

The Automotive Industries in Southern California



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WORLD TRADE CENTER ASSOCIATION
LOS ANGELES - LONG BEACH

Economic Information & Research Department
Los Angeles County Economic Development Corporation
444 S. Flower St., 34th Floor, Los Angeles, CA 90071
Tel: 213-622-4300, 888-4-LAEDC-1 Fax: 213-622-7100
<http://laedc.org> • research@laedc.org

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Written by George Huang, Economist

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Introduction

With the current turmoil in Detroit, many have lamented the decline in the U.S. auto industry. During the first half of 2006, the two remaining U.S. automakers (General Motors & Ford) accounted for just 42.7% of the U.S. market, down from 45.9% during the first half of 2005. Announcements of layoffs and plant closures no longer shock the general public. Even the hard-line UAW sees the need for concessions in order to help the two domestic automakers' efforts to stem their decline. Japanese automakers Toyota and Honda, meanwhile, have taken a lead in the gasoline-electric hybrid technology, which has become a potent competitive advantage.

Yet there's a lot more to the industry than just assembling cars. The U.S. auto industry is far more dynamic than the headlines suggest, and a large portion of the "hidden" auto industry is right here in Southern California. The auto industry in Los Angeles involves everything except assembling passenger cars, which ended in 1992 with the closure of a GM's plant in Van Nuys. Los Angeles is a major center of automotive design and marketing for firms from all around the world. In addition, there are many specialty/aftermarket equipment manufacturing firms in the region that produce modification or add-on performance parts for motor vehicles. Finally, since automobiles are such an important part of the L.A. lifestyle, there are many automotive lifestyle-related operations such as magazines, limo conversion services, and "tuner" shops.

The L.A. Auto Industry by the Numbers

The Los Angeles five-county area is one where cars are almost indispensable. In fact, there are more registered vehicles than licensed drivers. Based on 2005 data, there were 10.7 million licensed drivers in the five-county area and 12.8 million registered vehicles (cars, vans, and trucks; not including trailers, motorcycles, and fee-exempt vehicles such as buses and police cars). That's 1.20 vehicles per licensed driver. Although some of these are specialty vehicles not intended for everyday driving (e.g., dump trucks and "classic" cars), and many drivers are not licensed (e.g., some undocumented aliens, temporary residents from other states, and some teenagers), that ratio is still impressive.

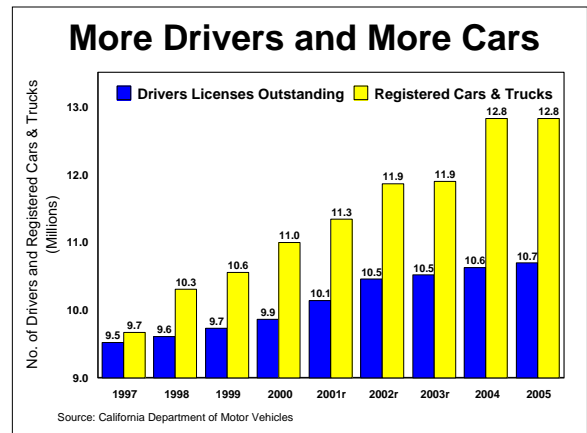


Table 1: Drivers Licenses Outstanding

Area \ Year	1999	2000	2001	2002	2003	2004	2005
Los Angeles	5,460,070	5,523,131	5,661,034	5,828,448	5,835,828	5,868,542	5,870,041
Orange	1,877,651	1,898,652	1,939,459	1,982,258	1,979,595	1,983,209	1,982,332
Riverside	902,462	931,725	974,189	1,027,559	1,065,497	1,109,934	1,152,021
San Bernardino	987,947	1,003,132	1,035,172	1,075,520	1,096,222	1,124,119	1,148,081
Ventura	502,800	509,761	522,433	536,416	538,336	540,019	540,502
LA 5-Co. area	9,730,930	9,866,401	10,132,287	10,450,201	10,515,478	10,625,823	10,692,977

As of Dec. 31th of each year

Source: California Dept. of Motor Vehicles

Table 2: Registered Cars and Trucks

Note: Trailers, motorcycles, and fee-exempt vehicles are not included in this tally. Data as of Dec. 31th of each year

Area \ Year	1999	2000	2001	2002	2003	2004	2005
Los Angeles	5,926,920	6,155,565	6,323,102	6,595,178	6,578,648	7,044,975	7,014,718
Orange	2,019,066	2,091,397	2,140,909	2,207,172	2,196,060	2,346,741	2,317,229
Riverside	972,920	1,038,067	1,100,221	1,182,492	1,221,720	1,365,087	1,411,893
San Bernardino	1,070,746	1,118,158	1,168,442	1,238,451	1,266,233	1,391,982	1,417,323
Ventura	566,039	588,338	609,276	634,192	633,574	675,103	664,682
LA 5-Co. area	10,555,691	10,991,525	11,341,950	11,857,485	11,896,235	12,823,888	12,825,845

Source: California Dept. of Motor Vehicles

Table 3: Vehicles Per Licensed Driver

Area \ Year	1999	2000	2001	2002	2003	2004	2005
Los Angeles	1.086	1.115	1.117	1.132	1.127	1.200	1.195
Orange	1.075	1.102	1.104	1.113	1.109	1.183	1.169
Riverside	1.078	1.114	1.129	1.151	1.147	1.230	1.226
San Bernardino	1.084	1.115	1.129	1.151	1.155	1.238	1.235
Ventura	1.126	1.154	1.166	1.182	1.177	1.250	1.230
LA 5-Co. area	1.085	1.114	1.119	1.135	1.131	1.207	1.199

Source: Calculated from data provided by California Dept. of Motor Vehicles

Data on new vehicle registrations in California show that the decline in light truck sales (which includes SUVs and mini-vans) was larger than the decline in passenger cars. This reflects the change in vehicle preference as gasoline prices rose. In general, buyers are now more interested in smaller, fuel-efficient vehicles.

Table 4: New Vehicle Registrations in California

	2004	2005	2006f	'05-'06 % chg.
Total	2,108,081	2,158,617	2,091,549	-3.1%
Cars	1,075,696	1,142,001	1,129,436	-1.1%
Light Trucks	1,032,385	1,016,616	962,113	-5.4%
Big Three *	963,795	945,886	878,850	-7.1%
Japanese	850,572	914,135	919,197	0.6%
European	222,827	226,010	223,171	-1.3%
Korean	70,887	72,586	70,331	-3.1%

Note: The "Big Three" include only the U.S. domestic brands of Ford, GM, and DaimlerChrysler
Sources: AutoCount (an Experian company); forecasts by California Motor Car Dealers Assn.

The change in market share of automakers is also of significant interest. With their better offerings of fuel-efficient and hybrid cars, Japanese automakers are picking up market share at the expense of the Big Three automakers (the domestic brands of GM and Ford, and the Chrysler division of DaimlerChrysler). European and Korean automakers have largely held their ground. The California Motor Car Dealers Association projects that the market share of Japanese automakers will surpass that of the Big Three this year in California.

Table 5: Market Share in California

	2004	2005	2006f
Total	100.0%	100.0%	100.0%
Cars	51.0%	52.9%	54.0%
Light Trucks	49.0%	47.1%	46.0%
Big Three	45.7%	43.8%	42.0%
Japanese	40.3%	42.3%	43.9%
European	10.6%	10.5%	10.7%
Korean	3.4%	3.4%	3.4%

Sources: AutoCount (an Experian company); forecasts by California Motor Car Dealers Assn.

In California, Toyota now has the largest market share among the major brands. Excluding its Lexus division, Toyota commanded over one-fifth of the new auto registrations in California during the second quarter of 2006. Honda followed with around one-eighth. Together these two brands accounted for over one-third of all passenger cars and light trucks sold in California.

Table 6: Market Share in California by Vehicle Make, 2Q2006

Rank	Make	Mkt. share	Chg. in mkt. share from 1Q'06
1	Toyota/Scion	23.4%	+2.1%
2	Honda	12.4%	+0.8%
3	Ford	9.6%	-0.4%
4	Chevrolet	8.2%	-0.3%
5	Nissan	7.0%	+0.0%
6	Mercedes-Benz	3.7%	-0.3%
7	BMW	3.7%	-0.2%
8	Lexus	3.6%	-0.2%
9	Dodge	3.6%	+0.2%
10	GMC	2.6%	-0.2%


Source: AutoCount (an Experian company)


L.A.'s "Automotive" Industries


Southern California has most components of the automotive industry except the actual assembly of passenger vehicle. Yet thanks to the Southland's deep automotive history, creative and engineering talent, and even its geography, L.A.'s motor vehicles industry is thriving. However, it does not show up on most people's radar screens.

Corporate Headquarters

Corporate headquarters generate a lot of white-collar jobs. Generally, localities near a corporation's headquarters also get more local involvement from the management that seeks to project a community-friendly image. Southern California is home to nearly all U.S. (or sometimes "North American") headquarters of Asian automakers. (The notable exception is Subaru of America, located in Cherry Hill, New Jersey.)

 Toyota/Lexus: Toyota Motor Sales, U.S.A., Inc. -- Torrance; est. 1957. U.S. manufacturing operations began in 1972 (The TABC in Long Beach). Its Calt Design Research Inc., established in 1973, was the first major auto design studio by an automaker in Southern California. (The holding company, Toyota Motor North America, Inc., is based in New York, but the real action takes place in Torrance.) In 1989, the luxury brand Lexus was introduced in the U.S. Its headquarters is also in Torrance.

 Honda/Acura: American Honda Motor Co., Inc. -- Torrance; est. 1959. Its first U.S. manufacturing plant was a motorcycle plant in Marysville, Ohio. The company's first U.S. vehicle assembly plant opened in 1982 (the Accord plant in Marysville, Ohio). In 1986, the luxury brand Acura was introduced in the U.S. Its headquarters is also in Torrance.

 Nissan North America -- initially in Gardena; est. 1960. In 1989, the luxury brand Infiniti was introduced in the U.S. Nissan is in the process of relocating its North American headquarters to Franklin, Tennessee by 2008 in order to be closer to its manufacturing facilities and to cut costs. Vigorous state and local efforts to retain Nissan in Gardena were not able to offset the financial incentives offered by Tennessee. However, Nissan will keep its design center in La Jolla.

- 🏭 Mazda North American Operations -- Irvine; est. 1970.
- 🏭 Isuzu Motors America Inc. -- Cerritos; est. 1980.
- 🏭 Mitsubishi Motors North America, Inc. -- Cypress; est. 1981.
- 🏭 Suzuki: American Suzuki Motor Corp. -- Brea; est. 1985. Suzuki is a unique automaker in that it manufactures many vehicles for other automakers.
- 🏭 Hyundai Motor America -- Fountain Valley; est. 1986.

Meanwhile, Kia Motors America Inc. has begun construction on its \$50 million North American headquarters in Irvine. Kia will also build its own design studio at this location. Currently it shares the design studio with Hyundai, which is also a member of the Hyundai Kia Automotive Group.

Ford's Premier Automotive Group (PAG), consisting of Aston Martin, Daimler (of U.K., not related to Germany's DaimlerChrysler), Jaguar, Land Rover, Rover (currently not in use), and Volvo, has its North American headquarters in Irvine. PAG's main headquarters is in London, since most of these brands are of U.K. origin.

Motor Vehicle Research, Design, & Development

Automakers have long realized the creative talent in Los Angeles. The Southland is home to many automotive research centers and design studios of firms headquartered elsewhere. Most focus on exterior and interior design, while the minute engineering details are often tackled elsewhere. Twelve major auto design studios are located in the Los Angeles five-county area, with two more just a short hop away in San Diego County. Three other design studios are under construction.

- ✍ BMW: Designworks USA -- Newbury Park; est. 1972 (wholly owned by BMW since 1995).
- ✍ DaimlerChrysler: Pacifica Design Center -- Carlsbad (San Diego County); est. 1983.
- ✍ Ford: California Advanced Product Creation -- Irvine, CA; est. 1984.
- ✍ General Motors: General Motors Advanced Design, California -- North Hollywood; est. 2000.
- ✍ Honda Research & Development, Los Angeles Center -- Torrance; est. 1985.
- ✍ Hyundai & Kia Design and Technical Center -- Irvine; est. 1990 originally in Fountain Valley.
- ✍ Isuzu Motors America Design -- Cerritos; est. 1984.
- ✍ Mazda Research & Development -- Irvine; est. 1988.
- ✍ Mercedes-Benz Advanced Design of North America -- Irvine; est. 1990.
- ✍ Mitsubishi Research & Design of North America -- Cypress; est. 1984.
- ✍ Nissan Design America -- La Jolla (San Diego County); est. 1979.
- ✍ Toyota: Caltex Design Research -- Newport Beach, CA; est. 1972. Caltex was the first design studio of a major automaker in Southern California.
- ✍ Volkswagen/Audi Design Center California -- Santa Monica; est. 1991 originally in Simi Valley.
- ✍ Volvo Monitoring & Concept Center -- Camarillo; est. 1986.

Honda will open its Advanced Design Studio in Pasadena later this year. It will focus on futuristic design concepts for both Honda and Acura. Honda's luxury division Acura will open its own design

studio in the summer of 2007. The Acura Design Center will be located next to Honda's existing R&D facility in Torrance. Honda hopes that by making the Acura brand more distinct from Honda, Acura will compete more effectively with luxury brands such as Lexus and Infiniti instead of the mass-market brands of Toyota, Nissan, and even Honda itself. Ironically, Acura was the first Japanese luxury brand introduced in the U.S.

As mentioned previously, Kia is also building its own design studio in Irvine as part of its new North American headquarters.

Why the dramatic clustering of automotive design in Southern California? One major reason is the presence of the Art Center College of Design in Pasadena. Around half of the world's current auto designers graduated from this prestigious school. By locating near L.A., design studios can work closely with the Art Center and identify promising future designers before they even graduate. The favorable weather here also helps the automakers attract and keep talent from all over the world.

Another major reason is the creative atmosphere in Los Angeles which reinforces itself through the synergy of many industries, including entertainment, aerospace, and the fine arts. Designers also draw inspirations from their own use of motor vehicles in this auto-centric city surrounded by a variety of different natural environments. Furthermore, the culture of vehicle modification can also contribute to their inspirations. "Rice rockets," Japanese cars tuned to higher performance, are a favorite among L.A.'s youth.

In the 2006 LA Auto Show, GM's PAD design from its design center in North Hollywood won the 2006 Design Challenge. An urban loft on wheels, it claims to be a solution to L.A.'s housing shortage. Unlike many concept designs, the PAD is highly functional and might have many immediate markets if it were introduced as a commercial product.



Finally, there is at least one "hidden" automobile research facility near the region. The Honda Proving Center of California located in Cantil, Kern County has a 7.5-mile oval track and 5-mile dirt roads used to test Honda/Acura vehicles and motorcycles. Hyundai also has a proving ground in California City (Kern County).

Scientific/Technical Consulting

The diverse manufacturing base and educational institutions in the Greater Los Angeles area possess a wide range of technical expertise and provide scientific and technical consulting services to the automotive industry. Exterior design is not just a work of art; it's also a complex optimizing effort involving different fields such as aerodynamics and fluid dynamics. This is one area that L.A.'s aerospace industry knows very well.

Another example of the automotive industry drawing on the expertise of local industries is in the development of power and fuel storage systems. There's intense research on hydrogen fuel cell-based automobiles, and hydrogen storage is a major technical challenge for automakers. Hydrogen has been used extensively in space applications for decades both as rocket fuel and power source. One provider of hydrogen-related technology and know-how is Pratt & Whitney Rocketdyne (PWR) located in Canoga Park, which offers this expertise through its consulting function, PWRengineering.com. PWR has provided hydrogen-fueled liquid rocket propulsion for over half a century.

Automotive Manufacturing & Wholesaling

There are at least 50,000 people working on the manufacturing and wholesaling side of L.A. region's auto industry. This group of industries includes motor vehicle, body, trailer, and parts manufacturing; tire manufacturing; and motor vehicle and parts wholesaling.

Table 7: Auto Manufacturing & Wholesale Industries in the L.A. 5-Co. Area, 2005

NAICS	Description	No. of Estab.	No. of Employees	Payroll (\$ million)	Avg. Annual Wage (\$)
32621	Tire manufacturing	27	257	\$ 9.2	35,635
3361	Motor vehicle manufacturing	7	583	21.8	37,424
3362	Motor vehicle body and trailer manufacturing	117	8,518	287.6	33,765
3363	Motor vehicle parts manufacturing	421	14,858	556.0	37,421
4231	Motor vehicle and parts merchant wholesaling	1,433	26,300	1,481.6	56,333
Total of these industries		2,005	50,516	\$ 2,356.1	46,641

Note: some disclosure issues cause under-reporting in most of the industries shown above.

Source: California Employment Development Department, Labor Market Information Division, ES202 data

Few automobiles are built in Southern California nowadays. The last passenger car factory was GM's Chevy Camaro facility in Van Nuys, which closed in 1992. The sole existing vehicle manufacturing plant in the Southland is a truck assembly plant in Long Beach, operated by Hino Motors Manufacturing, majority-owned by Toyota. Vehicle production there started in 2004. The plant has the capacity to produce 6,000 trucks a year.

Why did the factories of the U.S. "Big Three" disappear? Decades ago, the cost of transporting cars from a distant factory was high, and there were problems with damage and theft. Therefore, automobiles were built around the country to serve major markets nearby. At one time there were seven such plants in Los Angeles County. However, the introduction of a new generation of railroad auto carrier racks in the 1970s dramatically cut the costs of transportation of automobiles and reduced the rate of damage and theft. This changed the economics in favor of centralized production as factories gained significant efficiency from economies of scale, supplier consolidation, and centralized support services (e.g., engineering and accounting). Gradually, most U.S. auto factories were consolidated in Michigan through the Southeast U.S.

In addition to trucks, Toyota's TABC Inc. in Long Beach is a major parts manufacturing operation in L.A., producing millions of catalytic converters and other critical parts for Toyota and GM vehicles each year. Established in 1972, it was Toyota's first North American plant. Many of these parts go to the New United Motor Manufacturing, Inc. plant (NUMMI) in Fremont, Northern California. NUMMI is a joint venture between Toyota and GM, and currently assembles Toyota Corollas, Pontiac Vibes, and Toyota Tacomas.

Is It an American Car?

What makes a car "American?" That question is becoming ever more difficult to answer in this era of globalization. Although the American classic Ford Mustangs are still assembled in the U.S., they have less than 75% North American content (i.e., parts from Canada, U.S., and Mexico) and therefore could be considered more of an imported car than an American car. In contrast, many of the Toyotas and Hondas running on L.A. streets are actually made in Fremont, California (Toyota Corollas & Tacomas); Georgetown, Kentucky (Toyota Camrys, Avalons, and Solaras); Marysville and East Liberty, Ohio (Honda Accords & Civics, etc.); or Lincoln, Alabama (Honda Odysseys, etc.). (In November, Toyota will begin building its Tundras in a new factory in San Antonio, Texas.) All those "foreign cars" that have VINs starting with the numbers "1," "4," or "5" are actually built (or at least assembled) in the U.S.

There are more than 400 other independent parts manufacturers around the Southland. Some make parts for the key automakers, while others serve only the auto aftermarket. Finally, there are special parts and accessories manufacturers making everything from custom trailers to decorative "mods" (modifications). There are also "performance" parts designers and manufacturers whose products improve the vehicle's performance. Locally, Toyota's Toyota Racing Development (TRD) in Costa Mesa is one example of an aftermarket performance parts manufacturer that is affiliated with the parent company. Many "mods" are not visible on the outside (although some drivers deliberately put on stickers to show off their efforts). The Specialty Equipment Market Association (SEMA), the trade group for most of these aftermarket firms, is based in Diamond Bar.

Auto wholesaling is big business in the Southland. These firms order vehicles from U.S. and Japanese assembly plants and deliver them to dealers across the nation. In some cases, they are also involved in product marketing and strategic development, and dealer relations (i.e. development, monitoring, and training). The U.S. headquarters operations of Honda and Toyota are classified as wholesalers.

Not surprisingly, the L.A. region is a major import center for automobiles. The three seaports of the Southland -- ports of Los Angeles, Long Beach, and Hueneme -- handled over 9.8 million vehicles in 2005. Over 94% of the traffic was imports.



Auto imports at Port of Hueneme

Table 8: 2005 Auto Imports and Exports at Local Seaports

Port \ Units	Total	Export	Import	% Export	% Import
Long Beach	4,446,608	17,786	4,428,822	0.4%	99.6%
Los Angeles	2,186,946	546,737	1,640,210	25.0%	75.0%
Hueneme	3,201,172	16,006	3,185,166	0.5%	99.5%
Total	9,834,726	580,529	9,254,197	5.9%	94.1%

Source: Pacific Maritime Association, 2005 Annual Report

Motor Vehicle Advertising and Marketing

The marketing and advertising programs of most automakers are developed at their headquarters, and the advertising firms they employ usually have local offices near those locations to serve their clients. In the case of Asian automakers, their marketing departments and the advertising companies they employ are conveniently located in Los Angeles -- the hub of entertainment.

L.A. has long been a major center of advertising and marketing, thanks to its entertainment industry. Therefore it should be no surprise that many car commercials on TV feature Southern California locations, some for cars not even sold in the U.S. The streets of Downtown LA are especially popular thanks to some unique attributes of Downtown. Angelenos can almost play a game of "Name That Street" when watching those car ads. Downtown has buildings from the early half of the 20th century in the Old Bank District, modern business buildings in the Financial District, and ultra-modern structures such as the Disney Concert Hall. The steep slopes of Grand Avenue between 3rd and 5th streets, overpasses and underpasses, and tunnels and bridges over the Los Angeles River all add more ambiance. And since Downtown LA is usually not crowded on weekends, filming is less disrupting than in other urban areas such as New York City. Beaches and mountains are also just an hour away.

Automobile Retailing

According to the Quarterly Census of Employment and Wages (QCEW, a.k.a. ES 202) data from the California Employment Development Department, there were 1,616 new and used car dealers in the Los Angeles five-county area in 2005. These dealers employed 69,792 workers in 2005. Many employees at new car dealers are salesmen earning a base salary plus commissions, and this pushes their average annual wage well above \$50,000, the highest in the retail sector.

Table 9: Automobile Dealers in the L.A. 5-County Area, 2005

NAICS	Description	No. of Estab.	No. of Employees	Payroll (\$ million)	Avg. Annual Wage (\$)
44111	Retail: new car dealers	1,074	65,297	\$ 3,498.5	\$ 53,578
44112	Retail: used car dealers	542	4,495	177.8	39,555
Total of these industries		1,616	69,792	\$ 3,676.3	\$52,675

Source: California Employment Development Department, Labor Market Information Division, ES202 data

Some of the largest auto dealers (by sales volume) in the U.S. (if not the world) are also located in the L.A. area, including Longo Toyota/Lexus, Norm Reeves Honda, Galpin Ford, and Fletcher Jones Mercedes-Benz. These large dealers are very important to automakers because their sales and service patterns can be easily monitored and analyzed. Their feedback to automakers helps improve product offerings. Cities love these mega dealers too because of the tax revenues they bring in.

The total value of motor vehicles sold in the Los Angeles five-county area was \$33.1 billion in 2004, which translates into around \$2.6 billion in sales tax revenue for the State and local governments. Of this amount, 91.5% was from sale of new motor vehicles (\$30.3 billion), and 8.5% was from sale of used motor vehicles (\$2.8 billion). Taxable auto parts sales totaled \$2.4 billion in 2004, generating around \$190 million in sales tax revenue. Thanks to factory incentives and low interest rates, taxable vehicle sales hit new records in 2004, but eased back in 2005 and into 2006.

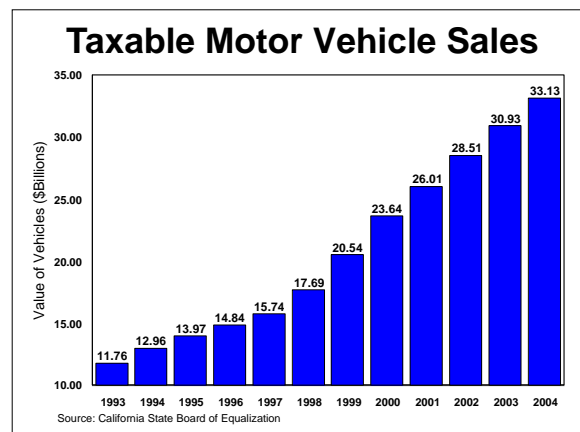


Table 10: Auto & Auto Parts Sales

(\$ millions)

New Motor Vehicles	1999	2000	2001	2002	2003	2004
Los Angeles	9,870.9	11,348.3	12,510.9	13,646.0	14,515.7	15,226.7
Orange	3,676.5	4,206.5	4,895.3	5,542.7	6,205.5	6,596.8
Riverside	1,698.2	2,101.0	2,450.0	2,797.9	3,089.4	3,517.7
San Bernardino	1,692.1	1,895.3	2,208.7	2,520.2	2,788.1	3,135.7
Ventura	1,170.1	1,359.9	1,519.9	1,673.0	1,796.2	1,819.3
LA 5-Co. area	18,107.8	20,911.0	23,584.8	26,179.7	28,394.9	30,296.2

Used Motor Vehicles	1999	2000	2001	2002	2003	2004
Los Angeles	1,171.6	1,317.8	1,222.9	1,202.1	1,284.4	1,333.5
Orange	536.0	648.4	521.0	441.7	484.2	556.7
Riverside	217.3	243.3	201.7	222.8	243.7	295.6
San Bernardino	376.8	414.5	370.9	355.3	427.6	535.5
Ventura	126.9	109.0	113.2	106.6	97.9	107.8
LA 5-Co. area	2,428.6	2,733.0	2,429.7	2,328.5	2,537.8	2,829.0

Source: California State Board of Equalization, Taxable Sales in California

Auto dealers, especially new car dealers, are the darlings of many cities. They generate perhaps the highest amount of sales tax revenue on a per acre basis. Several cities have giant "auto rows" or "auto malls" full of dealers of all brands and makes. The Cerritos Auto Square, for example, has 25 dealers (with two more under development) on 100 acres of land. Its cooperative marketing campaign makes it a household name in Southern California. Its dealers sold 52,856 cars (valued at over \$1.2 billion) in 2004, which accounted for roughly half of the city's retail sales and is the single largest source of revenue for the City of Cerritos. Then there are sales taxes from the sale of parts and repair services, along with utility taxes, property taxes, etc.

There are concerns that U.S. automakers may try to cut the number of dealers. The Big Three U.S. automakers have many small dealers with low sales volumes that compete with other dealers nearby. Import dealers, on the other hand, are fewer in number but are often bigger, and more of them provide a full suite of after-sale services. (Also, many import brands are still in an expansion mode.) For the domestic automakers with slipping market shares, having fewer dealers means having fewer "customers" to serve, but would probably not result in a loss of sales. The unique dissociation between the numbers of "customers" (i.e. the dealers) and the volume of car sales is the logic behind the push for dealer consolidation in larger metropolitan areas. They expect the potential buyers to drive a little farther to reach their (now larger) dealers. The Big Three have indicated their desire for fewer dealers, but they will not aggressively force dealers to consolidate or close. For the moment, they are relying on natural economic forces and financial incentives to make this happen. When some of these smaller dealers close, local governments will see a decline in their tax revenues.

Table 11: Vehicle Sales Per Dealership, August 2006

(This table shows a few makes for illustrative purposes; "foreign" makes are shaded)

Make (Parent Company)	No. of vehicles sold
Toyota/Scion	173
Lexus (Toyota)	146
Honda	132
Nissan	75
Acura (Honda)	69
Hyundai	66
BMW	66
Mercedes-Benz (DaimlerChrysler)	62
Ford	56
Infiniti (Nissan)	54
Chevrolet (GM)	51
Saturn (GM)	50
Dodge (DaimlerChrysler)	31
GMC (GM)	18
Chrysler (DaimlerChrysler)	16
Pontiac (GM)	14
Mercury (Ford)	8
Lincoln (Ford)	7

Note: Some makes are often sold at the same dealership, such as Lincoln & Mercury

Source: Automotive News Data Center

Contrary to popular belief, dealers find it more profitable selling used cars than new cars. While most used cars are taken in from trade-ins, lease returns, and rental fleet renewals, some dealers actively purchase used cars at auctions. Some used luxury cars are carefully inspected and repaired and then sold under special programs such as "certified pre-owned" vehicles with additional warranties. Some used cars are also exported and sold overseas.

Automotive Support Industries

According to the Quarterly Census of Employment and Wages (QCEW, a.k.a. ES 202), there were over 127,000 people working in automotive support industries in the five-county area. This group of industries includes auto parts & tires dealers, gasoline stations, car towing, auto repairs & maintenance, and parking garages.

Interestingly, the automotive culture is such an important part of life in California that the State has a special Bureau of Automotive Repairs to deal with auto repair shops who may be less than honest. And there are "backyard" auto repair activities as well, including people who will quickly tap out a dent at curbside.

Table 12: Automotive Support Industries in the L.A. 5-County Area, 2005

NAICS	Description	No. of Estab.	No. of Employees	Payroll (\$ million)	Avg. Annual Wage (\$)
4413	Retail: auto parts, acces., tires	2,640	25,032	\$ 759.3	\$ 30,335
447	Gasoline stations (some w/ stores)	2,692	22,804	497.9	21,836
48841	Motor vehicle towing	478	5,041	168.6	33,453
8111	Automotive repair & maintenance	8,908	60,947	1,743.7	28,611
81293	Parking lots and garages	1,189	13,265	258.5	19,489
Total of these industries		15,907	127,089	\$ 3,428.2	\$ 26,975

Source: California Employment Development Department, Labor Market Information Division, ES202 data

Table 13: Automotive Parts Sales

(\$ millions)

County \ Year	1999	2000	2001	2002	2003	2004
Los Angeles	992.0	1,046.6	1,004.3	1,021.2	1,066.6	1,138.4
Orange	312.8	331.9	529.9	339.8	359.5	381.5
Riverside	246.2	271.7	272.8	293.4	329.1	366.6
San Bernardino	285.7	302.9	301.7	319.7	337.6	370.8
Ventura	78.7	86.0	88.4	93.1	97.2	103.1
LA 5-Co. area	1,915.4	2,039.1	2,197.1	2,067.2	2,189.9	2,360.4

Source: California State Board of Equalization, Taxable Sales in California

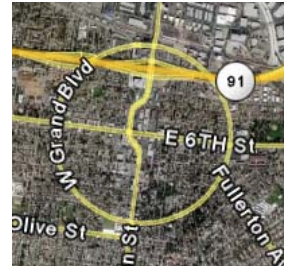
Gasoline and service stations generated over \$16.5 billion in sales in 2004. With gasoline prices having risen dramatically over the course of 2005, taxable sales revenues at these stations saw strong growth last year. State and local governments collected more sales tax because of the higher gasoline prices. There are also special gasoline excise taxes. Because the excise taxes are levied at specific rates (i.e. collected on a per gallon basis) instead of *ad valorem* taxes (i.e., proportional to value, like the sales tax), the higher gasoline prices did not lead to a proportional increase in the State's and Federal government's earnings (which are supposed to be dedicated to transportation infrastructure).

Table 14: California's Gasoline Taxes

Tax	Basis of calculation
Federal excise tax	\$0.184 per gallon
State excise tax	\$0.18 per gallon
State sales tax	7.25% to 8.25%, depending on locality

Racing & Auto Modification Industries

Like the adoption of personal computers, some of the earliest buyers of automobiles were hobbyists. During the early years of the 20th century, car races were popular, and there were two wooden race tracks in Los Angeles -- the Los Angeles Motordrome in Playa del Rey (1910-1913, when it was destroyed by fire) and the Beverly Hills Speedway (1920-1924, when it was moved to Culver City and became the Los Angeles Speedway. That speedway lasted only a few years, and then part of it was turned into a park). The City of Corona was also laid out for auto races. The Corona Road Race was held on the three-mile, circular Grand Blvd. between 1913 and 1916.



The Corona Circle (Grand Blvd.)
(taken from Google Earth)

The passion for car racing did not die off with the demise of the race tracks. It just moved to the streets. Illegal street racing probably started as soon as people started buying cars, but serious racing demand better facilities. In the 30s, hot-rodders began racing on the vast expanse of dry lake beds on the Mojave Desert. In 1950, the first-ever dedicated drag strip opened in Santa Ana. The trend of using imports began in the 60s with Volkswagon Beetles, but Japanese imports have come to be the new favorites.

This passion for racing led to the development of a specialized industry that focuses on modifying factory-built cars to improve their performance. Although American classics such as Ford Mustangs and Chevy Camaros are also popular in amateur racing, imports have come to dominate this market in recent years. A popular car for modification is the Honda Civic because of its high power-to-weight ratio and engine interchangeability with some other higher-performance engines from Honda. Modified cars and trucks are common on the L.A. streets, and some manufacturers have dedicated operations to serve this market. Many Honda/Acura owners proudly sport "Mugen" stickers on their cars -- the name of the Honda-affiliated modification equipment manufacturer. Toyota Racing Development U.S.A. (TRD), based in Costa Mesa, is one of the more visible local presence. Common modifications include the suspension system (e.g., lowering the vehicle to accommodate the shorter, wider racing wheels), the exhaust system (to improve engine performance and get the race car look and sound), and the cooling system (so the modified engine does not overheat).

Car races continue to be a big part of Southern California's automotive culture. What other location would inspire movies like The Fast and the Furious?

Off-Roading

Many high-performance sports car owners lament the lack of *autobahns* (German freeways with no speed limits on many segments) for them to really run their cars. Since street racing is illegal, many drivers in Southern California release their adrenaline through off-roading, or driving vehicles off paved roads. Vehicles that go off-road range from motorcycles, all-terrain vehicles (a.k.a. four-wheelers), sports utility vehicles (SUVs), light trucks, and monster trucks (modified trucks with oversized wheels). There are several off-road parks in Southern California. These parks offer opportunities for dune bashing, mud plugging, rock racing/crawling, and trail riding.

Off-roading is a boom to the automotive industry as well. According to the Off-Road Business magazine, the average off-roader spends over \$13,000 in upgrades and modifications to their vehicles. That is often more than half of the value of the original vehicle!

Yet by codifying drag races and taking them off the streets, racing enthusiasts have legitimized this sport. Nowadays some professional racetracks also allow amateurs to race on their tracks on off-days (e.g., the Irwindale Speedway and the California Speedway's Auto Club Dragway, which is separate from the D-shaped tracks).

There's also a big market for non-performance-enhancing modifications using off-the-shelf body kits for low-cost makeovers. Some modifications are functional (e.g., surfboard or bicycle carrier racks). Non-functional, decorative modifications are called "ricing," which had its origin because the trend started with Japanese imports. Japanese sports cars, performance-enhanced vehicles, and motorcycles are sometimes referred to as "rice rockets" (and guess who makes "pasta rockets?").

Southern California is known as the car customization capital of the world. This is a vibrant industry perfectly matched with the creative, adventurous culture of the region. Some of the big players in the field of custom auto design, manufacturing, and modifications include MetalCrafters (Fountain Valley), SO-CAL Speed Shop (Pomona), Boyd Coddington (La Habra), and Foose Design Inc. (Huntington Beach).

Closely connected with the auto modification industry is a base of antique auto collection enthusiasts. Jay Leno is perhaps the most visible of all, whose columns in the Popular Mechanics magazine feature interesting projects such as building a hot rod out of an engine from an M-47 Patton tank.

Finally, there's also an industry dedicated to limo conversion (most often stretching a wide variety of vehicles -- from a Lincoln Town Car to a Hummer -- to accommodate enhanced facilities such as a mini-bar). With its disproportional number of celebrities (and related parties and events), the demand for these symbols of glamour and prestige is probably higher than anywhere else in the world. Stretched limos are also popular for weddings, high school proms, and funerals. There are even buses converted to host private parties. Thus Los Angeles is a natural location for these limo conversion companies.

Other Related Industries

Finally, there's a variety of industries dedicated to other auto-related purposes. There are over 200 auto-related **clubs** (or local chapters of national clubs) with various activities (e.g., races and newsletters) throughout the region. There are at least seven automotive **museums**, including the famous Petersen Automotive Museum on the Miracle Mile (Wilshire Blvd. at Fairfax). There are 11 **race tracks**, some of which are open to the general public for recreational racing (e.g., the Irwindale Speedway). The largest race track in the area is the California Speedway in Fontana, which has three road courses inside the racetrack for "road" and motorcycle races and vehicle testing. A separate dragway south of the race track is available for amateur racing. Then there's the Toyota Grand Prix of Long Beach, which transforms the streets of Long Beach into an urban race track each spring. This 31-year-old tradition is a highly anticipated event for racing fans in Southern California.



Aerial view of the California Speedway (taken from Google Earth)

As a major media hub, it's natural that many auto-related **publications** are based here. Kelley Blue Book, a popular car appraisal guide, is based in Irvine. Its competitor, The N.A.D.A. Appraisal Guides, is across the city line in Costa Mesa. Many auto magazines are also published in the region, including Motor Trend, Truck Trend, Hot Rod, Street Rodder, Sport Truck, Dirt Rider, 4-Wheel & Off Road, Motorcyclist, and Import Tuner. They cover a wide array of interests ranging from casual drivers and enthusiasts to professional racers and auto-related businesses. Finally, there are also auto **research services** such as J.D. Power and Associates (Westlake Village) and Auto Pacific (Tustin).

L.A.'s Auto-Related Innovations

Many innovations related to automobiles were first created around L.A., often out of necessity. Some of these have been adopted worldwide.

- Today's SR-110 Pasadena Freeway was the first urban freeway in the world. Opened on 12/30/1940, it was originally called the Arroyo Seco Parkway. It remains the most important artery between the key business centers of Pasadena and Downtown Los Angeles.
- The interchange connecting SR-101 and SR-110 was the world's first four-level stacking interchange. This novel design was constructed in 1953.
- The first double-deck high occupancy vehicle lanes (HOV, better known in L.A. as "carpool lanes") were completed on the I-110 in 1993. (Only part of the total length of HOV lanes is double-decked.) Although extremely costly to build, the complete grade separation solves the problems of cross-freeway merging, interruption of traffic flow when entering and existing HOV lanes, and spectator traffic (during an accident). The HOV lanes on the I-110 also have dedicated lanes for buses.
- The first fully automated toll collection system was installed on the Express Lanes of the SR-91 and opened in 1995. By using cameras and RFID technology, cars with FasTrak transponders simply go through the toll stations without stopping, and the appropriate tolls are taken out of the drivers' accounts. SR-91's Express Lanes also feature partial "congestion pricing" -- where tolls are higher for the most congested time periods. (Full congestion pricing would take into account the actual traffic conditions, which SR-91's Express Lanes do not.)
- The "Sig Alert" was invented in 1955. The Sig Alert was named after Lloyd Sigmon, the inventor, by the then LAPD Chief William Parker. It began as a special radio reception device that listened for a specific tone from the LAPD, and then ran a tape recorder automatically to record the message that followed the tone. Radio station operators were notified by a light on the receiver and could choose to broadcast the information or not. Today, Sig Alerts are distributed through CHP's website, but the name "Sig Alert" stays. (The concept of Sig Alert has since led to many offspring, including the AMBER Alert.)
- California emission standards are some of the most stringent in the world. Since most models of cars are produced centrally, automakers often follow the most stringent standards so they only need to produce "one car." Therefore, California's emission standards are utilized in most cars being sold in the U.S. This means that California's emission standards are actually a driving force behind many emission control technologies nationwide.

Hybrid Technology -- The New "Fashion Statement"?

Hybrid-electric technology is currently the "fashion statement" in the auto industry. Hybrid technology utilizes the complementary nature of the internal combustion engine (ICE) and electric motor. Japanese automakers Toyota and Honda are the current leaders in the hybrid technology. The Honda Insight was the first hybrid-electric vehicle sold in the U.S. when it was introduced in 1999. The Toyota Prius, introduced in Japan in 1997, was the first mass-produced hybrid-electric vehicle. U.S. consumers didn't see the Prius until 2001.

Which hybrid technology is the best depends on the needs and the driving habits of the user. Some offer higher fuel efficiency while some give out more power. There are reports that some hybrid vehicles are not living up to their mileage efficiency claims. The fuel efficiency of hybrid systems in general is more sensitive to driving styles than the regular ICE system.

Some users of hybrid vehicles achieve even better mileage by modifying Toyota's HSD system to allow recharging of batteries from household electric outlets. These "Plug-in Hybrid Electric Vehicle" (PHEV) can run on solely electric power at low speeds. Plug-in modifications only make sense for certain drivers, however. For those running mostly long distances at high speeds, the extra weight of the modification may outweigh the benefits of additional electric power and therefore reduce fuel efficiency. Toyota is studying the plug-in options for its future hybrid vehicles. Toyota is also studying the use of the more powerful lithium-ion batteries to reduce the size and weight of its battery packs.

According to automotive research firm R. L. Polk, one-quarter of the 200,000 new hybrid cars registered in the U.S. belong to Californians. For the L.A. region, the spread of hybrid cars has led to complaints of clogging and slowing of traffic on the carpool lanes (single-driver hybrids with a special sticker from the DMV can run on the carpool lanes). Some hybrid drivers are extremely conscious about fuel efficiency and drive at 60 mph in order to raise their gas mileage. But every driver benefits from those hybrid cars. By reducing the demand for gasoline even marginally, they help reduce the pressure on the gasoline supply and help prevent even higher gasoline prices.

A number of critics, however, question whether the government should dole out so much in tax incentives for hybrid car buyers. The vehicles are likely attractive enough even without the tax incentives, and there are probably enough environmentally conscious consumers out there to ensure a healthy market for hybrids. For now, hybrids (especially the Prius) are the fashion statement on local roads, and owners' smiles are hard to hide when they fill up at a gasoline station.

Research on Future Technology

L.A. is also on the forefront of research for future transportation technologies. Research on advanced transportation technologies is taking place throughout the supply chain of the automotive industry. While the large automakers tend to grab the headlines, smaller suppliers are sometimes the real innovators in their specific fields. Also users of transportation equipment sometimes develop ways to cut pollution through better management of their resources. Even government agencies can innovate. For instance, better road management through monitoring devices and flexible scheduling can cut down on transit time and thus reduce both congestion and pollution.

Weststart-CALSTART, located in Pasadena, is a non-profit organization that supports firms and government agencies involved in the development of advanced transportation technologies. Technologies under development by members of this organization include pollution reduction & control, alternative fuels, and transportation systems planning. By promoting cooperation, it helps all participants to innovate and develop better technologies for all.

Today there are two main fields of research in the automotive world: alternative fuel (and related power systems) and intelligent transportation systems.

Alternative Fuels

The current hybrid technology is seen as an intermediate step to alternative fuels. The high cost of petroleum (and thus gasoline and diesel) has brought the alternative fuel research to the forefront once again. While the hybrid technology can reduce the consumption of gasoline, it will not eliminate the need for fossil fuels. Even with new alternative fuel sources, the complete elimination of gasoline is still many years away.

Natural gas is not technically an alternative fuel because it's still transformed ancient biomass (a.k.a. fossil fuel). Gas is, however, much cleaner than gasoline when burned. There are many natural gas (CNG or LNG) buses in use across the region. Also, there are some CNG light vehicles (e.g., Honda Civic GX) on the streets. However, widespread use of gas-powered light vehicles seems unlikely in the near future. The small number of natural gas filling stations is one deterrent to widespread adoption of natural gas vehicles. Another option is home refueling, but that process requires a special device and takes hours.

Biofuel is fuel derived from (recently) living biomass. Because the biomass gets its carbon from converting CO₂ in the air, the use of these fuels reduces the overall amount of carbon released into our atmosphere. Several kinds of biofuel are already in use, but their costs are generally higher than petroleum-based fuel. Widespread adoption of biofuel will likely require sustained high gasoline prices, prescriptive government regulations, and perhaps subsidies in the short term. Two major biofuels already in use are ethanol and biodiesel.

Electricity powering motor vehicles is not a new phenomenon, but new sources of electrical power may finally make this a viable alternative for the general population. Electric vehicles may one day replace most vehicles based on the internal combustion engine (ICE). Electric motors are simpler in design and maintenance than ICEs and therefore quite desirable for both automakers and consumers. However, current EVs rely on the bulky lead/acid batteries and can only go for short distances at low speeds, and the recharging time is measured in hours. Toyota is researching the use of lithium ion batteries, which have other issues of their own. Other fuels are being researched to replace the use of rechargeable batteries. Hydrogen (through the use of fuel cells) appears the most promising of these, thanks to its high power-to-weight ratio. Another possible source is the use of refuelable zinc/air batteries, which can be refilled in minutes.

Intelligent Transportation Systems

One way to improve traffic flow and thus cut emissions is through better use of technology. "Intelligent Transportation Systems" (ITS) is the catch-all concept that describes the integration of information and communications technologies in motor vehicles and infrastructure. ITS involves the

integration of many types of existing technologies, such as traffic flow monitoring, automated adjustment of signals based on traffic conditions, coordinated signal switching, and electronic toll collection. The automation of integrated systems yields higher efficiency than uncoordinated improvements in individual systems. ITS is especially important for places like Los Angeles where the options for massive infrastructure construction are extremely limited. Increasing the efficiency of existing infrastructure has the same effect as adding lanes to existing roads.

Many of these ITS systems are already in use in Los Angeles. Those "loops" cut into the pavement near intersections have embedded sensors that can detect vehicles as they pass the loops. Some are used to help control traffic lights to maximize the traffic flow. L.A. County's Metro Rapid buses employ a Signal Priority System (SPS) to lengthen the green light and reduce the time they waste at intersections. Metro estimates that SPS reduces travel time by 10%.

The "compounding" effect of systems integration is especially beneficial. It allows the traffic planners to implement previously unattainable schemes such as true congestion pricing (i.e., raising the tolls on toll roads at times when the congestion on free lanes is heavier) and variable street signal length (e.g., allow longer green lights for main arteries experiencing heavier-than-normal traffic while maintaining signal synchronization to maximize the uninterrupted traffic flow).

Thanks to the growing use of wireless communications in motor vehicles, motor vehicles will soon have the ability to tap into local ITS information centers and retrieve real-time information such as road conditions (e.g., road or lane closures), average speed, accidents, and alternative routes. With the right and timely information, drivers can make better decisions and therefore save time and fuel.

November 3, 2007, may be a day to remember. The 2007 Grand Challenge for fully autonomous vehicles, sponsored by the Defense Advanced Research Projects Agency (DARPA), will involve a 60-mile urban course (at a yet-to-be-disclosed location in the Western U.S.). The participants must complete the course in six hours and obey all California traffic rules (e.g., street lights, rights-of-way, etc.) while dealing with other robotic vehicles and obstacles on the course. Some local schools such as CalTech are preparing entries to this contest. Automakers are carefully following the developments of this race because of the potential technologies that may be developed by the participating teams. A car that drives itself is not beyond our capabilities in the coming decade. The military is also interested in creating unmanned urban combat vehicles to handle the dangerous tasks of urban warfare.

Finally, two of the most famous intelligent vehicles were built in L.A. Mars Exploratory Rovers Spirit and Opportunities are still operating on Mars, and together they have been running for nearly 2,000 Martian sols (a "day" on Mars; 24.65 Earth hours). While their operations are carefully planned and programmed on Earth, some of their traveling is done autonomously.

Conclusion

L.A. may not build many motor vehicles anymore, but it is the center of a variety of automobile-related industries. Thanks to its infrastructure (e.g., the ports for importing), expertise in related industries (e.g., design, advertising/commercials, and aerospace), educational institutions (e.g., Art Center College of Design), an environment of promoting creativity, and the residents' desires for environmental protection, many auto-related companies have prospered here. While the true economic impacts of these companies are hard to quantify because they are spread out in many industry sectors, their importance is well-known to the industry insiders.