a chemical reaction. They run longer than battery-powered vehicles, and can be quickly refueled. Those using hydrogen emit only heat and water vapor as by products, while those using other fuels produce few emissions. Given equivalent units of fuel, hydro-gen-based fuel cell vehicles are about twice as efficient as those powered by internal combustion engines (Harbour & Associates, 2001; Wald, 2004). For example, GM's model delivers the gasoline equivalent of 43 mpg with a range of 200 miles (Thomas, 2008b), and Honda's model gets the equivalent of 68 mpg (Business First, 2008) with a range of 270 (Thomas, 2008b) or 280 miles (Jones, 2008a).

GM and Honda are field testing hydrogen-based fuel cell-powered light vehicles, and favorable reactions have been re-ported. One driver of Honda's model commented that there was no sacrifice – he did not feel he was "puttering around in an underpowered, cramped little soapbox" (Thomas, 2008b). Indeed, Honda's most recent model can go from 0 to 60 mph in 10 seconds (Jones, 2008a), has a top speed of 99 mph, and seats four people. Its 148-pound fuel cell stack is 30 percent lighter than the previous model, and one-third the size of the 1999 model (Kageyama, 2008).

Fuel cells are appealing, but obstacles to widespread use remain. Fuel cells are heavy, difficult to make and not com-pletely reliable in freezing weather (Jones, 2008a). Hydrogen does not freely exist on Earth, and producing it depends on current energy sources. The sources are either expensive or the technology for using them is not widely available – and that includes electrolysis powered by water, wind and the sun. The current practice of extracting hydrogen from natural gas (coal is another source of hydrogen) produces about one-half of the greenhouse gases that a gasoline engine does, but costs the equivalent of $3 per gallon (Thomas, 2008b). Once produced, hydrogen must be moved to a point where it is stored is stored before being distributed to vehicles.[38] However, there are very few hydrogen filling stations in the

country right now (Jones, 2008a), and building a distribution system may take decades (Ogden, 2006). Problems with storing hydrogen on the vehicle are now seen as less of a problem because storage tanks have been design to diffuse hydrogen into the air in non-flammable concentrations if punctured or leaking (Thomas, 2008b).

A last alternative has received a lot of attention in the press as it has become increasingly popular. Hybrid vehicles com-bine battery-powered electric motors with internal combustion engines to turn the wheels while reducing fuel consumption in the latter. It needs to be emphasized that battery-powered electric motors can be combined with *any* type of internal combustion engine using *any* type of fuel – gasoline, gasoline-ethanol blends, natural gas, diesel – to create a hybrid system (Levy, 2008: 13). More recently, hybrid vehicles using rechargeable batteries have been introduced (Romm and Frank, 2006: 78).[39]

There are a variety of hybrid systems. Those using all techniques may improve fuel economy by up to 60 percent, while those simply shutting off the internal combustion engine during stops improve fuel economy about 10 percent. The tech-niques include reducing engine size which, *ceteris paribus*, reduces fuel consumption; replacing the familiar Otto (four-stroke) cycle internal combustion engine with the less powerful but more fuel efficient Atkinson (two-stroke) cycle en-gine;[40] running the vehicle's electrical components from the batteries instead of the internal combustion engine;[41] and capturing via regenerative braking[42] energy that would otherwise be lost (Romm and Frank, 2006: 75). In the same vein of recapturing-otherwise-lost energy, more efficient thermocouples converting heat from engines and exhaust systems into electricity have been developed recently (Mayhood, 2008). Although a number of assemblers offer hybrid vehicles, Toyota has the most advanced hybrid system and the majority of the sales in America. It has registered over 650 patents, and licenses the technology to other companies (Harbour Consulting, 2006: 144).

Incorporating hybrid technologies can add thousand of dollars to a vehicle's cost, and batteries are significant part of the extra cost. The choice is between incorporating more techniques with the attendant complexity achieving greater fuel economy at higher cost vs. fewer techniques with less complexity, achieving some fuel saving at a lower cost. Japanese-based companies have tended to choose the former, and U.S.-based companies have tended to choose the latter (Jones, 2008b). As mentioned earlier, battery technology has improved; as production volumes rise, the premium prices paid for hybrids are expected to drop. Nevertheless, owners must operate their vehicles for a while before recouping the extra cost in lower fuel expenditures, and for any one vehicle, the length of time depends on how many miles a vehicle is driven per year as well as the price of fuel (Romm and Frank, 2006).[43]

Heywood (2006: 62) estimates that it will take years – even decades – before any or all of the fuel efficiency technologies discussed are competitive and widely diffused in motor vehicles.

## THE NEAR AND LONGER TERM OUTLOOKS

While many of the trends identified earlier are expected to continue into the foreseeable future, analysts may differ in the details, and new developments will emerge. Topics about which they prognosticate include sales volumes, market shares, the direction of technologies and fuel prices, and the number of jobs.

The near-term outlook for sales is poor. Levy's mid-2008 forecasts of 15 million vehicles for 2008 and 15.4 million in 2009 were overly optimistic given that overall sales in recent months have been around 30 percent or more below the same months from one year earlier. The severity of the drop varied by company, but none of the major assemblers was exempt (for example, see Krisher and Fowler, 2008). It is due to a weak economy, the housing squeeze, higher credit costs, and upside-down loans.[44] Production at factories will follow sales (Levy, 2008: 1, 2, 5). The difference between the three largest Japanese-based assemblers – Honda, Nissan, and Toyota – and the Detroit Three is that the former are expected to surpass their 2007 production levels in a few years, while the latter are not. (Levy (2008: 12) notes that European-bas-ed assemblers as well as those based in Asia plan to add capacity in America.) At the time of publication in the middle of 2008, Levy (2008: 9) expected the Detroit Three's collective loss of N. American market share not to change company market share ranks; GM was still expected to be top-ranked here, followed by Toyota, Ford, Chrysler, Honda and Nissan – just as they ranked in 2007. More recent commentators might add "assuming they survive."

Meanwhile, medium- and heavy-duty truck sales could improve by the end of 2008 and in 2009 – despite the economic slow-down – due to buying ahead of stricter emission standards scheduled to start in 2010. This is similar to what hap-pened in 2006 and 2007 (Wang, 2008: 1-3, 11).

Similarly, the outlook for parts suppliers in 2008 also is negative. Most notably, light vehicle tire production in 2008 is ex-pected to be lower than 2007 due to cutbacks in vehicle production as well as fewer miles driven (Levy, 2008: 16). The demand for heavy-duty truck tires probably will remain soft due to a weak economy (Levy, 2008: 6). Like some assem-blers, tire manufacturers in N. America have more capacity than needed and face competition from manufacturers in low cost areas. In addition, the costs of raw materials have risen in recent years (Levy, 2008: 4).

Analysts differ in their assessment of long-term prospects for the industry. Levy (2004) describes the N. American and Western European light vehicle markets are mature and saturated, and predicts long-term sales growth therein will be relatively slow and cyclical. However, Figueroa and Woods (2007) forecast output from U.S. assembly plants (NAICS 3361) to grow at a faster-than-average rate of 3.3 percent for the 2006-2016 decade. Output from bodies and trailers (3362) is expected to match the growth rate for the economy as a whole: 2.9 percent. On the other hand, they expect output from the parts group (3363) to lag at only .7 percent per year. Wang believes that medium- and heavy-duty "truck

and engine sales [will] continue to show dramatic swings, with underlying growth averaging 4% to 5% annually over the long term" (2008: 8).

The longer-term potential for higher growth rates exists in the still-smaller markets of Latin America, Eastern Europe, and Asia – notably Brazil, Russia, India and China. In fact, the Chinese market is projected to replace the U.S. market within a decade as the world's largest for new vehicles (Levy, 2008: 7). However, exports of motor vehicles are unlikely to grow significantly for several reasons. Some countries – China, India, Indonesia, and Malaysia – are trying to develop their own industries or restrict the access of U.S. manufacturers. Others are subject to risks such as currency crises. Even if trade barriers did not exist, the typical U.S.-made product is over-equipped and far too expensive for emerging markets. Production costs (labor, energy, regulatory requirements, etc.) make this so. To a limited extent, this is true even of Canada. Canadians are much wealthier than typical consumers in emerging markets, but they generally are not as wealthy as Americans, and Canada's population is one-ninth that of the U.S. Consequently, the best-selling American-made models are the less expensive ones (Levy, 1999). Instead of trying to export to areas outside of N. America, U.S.-based assemblers may circumvent trade barriers by doing what they have done in the past: (1) set up operations in the markets in which they want to sell, even if the governments require using some locally produced parts, (2) buy a signifi-cant stake in a local company, and/or (3) form a joint venture with a local company (Gaines, 1999; Gott, et.al., 1999; Nielsen, 2000).

Within the overall sales forecast are a number of trends. The high oil prices of 2008 hurt consumers in many parts of the world (Charlton, 2008). Over the long term, oil prices are expected to trend higher, with reduced demand in the West offset by increased demand in Asia and the Middle East (Levy, 2008: 9).[45] Consequently, consumers are expected to purchase vehicles that are more fuel efficient, regardless of whether they are cars or light trucks. Levy (2008: 1, 10) specifically predicts a shift away SUVs and luxury vehicles to CUVs and less expensive models (the latter reflecting the current economic malaise). U.S.-based assemblers cannot immediately meet the new demand in America for small cars by simply importing them as-is from one of their factories overseas because the cars have been built and tested to meet overseas government regulations – not American regulations. Consequently, such vehicles first must be changed to meet American standards before they are sold here (Durbin, 2008).

Any shift away from light trucks to cars will have a negative impact on light truck suppliers in Ohio. One example is axle-maker Dana, which announced company-wide job cuts of 3,000 (Vellequette, 2008b). Another is seat-maker Johnson Controls, which laid-off people since GM closed its SUV plant in Moraine (Gnau, 2008).

High gasoline prices make alternative fuels and the associated technologies more practical. The demand for renewable fuels such as ethanol and biodiesel are expected to grow in the near future so long as the price of crude oil remains high (Wang, 2008: 4).

A number of motor vehicle company officials and industry analysts believe ethanol usage by light vehicles could increase if the federal government acted to encourage its use beyond simply mandating that renewable fuel usage increase.[46] They suggest incentives for service stations to install more pumps offering E85 (a mixture of 85 percent ethanol and 15 percent gasoline) and/or subsidies to lower its costs. It's also noteworthy that assemblers plan to sell more vehicles with flexible fuel engines – those using either gasoline or ethanol (Thomas, 2006a).

Sales of hybrids are expected to increase, as more companies offer more models with the option of hybrid drives. Annual sales for hybrid are forecast to exceed 1,000,000 (or 6.1 percent of the total) by 2012 (Levy, 2008: 10). It is possible that most new car models will offer hybrid power sources as an option by 2020 (Romm and Frank, 2006). In the future, more sophisticated systems will recapture more of the braking energy (Romm and Frank, 2006: 75).

More plant closures are expected, and the remaining assembly plants must become flexible if more models are to be made for slow-growing markets. Even as they are closing plants, the Detroit Three are expected to lose market share. Sales of light trucks are of special concern. While they still dominate this sector, foreign-based assemblers collectively continue to take market share. This, combined with a shift toward more fuel-efficient vehicles, puts pressure on prices in what has been the profit center for the Detroit Three. Furthermore, the reduced sales by the Detroit Three will impact their suppliers, in turn, with reduced demand for parts. Given the lower margins and higher capital requirements of suppliers, suppliers will have will have a hard time earning enough cash to pay off debts. Consequently, more bankruptcy filings are possible. On the other hand, loss of business here may be at least partially offset by gains from operations in foreign markets. Meanwhile, foreign-based assemblers – particularly those based in Asia – continue to add plants here to further insulate their operations from detrimental currency fluctuations (Levy, 2008: 2-3).

Figueroa and Woods (2007) project employment declines from 2006 through 2016 for the overall U.S. motor vehicle industry. They predict that most of the losses will occur in the parts group (NAICS 3363): 138,300, or 21.1 percent, while the bodies and trailers group (3362) may have the smallest numbers: 4,100, or 2.3 percent. Losses in the assembly group (3361) are expected to fall between the two: 10,300, or 4.4 percent. Similarly, the Ohio Dept. of Jobs and Family Services/Labor Market Information (ODJFS/LMI, 2008) expected employment in the parts group to fall by 24,400, or 27 percent. ODJFS/LMI also forecast a loss of 4,300 jobs – 15.3 percent – in assembly operations, and 1,400 jobs – 16.5 percent – in the bodies and trailers group. Overall, it projects that 30,100 motor vehicle industry jobs in Ohio will disappear, a decline of 23.7 percent. Not all of the job reductions will be due to lay-offs. Some of the job reductions will occur through attrition, others will be the result of buy-outs or early retirements.

See Table A16

# ASSEMBLER PROFILES

As this report is concluding, the Detroit Three are dire financial straits. They requested a Congressional appropriation of funds totaling $34 billion (B) in early December to avoid bankruptcy. (Honda's sales also are substantially lower by com-parable portions, but it has not requested assistance.) GM asked for $12B in direct loans and $6B in revolving credit, stating the first $4B is crucial to meeting obligations at the end of the month. Ford asked for $9B, but said it may need the money only if the recession lasts longer than forecasted. Chrysler said it could be out of operating capital by the end of the first quarter of 2009, and asked for $7B. Congress asked for a plan of action from each of the Detroit Three before it would consider their requests. The companies responded (Welch and Kiley, 2008).

All of the following news items and observations need to be seen in this context.

Ohio | Department of Development

**Ted Strickland**, Governor

**Lee Fisher**, Lt. Governor
Director, Ohio Department of Development

# Chrysler LLC in Ohio

CHRYSLER

**Replaced Toledo South and Stickney

Prepared by:
Ohio Department of Development
Policy Research and Strategic Planning
January 2009

R112008A

## Chrysler LLC

Website: www.chrysler.com

2007 Revenue: n.a.
Earnings: n.a.

2006 Vehicle Production for all of DaimlerChrysler AG:
in the world: 4,604,275 – ranked 5th with 6.7 percent of world production;
in N. America: 2,805,993 – ranked 3rd on the continent with 60.9 percent of its production in the world.

Cerberus Capital Management essentially took the Chrysler group private when it purchased an 80.1 percent interest from Daimler AG in 2007. Consequently, it does not have to report revenue or earnings. However, it is known that Chrysler was profitable in 2007. 2006 is the latest year for which worldwide production data are available for companies. Chrysler was still a part of DaimlerChrysler (DC) that year, and the vast majority of DC's N. American production came from the Chrysler group. Chrysler's world headquarters is in Auburn Hills, Michigan, where Robert L. Nardelli is Chairman and CEO. Tom W. La Sorda and James Press are listed as Vice Chairmen and co-Presidents. Its principal business is as-sembling cars and light trucks, and it makes parts, including engines, transmissions, and stampings. The company has plants in Canada and Mexico, a financial affiliate, and leasing operations. Chrysler's average worldwide employment in 2007 was 71,578 (LexisNexis, 2008; Ward's, 2008). At least 32,000 people left its payroll in 2008 (Welch and Kiley, 2008). Expect further plant closings and employment reductions; whether they will occur in Ohio remains to be seen.

Sales of the Jeep Liberty and Dodge Nitro – both assembled in Toledo – have been sluggish in 2008 (Blade Staff, 2008). Current thinking about these products leans towards phasing out the Nitro at the end of the 2010 model year and keeping the Liberty. Rebates have been revived in an effort to reduce the current overstock of these models, and employees are concerned about shift cuts in the current economic climate (Vellequette, 2008d). An electric Jeep is contemplated for the Toledo facilities (Chavez, 2008).

Ohio | Department of Development

**Ted Strickland**, Governor

**Lee Fisher**, Lt. Governor
Director, Ohio Department of Development

# Ford Motor Company in Ohio

Prepared by:
Ohio Department of Development
Policy Research and Strategic Planning
January 2009

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## Ford Motor Co.

Website: www.ford.com

2007 Revenue: $172,468,000,000 – ranked 7th in the U.S. and 13th in the world;
Earnings: -$2,723,000,000 – -1.6 percent of revenue.

2006 Vehicle Production:
in the world: 6,472,555 – ranked 3rd with 9.4 percent of world production;
in N. America: 2,999,798 – ranked 2nd on the continent with 46.3 percent of its production in the world.

Ford is the third largest motor vehicle manufacturer in the world, and the second largest in N. America. The company's world headquarters is in Dearborn, Michigan, where William Clay Ford Jr. is Chairman, and Alan Mulally is President. The company assembles motor vehicles on every continent in the world. However, the only continents where it annually pro-duces at least one million vehicles are Europe and N. America. Its principal business is assembling cars and the full range of trucks. It also makes engines, transmissions, stampings, and other parts. The company recently sold its Land Rover and Jaguar subsidiaries (Levy, 2008: 8; Staff, 2008), but retains Volvo cars. Ford also has a joint venture with Mazda: Auto Alliance. It no longer owns Hertz Rent-a-Car, but still has repair, real estate, retail, insurance, financing and leasing operations – some of which are not limited to the motor vehicle industry. Worldwide employment in 2007 aver-aged 246,000 (Fortune, 2008; LexisNexis, 2008; Ward's, 2008). Employment cuts since are "similar" to those made at Chrysler (Welch and Kiley, 2008). More plant closings and employment reductions in Ohio and elsewhere are possible.

Ford has made a number of changes in Ohio since the last report, and plans more. Engine Plant No. 1 in Cleveland was temporarily closed in 2007 due to low demand for its product, but the company plans to reopen it soon (Schoenberger, 2008a). Engine Plant No. 2, also in Cleveland, lost its second shift (Schoenberger, 2008c), and the casting plant in near-by Brook Park is scheduled to close in 2009 (Schoenberger, 2008d). Ford permanently closed its Batavia transmission plant and its Maumee stamping plant in 2008. Last July, it announced the addition of at least 200 jobs at it Lima engine plant as part of its plan to build more cars and CUVs (Vellequette, 2008a). Ford plans to produce six European-designed small cars in N. America as part of strategy to cut vehicle development costs by using the same basic models in all parts of the world (Schoenberger, 2008a). The company also wants to double the number of hybrid vehicles it offers (Bunkley, 2008).

Sales of the Econoline van this year are 24.6 percent below where they were at this time in 2007 (Green, 2008), and Ford plans to replace it with the European Transit van as early as 2010 (Schoenberger, 2008a).

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**Ted Strickland**, Governor

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Director, Ohio Department of Development

# General Motors in Ohio

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Policy Research and Strategic Planning
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## General Motors Corp.

Website: www.gm.com

2007 Revenue: $182,347,000,000 – ranked 4th in the U.S. and 9th in the world;
Earnings: -$38,732,000,000 – -21.2 percent of revenue.

2006 Vehicle Production:
in the world: 8,978,462 – ranked 2nd with 13.1 percent of world production;
in N. America: 4,639,899 – ranked 1st on the continent with 51.7 percent of its production in the world.

General Motors (GM) is the largest motor vehicle assembler in N. America and the second largest in the world. (Toyota edged past GM in 2006 by less than 8,000 vehicles.) The company's world headquarters is in Detroit, Michigan, where G. Richard Wagoner Jr. is chairman and CEO, Robert A. Lutz – soon retiring – is Vice Chairman of global product develop-ment, Frederick A. Henderson is President and COO, and Troy Clarke heads the N. American unit. The company as-sembles motor vehicles on every continent in the world, annually producing at least one million in N. America, Europe, and the Asia/Pacific region. The company's principal business is assembling cars and the full range of trucks. It makes motor vehicle parts, including engines, transmissions, and stampings. GM has joint ventures with Toyota at an assembly plant in California (New United Motor Manufacturing, Inc. – a.k.a. NUMMI), and with Isuzu at an engine plant in Dayton (DMAX). GM also makes aircraft engines and locomotives, and has financial operations related (but not limited) to motor vehicles. Average worldwide employment in 2007 was 266,000 (Fortune, 2008; Lexis-Nexis, 2008; Ward's, 2008). Em-ployment fell in 2008. Expect more plant closings and employment reductions, possibly in Ohio.

There was bad news and good news regarding GM's operations in Ohio. The bad news was the Moraine assembly plant closed due to a precipitous drop in SUV sales (Dayton Business Journal, 2008). Jobs losses there were mitigated by the early retirement of some employees and the buyouts of at least 770 of those not retiring (Tresslar, 2008). The reduced demand for trucks also led to layoffs at the DMAX engine plant (Dirr, 2008a). The good news was GM's planned invest-ment of at least $350 million in Lordstown in preparation for assembling the Chevrolet Cruze, currently scheduled to re-place the Cobalt starting in 2010 (Mackinnon, 2008).

GM's Toledo plant now makes six-speed rear-wheel drive transmissions that are lighter, smoother, and more powerful than the four-speed transmissions they are replacing. The new transmissions improve fuel efficiency by four to seven percent, and are varied to suit small cars and light trucks. A line of six-speed front-wheel drive transmissions will be added by 2010 (Vellequette, 2008c). GM is preparing to produce aluminum engine blocks at its Defiance casting plant

(Schoenberger, 2008e), and its plans to produce the new Duramax 6.6-liter V-8 turbo diesel engine in Dayton have not changed (Dirr, 2008a).

A key point in GM's plan is shrinking, selling or terminating the Hummer, Pontiac, Saab, and Saturn divisions to focus on funding and marketing new models in the Buick, Cadillac, Chevrolet, and GMC divisions. The latter cluster accounts for 83 percent GM's sales. GM also plans to reduce the total number of individual models from 63 to 40; including reviewing nameplates in the remaining cluster. Other elements in GM's plan include shifting the line-up from light trucks to cars and CUVs, renegotiating the current labor contract – particularly the guarantee of 75 percent of pay to laid-off workers, and seeking a debt reduction from $66B to $30B (Welch and Kiley, 2008).

Ohio | Department of Development

**Ted Strickland**, Governor

**Lee Fisher**, Lt. Governor
Director, Ohio Department of Development

# Honda Motor Company in Ohio

HONDA

Prepared by:
Ohio Department of Development
Policy Research and Strategic Planning
January 2009

R112008A

## Honda Motor Co.

Websites: world.honda.com, and www.ohio.honda.com

2007 Revenue: $105,102,000,000 – ranked 40th in the world;
Earnings: $5,254,000,000 – 5.0 percent of revenue.

2006 Vehicle Production:
in the world: 3,471,467 – ranked 7th with 5.1 percent of world production;
in N. America: 1,385,693 – ranked 5th on the continent with 39.9 percent of its production in the world.

Honda is the seventh largest motor vehicle manufacturer in the world, and the fifth largest in N. America. Recent year-to-date sales data show that Honda has surpassed Chrysler, moving into fourth place in light vehicle sales behind GM, To-yota and Ford (Gearino, 2008). It also is the third largest car maker on the continent. The company's world headquarters is in Tokyo, Japan, where Satoshi Aoki is Chairman, and Takeo Fukui is President and CEO. Takanobu Ito will succeed Mr. Fukui in June, 2009. Akio Hamada is President and CEO of Honda Manufacturing of America in Marysville. The company assembles vehicles in every major area of the world except Africa. However, the only areas wherein it annually produces at least one million vehicles are Asia/Pacific and N. America. The company also makes, sells, and repairs mo-torcycles, scooters, ATVs, lawn mowers and trimmers, power tillers, snow blowers, portable generators, aircraft, water-craft and associated and general-purpose engines. 167,231 is the latest worldwide employment figure (Fortune, 2008; LexisNexis, 2008; ODOD, 2009; Ward's, 2008). The company may reduce the number of hours to be worked by em-ployees.

Honda plans to shift Civic production from E. Liberty to its new Greensburg, In., plant in the future. The Greensburg plant will be the sole source for Civics powered by compressed natural gas.

Honda currently sells only one hybrid – a version of the Civic. The company sold 55,000 last year, but aims to expand its hybrid offerings and set a goal of annually selling 500,000 by early in the next decade. The first step towards that goal is offering a new compact next year that will be sold only as a hybrid; a sporty hybrid is planned for 2010, as is a new Civic hybrid; a hybrid version of the subcompact Fit is planned shortly thereafter. Honda's hybrid system is lighter and less complex than Toyota's, raising the possibility that Honda's could cost less and get better gas mileage than Toyota's. Hon-da is less interested in using hybrid technology in larger vehicles, and it technology is less suited for larger vehicles than is Toyota's. Honda prefers cleaner diesel technology for large vehicles, and plans to add that to its Acura line (Rowley, 2008).

Ohio | Department of Development

**Ted Strickland**, Governor

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Director, Ohio Department of Development

# Navistar International and PACCAR/Kenworth in Ohio

Prepared by:
Ohio Department of Development
Policy Research and Strategic Planning
January 2009

R112008A

## Navistar International Corp.

Website: www.navistarinternational.com

2007 Revenue: $12,295,000,000 – though not ranked by Fortune, the 2007 fiscal year figure would place it about 218th on Fortune's list for the U.S.; it would not be in the top 500 in the world;
Earnings: -$120,000,000 – -1.0 percent of revenue.

Navistar is the fourth largest medium- and heavy-duty truck maker in the world. Technically a holding company, its world headquarters is in Warrenville, Illinois, where Daniel C. Ustian is Chairman, President and CEO. The company's principal business is assembling medium- and heavy-duty trucks and buses at its International Truck and Engine subsidiary. It also manufactures truck and bus bodies, diesel engines, and parts. The company provides financing for dealers and retail customers, and owns an insurance company. 17,100 is the latest worldwide employment figure (Fortune, 2008; King, 2008; LexisNexis, 2008; Wang, 2008: 5).

## PACCAR, Inc.

Website: www.paccar.com

2007 Revenue: $15,221,700,000 – ranked 169th in the U.S.; not in the top 500 in the world;
Earnings: $1,227,300,000 – 8.1 percent of revenue.

PACCAR (from the original Pacific Car), formed by the merger of Kenworth and Peterbilt, is the third largest medium- and heavy-duty truck maker in the world. It owns European brands DAF and Leyland. It also makes motor vehicle bodies and parts, off-road trucks, tractors, a variety of winches and cranes, and has related operations in sales, leasing and financing. Its world headquarters is in Bellevue, Washington, where Mark C. Pigott is Chairman and CEO, and Thomas E. Plimpton is President. 21,800 is the latest worldwide employment figure (Fortune, 2008; LexisNexis, 2008; Wang, 2008: 5).

# APPENDICES

# DETAILED TABLES

**Table A1: Notable Motor Vehicle Industry Companies in Ohio, 2008**

| Parent/Company/Division | Primary NAICS | City | Jobs Total | Jobs At Site^ |
|---|---|---|---|---|
| AB Volvo*-Hitachi Ltd.*/Euclid-Hitachi Heavy Equipment, Inc. | 336212 | Cleveland | | 457 |
| Aisin Seiki Co. Ltd.*, et.al./ADVICS N. America, Inc./ADVICS Mfg. Ohio, Inc. | 33634 | Lebanon | | 625 |
| American Trim LLC | 33637 | Sidney | | 600 |
| ArcelorMittal*/Dofasco, Inc./Powerlasers Corp. | 33637 | Pioneer | | 115 |
| ArvinMeritor, Inc.* | | | 1,481 | |
| ArvinMeritor, Inc. | 33635 | Newark | | 600 |
| ArvinMeritor, Inc. | 336399 | Cleveland | | 81 |
| ArvinMeritor, Inc. | 336399 | Kenton | | 800 |
| Asahi Glass Co., Ltd.[1] | | | 650 | |
| AGC Automotive | 327215 | Bellefontaine | | 500 |
| Belletech Corp. (a joint venture with PPG*) | 327215 | Bellefontaine | | 150 |
| ATC Group, Inc. | | | 649 | |
| ATC Group, Inc. | 336321 | Geneva | | 100 |
| ATC Lighting & Plastics, Inc. | 336321 | Geneva | | 60 |
| ATC Lighting & Plastics, Inc./Advanced Technology Corp. | 336321 | Geneva | | 250 |
| ATC Lighting & Plastics, Inc./Lighting Products, Inc. | 336321 | Andover | | 155 |
| ATC Lighting & Plastics, Inc./Lighting Products, Inc. | 336321 | Andover | | 84 |
| Atlas Industries, Inc. | | | 532 | |
| Atlas Industries, Inc. | 336312 | Fremont | | 134 |
| Atlas Industries, Inc. | 336312 | Gibsonburg | | 302 |
| Atlas Industries, Inc. | 336312 | Tiffin | | 96 |
| BAE Systems AH, Inc.* | | | 340 | |
| BAE Systems Survivability Systems LLC | 336111 | Fairfield | | 250 |
| BAE Systems Survivability Systems LLC/Centigon USA LLC | 336111 | Fairfield | | 90 |
| Behr & Co. GmbH/Behr Dayton Thermal Products, Inc.[2] | 336391 | Dayton | | 1,400 |
| Berkshire-Hathaway*/Scott Fetzer Co. | | | 257 | |
| Stahl Co. | 336212 | Cardington | | 107 |
| Stahl Co. | 336212 | Wooster | | 150 |
| Blackhawk Automotive Plastics | 336399 | Salem | | 680 |
| Blackstone Group LP/ TRW Automotive Holdings* | | | 392 | |
| TRW Automotive, Inc. | 336311 | Cleveland | | 42 |
| TRW Automotive, Inc. | 33634 | Mt. Vernon | | 35 |
| TRW Automotive, Inc. | 336399 | Cleveland | | 50 |

**Table A1: Notable Motor Vehicle Industry Companies in Ohio, 2008**

| Parent/Company/Division | Primary NAICS | City | Jobs Total | Jobs At Site^ |
|---|---|---|---|---|
| Blackstone Group LP/ TRW Automotive Holdings* (continued) | | | | |
| TRW Automotive, Inc.[6] | 336399 | Fayette | | 210 |
| TRW Automotive U.S. LLC | 336399 | Toledo | | 55 |
| Bridgestone Corp.*/Bridgestone AMP Co. | 326291 | Upper Sandusky | | 100 |
| Cerberus Capital Mgt. LP[6] | | | 3,755 | |
| Chrysler LLC*[3] | | | 3,375 | |
| Toledo North Assembly Plant | 336112 | Toledo | | 1,275 |
| Toledo Supplier Park[4] | 336112 | Toledo | | 500 |
| Toledo Machining Plant | 3363 | Perrysburg | | 700 |
| Twinsburg Stamping Plant | 33637 | Twinsburg | | 900 |
| Tower Automotive, Inc. | | | 380 | |
| Tower Automotive Operations USA I LLC | 33637 | Bluffton | | 217 |
| Tower Automotive Operations USA I LLC | 336399 | Bellevue | | 163 |
| Commercial Vehicle Group, Inc. | | | 1,073 | |
| Commercial Vehicle Group, Inc.[5] | 336211 | Norwalk | ---------> | 450 |
| Commercial Vehicle Group, Inc.[5] | 33637 | Shadyside | | |
| Commercial Vehicle Group, Inc.[5] | 336399 | New Albany | | 125 |
| Trim Systems Operating Corp. | 31332 | Dublin | | 240 |
| Trim Systems Operating Corp. | 336211 | Chillicothe | | 178 |
| Trim Systems Operating Corp. | 336399 | New Albany | | 80 |
| Cooper Tire & Rubber Co., Inc.*[6] | 326211 | Findlay | | 1,192 |
| Cummins, Inc.*/Cummins Filtration, Inc./Kuss Corp. | 333999 | Findlay | | 280 |
| Cypress Group LLC/Cooper-Standard Automotive, Inc.* | | | 1,442 | |
| Cooper-Standard Automotive, Inc. | 32622 | Bowling Green | | 500 |
| Cooper-Standard Automotive, Inc. | 32622 | Bowling Green | | 350 |
| Cooper-Standard Automotive, Inc. | 33634 | New Lexington | | 352 |
| Cooper-Standard Automotive, Inc. | 336391 | Archbold | | 240 |
| Daimler AG*/Detroit Diesel Remanufacturing | 333618 | Byesville | | 500 |
| Dana Corp.* | | | 1,327 | |
| Coupled Products LLC | 33634 | Upper Sandusky | | 355 |
| Coupled Products LLC | 336399 | Wharton | | 200 |
| Daido Metal | 331525 | Bellefontaine | | 372 |
| Dana Corp. | 336399 | Toledo | | 300 |
| Dana Ltd. | 336399 | Maumee | | 100 |

**Table A1: Notable Motor Vehicle Industry Companies in Ohio, 2008**

| Parent/Company/Division | Primary NAICS | City | Jobs Total | Jobs At Site^ |
|---|---|---|---|---|
| Delphi Corp.* | | | 3,300+ | |
| Delphi Corp. | 336322 | Warren | | 120 |
| Delphi Corp. | 336399 | Dayton | | 1,200 |
| Delphi Corp. | 336399 | Dayton | | 700 |
| Delphi Corp. | 336399 | Kettering | | n.a. |
| Delphi Corp. | 336399 | Vienna | | 120 |
| Delphi Corp. | 336399 | Warren | | 99 |
| Delphi Corp. | 336399 | Warren | | 500 |
| Delphi Corp. | 336399 | Warren | | 200 |
| Delphi Corp. | 336399 | Youngstown | | 100 |
| Dover Corp.*/Dover Diversified, Inc./Wiseco Piston, Inc. | 336311 | Mentor | | 265 |
| Eaton Corp.* | | | 1,100 | |
| Eaton Corp. (headquarters only - no manufacturing at this site) | 336322 | Cleveland | | 500 |
| Eaton Corp. | 33634 | Cleveland | | 200 |
| Eaton Inoac (a joint venture with Inoac Corp.) | 336399 | Fremont | | 400 |
| Ernie Green Industries, Inc. | | | 983 | |
| Florida Production Engineering | 33637 | New Madison | | 230 |
| Marion Industries, Inc. | 336399 | Marion | | 753 |
| Ford Motor Co.*[6] | | | 7,995 | |
| Cleveland Casting Plant[7] | 331511 | Brook Park | | 1,067 |
| Ohio Assembly Plant | 336112 | Avon Lake | | 2,300 |
| Cleveland Engine Plant 1[8] | 336312 | Brook Park | | 0 |
| Cleveland Engine Plant 2 | 336312 | Brook Park | | 813 |
| Lima Engine Plant | 336312 | Lima | | 730 |
| Sharonville Transmission Plant | 33635 | Cincinnati | | 1,478 |
| Walton Hills Stamping Plant | 33637 | Walton Hills | | 607 |
| Automotive Components Holding Co. (f.k.a. a Visteon Corp.* plant)[9] | 336399 | Sandusky | | 1,000 |
| F-Tech, Inc./F&P America Mfg., Inc. | 336399 | Troy | | 650 |
| General Motors Corp.*[6] | | | 9,145 | |
| GMPT Defiance Foundry | 331511 | Defiance | | 1,493 |
| DMAX Ltd. (joint venture with Isuzu Motors Ltd.*)[10] | 333618 | Moraine | | 600 |
| Lordstown Complex: Assembly and Metal Center[11] | 336111/33637 | Lordstown | | 2,756 |
| GMPT Toledo Transmission | 33635 | Toledo | | 1,663 |

**Table A1: Notable Motor Vehicle Industry Companies in Ohio, 2008**

| Parent/Company/Division | Primary NAICS | City | Jobs Total | Jobs At Site^ |
|---|---|---|---|---|
| General Motors Corp.* (continued) | | | | |
| Mansfield Metal Center | 33637 | Mansfield | | 1,593 |
| GMPT Parma | 33637 | Parma | | 1,040 |
| Goodyear Tire & Rubber Co.*[12] | 326211 | Akron | | 3,000 |
| Guardian Industries Corp. | | | 725 | |
| Guardian Industries Corp. | 327215 | Millbury | | 225 |
| Guardian Industries Corp. | 327215 | Upper Sandusky | | 500 |
| Hayes Lemmerz International* | 336399 | Akron | | 230 |
| Hitachi Ltd.*/Hitachi Metals America Ltd./AAP St. Marys Corp. | 336399 | Saint Marys | | 470 |
| Honda Motor Co.*/Honda of America Mfg. | | | 11,980 | |
| E. Liberty Assembly Plant[6] | 336111 | E. Liberty | | 2,500 |
| Marysville Assembly Plant[6] | 336111 | Marysville | | 5,300 |
| Honda Foundry Co. Ltd./Celina Aluminum Precision Technology | 336311 | Celina | | 480 |
| Anna Engine Plant[6] | 336312 | Anna | | 2,800 |
| Russell's Point Transmission Plant[6] | 33635 | Russell's Point | | 900 |
| Honda affiliates:[13] | | | 6,051 | |
| Atsumitec Co., Ltd./Ada Technologies, Inc. | 33635 | Ada | | 60 |
| Jefferson Industries Corp. | 336111 | West Jefferson | | 370 |
| Kaneta Kogyo Co., Ltd./Bucyrus Precision Tech | 33635 | Bucyrus | | 189 |
| KTH Parts Industries, Inc. | | | 1,020 | |
| Kalida Mfg., Inc. | 336399 | Kalida | | 250 |
| KTH Parts Industries, Inc. | 336399 | Saint Paris | | 770 |
| Nihon Plast Co., Ltd./Neaton Auto Products Mfg., Inc. | 336399 | Eaton | | 705 |
| Nissin Kogyo Co., Ltd./Nissin Brake Ohio, Inc. (f.k.a. Findlex Corp.) | 33634 | Findlay | | 670 |
| Tanaka Seimitsu Kogyo Co., Ltd./FT Precision, Inc. | 336399 | Fredericktown | | 200 |
| Toyo Denso Co., Ltd. | | | 439 | |
| Weastec, Inc. | 336111 | Seaman | | 59 |
| Weastec, Inc. | 336322 | Greenfield | | 158 |
| Weastec, Inc. | 336322 | Hillsboro | | 222 |
| TS Tech Co., Ltd. | | | 488 | |
| TS Tech N. America, Inc. | 33637 | Reynoldsburg | | 88 |
| TS Tech N. America, Inc./TS Tech USA Corp. | 336399 | Reynoldsburg | | 400 |
| TS Trim Industries, Inc. | 33636 | Athens | | 360 |

**Table A1: Notable Motor Vehicle Industry Companies in Ohio, 2008**

| Parent/Company/Division | Primary NAICS | City | Jobs Total | Jobs At Site^ |
|---|---|---|---|---|
| Honda affiliates (continued) | | | | |
| Yachiyo Industry Co., Ltd./AY Mfg. Ltd. | 336399 | Columbus | | 200 |
| Yamada Mfg. Co., Ltd./Yamada N. America, Inc. | 33633 | S. Charleston | | 350 |
| Yanagawa Seiki Co., Ltd./YSK Corp. | 33637 | Chillicothe | | 250 |
| Yutaka Giken Co., Ltd./Cardington Yutaka Technologies | 336399 | Cardington | | 750 |
| Honeywell International, Inc.* | | | 1,225 | |
| Honeywell International, Inc. | 336399 | Fostoria | | 900 |
| Honeywell International, Inc. | 336399 | Greenville | | 325 |
| Illinois Tool Works, Inc.*/Tomco Div. | 326199 | Bryan | | 270 |
| INA Holding Schaffler KG/LuK GmbH/LuK Clutch Systems LLC | 336399 | Wooster | | 980 |
| International Automotive Components Group | | | 1,954 | |
| International Automotive Components Group | 326199 | Fremont | | 304 |
| International Automotive Components Group | 326199 | Huron | | 700 |
| International Automotive Components Group | 33636 | Sidney | | 350 |
| International Automotive Components Group | 336399 | Wauseon | | 600 |
| Johnson Controls, Inc.* | | | 1,376 | |
| Battery Group | 335911 | Holland | | 456 |
| Johnson Controls, Inc. | 336211 | Dayton | | 500 |
| Johnson Controls Interiors LLC | 33636 | Oberlin | | 250 |
| Johnson Controls Interiors LLC | 336399 | Northwood | | 170 |
| Kongsberg Automotive Holdings ASA/Kongsberg Driveline Systems II Corp. | 336399 | Van Wert | | 750 |
| Lear Corp.*[7] | 336399 | Zanesville | | 300 |
| Magna International, Inc.* | | | 750 | |
| Decoma International of America, Inc. | 336322 | Toledo | | 100 |
| Intier Automotive Seating of America, Inc. | 33636 | Strongsville | | 60 |
| Gra-Mag Truck Interior Systems (joint venture with Grammer AG) | 33636 | London | | 40 |
| Decoma International of America, Inc./Norplas Industries, Inc. | 33637 | Northwood | | 100 |
| Decoma International, Inc./Decoma Systems Integration Group, Inc. | 33637 | Toledo | | 100 |
| Decoma International of America, Inc./Decoma Modular Systems, Inc. | 336399 | Toledo | | 100 |
| Intier Automotive Seating of America, Inc. | 336399 | Warren | | 250 |
| Midway Products Group, Inc. | | | 650 | |
| Findlay Products Corp. | 33637 | Findlay | | 200 |
| P & A Industries, Inc. | 33637 | Findlay | | 200 |
| Progressive Stamping, Inc. | 33637 | Ottoville | | 250 |

**Table A1: Notable Motor Vehicle Industry Companies in Ohio, 2008**

| Parent/Company/Division | Primary NAICS | City | Jobs Total | Jobs At Site^ |
|---|---|---|---|---|
| Modine Mfg. Co.* | | | 285 | |
| Modine Mfg. Co. | 336111 | Toledo | | 35 |
| Modine Mfg. Co. | 336399 | Pemberville | | 250 |
| Mitsubishi Electric Corp.*/Mitsubishi Electric Automotive America, Inc. | 336322 | Mason | | 422 |
| Morioku Co., Ltd./Greenville Technology, Inc. | 336399 | Greenville | | 672 |
| M-Tek, Inc. | 33637 | Upper Sandusky | | 600 |
| Navistar International*[14] | | | 1,000-1,400 | |
| International Truck & Engine Corp. (Lagonda) | 33612 | Springfield | | n.a. |
| International Truck & Engine Corp. (Urbana Rd.) | 33612 | Springfield | | n.a. |
| International Truck & Engine Corp. (W. County Line) | 33612 | Springfield | | n.a. |
| PACCAR, Inc.*/Kenworth Div.[14] | 33612 | Chillicothe | | 1,000-1,500 |
| Pacific Industrial Co., Ltd./Pacific Industries USA, Inc. | | | 650 | |
| Pacific Mfg. Ohio, Inc. | 336399 | Fairfield | | 500 |
| Takumi Stamping, Inc. | 336399 | Fairfield | | 150 |
| Parker Hannifin Corp.* | 336399 | Wickliffe | | 271 |
| PPG Industries, Inc.* | | | 1,767 | |
| PPG Industries, Inc. | 32551 | Crestline | | 700 |
| PPG Industries, Inc. | 32551 | Delaware | | 465 |
| PPG Industries, Inc. | 32551 | Cleveland | | 602 |
| PSA Peugeot-Citreon S.A.* | | | 1,900 | |
| Faurecia Exhaust Systems, Inc. | 336399 | Franklin | | 400 |
| Faurecia Exhaust Systems, Inc. | 336399 | Toledo | | 1,200 |
| Faurecia Exhaust Systems, Inc. | 336399 | Troy | | 300 |
| Qualitor, Inc. | | | 1,015 | |
| Hebco Products, Inc. | 33634 | Bucyrus | | 862 |
| International Brake Industries, Inc. | 336211 | Lima | | 153 |
| Sankei Giken Co., Ltd./Newman Technology, Inc. | 336399 | Mansfield | | 850 |
| Sanoh Industrial Co., Ltd. | | | 957 | |
| Sanoh America, Inc. (f.k.a. Hisan) | 336399 | Findlay | | 733 |
| Sanoh America, Inc. (f.k.a. Hisan) | 336399 | Mt. Vernon | | 224 |
| Shiloh Industries, Inc. | 33637 | Valley City | | 1,200 |
| Showa Corp. | | | 1,130 | |
| American Showa, Inc. | 33633 | Blanchester | | 530 |
| American Showa, Inc. | 33633 | Sunbury | | 600 |

**Table A1: Notable Motor Vehicle Industry Companies in Ohio, 2008**

| Parent/Company/Division | Primary NAICS | City | Jobs Total | Jobs At Site^ |
|---|---|---|---|---|
| Stanley Electric Co., Ltd./Stanley Electric US Co., Inc. | 336321 | London | | 780 |
| Stoneridge, Inc. | 336322 | Mansfield | | 500 |
| Taichi-S Co., Ltd.[15]/Tachi-S Engineering USA, Inc./Setex, Inc. | 33636 | Saint Marys | | 600 |
| Teleflex, Inc.* | 32622 | Grand River | | 56 |
| Temasek Holding Pte. Ltd./Kidron, Inc. | 336211 | Kidron | | 500 |
| Tenneco, Inc.* | | | 1,254 | |
| Tenneco, Inc. | 336399 | Kettering | | 400 |
| Tenneco, Inc. | 336399 | Milan | | 450 |
| Tenneco, Inc. | 336399 | Napoleon | | 404 |
| Textron, Inc.*/Kautex, Inc.[7] | 326199 | Wilmington | | 160 |
| Thor Industries, Inc.*/Airstream, Inc. | 336213 | Jackson Center | | 350 |
| ThyssenKrupp AG*[1] | | | 280 | |
| ThyssenKrupp Atlas, Inc. | 336312 | Fostoria | | 80 |
| ThyssenKrupp Bilstein of America, Inc. | 33633 | Hamilton | | 200 |
| Tokai Kogyo Co., Ltd. | | | 1,350 | |
| DTR Industries, Inc. | 32622 | Bluffton | | 750 |
| Green Tokai Co., Ltd. | 336399 | Brookville | | 600 |
| Toledo Molding & Die, Inc. | | | 525 | |
| Toledo Molding & Die, Inc. (Allen Co.) | 326199 | Delphos | | 130 |
| Toledo Molding & Die, Inc. (Van Wert Co.) | 326199 | Delphos | | 85 |
| Toledo Molding & Die, Inc. | 326199 | Tiffin | | 310 |
| Toyota Motor Corp.*/Taiho Kogyo Co., Ltd./Taiho Corp. of America | 336399 | Tiffin | | 100 |
| Visteon Corp.* | 336111 | Springfield | | 61 |
| Worthington Industries, Inc.* | | | 572 | |
| Gerstenslager Co. | 33637 | Clyde | | 35 |
| Gerstenslager Co. | 33637 | Wooster | | 537 |
| YUSA Corp. | 326291 | Washington C.H. | | 1,046 |

Notes: ^ - sites with less than 50 jobs excluded; figures from Harris (2008) unless otherwise noted; * - a Fortune U.S. 1,000 or Global 500 company; 1) jobs figure from LexisNexis (2008); 2) jobs figure is not current, but is the latest available; 3) Daimler AG retain 19.9 percent of Chrysler, and Fiat recently acquired a 35 percent stake from Cerberus Capital; 4) perhaps 1,700 more work at the site, but only 500 work for Chrysler; 5) jobs figure from Burns (2009); 6) jobs figures from company website or ODOD (2008) sources; 7 ) scheduled to close in 2009; 8) may reopen in 2009; 9) jobs figure from Zelm (2008); 10) Dirr (2008a) reported 876; 11) jobs figures combined for Lordstown

**Table A1: Notable Motor Vehicle Industry Companies in Ohio, 2008**

| Parent/Company/Division | Primary NAICS | City | Jobs Total | Jobs At Site^ |
|---|---|---|---|---|

assembly and metal fabrication plants; second shift will be cut in 2009, leaving only 1,400 in assembly (Gearino, 2009); 12) jobs figure from Crain's Cleveland Business (2008) includes headquarters; 13) list compiled from Honda's and others' websites; 14) no one credible figure available; 15) Nissan* owns 12 percent; n.a. - not available.

Sources: Blade Staff (2008), Burns (2009), Crain's Cleveland Business (2008), Dirr (2008a), Gearino (2009), Harris (2008), Jarman (2008), LexisNexis (2008), ODOD (2008), Schoenberger (2008d), Zelm (2008), and various company websites.

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**Table A2: Expansion and Attraction Announcements in Ohio's Motor Vehicle Industry, 2005-2008**

| Year | Parent/Company/Division | County | NAICS Code* | Product | New or Expanded | Total Invested | Jobs | Space (Sq. Ft.) |
|---|---|---|---|---|---|---|---|---|
| 2005 | Accubuilt Acquisition Holdings, Inc./Accubuilt, Inc. | Allen | 336211 | Specialty vehicles | Expanded | $1,700,000 | 68 | 45,000 |
| 2005 | Accuride Corp. | Summit | 336399 | Truck rims | Expanded | $1,200,000 | 10 | |
| 2005 | Alumi-Bunk/Truckland | Lucas | 336211 | Sleeper cabs | New | $5,400,000 | 40 | 52,000 |
| 2005 | Android Industries | Clark | 336211 | Motor vehicle frames | New | $3,700,000 | 58 | 165,000 |
| 2005 | A-Stamp | Williams | 33637 | Motor vehicle stampings | Expanded | $1,200,000 | 25 | |
| 2005 | Auto-Temp, Inc. | Clermont | 327212 | Motor vehicle glass | Expanded | $5,200,000 | 15 | 75,000 |
| 2005 | Braun Industries | Van Wert | 336211 | Ambulances | Expanded | $1,380,000 | 12 | 34,000 |
| 2005 | Bridgestone Corp./Bridgestone APM | Hancock | 33633 | Motor vehicle parts | Expanded | $13,800,000 | 15 | |
| 2005 | Bridgestone Corp./Bridgestone APM | Wyandot | 33633 | Motor vehicle parts | Expanded | $2,022,000 | | 58,270 |
| 2005 | Collins & Aikman Corp. | Holmes | 31411 | Motor vehicle floor mats | Expanded | $1,231,000 | 19 | |
| 2005 | Crawford Machine, Inc. | Crawford | 33634 | Truck brake parts | Expanded | $2,500,000 | 40 | 144,000 |
| 2005 | Dana Corp./Torque-Traction Technologies, Inc. | Lucas | 33635 | Transmissions and power trains | New | $6,000,000 | 85 | 100,000 |
| 2005 | Elliott Machine Works | Crawford | 336399 | Gas tanks | New | $1,300,000 | 10 | 24,000 |
| 2005 | Engineered Plastic Products, Inc. | Allen | 326199 | Plastic motor vehicle parts | New | $3,400,000 | 60 | |
| 2005 | Ford Motor Co./Engine Plant | Cuyahoga | 336312 | Gasoline engines | Expanded | $64,400,000 | | |
| 2005 | Galion Mfg. | Crawford | 336212 | Trailers | New | $1,400,000 | 35 | 377,000 |
| 2005 | General Motors Corp./DMAX Ltd. (joint venture with Isuzu Motors Ltd.) | Montgomery | 333618 | Diesel engines | Expanded | $67,000,000 | 30 | |
| 2005 | General Motors Corp./Powertrain Division | Lucas | 33635 | Motor vehicle powertrains | Expanded | $35,000,000 | | |
| 2005 | General Products Corp. | Franklin | 336399 | Engine parts | New | $8,000,000 | 80 | 125,000 |
| 2005 | GKN plc/GKN Sinter Metals | Gallia | 3363 | Motor vehicle parts | Expanded | $1,500,000 | 15 | |
| 2005 | Goodyear Tire & Rubber Co. | Summit | 326211 | Tires | Expanded | $22,000,000 | | |
| 2005 | Honda Motor Co./Honda Foundry Co., Ltd./Celina Aluminum Precision Tech. | Mercer | 33633 | Motor vehicle suspensions | Expanded | $20,000,000 | 50 | |
| 2005 | Honda affiliate: Kalida Mfg. Co. | Putnam | 33637 | Motor vehicle stampings | Expanded | $11,000,000 | 15 | 100,000 |
| 2005 | Johnson Controls, Inc. | Lucas | 335911 | Motor vehicle batteries | Expanded | $6,400,000 | 25 | |
| 2005 | Johnson Controls, Inc. | Wood | 33636 | Motor vehicle seats | Expanded | $4,000,000 | 146 | |
| 2005 | Kuss Corp. | Hancock | 336399 | Motor vehicle fuel filters | Expanded | $10,800,000 | 20 | |
| 2005 | Lear Corp. | Huron | 336399 | Motor vehicle trim | Expanded | $13,000,000 | 173 | 22,000 |
| 2005 | Lear Corp./Interior Systems Division | Shelby | 336399 | Motor vehicle parts | Expanded | $6,000,000 | | |
| 2005 | MAC Trailer Mfg. | Columbiana | 336212 | Semi-truck trailers | New | $1,300,000 | 100 | 188,000 |
| 2005 | Magna International, Inc./Decoma Systems | Lucas | 336399 | Motor vehicle parts | New | $4,500,000 | 125 | 105,000 |
| 2005 | Mayflower Corp. plc/Mayflower Vehicle Systems, Inc./Norwalk Plant | Huron | 336211 | Truck cabs | Expanded | $2,000,000 | 250 | |
| 2005 | Morgenthaler LLP/Formed Fiber Technologies, Inc. | Shelby | 33636 | Motor vehicle seats | Expanded | $1,400,000 | 6 | |
| 2005 | Nissan Motor Co./Ikeda Bussan/Sunfield, Inc. | Licking | 33637 | Motor vehicle stampings | Expanded | $2,250,000 | 4 | 25,000 |
| 2005 | Oakley Industries, Inc. | Wood | 336399 | Motor vehicle wheels | New | $9,400,000 | 55 | 70,000 |
| 2005 | P&C Group 1, Inc./CAMACO LLC | Lorain | 33636 | Motor vehicle seat frames | New | $5,000,000 | 40 | 60,000 |
| 2005 | PACCAR, Inc./Kenworth Truck Co. | Ross | 33612 | Heavy-duty truck assembly | Expanded | $18,000,000 | 100 | |
| 2005 | PSA Peugeot Citroen SA/Faurecia Exhaust Systems | Miami | 336399 | Motor vehicle exhaust systems | Expanded | $18,000,000 | 150 | |
| 2005 | PSA Peugeot Citroen SA/Faurecia Exhaust Systems | Lucas | 336399 | Motor vehicle exhaust systems | New | $4,500,000 | 90 | |
| 2005 | PSA Peugeot Citroen SA/Faurecia Interior Systems USA | Wood | 336399 | Motor vehicle parts assembly | New | $3,750,000 | 95 | |
| 2005 | Seisekusho, Inc./American Showa, Inc. | Clinton | 33633 | Shock absorbers | Expanded | $12,500,000 | 45 | |
| 2005 | Seisekusho, Inc./American Showa, Inc. | Delaware | 33633 | Shock absorbers | Expanded | $6,000,000 | | 112,000 |
| 2005 | Sypris Solutions, Inc./Sypris Technologies, Inc. | Hardin | 33635 | Truck axles | Expanded | $7,800,000 | 80 | |
| 2005 | Taikeiyo Kogyo Co., Ltd./Pacific Mfg. Ohio | Butler | 336399 | Motor vehicle parts | Expanded | | 22 | 88,000 |
| 2005 | Teleflex, Inc./Teleflex Automotive | Fulton | 336399 | Motor vehicle parts | Expanded | $5,000,000 | | |
| 2005 | Thor Industries, Inc./Airstream, Inc. | Shelby | 336213 | Motor homes | Expanded | $9,887,000 | 276 | 200,000 |
| 2005 | Tokai Rubber Industries, Inc./Green Tokai Co. | Montgomery | 336399 | Motor vehicle plastic trim | Expanded | $11,000,000 | 25 | 175,000 |
| 2005 | Toledo Molding & Die, Inc. | Lucas | 3363 | Motor vehicle parts | Expanded | $6,900,000 | 155 | 90,000 |
| 2005 | Tom Smith Industries | Montgomery | 326199 | Plastic motor vehicle parts | Expanded | $1,068,000 | | 31,100 |
| 2005 | Toyo Roki Mfg./Filtech, Inc. | Hancock | 336399 | Oil filters | Expanded | $22,700,000 | 10 | |
| 2005 | Varbros/Trimline | Lorain | 33637 | Motor vehicle stampings | Expanded | $4,600,000 | 4 | |
| 2005 | Yamashita Rubber/YUSA Corp. | Fayette | 336399 | Rubber motor vehicle parts | Expanded | $4,700,000 | 35 | 20,000 |
| 2005 Subtotals: | | | | | | $482,788,000 | 2,713 | 2,485,370 |

**Table A2: Expansion and Attraction Announcements in Ohio's Motor Vehicle Industry, 2005-2008**

| Year | Parent/Company/Division | County | NAICS Code* | Product | New or Expanded | Total Invested | Jobs | Space (Sq. Ft.) |
|---|---|---|---|---|---|---|---|---|
| 2006 | Aisin Seiki Co. Ltd., et. al./Advics N. America, Inc./Advics Mfg. Ohio, Inc. | Warren | 33634 | Brake systems | Expanded | $37,000,000 | 10 | 25,000 |
| 2006 | Asahi Glass Co., Ltd./AFG Industries, Inc. | Logan | 327211 | Motor vehicle glass | Expanded | $5,700,000 | 100 | |
| 2006 | ASC Industries, Inc. | Summit | 336399 | Motor vehicle pumps | Expanded | $3,000,000 | 100 | 70,000 |
| 2006 | Atlas Industries, Inc. | Sandusky | 336312 | Crankshafts | Expanded | $4,200,000 | 25 | 58,000 |
| 2006 | Atsumitec/Ada Technologies | Hardin | 336399 | Motor vehicle parts | Expanded | $1,900,000 | 35 | 50,000 |
| 2006 | Behr GmbH & Co. KG/Behr America | Montgomery | 336391 | Motor vehicle HV/AC systems | Expanded | $16,000,000 | | |
| 2006 | Braun Industries | Van Wert | 336211 | Ambulances | Expanded | $1,400,000 | 12 | 34,000 |
| 2006 | Bucyrus Precision Tech. | Crawford | 336399 | Motor vehicle parts | Expanded | $5,300,000 | 10 | |
| 2006 | Cerberus Capital Mgt. L.P./Tower Automotive, Inc. | Sandusky | 336211 | Chassis frames | Expanded | $5,600,000 | 74 | |
| 2006 | Clarion Co., Ltd./CK Technologies | Williams | 326199 | Plastic motor vehicle parts | Expanded | $6,000,000 | 36 | 60,000 |
| 2006 | Commercial Vehicle Group, Inc. | Franklin | 336399 | Truck cabs | New | $30,000,000 | 80 | 94,000 |
| 2006 | Core Molding Technologies, Inc. | Franklin | 326199 | Motor vehicle fiberglass parts | Expanded | $4,600,000 | 52 | |
| 2006 | Dayton Polymeric Products | Montgomery | 326199 | Motor vehicle plastics | Expanded | $632,000 | 60 | |
| 2006 | Farber Specialty Vehicles | Franklin | 336111 | Motor vehicle modifications | Expanded | $2,850,000 | 20 | 40,000 |
| 2006 | Fastener Industries, Inc./Joseph Industries, Inc. | Portage | 33635 | Torque converters | Expanded | $2,700,000 | | 34,560 |
| 2006 | Fleetwood Enterprises, Inc./'Fleetwood Travel Trailers | Williams | 336214 | Recreational vehicles | Expanded | $755,000 | 200 | |
| 2006 | F-Tech, Inc./F&P America Mfg., Inc. | Miami | 336399 | Motor vehicle parts | Expanded | $20,000,000 | 2 | |
| 2006 | Fuserashi International Technology | Medina | 33637 | Motor vehicle stampings | Expanded | $4,000,000 | | 40,000 |
| 2006 | General Motors Corp. | Lucas | 33635 | Motor vehicle transmissions | Expanded | $462,800,000 | | 400,000 |
| 2006 | General Motors Corp. | Defiance | 331511 | Engine blocks | Expanded | $109,500,000 | | |
| 2006 | Hitachi Ltd./Hitachi Metals America/AAP St. Marys Corp. | Auglaize | 336399 | Motor vehicle parts | Expanded | $23,000,000 | 20 | 125,000 |
| 2006 | Honda Motor Co./Honda Foundry Co., Ltd./Celina Aluminum Precision Tech. | Mercer | 336311 | Motor vehicle parts | Expanded | $10,200,000 | 21 | 48,000 |
| 2006 | Honda Motor Co./Honda of America Mfg. | Shelby | 336312 | Gasoline engines | Expanded | $75,000,000 | 40 | |
| 2006 | Honda Motor Co./Honda of America Mfg. | Logan | 33635 | Motor vehicle transmission parts | Expanded | $3,000,000 | | 69,000 |
| 2006 | Honda affiliate: Kalida Mfg. Co. | Putnam | 336399 | Motor vehicle parts | Expanded | $2,100,000 | 30 | 50,000 |
| 2006 | Honda affiliate: Tanaka Seimitsu Kogyo Co., Ltd./FT Precision, Inc. | Knox | 33633 | Motor vehicle parts | Expanded | $6,033,000 | 63 | |
| 2006 | Honda affiliate: Toyo Denso Co., Ltd./Weastec, Inc. | Highland | 336399 | Motor vehicle parts | Expanded | $10,000,000 | 42 | |
| 2006 | Knorr-Bremse AG/Bendix Commercial Vehicle Systems LLC | Lorain | 33634 | Brake systems | Expanded | $2,900,000 | | |
| 2006 | Lacal Equipment | Shelby | 336399 | Motor vehicle parts | New | $2,620,000 | 10 | 87,000 |
| 2006 | Morgenthaler LLP/Formed Fiber Technologies, Inc. | Shelby | 336399 | Motor vehicle seating | Expanded | $5,000,000 | 35 | |
| 2006 | New Sabina Industries | Clinton | 336399 | Motor vehicle parts | Expanded | $10,000,000 | 40 | |
| 2006 | Nifco, Inc./Nifco America Corp. | Fairfield | 326199 | Plastic motor vehicle parts | Expanded | $1,200,000 | 15 | |
| 2006 | NV Bekaert SA/Bekaert Corp. | Wayne | 331111 | Steel tire cord | Expanded | $4,558,000 | | 35,100 |
| 2006 | PACCAR, Inc./Kenworth Truck Co. | Ross | 33612 | Heavy-duty truck assembly | Expanded | $50,000,000 | | 100,000 |
| 2006 | Plastic Trim LLC | Greene | 326199 | Plastic motor vehicle parts | Expanded | $1,800,000 | 65 | |
| 2006 | PSA Peugeot Citroen SA/Faurecia Exhaust Systems | Miami | 336399 | Motor vehicle parts | Expanded | $17,350,000 | 150 | |
| 2006 | ThyssenKrupp AG | Seneca | 336312 | Crankshafts | Expanded | $40,000,000 | 100 | |
| 2006 | Tigers Polymer Corp./Tigerpoly Manufacturing, Inc. | Franklin | 336312 | Engine parts | Expanded | $3,000,000 | | 55,000 |
| 2006 | US Aeroteam | Greene | 336412 | Motor vehicle/aerospace parts | New | $2,500,000 | 55 | 94,000 |
| 2006 | USUI International | Butler | 336399 | Motor vehicle fans | Expanded | $6,500,000 | 45 | 125,000 |
| 2006 | Worthington Precision Metal, Inc. | Lake | 336399 | Motor vehicle parts | Expanded | $8,000,000 | 50 | |
| 2006 | Yamada North America | Clark | 33633 | Motor vehicle steering systems | Expanded | $26,000,000 | 30 | |
| 2006 | YSK Corp. | Ross | 336399 | Motor vehicle parts | Expanded | $24,000,000 | 25 | 40,000 |
| 2006 Subtotals: | | | | | | $1,058,698,000 | 1,652 | 1,733,660 |
| 2007 | Advanced Engineering Solutions | Warren | 336399 | Motor vehicle parts | Expanded | $3,500,000 | 72 | 70,000 |
| 2007 | AO Smith Corp./GSW Mfg. | Hancock | 336322 | Motor vehicle wiring products | Expanded | $1,000,000 | 50 | |
| 2007 | Armor Holdings, Inc. | Butler | 336992 | Vehicle armor | New | $37,000,000 | 150 | 465,000 |
| 2007 | A-Stamp | Williams | 33637 | Motor vehicle stampings | Expanded | $1,700,000 | 20 | |
| 2007 | Boler Co./Hendrickson USA | Licking | 33633 | Suspension systems | Expanded | $1,500,000 | 40 | 40,000 |
| 2007 | Ernie Green Industries/Florida Production Engineering, Inc. | Pickaway | 336399 | Motor vehicle parts | Expanded | $3,300,000 | 33 | |
| 2007 | Ford Motor Co. | Hamilton | 33635 | Motor vehicle transmissions | Expanded | $200,000,000 | | |
| 2007 | F-Tech, Inc./F&P America Mfg., Inc. | Miami | 336399 | Motor vehicle parts | Expanded | $3,500,000 | | 75,000 |
| 2007 | General Motors Corp. | Lucas | 33635 | Motor vehicle transmissions | Expanded | $332,000,000 | | |

**Table A2: Expansion and Attraction Announcements in Ohio's Motor Vehicle Industry, 2005-2008**

| Year | Parent/Company/Division | County | NAICS Code* | Product | New or Expanded | Total Invested | Jobs | Space (Sq. Ft.) |
|---|---|---|---|---|---|---|---|---|
| 2007 | General Motors Corp. | Defiance | 331511 | Engine blocks | Expanded | $61,000,000 | | |
| 2007 | Guardian Industries Corp./Guardian Glass | Hancock | 327211 | Motor vehicle glass | Expanded | $2,100,000 | 10 | 80,000 |
| 2007 | Harco Industries, Inc. | Montgomery | 336399 | Brake hoses | New | $7,400,000 | | |
| 2007 | Honda Motor Co./Honda of America Mfg. | Union | 336111 | Light vehicle assembly | Expanded | $2,500,000 | | |
| 2007 | Honda affiliate: Jefferson Industries Corp. | Madison | 336399 | Motor vehicle parts | Expanded | $10,000,000 | 80 | 120,000 |
| 2007 | Honda affiliate: Nissin Kogyo Co., Ltd./Nissin Brake Ohio | Hancock | 33634 | Brake systems | Expanded | $50,000,000 | 50 | 40,000 |
| 2007 | Imasen Bucyrus Technology | Crawford | 336399 | Motor vehicle parts | Expanded | $4,000,000 | 101 | |
| 2007 | International Automotive Components Group | Sandusky | 336399 | Plastic motor vehicle parts | Expanded | $2,600,000 | 150 | |
| 2007 | Marion Industries | Marion | 336399 | Motor vehicle parts | Expanded | $8,000,000 | 22 | |
| 2007 | Newman Technology | Richland | 336399 | Motor vehicle parts | Expanded | $3,000,000 | 10 | |
| 2007 | Okamoto Industries | Erie | 336399 | Plastic motor vehicle parts | New | $3,500,000 | 120 | |
| 2007 | Rieter Holdings Ltd./Rieter Automotive Carpets Ltd. | Lucas | 336399 | Motor vehicle carpet | Expanded | $6,000,000 | 80 | 4,000 |
| 2007 | Shiloh Industries, Inc. | Lorain | 33637 | Motor vehicle stampings | New | $3,000,000 | 25 | |
| 2007 | Tenneco, Inc./Tenneco Automotive | Montgomery | 336399 | Motor vehicle parts | New | $10,000,000 | 350 | |
| 2007 | Yachiyo Industry Co., Ltd./Yachiyo of America | Franklin | 33637 | Motor vehicle parts | New | $11,500,000 | 34 | 47,000 |
| 2007 Subtotals: | | | | | | $768,100,000 | 1,397 | 941,000 |
| 2008 | Bridgestone Corp. | Summit | 326211 | Tires | Expanded | $100,000,000 | | 240,000 |
| 2008 | Camaco Lorain Mfg. | Lorain | 33637 | Motor vehicle stampings | Expanded | | 40 | 40,500 |
| 2008 | Cerberus Capital Mgt. L.P./Chrysler LLC | Wood | 33635 | Torque converters | Expanded | $27,000,000 | | |
| 2008 | Consolidated Vehicle Converters | Montgomery | 33635 | Torque converters | New | $3,000,000 | 20 | 3,000 |
| 2008 | Defiance Metal Products | Defiance | 33637 | Motor vehicle stampings | Expanded | $1,700,000 | 44 | |
| 2008 | ECS Tuning | Summit | 336399 | Motor vehicle parts | New | $1,500,000 | 6 | 30,000 |
| 2008 | Ford Motor Co. | Allen | 336312 | Gasoline engines | Expanded | $12,600,000 | 219 | |
| 2008 | General Motors Corp. | Trumbull | 336111 | Car assembly | Expanded | $317,000,000 | 600 | |
| 2008 | General Motors Corp. | Trumbull | 33637 | Motor vehicle stampings | Expanded | $49,000,000 | | |
| 2008 | General Motors Corp./DMAX Ltd. (joint venture with Isuzu Motors Ltd.) | Montgomery | 333618 | Diesel engines | Expanded | $63,500,000 | | |
| 2008 | Grand Rock Co. | Lake | 336211 | Truck bodies | Expanded | $1,700,000 | | |
| 2008 | Harco Industries, Inc. | Montgomery | 33634 | Brake hose assembly | New | $4,000,000 | 50 | |
| 2008 | Hi-Stat Mfg. | Richland | 336322 | Motor vehicle sensors | Expanded | $3,900,000 | 225 | 55,000 |
| 2008 | Honda Motor Co./Honda of America Mfg. | Union | 336111 | Light vehicle assembly | Expanded | $4,120,000 | | |
| 2008 | Honda Motor Co./Honda of America Mfg. | Union | 336111 | Light vehicle assembly | Expanded | $2,100,000 | | 35,200 |
| 2008 | Honda affiliate: Kalida Mfg. Co. | Putnam | 336396 | Motor vehicle parts | Expanded | $9,800,000 | 15 | |
| 2008 | Honda affiliate: TS Tech Co., Ltd./TS Tech USA Corp. | Franklin | 33636 | Motor vehicle seats | Expanded | | 100 | |
| 2008 | International Automotive Components Groups | Fulton | 336399 | Motor vehicle parts | Expanded | $10,500,000 | 260 | |
| 2008 | International Automotive Components Groups | Sandusky | 336399 | Motor vehicle parts | Expanded | $2,000,000 | 150 | |
| 2008 | Kyklos Bearing, Inc. | Erie | 33635 | Motor vehicle bearings | Expanded | $1,500,000 | | |
| 2008 | Liteflex LLC | Montgomery | 336333 | Composite springs | New | $1,700,000 | 30 | |
| 2008 | Magna International, Inc./Decoma Systems | Lucas | 336399 | Motor vehicle parts assembly | Expanded | $5,000,000 | | 99,000 |
| 2008 | Mahle International GmbH | Morgan | 336312 | Gasoline engine parts | Expanded | | | 50,000 |
| 2008 | Maumee Authority Stamping | Lucas | 33637 | Motor vehicle stampings | New | | 450 | |
| 2008 | Miba AG/Miba Bearings US LLC | Morgan | 33635 | Motor vehicle bearings | Expanded | $10,000,000 | 30 | 120,000 |
| 2008 | Miba AG/Miba Sinter USA | Morgan | 336399 | Motor vehicle parts | Expanded | $26,000,000 | 60 | 35,000 |
| 2008 | Ohio Metal Technologies | Licking | 332111 | Motor vehicle forgings | Expanded | $6,900,000 | 15 | |
| 2008 | Pacific Industrial Co., Ltd./Pacific Industries USA, Inc./Takumi Stamping, Inc. | Butler | 33637 | Motor vehicle stampings | Expanded | $3,600,000 | 25 | 120,000 |
| 2008 | PPG Industries, Inc. | Delaware | 32551 | Motor vehicle paint | Expanded | $12,000,000 | 40 | |
| 2008 | Sanoh Industrial Co., Ltd./Sanoh America, Inc. (f.k.a. Hisan) | Knox | 336399 | Motor vehicle parts | New | $9,000,000 | 50 | 200,000 |
| 2008 | Sumitomo/SMI Crankshafts | Seneca | 336312 | Crankshafts | Expanded | $10,000,000 | | 150,000 |
| 2008 | Sutphen Corp. | Clark | 336112 | Fire truck chassis | Expanded | $1,000,000 | 30 | 20,000 |
| 2008 | Tenneco, Inc./Tenneco Automotive | Montgomery | 336399 | Motor vehicle parts | New | $27,500,000 | 350 | |

**Table A2: Expansion and Attraction Announcements in Ohio's Motor Vehicle Industry, 2005-2008**

| Year | Parent/Company/Division | County | NAICS Code* | Product | New or Expanded | Total Invested | Jobs | Space (Sq. Ft.) |
|---|---|---|---|---|---|---|---|---|
| 2008 | Transeo Global Vehicle | Clark | 336111 | Armored vehicles | New | $200,000 | 69 | |
| 2008 Subtotals: | | | | | | $727,820,000 | 2,878 | 1,197,700 |
| Grand Totals 2005-2008: | | | | | | $3,037,406,000 | 8,640 | 6,357,730 |

Notes: * - Establishments with NAICS codes outside of the industry definition are included here when their products are made for motor vehicles.
Abbreviations Used: Mfg. - manufacturing.

Source: Policy Research & Strategic Planning (2008, 2009).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (JK, DL, 1/09).

**Table A3: Value-Added in Ohio's Motor Vehicle Industry, 2002 (in millions, except percentages)**

| NAICS Code | Industries | Value-Added in Ohio: Amount | Value-Added in Ohio: Distribution in Ohio | Value-Added in the U.S. | Ohio as a Percent of the U.S. |
|---|---|---|---|---|---|
| | Motor Vehicle (MV) Industry | $25,127.4 | 100.0% | $176,517.9 | 14.2% |
| Transportation Equipment Industries Include: | | $24,683.9 | 98.2% | $167,327.0 | 14.8% |
| 3361 | MV Assembly | $12,686.7 | 50.5% | $72,157.1 | 17.6% |
| 33611 | Automobile & Light Duty Motor Vehicles | D | n.a. | $69,099.8 | n.a. |
| 336111 | Automobiles | D | n.a. | $28,491.9 | n.a. |
| 336112 | Light Truck & Utility Vehicles | $5,336.7 | 21.2% | $40,607.9 | 13.1% |
| 33612 | Heavy Duty Trucks | D | n.a. | $3,057.3 | n.a. |
| 3362 | MV Bodies & Trailers | $244.0 | 1.0% | $8,741.7 | 2.8% |
| 336211 | MV Bodies | $147.0 | 0.6% | $2,743.6 | 5.4% |
| 336212 | Truck Trailers | $50.2 | 0.2% | $1,480.3 | 3.4% |
| 336213&4 | Motor Homes, Travel Trailers, & Campers* | $46.9 | 0.2% | $4,517.8 | 1.0% |
| 3363 | MV Parts | $11,753.1 | 46.8% | $86,428.2 | 13.6% |
| 33631 | MV Gas Engines & Engine Parts | $1,100.4 | 4.4% | $12,347.5 | 8.9% |
| 336311 | Carburetors, Pistons, Rings, & Valves | $53.5 | 0.2% | $1,378.2 | 3.9% |
| 336312 | Gasoline Engines & Engine Parts | $1,046.9 | 4.2% | $10,969.3 | 9.5% |
| 33632 | MV Electrical & Electronic Eqpt. | $975.5 | 3.9% | $12,949.1 | 7.5% |
| 336321 | Vehicular Lighting Eqpt. | D | n.a. | $1,735.0 | n.a. |
| 336322 | Other MV Electrical & Electronic Eqpt. | D | n.a. | $11,214.1 | n.a. |
| 33633 | MV Steering & Suspension Parts | $792.4 | 3.2% | $4,984.7 | 15.9% |
| 33634 | MV Brake Systems | $1,053.4 | 4.2% | $5,768.5 | 18.3% |

**Table A3: Value-Added in Ohio's Motor Vehicle Industry, 2002 (in millions, except percentages)**

| NAICS Code | Industries | Value-Added in Ohio: Amount | Value-Added in Ohio: Distribution in Ohio | Value-Added in the U.S. | Ohio as a Percent of the U.S. |
|---|---|---|---|---|---|
| 33635 | MV Transmission & Power Train Parts | $2,124.0 | 8.5% | $14,437.6 | 14.7% |
| 33636 | MV Seating & Interior Trim | $581.8 | 2.3% | $4,779.3 | 12.2% |
| 33637 | MV Metal Stamping | $3,278.9 | 13.0% | $12,474.5 | 26.3% |
| 33639 | Other MV Parts | $1,846.8 | 7.3% | $18,687.0 | 9.9% |
| 336391 | Motor Vehicle Air-Conditioning | D | n.a. | $2,748.7 | n.a. |
| 336399 | All Other MV Parts | D | n.a. | $15,938.2 | n.a. |
| Non-transportation Industries Include: | | $443.6 | 1.8% | $9,190.9 | 4.8% |
| 32621 | Tires | $367.7 | 1.5% | $7,665.5 | 4.8% |
| 326211 | Tire Mfg. (Exc. Retreading) | $344.8 | 1.4% | $7,176.7 | 4.8% |
| 326212 | Tire Retreading | $23.0 | 0.1% | $488.8 | 4.7% |
| 335911 | Storage Batteries | $75.8 | 0.3% | $1,525.4 | 5.0% |

Notes: D - Suppressed to maintain confidentiality; n.a. - not available.

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

Prepared by: Office of Strategic Research, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 4/06).

**Table A4: Detailed Light Vehicle Assembly Capacity (2008) and Production (2005 - 2007) in Ohio**

| Company and City/Assembly Type Nameplate and Model | 2008 Annual Plant Capacity | 2008 Daily Shifts | 2008 Units per Hour | 2008 Recent Employ-ment | 2007 Vehicles Produced | 2007 Percent of Pro-duction | 2006 Vehicles Produced | 2006 Percent of Pro-duction | 2005 Vehicles Produced | 2005 Percent of Pro-duction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Light Vehicles | 1,339,300 | | 371 | 13,275 | 1,748,335 | 100.0% | 1,669,741 | 100.0% | 1,794,589 | 100.0% | Production beyond capacity is achieved |
| Total Cars[1] | 878,900 | | 239 | 9,200 | 870,008 | 49.8% | 884,734 | 53.0% | 882,222 | 49.2% | with overtime. |
| Total Light Trucks | 460,400 | | 132 | 4,075 | 878,327 | 50.2% | 785,007 | 47.0% | 912,367 | 50.8% | |
| Chrysler: Light Trucks | 211,600 | | 89 | 1,775 | 377,911 | 21.6% | 296,363 | 17.7% | 317,099 | 17.7% | Small sport-utility vehicles (SUVs). |
| Toledo North: | 120,900 | 1 | 46 | 1,275 | 221,195 | 12.7% | 209,914 | 12.6% | 220,718 | 12.3% | |
| Dodge Nitro | | | | | 113,793 | 6.5% | 47,906 | 2.9% | 0 | 0.0% | |
| Jeep Liberty | | | | | 107,402 | 6.1% | 162,008 | 9.7% | 220,718 | 12.3% | |
| Toledo South (a.k.a. Stickney): | 90,700 | 1 | 43 | 500 | 156,716 | 9.0% | 86,449 | 5.2% | 96,381 | 5.4% | |
| Jeep Wrangler | | | | | 62,436 | 3.6% | 50,324 | 3.0% | 74,781 | 4.2% | |
| Jeep Wrangler Unlimited | | | | | 94,280 | 5.4% | 36,125 | 2.2% | 21,600 | 1.2% | |
| Ford: Light Trucks | 90,700 | | 43 | 2,300 | 179,918 | 10.3% | 179,293 | 10.7% | 230,132 | 12.8% | |
| Avon Lake (a.k.a. Ohio Assembly): | 90,700 | 1 | 43 | 2,300 | 179,918 | 10.3% | 179,293 | 10.7% | 27,061 | 1.5% | |
| Ford Econoline | | | | | 179,918 | 10.3% | 179,293 | 10.7% | 0 | 0.0% | Econoline to be replaced by European Transit in 201 |
| Mercury Mariner[2] | | | | | | | | | 27,061 | 1.5% | Mariner production consolidated to Kansas City. |
| Lorain | Permanently closed, December, 2005 | | | | | | | | 203,071 | 11.3% | Econoline (large van) moved to Avon Lake. |
| GM: Light Vehicles | 293,400 | | 63 | 1,400 | 489,188 | 28.0% | 507,418 | 30.4% | 600,179 | 33.4% | |
| Lordstown[3]--Cars: | 293,400 | 1 | 63 | 1,400 | 280,452 | 16.0% | 278,176 | 16.7% | 301,159 | 16.8% | Cruze production scheduled for 2010. |
| Chevrolet Cobalt | | | | | 226,314 | 12.9% | 232,913 | 13.9% | 279,711 | 15.6% | Sub-compact, to be replace by the Cruze. |
| Pontiac Pursuit/G5/G4 | | | | | 54,138 | 3.1% | 45,263 | 2.7% | 21,448 | 1.2% | Sub-compact, not for sale in the U.S. |
| Moraine--Light Trucks: | Permanently closed, December, 2008 | | | | 208,736 | 11.9% | 229,242 | 13.7% | 299,020 | 16.7% | Mid-size SUVs. |
| Buick Rainier | | | | | 2,561 | 0.1% | 10,001 | 0.6% | 12,298 | 0.7% | Model production ended in 2007. |
| Chevrolet TrailBlazer | | | | | 148,658 | 8.5% | 150,004 | 9.0% | 201,788 | 11.2% | |
| GMC Envoy[2] | | | | | 49,539 | 2.8% | 61,528 | 3.7% | 74,888 | 4.2% | |
| Isuzu Ascender[2] | | | | | 2,502 | 0.1% | 2,064 | 0.1% | 4,251 | 0.2% | |
| Saab 9-7X | | | | | 5,476 | 0.3% | 5,645 | 0.3% | 5,795 | 0.3% | |
| Honda: Light Vehicles[1] | 743,600 | | 176 | 7,800 | 701,318 | 40.1% | 686,667 | 41.1% | 647,179 | 36.1% | |
| E. Liberty--Light Vehicles: | 251,900 | 2 | 59 | 2,500 | 242,475 | 13.9% | 237,973 | 14.3% | 205,300 | 11.4% | |
| Accord--Car | | | | | 0 | 0.0% | 0 | 0.0% | 5,460 | 0.3% | An example of flexible manufacturing. |
| Civic[2]--Car | 118,400 | | | | 156,032 | 8.9% | 176,652 | 10.6% | 133,724 | 7.5% | Redesign scheduled in 2010. |
| CR-V--Light Truck | 70,500 | | | | 48,867 | 2.8% | 7,111 | 0.4% | 0 | 0.0% | Redesign scheduled in 2011. |
| Element--Light Truck | 63,000 | | | | 37,576 | 2.1% | 54,210 | 3.2% | 66,116 | 3.7% | |
| Marysville--Light Vehicles: | 491,700 | 2 | 117 | 5,300 | 458,843 | 26.2% | 448,694 | 26.9% | 441,879 | 24.6% | |
| Accord--Car | 373,700 | | | | 366,870 | 21.0% | 350,393 | 21.0% | 353,334 | 19.7% | |
| Acura RDX--Light Truck | 24,600 | | | | 25,319 | 1.4% | 18,788 | 1.1% | 0 | 0.0% | The RDX is a crossover utility vehicle (CUV). |
| Acura TL--Car | 93,400 | | | | 66,654 | 3.8% | 79,513 | 4.8% | 88,545 | 4.9% | Redesigned for 2008. |

Notes: 1 - Honda's employees and units per hour are counted in the car categories because the majority of vehicles it produces are cars; 2 - the same or slight variations of this model are made elsewhere in N. America; 3 - one shift only beginning in April, 2009, and assembly jobs will fall to 1,400.

Sources: Associated Press (2008), Gearino (2009), ODOD (2008), Ward's (2006-2008).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Phone 614/466-2116 (DL, 1/09).

**Table A5: Motor Vehicle Industry Establishments and Employment, Ohio and the U.S., 2006**

| | | Ohio | | | U.S. | | | Ohio as a Percentage of the U.S. | |
|---|---|---|---|---|---|---|---|---|---|
| NAICS Code | Shorter Industry Title | Establishments | Employment | Mean | Establishments | Employment | Mean | Establishments | Employment |
| | Total | 269,914 | 4,825,510 | 17.9 | 7,601,160 | 119,917,165 | 15.8 | 3.6% | 4.0% |
| | Motor Vehicle (MV) Industry* | 658 | 126,396 | 192.1 | 8,871 | 1,088,700 | 122.7 | 7.4% | 11.6% |
| Transportation Equipment Industries Include: | | 613 | 122,222 | 199.4 | 8,083 | 1,007,939 | 124.7 | 7.6% | 12.1% |
| 3361 | MV Assembly | 28 | 26,844 | 958.7 | 370 | 211,162 | 570.7 | 7.6% | 12.7% |
| 33611 | Automobile & Light Duty Motor Vehicles | 19 | 23,172 | 1,219.6 | 275 | 179,040 | 651.1 | 6.9% | 12.9% |
| 336111 | Automobiles*^ | 14 | 14,169 | 1,012.0 | 181 | 75,225 | 415.6 | 7.7% | 18.8% |
| 336112 | Light Truck & Utility Vehicles*^ | 5 | 9,003 | 1,800.7 | 94 | 103,815 | 1,104.4 | 5.3% | 8.7% |
| 33612 | Heavy Duty Trucks | 9 | 3,672 | 408.0 | 95 | 32,122 | 338.1 | 9.5% | 11.4% |
| 3362 | MV Bodies & Trailers | 95 | 4,936 | 52.0 | 2,157 | 155,649 | 72.2 | 4.4% | 3.2% |
| 336211 | MV Bodies | 43 | 2,462 | 57.3 | 820 | 47,566 | 58.0 | 5.2% | 5.2% |
| 336212 | Truck Trailers | 24 | 1,501 | 62.5 | 394 | 32,260 | 81.9 | 6.1% | 4.7% |
| 336213 | Motor Homes* | 4 | 62 | 15.5 | 91 | 21,533 | 236.6 | 4.4% | 0.3% |
| 336214 | Travel Trailers & Campers* | 24 | 911 | 38.0 | 852 | 54,290 | 63.7 | 2.8% | 1.7% |
| 3363 | MV Parts | 490 | 90,442 | 184.6 | 5,556 | 641,128 | 115.4 | 8.8% | 14.1% |
| 33631 | MV Gas Engines & Engine Parts | 54 | 8,459 | 156.6 | 992 | 76,649 | 77.3 | 5.4% | 11.0% |
| 336311 | Carburetors, Pistons, Rings, & Valves | 7 | 641 | 91.6 | 116 | 10,537 | 90.8 | 6.0% | 6.1% |
| 336312 | Gasoline Engines & Engine Parts | 47 | 7,818 | 166.3 | 876 | 66,112 | 75.5 | 5.4% | 11.8% |
| 33632 | MV Electrical & Electronic Eqpt. | 39 | 9,668 | 247.9 | 799 | 77,631 | 97.2 | 4.9% | 12.5% |
| 336321 | Vehicular Lighting Eqpt.*^ | 9 | 2,182 | 242.4 | 102 | 15,615 | 153.1 | 8.8% | 14.0% |
| 336322 | Other MV Electrical & Electronic Eqpt.* | 30 | 7,486 | 249.5 | 697 | 62,016 | 89.0 | 4.3% | 12.1% |
| 33633 | MV Steering & Suspension Parts | 24 | 4,884 | 203.5 | 257 | 39,390 | 153.3 | 9.3% | 12.4% |
| 33634 | MV Brake Systems | 29 | 6,204 | 213.9 | 241 | 33,782 | 140.2 | 12.0% | 18.4% |
| 33635 | MV Transmission & Power Train Parts | 35 | 13,088 | 373.9 | 535 | 83,756 | 156.6 | 6.5% | 15.6% |
| 33636 | MV Seating & Interior Trim | 37 | 7,315 | 197.7 | 421 | 52,842 | 125.5 | 8.8% | 13.8% |
| 33637 | MV Metal Stamping | 152 | 24,268 | 159.7 | 781 | 110,578 | 141.6 | 19.5% | 21.9% |
| 33639 | Other MV Parts | 120 | 16,556 | 138.0 | 1,530 | 166,500 | 108.8 | 7.8% | 9.9% |
| 336391 | Motor Vehicle Air-Conditioning | 5 | 3,177 | 635.4 | 72 | 17,249 | 239.6 | 6.9% | 18.4% |
| 336399 | All Other MV Parts | 115 | 13,379 | 116.3 | 1,458 | 149,251 | 102.4 | 7.9% | 9.0% |

**Table A5: Motor Vehicle Industry Establishments and Employment, Ohio and the U.S., 2006**

| | | Ohio | | | U.S. | | | Ohio as a Percentage of the U.S. | |
|---|---|---|---|---|---|---|---|---|---|
| NAICS Code | Shorter Industry Title | Establishments | Employment | Mean | Establishments | Employment | Mean | Establishments | Employment |
| The Related Industries* Include: | | 45 | 4,174 | 92.7 | 788 | 80,761 | 102.5 | 5.7% | 5.2% |
| 32621 | Tires | 38 | 3,138 | 82.6 | 663 | 62,478 | 94.2 | 5.7% | 5.0% |
| 326211 | Tire Mfg. (Exc. Retreading) | 9 | 2,747 | 305.2 | 138 | 53,985 | 391.2 | 6.5% | 5.1% |
| 326212 | Tire Retreading | 29 | 391 | 13.5 | 525 | 8,493 | 16.2 | 5.5% | 4.6% |
| 335911 | Storage Batteries* | 7 | 1,036 | 147.9 | 125 | 18,283 | 146.3 | 5.6% | 5.7% |

Notes: * - The Ohio employment figure is (or contains) an estimate; ^ - Employment data from Harris (2006) and PR&SP (2006) are incorporated. Abbreviations used: Eqpt. - equipment; Exc. - except; Mfg. - manufacturing; MV - motor vehicle. It should also be noted that neither the iron foundries dedicated to the motor vehicle industry, particularly Ford's in Brookpark and General Motor's (GM's) in Defiance, nor the diesel engine plants of GM and Daimler AG in Dayton and Byesville, respectively, are included in this table because their NAICS codes (331511 and 333618) exclude them, and there is no ready comparison to the nation as a whole. If such a comparison was possible, then there would have been almost 6,200 more workers in Ohio's motor vehicle industry - and thousands more throughout the nation - in 2006.

Sources: Harris (2006); ODOD (2006); U.S. Bureau of the Census (2008b).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 7/08).

**Table A6: Motor Vehicle Industry Employment and Pay, Ohio and the U.S., 2006**

| NAICS Code | Shorter Industry Title | Ohio Employ-ment | Ohio Payroll in millions | Ohio Mean | U.S. Employ-ment | U.S. Payroll in millions | U.S. Mean | Ohio Means as a Percent of U.S. Means |
|---|---|---|---|---|---|---|---|---|
| | Total | 4,825,510 | $176,074.8 | $36,488 | 119,917,165 | $4,792,429.9 | $39,965 | 91.3% |
| | Motor Vehicle (MV) Industry* | 126,396 | n.a. | n.a. | 1,088,700 | $53,403.6 | $49,053 | n.a. |
| Transportation Equipment Industries Include: | | 122,222 | $6,537.7 | $53,490 | 1,007,939 | $49,511.8 | $49,122 | 108.9% |
| 3361 | MV Assembly | 26,844 | $1,832.4 | $68,262 | 211,162 | $14,279.1 | $67,621 | 100.9% |
| 33611 | Automobile & Light Duty Motor Vehicles | 23,172 | $1,622.9 | $70,038 | 179,040 | $12,736.6 | $71,138 | 98.5% |
| 336111 | Automobiles*^ | 11,955 | D | n.a. | 75,225 | $5,463.1 | $72,623 | n.a. |
| 336112 | Light Truck & Utility Vehicles*^ | 10,747 | D | n.a. | 103,815 | $7,273.5 | $70,062 | n.a. |
| 33612 | Heavy Duty Trucks | 3,672 | $209.5 | $57,050 | 32,122 | $1,542.5 | $48,019 | 118.8% |
| 3362 | MV Bodies & Trailers | 4,936 | $199.4 | $40,397 | 155,649 | $5,590.0 | $35,914 | 112.5% |
| 336211 | MV Bodies | 2,462 | $107.1 | $43,516 | 47,566 | $1,838.3 | $38,647 | 112.6% |
| 336212 | Truck Trailers | 1,501 | $59.8 | $39,845 | 32,260 | $1,121.3 | $34,758 | 114.6% |
| 336213 | Motor Homes* | 62 | D | n.a. | 21,533 | $747.0 | $34,690 | n.a. |
| 336214 | Travel Trailers & Campers* | 911 | D | n.a. | 54,290 | $1,883.4 | $34,692 | n.a. |
| 3363 | MV Parts | 90,442 | $4,505.8 | $49,820 | 641,128 | $29,642.8 | $46,235 | 107.8% |
| 33631 | MV Gas Engines & Engine Parts | 8,459 | $552.3 | $65,289 | 76,649 | $4,050.4 | $52,843 | 123.6% |
| 336311 | Carburetors, Pistons, Rings, & Valves | 641 | $27.4 | $42,807 | 10,537 | $436.2 | $41,395 | 103.4% |
| 336312 | Gasoline Engines & Engine Parts | 7,818 | $524.8 | $67,133 | 66,112 | $3,614.2 | $54,668 | 122.8% |
| 33632 | MV Electrical & Electronic Eqpt. | 9,668 | $508.6 | $52,608 | 77,631 | $3,452.3 | $44,471 | 118.3% |
| 336321 | Vehicular Lighting Eqpt.*^ | 2,182 | D | n.a. | 15,615 | $713.0 | $45,662 | n.a. |
| 336322 | Other MV Electrical & Electronic Eqpt.* | 7,486 | D | n.a. | 62,016 | $2,739.3 | $44,171 | n.a. |
| 33633 | MV Steering & Suspension Parts | 4,884 | $235.3 | $48,170 | 39,390 | $1,813.2 | $46,031 | 104.6% |
| 33634 | MV Brake Systems | 6,204 | $253.1 | $40,797 | 33,782 | $1,300.1 | $38,486 | 106.0% |
| 33635 | MV Transmission & Power Train Parts | 13,088 | $781.1 | $59,679 | 83,756 | $4,949.9 | $59,099 | 101.0% |
| 33636 | MV Seating & Interior Trim | 7,315 | $292.6 | $40,002 | 52,842 | $2,140.9 | $40,515 | 98.7% |
| 33637 | MV Metal Stamping | 24,268 | $1,228.6 | $50,626 | 110,578 | $5,386.9 | $48,716 | 103.9% |
| 33639 | Other MV Parts | 16,556 | $654.3 | $39,520 | 166,500 | $6,549.1 | $39,334 | 100.5% |
| 336391 | Motor Vehicle Air-Conditioning | 3,177 | $138.0 | $43,438 | 17,249 | $806.1 | $46,732 | 93.0% |
| 336399 | All Other MV Parts | 13,379 | $516.3 | $38,590 | 149,251 | $5,743.0 | $38,479 | 100.3% |

**Table A6: Motor Vehicle Industry Employment and Pay, Ohio and the U.S., 2006**

| NAICS Code | Shorter Industry Title | Ohio Employ-ment | Ohio Payroll in millions | Ohio Mean | U.S. Employ-ment | U.S. Payroll in millions | U.S. Mean | Ohio Means as a Percent of U.S. Means |
|---|---|---|---|---|---|---|---|---|
| The Related Industries* Include: | | 4,174 | n.a. | n.a. | 80,761 | $3,891.8 | $48,189 | n.a. |
| 32621 | Tires | 3,138 | $179.5 | $57,200 | 62,478 | $3,062.6 | $49,019 | 116.7% |
| 326211 | Tire Mfg. (Exc. Retreading) | 2,747 | $165.2 | $60,154 | 53,985 | $2,775.5 | $51,412 | 117.0% |
| 326212 | Tire Retreading | 391 | $14.3 | $36,448 | 8,493 | $287.2 | $33,811 | 107.8% |
| 335911 | Storage Batteries* | 1,036 | D | n.a. | 18,283 | $829.2 | $45,353 | n.a. |

Notes: * - The Ohio employment figure is (or contains) an estimate; ^ - Employment data from Harris (2006) and PR&SP (2006) are incorporated. Abbreviations used: Eqpt. - equipment; Exc. - except; Mfg. - manufacturing; MV - motor vehicle. It should also be noted that neither the iron foundries dedicated to the motor vehicle industry, particularly Ford's in Brookpark and General Motor's (GM's) in Defiance, nor the diesel engine plants of GM and Daimler AG in Dayton and Byesville, respectively, are included in this table because their NAICS codes (331511 and 333618) exclude them, and there is no ready comparison to the nation as a whole. If such a comparison was possible, then there would have been almost 6,200 more workers in Ohio's motor vehicle industry - and thousands more throughout the nation - in 2006.

Sources: Harris (2006); ODOD (2006); U.S. Bureau of the Census (2008b).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 7/08).

**Table A7: Establishments and Employment in Ohio's Motor Vehicle Industry by County, 2006**

| Area Name | Estab-lishments | Employ-ment* | Area Name | Estab-lishments | Employ-ment* | Area Name | Estab-lishments | Employ-ment* |
|---|---|---|---|---|---|---|---|---|
| Ohio | 661 | 135,899 | Greene | 2 | 33 | Morrow | 5 | 809 |
| | | | Guernsey^ | 1 | 550 | Muskingum | 1 | 28 |
| Adams | 0 | 0 | Hamilton | 16 | 2,400 | Noble | 1 | 333 |
| Allen | 10 | 2,682 | Hancock | 19 | 4,223 | Ottawa | 5 | 77 |
| Ashland | 2 | 43 | Hardin | 2 | 333 | Paulding | 3 | 336 |
| Ashtabula | 9 | 350 | Harrison | 0 | 0 | Perry | 0 | 0 |
| Athens | 0 | 0 | Henry | 4 | 958 | Pickaway | 1 | 143 |
| Auglaize | 5 | 673 | Highland | 3 | 143 | Pike | 1 | 333 |
| Belmont | 2 | 333 | Hocking | 0 | 0 | Portage | 4 | 697 |
| Brown | 0 | 0 | Holmes | 4 | 134 | Preble | 2 | 69 |
| Butler | 9 | 1,107 | Huron | 4 | 476 | Putnam | 4 | 366 |
| Carroll | 1 | 3 | Jackson | 1 | 333 | Richland | 15 | 4,373 |
| Champaign | 4 | 1,357 | Jefferson | 0 | 0 | Ross | 3 | 1,833 |
| Clark | 17 | 2,179 | Knox | 4 | 621 | Sandusky | 11 | 1,446 |
| Clermont | 6 | 2,053 | Lake | 10 | 302 | Scioto | 2 | 333 |
| Clinton | 4 | 1,068 | Lawrence | 0 | 0 | Seneca | 6 | 733 |
| Columbiana | 8 | 341 | Licking | 7 | 1,428 | Shelby | 9 | 4,590 |
| Coshocton | 0 | 0 | Logan | 5 | 4,037 | Stark | 22 | 1,751 |
| Crawford | 7 | 803 | Lorain | 18 | 3,293 | Summit | 30 | 6,586 |
| Cuyahoga^ | 77 | 11,035 | Lucas | 34 | 11,890 | Trumbull | 18 | 10,458 |
| Darke | 4 | 333 | Madison | 6 | 1,418 | Tuscarawas | 6 | 179 |
| Defiance^ | 7 | 3,136 | Mahoning | 11 | 194 | Union | 1 | 5,600 |
| Delaware | 6 | 716 | Marion | 5 | 523 | Van Wert | 8 | 872 |
| Erie | 6 | 3,047 | Medina | 9 | 640 | Vinton | 0 | 0 |
| Fairfield | 4 | 145 | Meigs | 0 | 0 | Warren | 8 | 1,495 |
| Fayette | 2 | 171 | Mercer | 2 | 333 | Washington | 2 | 10 |
| Franklin | 36 | 3,670 | Miami | 8 | 1,204 | Wayne | 14 | 2,620 |
| Fulton | 8 | 1,428 | Monroe | 1 | 7 | Williams | 14 | 1,638 |
| Gallia | 1 | 143 | Montgomery^ | 31 | 11,826 | Wood | 15 | 2,715 |
| Geauga | 0 | 0 | Morgan | 1 | 143 | Wyandot | 7 | 1,217 |

Notes: * - Employment figures are estimates or incorporate estimates - because their sum is slightly larger than the actual state total, they tend to be a little high; ^ - Figures include Ford's casting plant in Cuyahoga, GM's casting plant in Defiance, Daimler's diesel plant in Muskingum, and GM's and Isuzu's DMAX diesel plant in Montgomery.

Sources: Harris (2006), ODOD (2006), and U.S. Bureau of the Census (2008b).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300, or 614/466-2116. (DL, 7/08).

**Table A8a: Motor Vehicle Industry Employment Trends in Ohio, 1998-2006**

| NAICS Code | Shorter Industry Title | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Changes: 1998-2006 Number | Changes: 1998-2006 Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11-92 | Total | 4,806,046 | 4,867,368 | 5,001,980 | 4,932,943 | 4,743,151 | 4,770,283 | 4,762,205 | 4,762,618 | 4,825,510 | 19,464 | 0.4% |
| 31-33 | Manufacturing | 994,788 | 982,853 | 988,612 | 936,161 | 829,456 | 838,725 | 814,662 | 792,783 | 787,946 | -206,842 | -20.8% |
| 32621-3363 | Motor Vehicle (MV) Industry | 156,440 | 155,187 | 157,766 | 144,540 | 122,766 | 133,279 | 131,612 | 126,487 | 126,396 | -30,045 | -19.2% |
| Transportation Equipment Industries Include: | | 152,201 | 150,613 | 153,126 | 139,578 | 117,328 | 128,411 | 127,358 | 122,193 | 122,222 | -29,979 | -19.7% |
| 3361 | MV Assembly | 36,728 | 34,184 | 34,023 | 33,797 | 28,698 | 27,365 | 28,584 | 27,323 | 26,844 | -9,884 | -26.9% |
| 33611 | Automobile & Light Duty Motor Vehicles*^ | 31,149 | 28,246 | 28,036 | 28,580 | 24,778 | 24,018 | 25,230 | 23,619 | 23,172 | -7,977 | -25.6% |
| 336111 | Automobiles*^ | 15,249 | 13,846 | 13,837 | 13,167 | 11,978 | 13,053 | 13,210 | 12,261 | 14,169 | -1,080 | -7.1% |
| 336112 | Light Truck & Utility Vehicles*^ | 15,900 | 14,400 | 14,199 | 15,413 | 12,800 | 10,965 | 12,020 | 11,359 | 9,003 | -6,897 | -43.4% |
| 33612 | Heavy Duty Trucks*^ | 5,579 | 5,938 | 5,987 | 5,217 | 3,920 | 3,347 | 3,354 | 3,704 | 3,672 | -1,907 | -34.2% |
| 3362 | MV Bodies & Trailers | 4,765 | 5,719 | 5,899 | 4,884 | 4,171 | 3,603 | 4,264 | 4,552 | 4,936 | 171 | 3.6% |
| 336211 | MV Bodies | 2,724 | 3,681 | 3,452 | 3,033 | 2,606 | 1,988 | 2,137 | 2,334 | 2,462 | -262 | -9.6% |
| 336212 | Truck Trailers | 1,046 | 1,011 | 1,370 | 917 | 716 | 764 | 1,222 | 1,171 | 1,501 | 455 | 43.5% |
| 336213&4 | Motor Homes, Travel Trailers, & Campers | 995 | 1,027 | 1,077 | 934 | 849 | 851 | 905 | 1,047 | 973 | -22 | -2.2% |
| 3363 | MV Parts | 110,708 | 110,710 | 113,204 | 100,897 | 84,459 | 97,443 | 94,510 | 90,318 | 90,442 | -20,266 | -18.3% |
| 33631 | MV Gas Engines & Engine Parts | 9,949 | 10,053 | 10,407 | 9,185 | 8,462 | 10,108 | 9,453 | 8,621 | 8,459 | -1,490 | -15.0% |
| 336311 | Carburetors, Pistons, Rings, & Valves* | 1,154 | 1,086 | 1,149 | 837 | 340 | 514 | 642 | 652 | 641 | -513 | -44.5% |
| 336312 | Gasoline Engines & Engine Parts* | 8,795 | 8,967 | 9,258 | 8,348 | 8,122 | 9,594 | 8,811 | 7,969 | 7,818 | -977 | -11.1% |
| 33632 | MV Electrical & Electronic Eqpt. | 16,791 | 15,332 | 15,531 | 13,456 | 5,813 | 9,949 | 9,051 | 8,506 | 9,668 | -7,123 | -42.4% |
| 336321 | Vehicular Lighting Eqpt.* | 2,403 | 2,342 | 2,267 | 1,914 | 708 | 1,320 | 1,084 | 1,032 | 2,182 | -221 | -9.2% |
| 336322 | Other MV Electrical & Electronic Eqpt.* | 14,388 | 12,990 | 13,264 | 11,542 | 5,105 | 8,629 | 7,967 | 7,474 | 7,486 | -6,902 | -48.0% |
| 33633 | MV Steering & Suspension Parts | 8,174 | 8,907 | 9,219 | 8,282 | 6,260 | 6,164 | 5,642 | 4,927 | 4,884 | -3,290 | -40.2% |
| 33634 | MV Brake Systems | 8,199 | 7,344 | 7,234 | 6,127 | 5,554 | 8,066 | 7,304 | 6,361 | 6,204 | -1,995 | -24.3% |
| 33635 | MV Transmission & Power Train Parts | 12,132 | 12,444 | 13,259 | 12,593 | 11,462 | 13,404 | 13,751 | 13,305 | 13,088 | 956 | 7.9% |
| 33636 | MV Seating & Interior Trim | 4,703 | 5,086 | 5,421 | 5,372 | 5,503 | 7,268 | 7,177 | 7,317 | 7,315 | 2,612 | 55.5% |
| 33637 | MV Metal Stamping | 29,995 | 30,166 | 30,607 | 26,588 | 25,573 | 26,378 | 25,088 | 24,037 | 24,268 | -5,727 | -19.1% |
| 33639 | Other MV Parts^ | 20,765 | 21,378 | 21,526 | 19,294 | 15,832 | 16,106 | 17,044 | 17,244 | 16,556 | -4,209 | -20.3% |
| 336391 | Motor Vehicle Air-Conditioning*^ | 3,980 | 3,521 | 3,859 | 3,576 | 3,193 | 3,208 | 3,621 | 3,103 | 3,177 | -803 | -20.2% |
| 336399 | All Other MV Parts* | 16,785 | 17,857 | 17,667 | 15,718 | 12,639 | 12,898 | 13,423 | 14,141 | 13,379 | -3,406 | -20.3% |
| The Related Industries Include: | | 4,239 | 4,574 | 4,640 | 4,962 | 5,438 | 4,868 | 4,254 | 4,294 | 4,174 | -66 | -1.5% |
| 32621 | Tires | 3,248 | 3,613 | 3,683 | 4,053 | 4,456 | 3,718 | 3,179 | 3,261 | 3,138 | -110 | -3.4% |
| 326211 | Tire Mfg. (Exc. Retreading) | 2,913 | 3,274 | 3,314 | 3,588 | 3,996 | 3,182 | 2,722 | 2,746 | 2,747 | -166 | -5.7% |
| 326212 | Tire Retreading | 335 | 339 | 369 | 465 | 460 | 536 | 457 | 515 | 391 | 56 | 16.7% |
| 335911 | Storage Batteries* | 991 | 961 | 957 | 909 | 982 | 1,150 | 1,075 | 1,033 | 1,036 | 45 | 4.5% |

Notes: * - Employment figures may be (or contain) estimates. ^ - Employment information from Harris (1998-2006) and/or OSR (2004, 2006) may be incorporated.
Abbreviations used: Eqpt. - equipment; Exc. - except; Mfg. - manufacturing; MV - motor vehicle.

Sources: Harris (1998-2006); ODOD (2004, 2006, 2008), U.S. Bureau of the Census (2000-2002, 2003b, 2004, 2005b, 2006a, 2006b, 2007b, 2008b).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 8/08).

**Table A8b: Motor Vehicle Industry Employment Trends in the U.S., 1998-2006**

| NAICS Code | Shorter Industry Title | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Changes: 1998-2006 Number | Changes: 1998-2006 Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11-92 | Total | 108,117,731 | 110,705,661 | 114,064,976 | 115,061,184 | 112,400,654 | 113,398,043 | 115,074,924 | 116,317,003 | 119,917,165 | 11,799,434 | 10.9% |
| 31-33 | Manufacturing | 16,945,834 | 16,659,930 | 16,473,994 | 15,950,424 | 14,393,609 | 14,132,020 | 13,821,976 | 13,667,337 | 13,631,683 | -3,314,151 | -19.6% |
| 32621-3363 | Motor Vehicle (MV) Industry | 1,261,160 | 1,265,715 | 1,295,227 | 1,183,040 | 1,075,597 | 1,116,495 | 1,131,767 | 1,112,879 | 1,088,700 | -172,460 | -13.7% |
| Transportation Equipment Industries Include: | | 1,165,631 | 1,170,050 | 1,198,065 | 1,087,564 | 988,398 | 1,032,461 | 1,049,744 | 1,033,204 | 1,007,939 | -157,692 | -13.5% |
| 3361 | MV Assembly | 235,483 | 233,917 | 235,413 | 215,132 | 216,886 | 211,454 | 216,793 | 214,536 | 211,162 | -24,321 | -10.3% |
| 33611 | Automobile & Light Duty Motor Vehicles | 204,054 | 199,924 | 199,974 | 187,713 | 196,197 | 183,401 | 187,216 | 182,188 | 179,040 | -25,014 | -12.3% |
| 336111 | Automobiles | 123,172 | 105,855 | 101,962 | 97,321 | 112,453 | 74,821 | 79,087 | 74,410 | 75,225 | -47,947 | -38.9% |
| 336112 | Light Truck & Utility Vehicles | 80,882 | 94,069 | 98,012 | 90,392 | 83,744 | 108,580 | 108,129 | 107,778 | 103,815 | 22,933 | 28.4% |
| 33612 | Heavy Duty Trucks | 31,429 | 33,993 | 35,439 | 27,419 | 20,689 | 28,053 | 29,577 | 32,348 | 32,122 | 693 | 2.2% |
| 3362 | MV Bodies & Trailers | 128,687 | 141,610 | 150,461 | 132,765 | 114,410 | 132,617 | 143,888 | 147,634 | 155,649 | 26,962 | 21.0% |
| 336211 | MV Bodies | 44,387 | 48,322 | 51,428 | 48,089 | 39,280 | 43,704 | 44,969 | 46,204 | 47,566 | 3,179 | 7.2% |
| 336212 | Truck Trailers | 32,656 | 35,975 | 38,396 | 28,261 | 22,008 | 23,716 | 25,698 | 29,000 | 32,260 | -396 | -1.2% |
| 336213&4 | Motor Homes, Travel Trailers, & Campers | 51,644 | 57,313 | 60,637 | 56,415 | 53,122 | 65,197 | 73,221 | 72,430 | 75,823 | 24,179 | 46.8% |
| 3363 | MV Parts | 801,461 | 794,523 | 812,191 | 739,667 | 657,102 | 688,390 | 689,063 | 671,034 | 641,128 | -160,333 | -20.0% |
| 33631 | MV Gas Engines & Engine Parts | 104,197 | 103,848 | 105,256 | 98,182 | 80,507 | 92,286 | 91,805 | 80,904 | 76,649 | -27,548 | -26.4% |
| 336311 | Carburetors, Pistons, Rings, & Valves | 18,579 | 18,689 | 20,242 | 18,345 | 14,511 | 13,134 | 12,649 | 10,948 | 10,537 | -8,042 | -43.3% |
| 336312 | Gasoline Engines & Engine Parts | 85,618 | 85,159 | 85,014 | 79,837 | 65,996 | 79,152 | 79,156 | 69,956 | 66,112 | -19,506 | -22.8% |
| 33632 | MV Electrical & Electronic Eqpt. | 118,129 | 111,989 | 113,031 | 104,769 | 83,434 | 89,283 | 87,042 | 85,313 | 77,631 | -40,498 | -34.3% |
| 336321 | Vehicular Lighting Eqpt. | 16,343 | 16,780 | 16,501 | 16,126 | 13,752 | 15,637 | 14,742 | 14,962 | 15,615 | -728 | -4.5% |
| 336322 | Other MV Electrical & Electronic Eqpt. | 101,786 | 95,209 | 96,530 | 88,643 | 69,682 | 73,646 | 72,300 | 70,351 | 62,016 | -39,770 | -39.1% |
| 33633 | MV Steering & Suspension Parts | 48,499 | 47,467 | 50,001 | 44,251 | 36,109 | 39,098 | 37,272 | 37,810 | 39,390 | -9,109 | -18.8% |
| 33634 | MV Brake Systems | 41,357 | 43,812 | 43,115 | 39,484 | 36,478 | 41,419 | 40,905 | 39,373 | 33,782 | -7,575 | -18.3% |
| 33635 | MV Transmission & Power Train Parts | 115,906 | 113,184 | 118,268 | 105,316 | 92,395 | 93,687 | 94,626 | 90,795 | 83,756 | -32,150 | -27.7% |
| 33636 | MV Seating & Interior Trim | 46,977 | 50,847 | 53,783 | 50,433 | 47,931 | 54,858 | 56,891 | 57,390 | 52,842 | 5,865 | 12.5% |
| 33637 | MV Metal Stamping | 126,060 | 127,248 | 129,416 | 115,931 | 111,908 | 115,517 | 114,664 | 111,168 | 110,578 | -15,482 | -12.3% |
| 33639 | Other MV Parts | 200,336 | 196,128 | 199,321 | 181,301 | 168,340 | 162,242 | 165,858 | 168,281 | 166,500 | -33,836 | -16.9% |
| 336391 | Motor Vehicle Air-Conditioning | 22,168 | 22,210 | 21,894 | 19,406 | 12,985 | 15,431 | 17,913 | 16,750 | 17,249 | -4,919 | -22.2% |
| 336399 | All Other MV Parts | 178,168 | 173,918 | 177,427 | 161,895 | 155,355 | 146,811 | 147,945 | 151,531 | 149,251 | -28,917 | -16.2% |
| The Related Industries Include: | | 95,529 | 95,665 | 97,162 | 95,476 | 87,199 | 84,034 | 82,023 | 79,675 | 80,761 | -14,768 | -15.5% |
| 32621 | Tires | 72,784 | 72,608 | 74,325 | 72,481 | 68,862 | 66,587 | 64,007 | 62,621 | 62,478 | -10,306 | -14.2% |
| 326211 | Tire Mfg. (Exc. Retreading) | 65,298 | 64,810 | 66,133 | 63,931 | 60,905 | 58,188 | 55,064 | 54,323 | 53,985 | -11,313 | -17.3% |
| 326212 | Tire Retreading | 7,486 | 7,798 | 8,192 | 8,550 | 7,957 | 8,399 | 8,943 | 8,298 | 8,493 | 1,007 | 13.5% |
| 335911 | Storage Batteries | 22,745 | 23,057 | 22,837 | 22,995 | 18,337 | 17,447 | 18,016 | 17,054 | 18,283 | -4,462 | -19.6% |

Note: Abbreviations used: Eqpt. - equipment; Exc. - except; Mfg. - manufacturing; MV - motor vehicle.

Sources: U.S. Bureau of the Census (2000-2002, 2003b, 2004, 2005b, 2006a, 2006b, 2007b, 2008b).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 8/08).

**Table A9: Total and Motor Vehicle Industry Gross Domestic Product for Ohio and the U.S., 1997-2006**
(in billions of chained dollars, except percentages, and standardized on 2000)

| | Motor Vehicles, Bodies, Trailers & Parts (NAICS 3361-3363) GDP | | | | | | Total GDP | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ohio | | | U.S. | | | Ohio | | U.S. | | Ohio as a Percent of the U.S. | | |
| Year | Dollar Value (billions) | Percent Change from Prior Yr. | As Percent of Total | Dollar Value (billions) | Percent Change from Prior Yr. | As Percent of Total | Dollar Value (billions) | Percent Change from Prior Yr. | Dollar Value (billions) | Percent Change from Prior Yr. | NAICS 3361-3363 | Total | Ohio::U.S. Concentration Ratio |
| 1997 | $14.56 | | 4.2% | $105.34 | | 1.2% | $350.60 | | $8,620.96 | | 13.8% | 4.1% | 3.40 |
| 1998 | $16.98 | 16.6% | 4.7% | $111.77 | 6.1% | 1.2% | $362.72 | 3.5% | $9,004.67 | 4.5% | 15.2% | 4.0% | 3.77 |
| 1999 | $15.72 | -7.4% | 4.3% | $114.61 | 2.5% | 1.2% | $368.48 | 1.6% | $9,404.25 | 4.4% | 13.7% | 3.9% | 3.50 |
| 2000 | $16.79 | 6.8% | 4.5% | $118.11 | 3.1% | 1.2% | $372.01 | 1.0% | $9,749.10 | 3.7% | 14.2% | 3.8% | 3.72 |
| 2001 | $14.06 | -16.3% | 3.8% | $104.60 | -11.4% | 1.1% | $365.74 | -1.7% | $9,836.58 | 0.9% | 13.4% | 3.7% | 3.61 |
| 2002 | $17.41 | 23.9% | 4.7% | $127.51 | 21.9% | 1.3% | $373.46 | 2.1% | $9,981.85 | 1.5% | 13.7% | 3.7% | 3.65 |
| 2003 | $16.93 | -2.8% | 4.5% | $136.97 | 7.4% | 1.3% | $378.72 | 1.4% | $10,225.68 | 2.4% | 12.4% | 3.7% | 3.34 |
| 2004 | $17.63 | 4.2% | 4.6% | $125.43 | -8.4% | 1.2% | $387.44 | 2.3% | $10,580.22 | 3.5% | 14.1% | 3.7% | 3.84 |
| 2005 | $17.61 | -0.1% | 4.5% | $129.78 | 3.5% | 1.2% | $389.96 | 0.7% | $10,899.70 | 3.0% | 13.6% | 3.6% | 3.79 |
| 2006 | $19.28 | 9.4% | 5.0% | $143.98 | 10.9% | 1.3% | $388.92 | -0.3% | $11,240.11 | 3.1% | 13.4% | 3.5% | 3.87 |
| Net Changes, 1997-2006 | | | | | | | | | | | | | |
| Numeric | $4.72 | | 0.8% | $38.64 | | 0.1% | $38.32 | | $2,619.15 | | -0.4% | -0.6% | 0.47 |
| Percent | 32.4% | | | 36.7% | | | 10.9% | | 30.4% | | | | |

Notes: State GDP is analogous to national GDP, but not identical with it due to minor technical differences. Real GDP adjusts for inflation, allowing comparisons of the volume of goods produced from year to year.

Source: U.S. Bureau of Economic Analysis (2008a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 8/08).

**Table A10: Trends in Value-Added by Group for Ohio and the U.S., 1997-2006**
**(in millions of dollars)**

| | Ohio | | | | U.S. | | | | Ohio as a Percentage of the U.S. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 3361: Assembly | 3362: Bodies & Trailers* | 3363: Parts | Summary | 3361: Assembly | 3362: Bodies & Trailers | 3363: Parts | Summary | 3361: As-sembly | 3362: Bodies & Trailers* | 3363: Parts | Sum-mary |
| 1997 | $10,760.0 | $281.9 | $11,275.6 | $22,317.5 | $72,575.0 | $7,693.7 | $73,797.9 | $154,066.6 | 14.8% | 3.7% | 15.3% | 14.5% |
| 1998 | $13,493.2 | $331.0 | $10,977.3 | $24,801.4 | $66,288.7 | $8,474.4 | $77,370.5 | $152,133.6 | 20.4% | 3.9% | 14.2% | 16.3% |
| 1999 | $13,344.9 | $331.2 | $11,665.1 | $25,341.2 | $77,424.7 | $10,158.9 | $85,426.3 | $173,009.9 | 17.2% | 3.3% | 13.7% | 14.6% |
| 2000 | $12,092.3 | $339.9 | $11,197.9 | $23,630.2 | $61,627.7 | $9,871.3 | $84,481.3 | $155,980.3 | 19.6% | 3.4% | 13.3% | 15.1% |
| 2001 | $10,408.9 | $273.1 | $9,362.9 | $20,044.9 | $54,172.8 | $8,417.3 | $74,532.3 | $137,122.4 | 19.2% | 3.2% | 12.6% | 14.6% |
| 2002 | $12,686.7 | $244.0 | $11,753.1 | $24,683.9 | $72,157.1 | $8,741.7 | $86,428.2 | $167,327.0 | 17.6% | 2.8% | 13.6% | 14.8% |
| 2003 | $9,606.0 | $272.5 | $12,292.3 | $22,170.8 | $78,239.9 | $9,475.8 | $84,401.2 | $172,117.0 | 12.3% | 2.9% | 14.6% | 12.9% |
| 2004 | $10,541.7 | $703.1 | $13,504.4 | $24,749.2 | $71,100.6 | $11,186.5 | $83,006.0 | $165,293.2 | 14.8% | 6.3% | 16.3% | 15.0% |
| 2005 | $10,800.6 | $945.8 | $12,361.1 | $24,107.5 | $67,605.8 | $12,292.5 | $81,289.8 | $161,188.0 | 16.0% | 7.7% | 15.2% | 15.0% |
| 2006 | $10,908.5 | $1,122.4 | $11,298.8 | $23,329.8 | $66,035.3 | $13,482.8 | $80,497.4 | $160,015.6 | 16.5% | 8.3% | 14.0% | 14.6% |
| Average percentages for the 10-year period: | | | | | | | | | 16.7% | 4.9% | 14.3% | 14.7% |

Note: * - Data for this group are unreliable, as indicated by the relatively large standard errors of the estimates (not shown).

Sources: U.S. Bureau of the Census (2003a, 2005a, 2005e, 2007a, 2008a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300 or 614/466-2116 (DL, 7/08).

**Table A11: Light Vehicle Production in Ohio and the U.S., 1987-2007**

| | Ohio | | | | U.S. | | | | Ohio as Percent of U.S. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Cars | Light Trucks | Light Vehicles | Cars % of Light Vehicles | Cars | Light Trucks | Light Vehicles | Cars % of Light Vehicles | Cars | Light Trucks | Light Vehicles |
| 1987 | 923,710 * | 802,660 | 1,726,370 | 53.5% | 7,099,829 | 3,528,206 ^ | 10,628,035 | 66.8% | 13.0% | 22.7% | 16.2% |
| 1988 | 874,064 * | 877,939 | 1,752,003 | 49.9% | 7,137,397 | 3,809,960 ^ | 10,947,357 | 65.2% | 12.2% | 23.0% | 16.0% |
| 1989 | 845,942 * | 822,295 | 1,668,237 | 50.7% | 6,824,639 | 3,781,396 | 10,606,035 | 64.3% | 12.4% | 21.7% | 15.7% |
| 1990 | 843,476 * | 631,178 | 1,474,654 | 57.2% | 6,077,885 | 3,463,527 | 9,541,412 | 63.7% | 13.9% | 18.2% | 15.5% |
| 1991 | 966,663 * | 677,811 * | 1,644,474 | 58.8% | 5,439,864 | 3,176,719 | 8,616,583 | 63.1% | 17.8% | 21.3% | 19.1% |
| 1992 | 914,951 * | 564,887 * | 1,479,838 | 61.8% | 5,666,891 | 3,808,159 | 9,475,050 | 59.8% | 16.1% | 14.8% | 15.6% |
| 1993 | 1,005,870 | 795,541 | 1,801,411 | 55.8% | 5,982,120 | 4,608,017 | 10,590,137 | 56.5% | 16.8% | 17.3% | 17.0% |
| 1994 | 959,856 | 812,660 | 1,772,516 | 54.2% | 6,601,223 | 5,332,048 | 11,933,271 | 55.3% | 14.5% | 15.2% | 14.9% |
| 1995 | 988,869 | 907,288 | 1,896,157 | 52.2% | 6,339,892 | 5,306,197 | 11,646,089 | 54.4% | 15.6% | 17.1% | 16.3% |
| 1996 | 1,084,599 | 855,430 | 1,940,029 | 55.9% | 6,082,835 | 5,749,418 | 11,832,253 | 51.4% | 17.8% | 14.9% | 16.4% |
| 1997 | 1,105,007 | 893,447 | 1,998,454 | 55.3% | 5,933,921 | 6,196,565 | 12,130,486 | 48.9% | 18.6% | 14.4% | 16.5% |
| 1998 | 1,016,129 | 840,416 | 1,856,545 | 54.7% | 5,554,373 | 6,448,290 | 12,002,663 | 46.3% | 18.3% | 13.0% | 15.5% |
| 1999 | 1,055,762 | 918,210 | 1,973,972 | 53.5% | 5,637,949 | 7,387,029 | 13,024,978 | 43.3% | 18.7% | 12.4% | 15.2% |
| 2000 | 1,022,393 | 841,636 | 1,864,029 | 54.8% | 5,542,217 | 7,228,497 | 12,770,714 | 43.4% | 18.4% | 11.6% | 14.6% |
| 2001 | 1,016,218 | 722,869 | 1,739,087 | 58.4% | 4,879,119 | 6,545,570 | 11,424,689 | 42.7% | 20.8% | 11.0% | 15.2% |
| 2002 | 989,509 | 847,787 | 1,837,296 | 53.9% | 5,018,777 | 7,260,805 | 12,279,582 | 40.9% | 19.7% | 11.7% | 15.0% |
| 2003 | 927,925 | 956,952 | 1,884,877 | 49.2% | 4,510,469 | 7,576,559 | 12,087,028 | 37.3% | 20.6% | 12.6% | 15.6% |
| 2004 | 797,009 | 943,622 | 1,740,631 | 45.8% | 4,229,625 | 7,730,729 | 11,960,354 | 35.4% | 18.8% | 12.2% | 14.6% |
| 2005 | 882,222 | 912,367 | 1,794,589 | 49.2% | 4,321,272 | 7,625,381 | 11,946,653 | 36.2% | 20.4% | 12.0% | 15.0% |
| 2006 | 884,734 | 785,007 | 1,669,741 | 53.0% | 4,366,996 | 6,893,281 | 11,260,277 | 38.8% | 20.3% | 11.4% | 14.8% |
| 2007 | 870,008 | 878,327 | 1,748,335 | 49.8% | 3,924,268 | 6,828,042 | 10,752,310 | 36.5% | 22.2% | 12.9% | 16.3% |

Notes: * - Model year production, which does not coincide with the calendar year. Research for a prior report showed that combining and comparing model and calendar year data introduces only minimal distortions. Therefore, comparisons of Ohio with the U.S. for these years are useful, but not entirely valid. ^ - Factory shipments of class 1 & 2 trucks - almost the same as production.

Source: Ward's (1988-2008).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development (DL, 8/08).

**Table A12: Trends in Capital Expenditures by Group for Ohio and the U.S., 1997-2006**
**(in millions of dollars)**

| | Ohio | | | | U.S. | | | | Ohio as a Percentage of the U.S. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 3361: Assembly | 3362: Bodies & Trailers* | 3363: Parts | Summary | 3361: Assembly | 3362: Bodies & Trailers | 3363: Parts | Summary | 3361: As-sembly | 3362: Bodies & Trailers* | 3363: Parts | Sum-mary |
| 1997 | $454.1 | $26.6 | $1,888.5 | $2,369.3 | $5,406.6 | $441.1 | $9,489.4 | $15,337.1 | 8.4% | 6.0% | 19.9% | 15.4% |
| 1998 | $364.1 | $12.6 | $1,669.7 | $2,046.4 | $5,383.8 | $377.8 | $9,830.8 | $15,592.3 | 6.8% | 3.3% | 17.0% | 13.1% |
| 1999 | $745.7 | $16.6 | $1,323.6 | $2,086.0 | $4,773.5 | $463.7 | $9,464.3 | $14,701.4 | 15.6% | 3.6% | 14.0% | 14.2% |
| 2000 | $840.2 | $13.6 | $1,118.0 | $1,971.8 | $4,777.8 | $588.1 | $8,863.0 | $14,229.0 | 17.6% | 2.3% | 12.6% | 13.9% |
| 2001 | $462.6 | $6.7 | $1,099.9 | $1,569.2 | $4,461.3 | $503.3 | $8,390.4 | $13,355.0 | 10.4% | 1.3% | 13.1% | 11.8% |
| 2002 | $318.6 | $8.3 | $1,366.9 | $1,693.8 | $4,802.2 | $328.0 | $7,534.3 | $12,664.5 | 6.6% | 2.5% | 18.1% | 13.4% |
| 2003 | $285.3 | $4.6 | $932.7 | $1,222.6 | $5,186.7 | $386.8 | $7,377.3 | $12,950.7 | 5.5% | 1.2% | 12.6% | 9.4% |
| 2004 | $421.3 | $14.6 | $1,123.6 | $1,559.5 | $4,686.8 | $441.5 | $6,259.2 | $11,387.5 | 9.0% | 3.3% | 18.0% | 13.7% |
| 2005 | $453.8 | $22.7 | $803.2 | $1,279.7 | $4,283.1 | $391.2 | $6,759.4 | $11,433.6 | 10.6% | 5.8% | 11.9% | 11.2% |
| 2006 | $570.5 | $11.1 | $1,543.9 | $2,125.4 | $4,042.8 | $393.5 | $6,884.3 | $11,320.6 | 14.1% | 2.8% | 22.4% | 18.8% |
| Average percentages for the 10-year period: | | | | | | | | | 10.3% | 3.2% | 15.9% | 13.5% |

Note: * - Data for this group are unreliable, as indicated by the relatively large standard errors of the estimates (not shown).

Sources: U.S. Bureau of the Census (2003a, 2005a, 2005e, 2007a, 2008a).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 800/848-1300 or 614/466-2116 (DL, 7/08).

**Table A13a: Motor Vehicle Industry Establishment Trends in Ohio, 1998-2006**

| NAICS Code | Shorter Industry Title | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Changes: 1998-2006 Number | Changes: 1998-2006 Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11-92 | Total | 270,343 | 270,766 | 270,509 | 269,944 | 271,181 | 270,255 | 271,733 | 270,968 | 269,914 | -429 | -0.2% |
| 31-33 | Manufacturing | 18,052 | 17,930 | 17,704 | 17,597 | 17,189 | 17,082 | 16,887 | 16,617 | 16,401 | -1,651 | -9.1% |
| 32621-3363 | Motor Vehicle (MV) Industry | 641 | 630 | 627 | 612 | 606 | 648 | 653 | 645 | 658 | 17 | 2.7% |
| Transportation Equipment Industries Include: | | 581 | 567 | 572 | 555 | 558 | 600 | 607 | 602 | 613 | 32 | 5.5% |
| 3361 | MV Assembly | 23 | 23 | 22 | 23 | 24 | 21 | 27 | 29 | 28 | 5 | 21.7% |
| 33611 | Automobile & Light Duty Motor Vehicles | 14 | 15 | 15 | 16 | 16 | 14 | 18 | 19 | 19 | 5 | 35.7% |
| 336111 | Automobiles | 10 | 10 | 11 | 12 | 13 | 10 | 14 | 14 | 14 | 4 | 40.0% |
| 336112 | Light Truck & Utility Vehicles | 4 | 5 | 4 | 4 | 3 | 4 | 4 | 5 | 5 | 1 | 25.0% |
| 33612 | Heavy Duty Trucks | 9 | 8 | 7 | 7 | 8 | 7 | 9 | 10 | 9 | 0 | 0.0% |
| 3362 | MV Bodies & Trailers | 74 | 69 | 71 | 70 | 72 | 80 | 82 | 80 | 95 | 21 | 28.4% |
| 336211 | MV Bodies | 38 | 37 | 37 | 38 | 38 | 42 | 38 | 35 | 43 | 5 | 13.2% |
| 336212 | Truck Trailers | 16 | 14 | 16 | 13 | 14 | 16 | 20 | 18 | 24 | 8 | 50.0% |
| 336213&4 | Motor Homes, Travel Trailers, & Campers | 20 | 18 | 18 | 19 | 20 | 22 | 24 | 27 | 28 | 8 | 40.0% |
| 3363 | MV Parts | 484 | 475 | 479 | 462 | 462 | 499 | 498 | 493 | 490 | 6 | 1.2% |
| 33631 | MV Gas Engines & Engine Parts | 49 | 48 | 51 | 49 | 46 | 49 | 55 | 49 | 54 | 5 | 10.2% |
| 336311 | Carburetors, Pistons, Rings, & Valves | 11 | 11 | 11 | 12 | 6 | 6 | 7 | 7 | 7 | -4 | -36.4% |
| 336312 | Gasoline Engines & Engine Parts | 38 | 37 | 40 | 37 | 40 | 43 | 48 | 42 | 47 | 9 | 23.7% |
| 33632 | MV Electrical & Electronic Eqpt. | 57 | 54 | 55 | 53 | 50 | 44 | 41 | 38 | 39 | -18 | -31.6% |
| 336321 | Vehicular Lighting Eqpt. | 9 | 10 | 11 | 10 | 11 | 9 | 8 | 8 | 9 | 0 | 0.0% |
| 336322 | Other MV Electrical & Electronic Eqpt. | 48 | 44 | 44 | 43 | 39 | 35 | 33 | 30 | 30 | -18 | -37.5% |
| 33633 | MV Steering & Suspension Parts | 19 | 21 | 21 | 21 | 24 | 23 | 22 | 23 | 24 | 5 | 26.3% |
| 33634 | MV Brake Systems | 26 | 24 | 25 | 21 | 26 | 33 | 33 | 29 | 29 | 3 | 11.5% |
| 33635 | MV Transmission & Power Train Parts | 37 | 36 | 33 | 30 | 34 | 40 | 38 | 35 | 35 | -2 | -5.4% |
| 33636 | MV Seating & Interior Trim | 26 | 25 | 25 | 26 | 24 | 31 | 32 | 34 | 37 | 11 | 42.3% |
| 33637 | MV Metal Stamping | 146 | 143 | 140 | 135 | 130 | 154 | 156 | 159 | 152 | 6 | 4.1% |
| 33639 | Other MV Parts | 124 | 124 | 129 | 127 | 128 | 125 | 121 | 126 | 120 | -4 | -3.2% |
| 336391 | Motor Vehicle Air-Conditioning | 6 | 6 | 6 | 6 | 7 | 6 | 6 | 5 | 5 | -1 | -16.7% |
| 336399 | All Other MV Parts | 118 | 118 | 123 | 121 | 121 | 119 | 115 | 121 | 115 | -3 | -2.5% |
| The Related Industries Include: | | 60 | 63 | 55 | 57 | 48 | 48 | 46 | 43 | 45 | -15 | -25.0% |
| 32621 | Tires | 54 | 57 | 50 | 51 | 41 | 42 | 40 | 37 | 38 | -16 | -29.6% |
| 326211 | Tire Mfg. (Exc. Retreading) | 12 | 12 | 10 | 11 | 10 | 11 | 12 | 10 | 9 | -3 | -25.0% |
| 326212 | Tire Retreading | 42 | 45 | 40 | 40 | 31 | 31 | 28 | 27 | 29 | -13 | -31.0% |
| 335911 | Storage Batteries | 6 | 6 | 5 | 6 | 7 | 6 | 6 | 6 | 7 | 1 | 16.7% |

Abbreviations used: Eqpt. - equipment; Exc. - except; Mfg. - manufacturing; MV - motor vehicle.

Source: Harris (2004, 2006), ODOD (2004, 2006), U.S. Bureau of the Census (2000-2002, 2003b, 2004, 2005b, 2006a, 2006b, 2007b, 2008b).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 8/08).

**Table A13b: Motor Vehicle Industry Establishment Trends in the U.S., 1998-2006**

| NAICS Code | Shorter Industry Title | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Changes: 1998-2006 Number | Changes: 1998-2006 Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11-92 | Total | 6,941,822 | 7,008,444 | 7,070,048 | 7,095,302 | 7,200,770 | 7,254,745 | 7,387,724 | 7,499,702 | 7,601,160 | 659,338 | 9.5% |
| 31-33 | Manufacturing | 366,249 | 360,244 | 354,498 | 352,619 | 344,341 | 341,849 | 339,083 | 333,460 | 331,062 | -35,187 | -9.6% |
| 32621-3363 | Motor Vehicle (MV) Industry | 9,464 | 9,341 | 9,118 | 8,974 | 8,668 | 9,012 | 9,061 | 8,945 | 8,871 | -593 | -6.3% |
| Transportation Equipment Industries Include: | | 8,458 | 8,337 | 8,112 | 7,998 | 7,833 | 8,160 | 8,240 | 8,168 | 8,083 | -375 | -4.4% |
| 3361 | MV Assembly | 411 | 418 | 410 | 410 | 395 | 367 | 377 | 380 | 370 | -41 | -10.0% |
| 33611 | Automobile & Light Duty Motor Vehicles | 324 | 329 | 324 | 321 | 308 | 273 | 275 | 281 | 275 | -49 | -15.1% |
| 336111 | Automobiles | 216 | 218 | 217 | 221 | 207 | 172 | 183 | 180 | 181 | -35 | -16.2% |
| 336112 | Light Truck & Utility Vehicles | 108 | 111 | 107 | 100 | 101 | 101 | 92 | 101 | 94 | -14 | -13.0% |
| 33612 | Heavy Duty Trucks | 87 | 89 | 86 | 89 | 87 | 94 | 102 | 99 | 95 | 8 | 9.2% |
| 3362 | MV Bodies & Trailers | 2,116 | 2,103 | 2,081 | 2,062 | 2,001 | 2,142 | 2,195 | 2,164 | 2,157 | 41 | 1.9% |
| 336211 | MV Bodies | 814 | 832 | 822 | 811 | 753 | 837 | 826 | 814 | 820 | 6 | 0.7% |
| 336212 | Truck Trailers | 410 | 392 | 394 | 393 | 388 | 394 | 408 | 391 | 394 | -16 | -3.9% |
| 336213&4 | Motor Homes, Travel Trailers, & Campers | 892 | 879 | 865 | 858 | 860 | 911 | 961 | 959 | 943 | 51 | 5.7% |
| 3363 | MV Parts | 5,931 | 5,816 | 5,621 | 5,526 | 5,437 | 5,651 | 5,668 | 5,624 | 5,556 | -375 | -6.3% |
| 33631 | MV Gas Engines & Engine Parts | 1,048 | 1,003 | 982 | 984 | 971 | 1,042 | 1,021 | 1,005 | 992 | -56 | -5.3% |
| 336311 | Carburetors, Pistons, Rings, & Valves | 148 | 145 | 135 | 138 | 127 | 128 | 127 | 115 | 116 | -32 | -21.6% |
| 336312 | Gasoline Engines & Engine Parts | 900 | 858 | 847 | 846 | 844 | 914 | 894 | 890 | 876 | -24 | -2.7% |
| 33632 | MV Electrical & Electronic Eqpt. | 1,135 | 1,109 | 1,072 | 1,034 | 922 | 880 | 854 | 828 | 799 | -336 | -29.6% |
| 336321 | Vehicular Lighting Eqpt. | 104 | 111 | 109 | 100 | 100 | 99 | 103 | 102 | 102 | -2 | -1.9% |
| 336322 | Other MV Electrical & Electronic Eqpt. | 1,031 | 998 | 963 | 934 | 822 | 781 | 751 | 726 | 697 | -334 | -32.4% |
| 33633 | MV Steering & Suspension Parts | 211 | 212 | 207 | 204 | 221 | 233 | 229 | 246 | 257 | 46 | 21.8% |
| 33634 | MV Brake Systems | 282 | 278 | 266 | 260 | 253 | 262 | 262 | 251 | 241 | -41 | -14.5% |
| 33635 | MV Transmission & Power Train Parts | 550 | 532 | 509 | 507 | 513 | 536 | 534 | 533 | 535 | -15 | -2.7% |
| 33636 | MV Seating & Interior Trim | 366 | 350 | 335 | 338 | 332 | 392 | 407 | 399 | 421 | 55 | 15.0% |
| 33637 | MV Metal Stamping | 789 | 784 | 754 | 740 | 719 | 790 | 788 | 792 | 781 | -8 | -1.0% |
| 33639 | Other MV Parts | 1,550 | 1,548 | 1,496 | 1,459 | 1,506 | 1,516 | 1,573 | 1,570 | 1,530 | -20 | -1.3% |
| 336391 | Motor Vehicle Air-Conditioning | 62 | 70 | 69 | 69 | 72 | 87 | 86 | 80 | 72 | 10 | 16.1% |
| 336399 | All Other MV Parts | 1,488 | 1,478 | 1,427 | 1,390 | 1,434 | 1,429 | 1,487 | 1,490 | 1,458 | -30 | -2.0% |
| The Related Industries Include: | | 1,006 | 1,004 | 1,006 | 976 | 835 | 852 | 821 | 777 | 788 | -218 | -21.7% |
| 32621 | Tires | 874 | 867 | 868 | 838 | 707 | 722 | 692 | 656 | 663 | -211 | -24.1% |
| 326211 | Tire Mfg. (Exc. Retreading) | 160 | 162 | 160 | 161 | 149 | 153 | 145 | 138 | 138 | -22 | -13.8% |
| 326212 | Tire Retreading | 714 | 705 | 708 | 677 | 558 | 569 | 547 | 518 | 525 | -189 | -26.5% |
| 335911 | Storage Batteries | 132 | 137 | 138 | 138 | 128 | 130 | 129 | 121 | 125 | -7 | -5.3% |

Note: Abbreviations used: Eqpt. - equipment; Exc. - except; Mfg. - manufacturing; MV - motor vehicle.

Source: U.S. Bureau of the Census (2000-2002, 2003b, 2004, 2005b, 2006a, 2006b, 2007b, 2008b).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 8/08).

**Table A14: Exports as a Percentage of Imports - Motor Vehicles, Engines and Parts by Area and Type, 1997-2007**

| Activity | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 52.5% | 48.7% | 42.1% | 41.0% | 39.7% | 38.7% | 38.4% | 39.1% | 41.1% | 41.7% | 46.7% |
| Passenger cars, new & used | 23.2% | 20.4% | 17.1% | 15.3% | 16.7% | 18.0% | 19.3% | 20.1% | 24.7% | 25.1% | 32.7% |
| Trucks, buses & special purpose vehicles | 65.7% | 66.4% | 44.1% | 50.3% | 39.3% | 43.1% | 51.7% | 56.9% | 59.5% | 61.9% | 73.1% |
| Engines & engine parts | 58.1% | 54.9% | 61.6% | 68.5% | 71.7% | 67.7% | 63.3% | 59.5% | 58.6% | 62.1% | 65.1% |
| Other parts & accessories | 98.6% | 93.9% | 85.2% | 83.0% | 80.2% | 72.0% | 63.7% | 62.7% | 58.2% | 59.3% | 57.7% |
| Canada: | 80.4% | 78.7% | 72.0% | 71.6% | 70.2% | 74.6% | 76.2% | 73.9% | 75.7% | 80.8% | 86.9% |
| Passenger cars, new & used | 36.9% | 31.5% | 27.3% | 27.2% | 28.3% | 32.8% | 35.2% | 29.4% | 33.5% | 35.9% | 41.2% |
| Trucks, buses & special purpose vehicles | 57.6% | 67.5% | 52.0% | 53.7% | 48.2% | 57.9% | 71.0% | 80.4% | 78.3% | 93.5% | 110.9% |
| Engines & engine parts | 138.1% | 129.5% | 136.1% | 138.1% | 152.6% | 146.4% | 141.5% | 133.9% | 147.1% | 172.9% | 158.9% |
| Other parts & accessories | 184.6% | 184.9% | 186.6% | 177.6% | 167.0% | 161.3% | 145.7% | 150.3% | 143.3% | 146.0% | 152.2% |
| Other areas: | 37.3% | 32.8% | 25.5% | 26.2% | 26.4% | 23.9% | 23.0% | 24.4% | 26.6% | 27.0% | 32.1% |
| Passenger cars, new & used | 15.9% | 14.6% | 11.6% | 10.0% | 12.1% | 12.5% | 13.6% | 16.3% | 21.1% | 21.1% | 29.5% |
| Trucks, buses & special purpose vehicles | 81.5% | 64.5% | 30.0% | 44.1% | 27.3% | 23.4% | 27.3% | 29.1% | 34.6% | 28.1% | 37.3% |
| Engines & engine parts | 32.7% | 27.9% | 31.9% | 41.8% | 44.7% | 42.8% | 38.7% | 36.2% | 33.6% | 34.5% | 40.2% |
| Other parts & accessories | 65.6% | 59.7% | 47.4% | 50.0% | 50.4% | 41.6% | 35.7% | 34.3% | 31.8% | 34.4% | 33.1% |

Sources: U.S. Bureau of Economic Analysis (2008b).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Phone 614/466-2116 (DL, 8/08).

**Table A15a: U.S. Sales of Imported and Domestic Light Vehicles, 1988-2007**

| | Domestic Built | | | | Imports | | | | Totals | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year & type | U.S. Brand | Japanese Brand | All Others | Total | U.S. Brand | Japanese Brand | All Others | Total | U.S. Brand | Japanese Brand | All Others | Total |
| 1988: Cars | 6,909,660 | 592,024 | 38,239 | 7,539,923 | 393,412 | 1,813,980 | 796,300 | 3,003,692 | 7,303,072 | 2,406,004 | 834,539 | 10,543,615 |
| Trucks | 4,397,119 | 116,717 | 3,006 | 4,516,842 | 72,353 | 634,778 | 20,780 | 727,911 | 4,469,472 | 751,495 | 23,786 | 5,244,753 |
| Total | 11,306,779 | 708,741 | 41,245 | 12,056,765 | 465,765 | 2,448,758 | 817,080 | 3,731,603 | 11,772,544 | 3,157,499 | 858,325 | 15,788,368 |
| 1989: Cars | 6,294,220 | 778,680 | 5,180 | 7,078,080 | 340,986 | 1,701,322 | 657,617 | 2,699,925 | 6,635,206 | 2,480,002 | 662,797 | 9,778,005 |
| Trucks | 4,276,907 | 131,347 | 2,037 | 4,410,291 | 52,762 | 582,902 | 21,096 | 656,760 | 4,329,669 | 714,249 | 23,133 | 5,067,051 |
| Total | 10,571,127 | 910,027 | 7,217 | 11,488,371 | 393,748 | 2,284,224 | 678,713 | 3,356,685 | 10,964,875 | 3,194,251 | 685,930 | 14,845,056 |
| 1990: Cars | 5,816,642 | 1,060,585 | 19,661 | 6,896,888 | 296,778 | 1,533,339 | 573,204 | 2,403,321 | 6,113,420 | 2,593,924 | 592,865 | 9,300,209 |
| Trucks | 4,070,242 | 162,660 | 1,640 | 4,234,542 | 19,150 | 583,717 | 23,498 | 626,365 | 4,089,392 | 746,377 | 25,138 | 4,860,907 |
| Total | 9,886,884 | 1,223,245 | 21,301 | 11,131,430 | 315,928 | 2,117,056 | 596,702 | 3,029,686 | 10,202,812 | 3,340,301 | 618,003 | 14,161,116 |
| 1991: Cars | 4,993,456 | 1,124,401 | 18,930 | 6,136,787 | 254,572 | 1,348,123 | 435,204 | 2,037,899 | 5,248,028 | 2,472,524 | 454,134 | 8,174,686 |
| Trucks | 3,625,545 | 188,420 | 1,329 | 3,815,294 | 9,970 | 522,736 | 16,597 | 549,303 | 3,635,515 | 711,156 | 17,926 | 4,364,597 |
| Total | 8,619,001 | 1,312,821 | 20,259 | 9,952,081 | 264,542 | 1,870,859 | 451,801 | 2,587,202 | 8,883,543 | 3,183,680 | 472,060 | 12,539,283 |
| 1992: Cars | 5,098,605 | 1,160,967 | 26,344 | 6,285,916 | 202,476 | 1,313,806 | 410,915 | 1,927,197 | 5,301,081 | 2,474,773 | 437,259 | 8,213,113 |
| Trucks | 4,204,150 | 277,127 | 446 | 4,481,723 | 12,822 | 402,794 | 6,923 | 422,539 | 4,216,972 | 679,921 | 7,369 | 4,904,262 |
| Total | 9,302,755 | 1,438,094 | 26,790 | 10,767,639 | 215,298 | 1,716,600 | 417,838 | 2,349,736 | 9,518,053 | 3,154,694 | 444,628 | 13,117,375 |
| 1993: Cars | 5,454,470 | 1,264,601 | 22,596 | 6,741,667 | 166,500 | 1,216,952 | 392,740 | 1,776,192 | 5,620,970 | 2,481,553 | 415,336 | 8,517,859 |
| Trucks | 4,907,793 | 379,373 | 5 | 5,287,171 | 10,112 | 373,179 | 10,544 | 393,835 | 4,917,905 | 752,552 | 10,549 | 5,681,006 |
| Total | 10,362,263 | 1,643,974 | 22,601 | 12,028,838 | 176,612 | 1,590,131 | 403,284 | 2,170,027 | 10,538,875 | 3,234,105 | 425,885 | 14,198,865 |
| 1994: Cars | 5,734,817 | 1,447,223 | 73,263 | 7,255,303 | 73,720 | 1,209,002 | 452,492 | 1,735,214 | 5,808,537 | 2,656,225 | 525,755 | 8,990,517 |
| Trucks | 5,521,991 | 473,573 | 0 | 5,995,564 | 9,028 | 399,545 | 16,720 | 425,293 | 5,531,019 | 873,118 | 16,720 | 6,420,857 |
| Total | 11,256,808 | 1,920,796 | 73,263 | 13,250,867 | 82,748 | 1,608,547 | 469,212 | 2,160,507 | 11,339,556 | 3,529,343 | 542,475 | 15,411,374 |
| 1995: Cars | 5,433,959 | 1,594,725 | 100,023 | 7,128,707 | 74,065 | 967,906 | 464,286 | 1,506,257 | 5,508,024 | 2,562,631 | 564,309 | 8,634,964 |
| Trucks | 5,622,090 | 441,007 | 0 | 6,063,097 | 7,840 | 380,923 | 29,501 | 418,264 | 5,629,930 | 821,930 | 29,501 | 6,481,361 |
| Total | 11,056,049 | 2,035,732 | 100,023 | 13,191,804 | 81,905 | 1,348,829 | 493,787 | 1,924,521 | 11,137,954 | 3,384,561 | 593,810 | 15,116,325 |
| 1996: Cars | 5,283,829 | 1,840,015 | 129,738 | 7,253,582 | 43,727 | 722,403 | 506,042 | 1,272,172 | 5,327,556 | 2,562,418 | 635,780 | 8,525,754 |
| Trucks | 6,004,180 | 459,689 | 10,165 | 6,474,034 | 6,525 | 414,715 | 34,085 | 455,325 | 6,010,705 | 874,404 | 44,250 | 6,929,359 |
| Total | 11,288,009 | 2,299,704 | 139,903 | 13,727,616 | 50,252 | 1,137,118 | 540,127 | 1,727,497 | 11,338,261 | 3,436,822 | 680,030 | 15,455,113 |
| 1997*: Cars | 4,947,704 | 1,827,257 | 141,808 | 6,916,769 | 106,608 | 737,506 | 511,191 | 1,355,305 | 5,054,312 | 2,564,763 | 652,999 | 8,272,074 |
| Trucks | 5,778,757 | 473,971 | 14,712 | 6,267,440 | 2,949 | 533,953 | 45,305 | 582,207 | 5,781,706 | 1,007,924 | 60,017 | 6,849,647 |
| Total | 10,726,461 | 2,301,228 | 156,520 | 13,184,209 | 109,557 | 1,271,459 | 556,496 | 1,937,512 | 10,836,018 | 3,572,687 | 713,016 | 15,121,721 |
| 1998*: Cars | 4,671,055 | 1,891,048 | 199,278 | 6,761,381 | 83,370 | 706,939 | 587,789 | 1,378,098 | 4,754,425 | 2,597,987 | 787,067 | 8,139,479 |
| Trucks | 6,181,040 | 518,411 | 43,804 | 6,743,255 | 3,207 | 603,078 | 51,746 | 658,031 | 6,184,247 | 1,121,489 | 95,550 | 7,401,286 |
| Total | 10,852,095 | 2,409,459 | 243,082 | 13,504,636 | 86,577 | 1,310,017 | 639,535 | 2,036,129 | 10,938,672 | 3,719,476 | 882,617 | 15,540,765 |

**Table A15a: U.S. Sales of Imported and Domestic Light Vehicles, 1988-2007**

| | Domestic Built | | | | Imports | | | | Totals | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year & type | U.S. Brand | Japanese Brand | All Others | Total | U.S. Brand | Japanese Brand | All Others | Total | U.S. Brand | Japanese Brand | All Others | Total |
| 1999*: Cars | 4,863,463 | 1,870,805 | 245,089 | 6,979,357 | 206,340 | 783,597 | 728,990 | 1,718,927 | 5,069,803 | 2,654,402 | 974,079 | 8,698,284 |
| Trucks | 6,567,196 | 715,372 | 137,463 | 7,420,031 | 4,109 | 685,956 | 85,158 | 775,223 | 6,571,305 | 1,401,328 | 222,621 | 8,195,254 |
| Total | 11,430,659 | 2,586,177 | 382,552 | 14,399,388 | 210,449 | 1,469,553 | 814,148 | 2,494,150 | 11,641,108 | 4,055,730 | 1,196,700 | 16,893,538 |
| 2000*: Cars | 4,651,346 | 1,922,657 | 256,502 | 6,830,505 | 216,786 | 885,094 | 914,240 | 2,016,120 | 4,868,132 | 2,807,751 | 1,170,742 | 8,846,625 |
| Trucks | 6,675,664 | 895,081 | 80,060 | 7,650,805 | 38,306 | 737,590 | 76,429 | 852,325 | 6,713,970 | 1,632,671 | 156,489 | 8,503,130 |
| Total | 11,327,010 | 2,817,738 | 336,562 | 14,481,310 | 255,092 | 1,622,684 | 990,669 | 2,868,445 | 11,582,102 | 4,440,422 | 1,327,231 | 17,349,755 |
| 2001*: Cars | 4,132,495 | 1,953,838 | 238,663 | 6,324,996 | 193,241 | 865,424 | 1,038,964 | 2,097,629 | 4,325,736 | 2,819,262 | 1,277,627 | 8,422,625 |
| Trucks | 6,664,127 | 967,980 | 86,357 | 7,718,464 | 51,799 | 793,396 | 136,085 | 981,280 | 6,715,926 | 1,761,376 | 222,442 | 8,699,744 |
| Total | 10,796,622 | 2,921,818 | 325,020 | 14,043,460 | 245,040 | 1,658,820 | 1,175,049 | 3,078,909 | 11,041,662 | 4,580,638 | 1,500,069 | 17,122,369 |
| 2002*: Cars | 3,736,251 | 1,927,076 | 214,318 | 5,877,645 | 185,726 | 952,315 | 1,087,543 | 2,225,584 | 3,921,977 | 2,879,391 | 1,301,861 | 8,103,229 |
| Trucks | 6,609,603 | 954,593 | 82,568 | 7,646,764 | 66,032 | 819,295 | 181,048 | 1,066,375 | 6,675,635 | 1,773,888 | 263,616 | 8,713,139 |
| Total | 10,345,854 | 2,881,669 | 296,886 | 13,524,409 | 251,758 | 1,771,610 | 1,268,591 | 3,291,959 | 10,597,612 | 4,653,279 | 1,565,477 | 16,816,368 |
| 2003*: Cars | 3,391,080 | 1,941,147 | 195,203 | 5,527,430 | 194,047 | 844,482 | 1,044,522 | 2,083,051 | 3,585,127 | 2,785,629 | 1,239,725 | 7,610,481 |
| Trucks | 6,600,737 | 1,129,552 | 71,103 | 7,801,392 | 94,839 | 892,164 | 240,177 | 1,227,180 | 6,695,576 | 2,021,716 | 311,280 | 9,028,572 |
| Total | 9,991,817 | 3,070,699 | 266,306 | 13,328,822 | 288,886 | 1,736,646 | 1,284,699 | 3,310,231 | 10,280,703 | 4,807,345 | 1,551,005 | 16,639,053 |
| 2004*: Cars | 3,114,964 | 2,094,307 | 147,602 | 5,356,873 | 253,039 | 852,346 | 1,043,674 | 2,149,059 | 3,368,003 | 2,946,653 | 1,191,276 | 7,505,932 |
| Trucks | 6,664,465 | 1,389,089 | 61,176 | 8,114,730 | 102,052 | 824,785 | 319,421 | 1,246,258 | 6,766,517 | 2,213,874 | 380,597 | 9,360,988 |
| Total | 9,779,429 | 3,483,396 | 208,778 | 13,471,603 | 355,091 | 1,677,131 | 1,363,095 | 3,395,317 | 10,134,520 | 5,160,527 | 1,571,873 | 16,866,920 |
| 2005*: Cars | 3,075,058 | 2,189,281 | 216,194 | 5,480,533 | 234,455 | 969,341 | 982,737 | 2,186,533 | 3,309,513 | 3,158,622 | 1,198,931 | 7,667,066 |
| Trucks | 6,441,730 | 1,546,113 | 77,530 | 8,065,373 | 117,187 | 773,429 | 324,699 | 1,215,315 | 6,558,917 | 2,319,542 | 402,229 | 9,280,688 |
| Total | 9,516,788 | 3,735,394 | 293,724 | 13,545,906 | 351,642 | 1,742,770 | 1,307,436 | 3,401,848 | 9,868,430 | 5,478,164 | 1,601,160 | 16,947,754 |
| 2006*: Cars | 3,068,116 | 2,107,786 | 300,188 | 5,476,090 | 198,446 | 1,207,354 | 938,964 | 2,344,764 | 3,266,562 | 3,315,140 | 1,239,152 | 7,820,854 |
| Trucks | 5,675,676 | 1,522,237 | 138,883 | 7,336,796 | 117,425 | 938,955 | 290,370 | 1,346,750 | 5,793,101 | 2,461,192 | 429,253 | 8,683,546 |
| Total | 8,743,792 | 3,630,023 | 439,071 | 12,812,886 | 315,871 | 2,146,309 | 1,229,334 | 3,691,514 | 9,059,663 | 5,776,332 | 1,668,405 | 16,504,400 |
| 2007*: Cars | 2,708,404 | 2,259,309 | 285,637 | 5,253,350 | 185,388 | 1,240,663 | 939,012 | 2,365,063 | 2,893,792 | 3,499,972 | 1,224,649 | 7,618,413 |
| Trucks | 5,397,480 | 1,484,315 | 200,929 | 7,082,724 | 111,103 | 982,240 | 294,742 | 1,388,085 | 5,508,583 | 2,466,555 | 495,671 | 8,470,809 |
| Total | 8,105,884 | 3,743,624 | 486,566 | 12,336,074 | 296,491 | 2,222,903 | 1,233,754 | 3,753,148 | 8,402,375 | 5,966,527 | 1,720,320 | 16,089,222 |

Note: * - Wards changed how data are presented. Therefore, figures for 1997 and after are not entirely comparable with earlier years.
n.a. - Not available.

Sources: Ward's (1993, 1998, 1999, 2001, 2003, 2005, 2006, 2008).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 8/08).

**Table A15b: Percentages of U.S. Sales of Imported and Domestic Light Vehicles, 1988-2007**

| | Domestic Built | | | | Imports | | | | Totals | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year & type | U.S. Brand | Japanese Brand | All Others | Total | U.S. Brand | Japanese Brand | All Others | Total | U.S. Brand | Japanese Brand | All Others | Total |
| 1988: Cars | 43.8% | 3.7% | 0.2% | 47.8% | 2.5% | 11.5% | 5.0% | 19.0% | 46.3% | 15.2% | 5.3% | 66.8% |
| Trucks | 27.9% | 0.7% | 0.0% | 28.6% | 0.5% | 4.0% | 0.1% | 4.6% | 28.3% | 4.8% | 0.2% | 33.2% |
| Total | 71.6% | 4.5% | 0.3% | 76.4% | 3.0% | 15.5% | 5.2% | 23.6% | 74.6% | 20.0% | 5.4% | 100.0% |
| 1989: Cars | 42.4% | 5.2% | 0.0% | 47.7% | 2.3% | 11.5% | 4.4% | 18.2% | 44.7% | 16.7% | 4.5% | 65.9% |
| Trucks | 28.8% | 0.9% | 0.0% | 29.7% | 0.4% | 3.9% | 0.1% | 4.4% | 29.2% | 4.8% | 0.2% | 34.1% |
| Total | 71.2% | 6.1% | 0.0% | 77.4% | 2.7% | 15.4% | 4.6% | 22.6% | 73.9% | 21.5% | 4.6% | 100.0% |
| 1990: Cars | 41.1% | 7.5% | 0.1% | 48.7% | 2.1% | 10.8% | 4.0% | 17.0% | 43.2% | 18.3% | 4.2% | 65.7% |
| Trucks | 28.7% | 1.1% | 0.0% | 29.9% | 0.1% | 4.1% | 0.2% | 4.4% | 28.9% | 5.3% | 0.2% | 34.3% |
| Total | 69.8% | 8.6% | 0.2% | 78.6% | 2.2% | 14.9% | 4.2% | 21.4% | 72.0% | 23.6% | 4.4% | 100.0% |
| 1991: Cars | 39.8% | 9.0% | 0.2% | 48.9% | 2.0% | 10.8% | 3.5% | 16.3% | 41.9% | 19.7% | 3.6% | 65.2% |
| Trucks | 28.9% | 1.5% | 0.0% | 30.4% | 0.1% | 4.2% | 0.1% | 4.4% | 29.0% | 5.7% | 0.1% | 34.8% |
| Total | 68.7% | 10.5% | 0.2% | 79.4% | 2.1% | 14.9% | 3.6% | 20.6% | 70.8% | 25.4% | 3.8% | 100.0% |
| 1992: Cars | 38.9% | 8.9% | 0.2% | 47.9% | 1.5% | 10.0% | 3.1% | 14.7% | 40.4% | 18.9% | 3.3% | 62.6% |
| Trucks | 32.1% | 2.1% | 0.0% | 34.2% | 0.1% | 3.1% | 0.1% | 3.2% | 32.1% | 5.2% | 0.1% | 37.4% |
| Total | 70.9% | 11.0% | 0.2% | 82.1% | 1.6% | 13.1% | 3.2% | 17.9% | 72.6% | 24.0% | 3.4% | 100.0% |
| 1993: Cars | 38.4% | 8.9% | 0.2% | 47.5% | 1.2% | 8.6% | 2.8% | 12.5% | 39.6% | 17.5% | 2.9% | 60.0% |
| Trucks | 34.6% | 2.7% | 0.0% | 37.2% | 0.1% | 2.6% | 0.1% | 2.8% | 34.6% | 5.3% | 0.1% | 40.0% |
| Total | 73.0% | 11.6% | 0.2% | 84.7% | 1.2% | 11.2% | 2.8% | 15.3% | 74.2% | 22.8% | 3.0% | 100.0% |
| 1994: Cars | 37.2% | 9.4% | 0.5% | 47.1% | 0.5% | 7.8% | 2.9% | 11.3% | 37.7% | 17.2% | 3.4% | 58.3% |
| Trucks | 35.8% | 3.1% | 0.0% | 38.9% | 0.1% | 2.6% | 0.1% | 2.8% | 35.9% | 5.7% | 0.1% | 41.7% |
| Total | 73.0% | 12.5% | 0.5% | 86.0% | 0.5% | 10.4% | 3.0% | 14.0% | 73.6% | 22.9% | 3.5% | 100.0% |
| 1995: Cars | 35.9% | 10.5% | 0.7% | 47.2% | 0.5% | 6.4% | 3.1% | 10.0% | 36.4% | 17.0% | 3.7% | 57.1% |
| Trucks | 37.2% | 2.9% | 0.0% | 40.1% | 0.1% | 2.5% | 0.2% | 2.8% | 37.2% | 5.4% | 0.2% | 42.9% |
| Total | 73.1% | 13.5% | 0.7% | 87.3% | 0.5% | 8.9% | 3.3% | 12.7% | 73.7% | 22.4% | 3.9% | 100.0% |
| 1996: Cars | 34.2% | 11.9% | 0.8% | 46.9% | 0.3% | 4.7% | 3.3% | 8.2% | 34.5% | 16.6% | 4.1% | 55.2% |
| Trucks | 38.8% | 3.0% | 0.1% | 41.9% | 0.0% | 2.7% | 0.2% | 2.9% | 38.9% | 5.7% | 0.3% | 44.8% |
| Total | 73.0% | 14.9% | 0.9% | 88.8% | 0.3% | 7.4% | 3.5% | 11.2% | 73.4% | 22.2% | 4.4% | 100.0% |
| 1997*: Cars | 32.7% | 12.1% | 0.9% | 45.7% | 0.7% | 4.9% | 3.4% | 9.0% | 33.4% | 17.0% | 4.3% | 54.7% |
| Trucks | 38.2% | 3.1% | 0.1% | 41.4% | 0.0% | 3.5% | 0.3% | 3.9% | 38.2% | 6.7% | 0.4% | 45.3% |
| Total | 70.9% | 15.2% | 1.0% | 87.2% | 0.7% | 8.4% | 3.7% | 12.8% | 71.7% | 23.6% | 4.7% | 100.0% |
| 1998*: Cars | 30.1% | 12.2% | 1.3% | 43.5% | 0.5% | 4.5% | 3.8% | 8.9% | 30.6% | 16.7% | 5.1% | 52.4% |
| Trucks | 39.8% | 3.3% | 0.3% | 43.4% | 0.0% | 3.9% | 0.3% | 4.2% | 39.8% | 7.2% | 0.6% | 47.6% |
| Total | 69.8% | 15.5% | 1.6% | 86.9% | 0.6% | 8.4% | 4.1% | 13.1% | 70.4% | 23.9% | 5.7% | 100.0% |

**Table A15b: Percentages of U.S. Sales of Imported and Domestic Light Vehicles, 1988-2007**

| | Domestic Built | | | | Imports | | | | Totals | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year & type | U.S. Brand | Japanese Brand | All Others | Total | U.S. Brand | Japanese Brand | All Others | Total | U.S. Brand | Japanese Brand | All Others | Total |
| 1999*: Cars | 28.8% | 11.1% | 1.5% | 41.3% | 1.2% | 4.6% | 4.3% | 10.2% | 30.0% | 15.7% | 5.8% | 51.5% |
| Trucks | 38.9% | 4.2% | 0.8% | 43.9% | 0.0% | 4.1% | 0.5% | 4.6% | 38.9% | 8.3% | 1.3% | 48.5% |
| Total | 67.7% | 15.3% | 2.3% | 85.2% | 1.2% | 8.7% | 4.8% | 14.8% | 68.9% | 24.0% | 7.1% | 100.0% |
| 2000*: Cars | 26.8% | 11.1% | 1.5% | 39.4% | 1.2% | 5.1% | 5.3% | 11.6% | 28.1% | 16.2% | 6.7% | 51.0% |
| Trucks | 38.5% | 5.2% | 0.5% | 44.1% | 0.2% | 4.3% | 0.4% | 4.9% | 38.7% | 9.4% | 0.9% | 49.0% |
| Total | 65.3% | 16.2% | 1.9% | 83.5% | 1.5% | 9.4% | 5.7% | 16.5% | 66.8% | 25.6% | 7.6% | 100.0% |
| 2001*: Cars | 24.1% | 11.4% | 1.4% | 36.9% | 1.1% | 5.1% | 6.1% | 12.3% | 25.3% | 16.5% | 7.5% | 49.2% |
| Trucks | 38.9% | 5.7% | 0.5% | 45.1% | 0.3% | 4.6% | 0.8% | 5.7% | 39.2% | 10.3% | 1.3% | 50.8% |
| Total | 63.1% | 17.1% | 1.9% | 82.0% | 1.4% | 9.7% | 6.9% | 18.0% | 64.5% | 26.8% | 8.8% | 100.0% |
| 2002*: Cars | 22.2% | 11.5% | 1.3% | 35.0% | 1.1% | 5.7% | 6.5% | 13.2% | 23.3% | 17.1% | 7.7% | 48.2% |
| Trucks | 39.3% | 5.7% | 0.5% | 45.5% | 0.4% | 4.9% | 1.1% | 6.3% | 39.7% | 10.5% | 1.6% | 51.8% |
| Total | 61.5% | 17.1% | 1.8% | 80.4% | 1.5% | 10.5% | 7.5% | 19.6% | 63.0% | 27.7% | 9.3% | 100.0% |
| 2003*: Cars | 20.4% | 11.7% | 1.2% | 33.2% | 1.2% | 5.1% | 6.3% | 12.5% | 21.5% | 16.7% | 7.5% | 45.7% |
| Trucks | 39.7% | 6.8% | 0.4% | 46.9% | 0.6% | 5.4% | 1.4% | 7.4% | 40.2% | 12.2% | 1.9% | 54.3% |
| Total | 60.1% | 18.5% | 1.6% | 80.1% | 1.7% | 10.4% | 7.7% | 19.9% | 61.8% | 28.9% | 9.3% | 100.0% |
| 2004*: Cars | 18.5% | 12.4% | 0.9% | 31.8% | 1.5% | 5.1% | 6.2% | 12.7% | 20.0% | 17.5% | 7.1% | 44.5% |
| Trucks | 39.5% | 8.2% | 0.4% | 48.1% | 0.6% | 4.9% | 1.9% | 7.4% | 40.1% | 13.1% | 2.3% | 55.5% |
| Total | 58.0% | 20.7% | 1.2% | 79.9% | 2.1% | 9.9% | 8.1% | 20.1% | 60.1% | 30.6% | 9.3% | 100.0% |
| 2005*: Cars | 18.1% | 12.9% | 1.3% | 32.3% | 1.4% | 5.7% | 5.8% | 12.9% | 19.5% | 18.6% | 7.1% | 45.2% |
| Trucks | 38.0% | 9.1% | 0.5% | 47.6% | 0.7% | 4.6% | 1.9% | 7.2% | 38.7% | 13.7% | 2.4% | 54.8% |
| Total | 56.2% | 22.0% | 1.7% | 79.9% | 2.1% | 10.3% | 7.7% | 20.1% | 58.2% | 32.3% | 9.4% | 100.0% |
| 2006*: Cars | 18.6% | 12.8% | 1.8% | 33.2% | 1.2% | 7.3% | 5.7% | 14.2% | 19.8% | 20.1% | 7.5% | 47.4% |
| Trucks | 34.4% | 9.2% | 0.8% | 44.5% | 0.7% | 5.7% | 1.8% | 8.2% | 35.1% | 14.9% | 2.6% | 52.6% |
| Total | 53.0% | 22.0% | 2.7% | 77.6% | 1.9% | 13.0% | 7.4% | 22.4% | 54.9% | 35.0% | 10.1% | 100.0% |
| 2007*: Cars | 16.8% | 14.0% | 1.8% | 32.7% | 1.2% | 7.7% | 5.8% | 14.7% | 18.0% | 21.8% | 7.6% | 47.4% |
| Trucks | 33.5% | 9.2% | 1.2% | 44.0% | 0.7% | 6.1% | 1.8% | 8.6% | 34.2% | 15.3% | 3.1% | 52.6% |
| Total | 50.4% | 23.3% | 3.0% | 76.7% | 1.8% | 13.8% | 7.7% | 23.3% | 52.2% | 37.1% | 10.7% | 100.0% |

Note: * - Wards changed how data are presented. Therefore, figures for 1997 and after are not entirely comparable with earlier years.

Sources: Ward's (1993, 1998, 1999, 2001, 2003, 2005, 2006, 2008).

Prepared by: Policy Research & Strategic Planning, Ohio Dept. of Development. Telephone 614/466-2116 (DL, 8/08).

**Table A16: Projections of Motor Vehicle Industry Employment,* Ohio and the U.S., 2006-2016**

| NAICS Code | Shorter Industry Title | Jobs: Actual | Jobs: Projected | Changes: Number | Changes: Percent |
|---|---|---|---|---|---|
| Ohio: | Total | 5,842,100 | 6,132,800 | 290,700 | 5.0% |
| 31-33 | Manufacturing | 795,500 | 654,700 | -140,800 | -17.7% |
| 3361-3 | MV Core Groups Subtotal | 127,000 | 96,900 | -30,100 | -23.7% |
| 3361 | MV Assembly | 28,100 | 23,800 | -4,300 | -15.3% |
| 3362 | MV Bodies & Trailers | 8,500 | 7,100 | -1,400 | -16.5% |
| 3363 | MV Parts | 90,400 | 66,000 | -24,400 | -27.0% |
| 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% |
| 3361-3 | MV Core Groups Subtotal | 1,070,400 | 917,700 | -152,700 | -14.3% |
| 3361 | MV Assembly | 236,100 | 225,800 | -10,300 | -4.4% |
| 3362 | MV Bodies & Trailers | 180,200 | 176,100 | -4,100 | -2.3% |
| 3363 | MV Parts | 654,100 | 515,800 | -138,300 | -21.1% |

Note: * - Projections have not been made for tires (NAICS 32621) or storage batteries (335911).

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

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## NAICS CODES: INDUSTRY DEFINITION AND EXAMPLES

Beginning with the 1997 Economic Censuses, the nation's industry statistics have been collected under the North Ameri-can Industry Classification System (NAICS) (Office of Management and Budget, 1998). Establishments producing goods or providing services sufficiently alike are classified in the same *industry*. A six-digit NAICS code is assigned to each in-dustry. Closely related industries formed an *industry group*. The first four digits of the 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 serves as an industry code.) Industry groups with common elements and shared characteristics comprise a *major indus-try* or *sub-sector*, and are indicated by the first three digits of the code. Most of the data from government sources used in this report have been collected under that system.

Three groups from the *transportation equipment* sub-sector (NAICS 336) combine to form the core of the motor vehicle industry in this report. They are *motor vehicles* (3361, also referred to as assembly operations), *motor vehicle bodies and trailers* (3362), and *motor vehicle parts* (3363). The *tires* subgroup (32621) and *storage batteries* (335911) are included – when information is available – because most of the goods produced in those industries are original equipment or replace-ment parts for motor vehicles. Industries wherein most of the goods produced are not used in motor vehicles are exclud-ed from this report, although some exceptions may be made for establishments at least mostly dedicated to motor vehicle parts. Diesel engine and automotive glass production (333618 and 327215, respectively) are examples of this.

The defining concept for the motor vehicle industry is manufacturing equipment for transporting people and goods over a network of roads. This definition excludes establishments producing ships, boats, railroad and aerospace vehicles and equipment. Also excluded for various reasons are establishments producing motorcycles, bicycles, military armored ve-hicles and tanks, all-terrain vehicles, go-carts, golf carts, racecars, snowmobiles, animal-drawn vehicles, children's ve-hicles, and their components. After the discussion of the industry's impact on Ohio's economy, industries dependent on motor vehicles – suppliers of materials to the industry, makers of equipment used to manufacture motor vehicles-bodies-trailers-and-parts, wholesalers, retailers, gas stations, and repair services – are not included.

Motor vehicle establishments use production processes similar to machinery manufacturers (333): bending, forming, welding, machining and assembling metal, glass, rubber and/or plastic parts into components and finished products. However, most machinery is used to produce other goods, and the goods-moving machinery – agricultural, construction, and material-handling equipment – is not intended for highway use. Other people-moving machinery such as elevators, escalators, or moving sidewalks is also classified in the machinery industry.

Examples of products made in various motor vehicle industries follow the NAICS codes and industry titles below.

The transportation equipment industries:

| | |
|---|---|
| 3361 | Motor Vehicles. |
| 33611 | Automobiles and Light Duty Motor Vehicles. |
| 336111 | Automobiles. Establishments assemble complete automobiles (uni-body or body and chassis) or produce chassis alone. The manufacture of car bodies or assembling vehicles on a purchased chassis is classified in 336211. |
| 336112 | Light Trucks and Utility Vehicles. Establishments assemble complete light trucks (body and chassis) or produce light truck chassis alone. Light duty trucks include minivans, pick-ups, and sport-utility vehicles. The manufacture of truck and bus bodies or assembling vehicles on a purchased chassis is classified in 336211. |
| 33612 | Heavy Duty Trucks. Heavy-duty trucks also include buses, heavy-duty motor homes, and other special purpose heavy-duty motor vehicles for highway use. Establishments assemble complete trucks (body and chassis) or chassis alone. Medium-duty trucks (as defined by Ward's) are also included in this industry. |
| 3362 | Motor Vehicle Bodies and Trailers. |
| 336211 | Motor Vehicle Bodies. Establishments produce truck cabs as well as car, truck and bus bodies. These may be sold separately or assembled on a purchased chassis and sold as complete vehicles. Dump truck lifting mechanisms and fifth wheels are included. |
| 336212 | Truck Trailers. Examples also include truck trailer chassis, cargo container chassis, detachable trailer bodies, and detachable trailer chassis sold separately. |
| 336213 | Motor Homes. The defining element is the integration of the motor and the living quarters in the same unit. Whether or not the chassis is purchased is irrelevant. Car and van conversion is included if the work is done on an assembly line. Mobile homes are classified in 321991, and customized cars and trailers are classified in 811121. |
| 336214 | Travel Trailers and Campers. Examples include transport trailers for cars, camping trailers, horse trailers, and utility trailers. |
| 3363 | Motor Vehicle Parts. |
| 33631 | Motor Vehicle Gasoline Engines and Engine Parts. |
| 336311 | Carburetors, Pistons, Rings, and Valves. Both original and rebuilt equipment is included. |
| 336312 | Gasoline Engines and Engine Parts. Examples include crankshafts, flywheels, ring gears, fuel injection systems and parts, manifolds, positive crankcase ventilation (PCV) valves, mechanical pumps, and timing gears and chains. Both original and rebuilt equipment is included. Other gasoline engine equipment – carburetors, pistons, piston rings, |

valves, wiring harnesses, electrical and electronic equipment, transmissions, radiators, steering and suspension components, rubber and plastic belts and hoses without fittings – is clas-sified elsewhere in 3363. Stationary gasoline engines and parts of the same nature but not for use in motor vehicles are classified outside of the motor vehicle industry. All diesel engines, including those used in motor vehicles, are classified in 333618.

33632 Motor Vehicle Electrical and Electronic Equipment.

336321 Vehicular Lighting Equipment. Vehicular lighting fixtures are included, but bulbs are classified elsewhere.

336322 Other Motor Vehicle Electrical and Electronic Equipment. Examples include alternators, generators, coils, distributors, ignition cable sets, wiring harnesses, instrument control panels, spark plugs, block and battery heaters, and windshield washer pumps. Equipment of the same nature but not for use with motor vehicles is classified elsewhere. Electric motors (even for electric vehicles), railway traffic control signals and passen-ger car alarms, and car stereos are classified elsewhere.

33633 Motor Vehicle Steering and Suspension Components. Examples include steering wheels and columns, rack and pinion steering assemblies, struts, and shock absorbers. Spring manufacturers are classified in fabri-cated metal products (332).

33634 Motor Vehicle Brake Systems. Examples include cylinders, drums, hose assemblies, calipers, pads, linings and shoes. Rubber and plastic hose and belting without fittings are classified in 326.

33635 Motor Vehicle Transmissions and Parts. Examples include automatic and manual transmissions, axle bear-ings, differentials and axle assemblies, torque converters, and universal joints. Both original and rebuilt equipment is included. Mechanical power transmission equipment not for use in motor vehicles is classified elsewhere.

33636 Motor Vehicle Seating and Interior Trim. Seat belts, and seat and tire covers are included.

33637 Motor Vehicle Metal Stampings. Examples include fenders, hard tops, body parts, moldings, and exterior trim. Tops for convertibles are classified in 336399.

33639 Other Motor Vehicle Parts.

336391 Motor Vehicle Air Conditioning. This industry produces air conditioning compressors and systems for cars, trucks and buses. It also produces them for vehicles that are not part of the motor vehicle industry: aircraft (NAICS 336411), farm machinery (NAICS 333111), construction machinery (NAICS 33312), and related vehicles. The reason equipment for such other vehicles is included is probably because it is highly similar to that used in motor vehicles and the greatest portion of it is used in motor vehicles. Establishments produc-ing air-conditioning compressors and systems not used in vehicles are classified in NAICS 333415.

336399 All Other Motor Vehicle Parts. Examples include air bags, catalytic converters, intake filters, luggage and utility racks, mufflers, resonators, radiators (including those for stationary engines), trailer hitches, and wheel rims. Both original and rebuilt equipment is included.

The related industries:

| | |
|---|---|
| 32621 | Tires. |
| 326211 | Tire Manufacturing, except retreading. Includes pneumatic, semi-pneumatic and solid tires, inner tubes, and repair materials. Most new tires are produced for motor vehicles. |
| 326212 | Tire retreading. The feature distinguishing this industry from tire repair service is the reliance on assembly line operations. Retreads are used by school buses and commercial trucks (Rubber Manufacturers Associ-ation, 2006). These markets are much smaller than the markets for passenger cars and non-commercial light trucks. |
| 335911 | Storage Batteries. In particular, lead-acid batteries smaller than 1.5 cubic feet. |

## GLOSSARY

A number of terms used in this report have more or less specific meanings. The term *motor vehicles* includes a variety of products: cars, vans, sport-utility vehicles (SUVs), crossover vehicles, buses and trucks. The basic industry divisions are between passenger cars, light trucks, and medium- and heavy-duty trucks. The most detailed industry reports divide trucks into eight classes based on gross vehicle weight (GVW - the combined weight of the vehicle and its maximum pay-load). These eight classes are regrouped into *light*, *medium*, and *heavy-duty* for general discussion. It must be noted that classes comprising the light, medium and heavy groups vary by author. Among three sources repeatedly cited in this re-port, class 1 and 2 trucks, with GVWs of 10,000 pounds or less, are always considered light-duty. Light trucks include small and family vans, sport-utility vehicles (SUVs), and pickups, and account for around 95 percent of all truck sales these days. Class 8 trucks, with GVWs over 33,000 pounds, are always considered heavy-duty. However, Standard and Poor's call class 3 trucks, with GVWs of 10,001-14,000 pounds, medium-duty, while Ward's classifies them as light-duty. Standard and Poor's and Ward's call class 7 trucks, with GVWs of 26,001-33,000 pounds, medium-duty. The Census Bureau considers any truck with a GVW over 14,000 pounds to be heavy duty (Levy, 2008: 5; U.S. Bureau of the Census, 2009; Ward's, 2005; Wang, 2008: 10).

*Assembler* distinguishes motor vehicle manufacturers such as Ford, GM, Honda, or Kenworth from other companies making only the parts and modules comprising a vehicle. The latter are *parts manufacturers* or *suppliers*. Suppliers produce goods and modules for use either as *original equipment (OE)* or to be sold as *replacement parts* in the *aftermarket (AM)*. Many do both to varying degrees. Parts makers also are grouped depending on their position in the supply chain. *Tier 1* refers to those selling parts and sub-assemblies directly to assemblers. *Tier 2* companies make parts for tier 1 companies, and *tier 3* companies supply the raw materials to tier 1 and 2 companies. *Powertrain* is a generic term refer-ing to engines and transmissions.

## NOTES

1 Honda's plant in E. Liberty makes both cars and light trucks; GM's Moraine plant closed in December, 2008.

2 Daimler AG sold 80.1 percent of Chrysler to Cerberus Capital Management in 2007, retaining a 19.9 percent interest in Chrysler. Cerberus very recently gave a 35 percent share to Fiat as part of an exchange agreement. Cerberus also owns Tower Automotive, which employs about 380 people in Ohio. Therefore, it may be argued that Cerberus is the lead employer of well over 3,700 industry workers in Ohio.

3 Total company employment figures for the motor vehicle industry include the sites employing less than 50 people. Also, Rockwell Automation, Saint-Gobain, Sumitomo Electric Industries, and U.R.S. Corp. are included in the 47 Fortune companies, but listed only in table A1 because their lone establishments employ less than 50 people in Ohio in the industry.

4 This includes $130.5M for the DMAX diesel engine plant, a joint venture with Isuzu Motors, Ltd.; most assembler figures in this section include investments in parts operations.

5 The concentration would be even higher if diesel engine production for motor vehicles was included.

6 Unfortunately, the value of the latter cannot be disaggregated because the Census Bureau must maintain the confidentiality of respondents. Given that cars were produced in slightly larger numbers than light trucks in 2002 (Ward's, 2003), and assuming that light trucks average a little higher value, one might guess that the value-added for cars (NAICS 336111) is approximately the same as for light trucks – about 20 percent of the industry value-added in Ohio. That implies that the value-added attributable to heavy-duty trucks may be 10 percent the industry total for the state. However, this is just speculation.

7 There have been, and are, exceptions; recent examples follow. Honda makes some engines for GM's Saturn models, helping the latter meet California's low-emissions requirements for vehicles sold there. In turn, GM sup-plies some diesel engines for vehicles Honda sells in Europe (Harbour Consulting, 2004). DaimlerChrysler, Mitsubishi, and Hyundai formed their Global Engine Manufacturing Alliance (GEMA) to produce engines for some of their vehicles. Ford and GM cooperated on designing, engineering, and testing front wheel drive six-speed trans-missions. Some assemblers bought six-speed transmissions made by specialists such as Aisin Seiki (in which Toyota has a minority stake) and Borg Warner (Harbour Consulting, 2006: 170-172).

8 It should be noted that GM's stamping plant in Lordstown is adjacent to its assembly plant.

9 The fact that 53.4 percent of all of Honda's tier-1 suppliers are located in N. America indicates just how much of an American company Honda has become.

10 Two foundries (NAICS code 3315) dedicated to the motor vehicle industry were excluded in the previous section so that consistent comparisons could be made with the national industry. They are included in this section, and their employment is included in the next section.

11 As with BLS data – and for the same reasons – ODJFS/LMI and Census Bureau data are not strictly comparable.

12 Value-added and GDP figures are closely related. The computation of GDP begins with value-added (largely the difference between the value of shipments and the costs of labor and materials), and proceeds by subtracting additional costs such as services purchased by the manufacturing establishment. This explains why GDP figures are less than value-added figures.

13 The percentage of value-added for bodies and trailers in Ohio during 2004-2006 are greater than the percent of U.S. GDP originating in Ohio, leading one to believe that the former is concentrated here. However, these percent-ages – and the totals on which they are based – are not reliable because the relative standard errors of the bodies and trailers estimates are way too high (see U.S. Census Bureau, 2008).

14 Using value-added in Ohio as a percentage of the nation removes the effects of inflation, making comparisons of one year with any other more meaningful. It should also be noted that the decline in value added from 2002 to 2003 is inconsistent with the increases of GDP and light vehicle production for the same period (U.S. Bureau of the Census, 2005a; U.S. Bureau of Economic Analysis, 2008a; Ward's, 2005).

15 Capital expenditures also vary with the size and degree of vertical integration of the company. GM and Ford generally spend more than the smaller and less vertically integrated Chrysler (Levy, 2008: 13).

16 In this section, vehicles, parts, and accessories from Canada and Mexico are imports. In the Market Share Trends section that follows, they are considered domestic production.

17 One possible explanation for the mismatches is that U.S. trade is asymmetric. Overall, about one-half of industry exports go to Canada, while imports from Canada are a minor part of all imports. Furthermore, change in the index value of the dollar –

based on a number of currencies – is a crude measure, poorly capturing the effects of specific currency change on trade in specific items from specific countries. It works better with the overall balance of trade.

18 U.S.-brand assemblers have made substantial progress in matching the initial-quality and frequency-of-repair records of Japanese-brand assemblers. At the same time, though, assemblers' recalls have risen. This is probably due to the increased use of electronics, tougher standards, and better reporting (Harbour Consulting, 2004).

19 The Federal Reserve Board used different indices to measure the value of the dollar. One, the G10, covered the period from 1967 through 1998, when it was discontinued. The second, G5a, dates to 1995. While the numbers differed during the overlapping periods, the trends are the same. A small of number of imports are included in U.S. brands, and "Others" includes a couple of European brands made in the U.S. However, these percentages are tiny, roughly counter balancing one another, and do not alter the conclusion.

20 Loss of market share probably is not the only reason for Ford's and GM's current financial difficulties. Growing health care costs of retired and current employees amounting to hundreds of dollars *per vehicle* also eroded the companies' bottom lines; promises made years ago had become untenable. Both companies announced agree-ments with employees reducing benefits that are expected, in turn, to reduce losses, and both agreed to contribute varying amounts of money to a benefit association to soften the blow. By contrast, foreign-based manufacturers – notably Honda, Nissan and Toyota – do not have this competitive burden because they offer only limited health care coverage and have few retirees in America (Harbour Consulting, 2006: 6, 186).

21 Renault has an indirect interest in the American market due to its large minority interest in Nissan.

22 The actions of light vehicle assemblers contrast with those of medium- and heavy-duty truck makers, who have used discounts and rebates to stimulate sales only when necessary (Fiore, 2006: 14).

23 The four are: Daimler AG, with its Mercedes Benz, Freightliner, Sterling, and Western Star brands; Navistar International and its International Truck and Engine subsidiary; PACCAR, formed by merging Kenworth and Peterbilt; and Volvo, which bought Mack Trucks from Renault. Consolidation in the medium- and heavy-duty truck industry slowed after major mergers and acquisitions were accomplished in the wake of the downturn in the first years of this decade (Wang: 2008: 8-9).

24 Assemblers also establish and support a network of independent dealers with wholesale financing, marketing stra-tegies and materials, etc. The dealerships, in turn, sell to independent truck operators – persons who typically buy just one vehicle from inventory (Wang, 2008: 11).

25 Conversely, companies based in Russia, China, and India making acquisitions in the West. Given the current difficulties, at least some companies are willing to sell assets, technology or skills. The most noted example is Ford's sale of Jaguar and Land Rover to India's Tata Motors. Mostly, though, it involves parts suppliers such as Russia-based Basic Element's purchase of a stake in Magna International. The non-monetary exchange is Basic Element gaining access to technical expertise, and Magna gaining access to the rapidly growing Russian market. Chinese companies also are looking to acquire U.S. parts suppliers (Levy, 2008: 8).

26 Both assemblers and suppliers face challenges in dealing with higher costs of raw material (steel, copper, rubber and plastics) due to increased demand for commodities. Rapid growth in developing countries – particularly China – is a significant factor in such demand.

27 On the other hand, the reliance on one source for a component risks slow-downs or even stoppages at assembly plants when production slows down or stops at the plant where the component is made. For example, operations at seven Chrysler and three GM assembly plants slowed for lack of a single part because of hurricane-induced floods at the supplier in North Carolina (Associated Press, 1999).

28 In the U.S., new safety features usually are incorporated by regulation; in Europe, they typically originate with customer demand. Consequently, European parts makers are leaders in this field (Levy, 2008: 10-11).

29 Electronics are an integral part of vehicles today. They are control many of the safety features mentioned as well as being the basis of entertainment and communications. The leading electronics suppliers are Delphi, Visteon, Robert Bosch, Siemens, and Denso. Electronic features are so popular that Delphi wants to focus on electronics, safety, and entertainment, and jettison its non-core operations (Levy, 2008).

30 Assemblers are making engineering changes to vehicles currently in production to increase gas mileage. These efforts include models that already get relatively high gas mileage; two examples are the Lordstown-made Cobalt and G5. Honda's V-6 engine, made in Anna, can operate on three or four cylinders as well. Other possibilities for simultaneously improving vehicle gasoline mileage and engine performance include:

- automatically turning off the engine at stop lights (some hybrids already use this),
- using booster batteries during acceleration to supplement engines design for maintaining speed,
- turbocharging,
- getting gasoline engines to diesel, and
- improving aerodynamics, including the underbody of the vehicle (Phelan, 2008).

31 Natural gas is a generic term referring to methane and ethane – the two most common types – but also including propane, butane, and other paraffin hydrocarbons. These are subject to processing before use. Gasoline consists of liquid hydrocarbons derived from crude petroleum by a variety of processes (Parker, 1984).

32 Honda's Anna plant makes engines that use natural gas (Harbour Consulting, 2004), but the company limits sales of vehicles with such engines to fleet operations. Engines using natural gas also emit fewer pollutants than gaso-line, but such vehicles have limited ranges, and there is no distribution network comparable to that for gasoline and diesel fuel.

33 Decades ago, farmers produced ethanol for use in their own engines (Wikipedia, 2008); cost-cutting and technical improvements in the production process may further reduce the break-even price of ethanol (Rohter, 2006).

34 Octane ratings of gasoline are based on the ratio of 2,2,4-trimethylpentane, which has eight carbon atoms chained together, to heptane (seven carbon atoms). Gasoline rated at 87 octane has a ratio of the former to the latter of 87 to 13. The more complex the chain, the more the molecule can be compressed before spontaneously igniting, allowing the engine to operate at a higher compression ratio and producing greater power. The octane rating of ethanol is typically 108-110 (Fischetti, 2006).

35 Ethanol can be fermented from a variety of plants; sugarcane is a better source than corn. Brazilian officials claim that U.S. import duties of $.54 per gallon prevent the industry from developing even faster (Rohter, 2006; Wiki-pedia, 2008).

36 The reason cold engines are harder to start with ethanol is that it is less volatile than gasoline.

37 It is important to note that the Alias and other such vehicles are classified as motor cycles because they have three wheels. This designation exempts them from a number of safety features required for four wheel vehicles, thereby reducing costs. Furthermore, they were illegal on Ohio roads until the legislature changed the word from "saddle" to seat in the Ohio Revised Code when defining a motor cycle (Vellequette, 2008e).

38 Grant, et.al., (2006) suggested hydrogen can be extracted from the next generation of nuclear reactors, liquefied and used as a coolant for super-conducting wires transmitting power while it is pumped to distribution centers.

39 Honda's head of research and development is skeptical of plug-in hybrids because he says the battery technology is not ready; other companies disagree (Rowley, 2008).

40 See Wikipedia (2008) for illustrations of the differences between the two internal combustion engine types.

41 It is more efficient to run electrical devices from a steady power source such as a battery than to adapt them to work with a highly varying power source such as an internal combustion engine (Romm and Frank, 2006).

42 "Just as a motor can transform electrical energy stored in a battery into torque (the force that produces wheel rotation and hauling power), the process can run in reverse so that the torque created by slowing a moving car generates electricity that can be accumulated in the battery" (Romm and Frank, 2006: 74-76).

43 As this report was written, tax credits for purchasing hybrid vehicles were diminishing and set to expire by the end of 2008. This increases the payback time for recouping the greater cost of hybrids by gasoline savings alone (Zim-merman, 2008).

44 An upside-down loan is one where the balance due on the loan is more than the trade-in value of the vehicle.

45 Experts debate just exactly when world oil production will plateau or peak, followed by an inevitable decline. Some have concluded that it could occur in the next decade, while others think it is decades away. "Many industry experts… argue that today's high prices are temporary, the result of technical bottleneck, sharply rising demand from Asia, and a plummeting dollar" (Roberts, 2008: 88). Others argue that speculation by large investors is the primary reason (Herbert, 2008b). Whatever the reason, though, high prices have not generated the output that prior price jumps have. Some industry experts counter this last point by noting that political and economic impediments above ground have prevented extracting more of what is below ground. Even if these problems are resolved and output increased, worldwide demand is expected to grow due to continued population growth as well as economic development, eventually outstripping supply. Extracting what remains will be much more difficult and costly. Furthermore, the amount of oil discovered each year since the early 1960s has trended downward. World oil production from existing fields has been falling by as much as eight percent per year, meaning that the oil companies must develop an average of up to seven million barrels *a day* in additional capacity to maintain current total output levels – let alone additional output to meet growing demand. Biofuels and more efficient motor vehicles may compensate to a degree – for a while, but sooner or later more fundamental and extensive changes to our currently energy-hungry lifestyle and economy must be made (Roberts, 2008).

46 The Renewable Fuel Program of the Energy Policy Act of 2005 "mandates a rise in renewable fuel use in gasoline to 7.5 billion gallons by 2012, nearly double the estimated four billion gallons of fuel ethanol consumed in the" U.S. in 2005 (Wang, 2008: 4). By comparison, U.S. production of gasoline in 2005 was nearly 126.6 billion gallons (U.S. Bureau of the Census, 2007c: table 874).

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