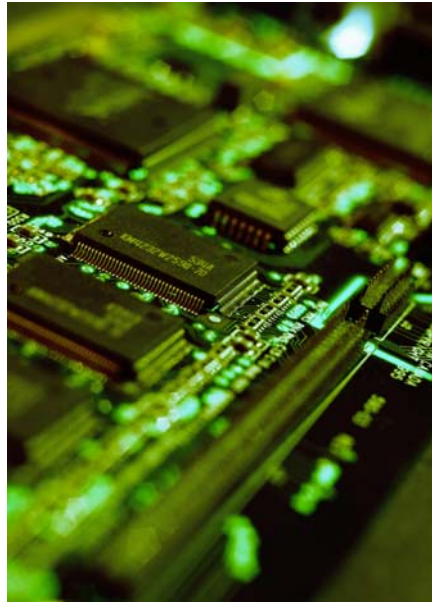




OFFICE OF THE GOVERNOR
ECONOMIC DEVELOPMENT & TOURISM



TEXAS SEMICONDUCTOR INDUSTRY REPORT

OCTOBER 2005



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SEMICONDUCTOR INDUSTRY OVERVIEW

Semiconductors are materials whose ability to conduct electric current can be easily regulated and can act as both insulators and conductors. These qualities have made semiconductors useful in the electronics field since its inception. Today semiconductor devices are ubiquitous in a wide range of industries, including computers, communications, aerospace, manufacturing, agriculture, and healthcare. Semiconductors have made electronic devices – such as TV’s, CD players, computers, and cell phones – smaller, cheaper, faster, and more reliable.

By the late 1800s, electricity was being used to carry both power and information in electronics devices like telegraphs, telephones, and radios. Semiconductor devices were already used as detectors in radios. In 1947, transistors were invented at Bell Telephone Laboratories. They revolutionized electronics because of their inexpensive, flexible, and reliable functionality and low power requirements. Transistors are solid state semiconductor devices that allow the precise control of current and can be used for amplification, switching, and other functions. They are the key active component in most modern electronics. Integrated circuits (ICs) or “chips” were first patented in 1959 by Texas Instruments. ICs are thin chips consisting of several interconnected semiconductor devices, including transistors. Chip miniaturization and mass production advancements in the 1960s led to the development of increasingly inexpensive, efficient products like pocket calculators and digital watches. Microprocessors, the next major innovation, were almost simultaneously first patented in the early 1970s by Intel, Texas Instruments, and others. Microprocessors are electronic components integrating miniaturized transistors and other elements on a single chip that can execute programs and perform functions like calculations and data storage. The best known microprocessor is the central processing unit or CPU, the semiconductor device driving personal computers. Recent advances in nanotechnology are being used in semiconductor fabrication to further miniaturize electronics.

The semiconductor industry includes companies primarily engaged in manufacturing semiconductors, other components for electronic applications, and semiconductor-making machinery. Industry products include chips or integrated circuits, wafers, transistors, microprocessors, circuit boards, electronic connectors, and most recently, nanotechnology products.

A list of the major semiconductor industry codes from the Standard Industrial Classification (SIC) system and the succeeding North American Industry Classification System (NAICS) follows. ⁱ

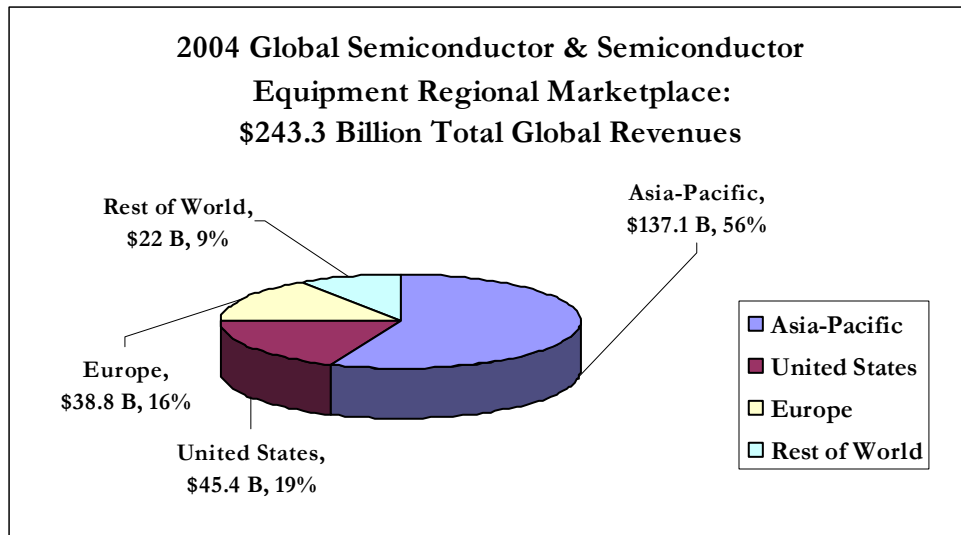
| | |
|--------------|---|
| SIC 3674 | Semiconductors and Related Devices |
| SIC 3672 | Printed Circuit Boards |
| SIC 3825 | Instruments for Measuring and Testing of Electricity and Electrical Signals |
| NAICS 3344 | Semiconductor and Other Electronic Component Manufacturing |
| NAICS 333295 | Semiconductor Machinery Manufacturing |

GLOBAL SEMICONDUCTOR INDUSTRY MARKETPLACE AND REVENUES

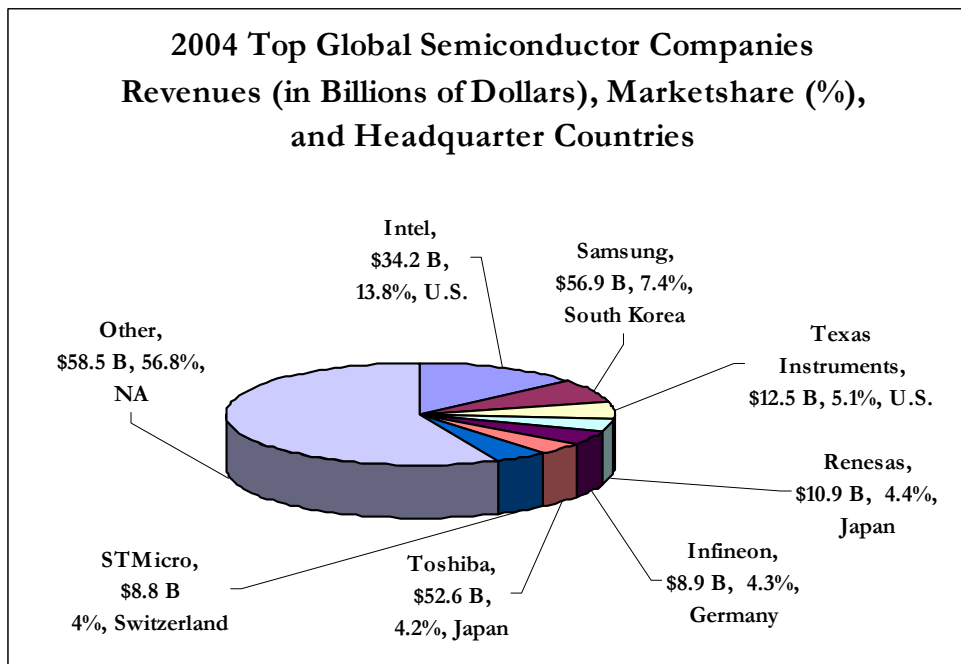
The global semiconductor industry marketplace grew exponentially in the early 1960s, surpassing \$1 billion in sales in 1964. Semiconductor industry growth since then has been cyclical, with marked periods of growth and decline. The latest global industry downturn was from 2000 to 2002, resulting from overcapacity and

decreased demand coupled with the global economic downturn. Over the past two years, the global semiconductor market has seen increased volume sales, applications, and end markets.

Datamonitor, a consulting firm, estimates the value of the 2004 global semiconductors and semiconductor equipment industry marketplace at \$243.3 billion in revenues – with semiconductors alone accounting for 86.5 percent or \$210.6 billion of that total. This represents strong annual growth of almost 30 percent, indicating the industry has recovered from the 2000-2002 downturn. The Asia-Pacific region – in particular China, South Korea, and India – holds more than 50 percent of this market and is also home to three of the top seven global semiconductor companies. Datamonitor forecasts that by 2009, the global semiconductors and semiconductor equipment marketplace will be valued at \$328.8 billion, an increase of more than 35 percent from 2004.



Source: Datamonitor



Source: Datamonitor

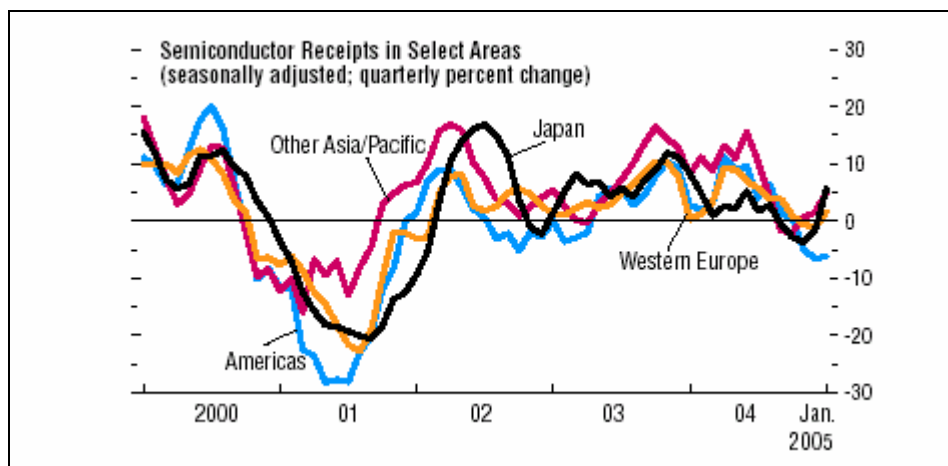
For the first six months of 2005, the Semiconductor Industry Association (SIA) reported that global chip sales totaled \$109.0 billion, an increase of 6.5 percent over the first six months of 2004. SIA reported that sales in most major end markets for semiconductors – including personal computers, wireless handsets, automotive applications, and wired communications – were substantially above expectations. SIA forecasts flat global revenues in 2005, resumed growth in 2006, and revenues exceeding \$250 billion in 2007.

Recent semiconductor industry trends include adding capacity in anticipation of forthcoming demand and outsourcing manufacturing to areas with inexpensive labor or even fabrication-less manufacturing, where all or most processes are outsourced. While volume sales, applications, and end markets are increasing, prices are falling. There are continuous efforts to develop greater functionality into chips, improve performance, and introduce new technologies so that companies can capture market share and drive further innovations. ⁱⁱ

U.S. SEMICONDUCTOR INDUSTRY MARKETPLACE

Datamonitor estimates that the United States accounted for \$45.4 billion, or approximately 19 percent of the \$243.3 billion global semiconductor and semiconductor equipment industry group’s value in 2004. Various sources agree that the U.S. now ranks second behind other world regions, particularly the Asia-Pacific, after years of being the global leader.

The following chart shows global semiconductor industry revenues from 2000 to 2005 and indicates the growing dominance of the Asia-Pacific region and decline of the Americas, which includes the U.S.



Publicly posted at http://www.imf.org/external/pubs/ft/weo/2005/01/chp1pdf/fig1_22.pdf
 Source: *World Economic Outlook 2005*, International Monetary Fund, April 2005, Figure 1.2: Semiconductor Market

According to the U.S. Bureau of Labor Statistics, semiconductor employment and the number of establishments have been in decline since 2000. From 2001 to 2004, employee numbers declined approximately 30 percent and establishments declined approximately 12 percent. In 2004, there were approximately 6,300 U.S. semiconductor industry establishments employing approximately 467,000 people, down slightly from 2003. Average weekly and average annual wages increased slightly from 2003 to 2004.

The following chart shows preliminary 2004 data on the U.S. semiconductor industry using the major industry codes (NAICS).

| 2004 U.S. SEMICONDUCTOR INDUSTRY INFORMATION | | | | | |
|---|--|--------------------|-----------------------|-------------------------|--------------------------|
| <i>NAICS</i> | <i>Description</i> | <i>Employees</i> | <i>Establishments</i> | <i>Ave. Weekly Wage</i> | <i>Ave. Annual Pay</i> |
| 3344 | Semiconductor and Electronic Components | 449,597 (P) | 6,072 (P) | \$1,294 (P) | \$67,273 (P) |
| 333295 | Semiconductor Machinery Manufacturing | 17,242 (P) | 232 (P) | \$2,064 (P) | \$107,314 (P) |
| OVERALL TOTALS / AVERAGES* | --- | 466,839 (P) | 6,304 (P) | \$1,679 * (P) | \$87,293.50 (P) * |

Source: U.S. Bureau of Labor Statistics
(P) = Preliminary

Private establishments only

There are efforts to reinvigorate the U.S. semiconductor marketplace. In August 2005, the first-ever U.S. government and U.S. semiconductor industry collaboration was announced in an effort to maintain U.S. competitiveness in the global semiconductor industry. The National Science Foundation (NSF) and the Nanoelectronics Research Initiative (NRI) – a consortium comprised by SIA members Advanced Micro Devices, Freescale Semiconductor, IBM, Intel, Micron Technology, and Texas Instruments – will both contribute \$1 million to fund a national university-based research program focused on nanoelectronics. Other, similar efforts are ongoing in Texas and across the nation.

A selection of U.S. semiconductor industry marketplace highlights follow:

- According to the Semiconductor Industry Association (SIA), in 2004 the U.S. semiconductor industry had sales of \$99.5 billion, or 47 percent, of the \$213 billion global semiconductor market and employed 225,000 people.
- SIA estimates only 20 percent of the new, state-of-the-art production facilities are now under construction domestically and has noted a major migration of chip manufacturing from the U.S. to Asia in recent years.
- In 2004, venture capital (VC) firms invested approximately \$1.9 billion in the U.S. semiconductor industry according to PriceWaterHouseCoopers' MoneyTree Survey. That figure represents 11.6 percent of the total \$16.3 billion VC investment nationwide in all industries.
- Two of the top seven global semiconductor companies – Texas Instruments and Intel – are based in the U.S.
- In 2004, the U.S. Census Bureau valued U.S. shipments of semiconductors and other electronic components at \$115.3 billion, an 11.5 percent decrease from 2003's revised total. ⁱⁱⁱ

TEXAS SEMICONDUCTOR INDUSTRY MARKETPLACE OVERVIEW

Texas has been a national and global leader in the semiconductor industry since the 1950s. The state of Texas has committed many resources to the industry over the years. The combination of government and private business support, a highly trained workforce, excellent educational and research institutions, and a

favorable business climate have contributed toward maintaining the state's leadership in the semiconductor industry.

The following are some of the recent state government activities supportive of the semiconductor industry:

- In June 2005, Texas Governor Perry signed a bill creating the \$200 million Emerging Technology Fund (ETF). The ETF will improve Texas university research, increase collaboration between public and private sector entities, help start-up technology firms, assist in speeding technology commercialization, and attract more top-notch companies and researchers.
- In October 2004, Texas Governor Perry announced a state industry cluster initiative to stimulate long-term growth and economic development in six key areas. The *Advanced Technologies and Manufacturing* and *Information and Computer Technology* industry clusters both contain semiconductor elements.
- In 2002, the Texas Technology Initiative (TTI) was formed to promote state technological innovations and development through an alliance of state public and business leaders, educators, and entrepreneurs. The TTI long term economic development strategy targets many advanced technologies, including semiconductors.
- In 2001, the 77th Texas Legislature appropriated \$800 million for science, engineering, research, and commercialization activities, including \$385 million for research infrastructure.

Texas is home to one of the semiconductor industry's top ten global companies, one of the world's top ten chip makers, and one of the industry's leading national research consortiums:

- Texas Instruments (TI), headquartered in Dallas, was ranked fourth by revenues in the 2004 global semiconductor market. TI has been instrumental in many key semiconductor industry developments. Jack Kilby (1923-2005), a legend in the semiconductor industry, joined TI in Dallas in 1958 and retired from there in 1983. Kilby invented the integrated circuit (IC) in 1958, went on to hold approximately 60 patents, developed popular products like the pocket calculator, and won the 2000 Nobel Prize in Physics for his role in the IC invention.



Jack Kilby holding an old TI calculator and a new portable calculator Source: Publicly posted at http://en.wikipedia.org/wiki/Image:Jack_kilby.jpg

- Freescale Semiconductor, headquartered in Austin, ranked in the top ten largest global chip makers in 2004 with revenues of \$5.7 billion.
- In 1987, the semiconductor consortium SEMATECH was founded and headquartered in Austin. The consortium was created as a way for semiconductor companies to work in cooperation to regain the U.S' status as a world-leader in semiconductor manufacturing. Over the years, SEMATECH has had leading semiconductor companies as members, established both domestic and international partnerships, developed many innovations, expanded to become an international consortium, and proven itself in a highly competitive marketplace. Current members include Advanced Micro Devices, Freescale Semiconductor, Hewlett-Packard, IBM, Infineon, Intel, Philips, Texas Instruments, and Samsung Electronics. Texas is also home to SEMATECH subsidiaries ISMI (International Semiconductor Manufacturing Initiative), ATDF (Advanced Technology Development Facility), and the Advanced Materials Research Center (AMRC).^{iv}

TEXAS SEMICONDUCTOR INDUSTRY STATISTICS AND EMPLOYMENT

Texas semiconductor industry statistics and employment figures indicate steady growth, a strong national presence, and a solid support base. According to the Texas Workforce Commission (TWC), from 2004Q1 to 2005Q1 there were slight increases in the Texas semiconductor industry's employment, number of establishments, and average weekly wages. Most significantly, TWC figures indicate that from 2004Q1 to 2005Q1, the total semiconductor industry's average weekly wages increased by \$140.50 and average annual pay increased by \$7,306. According to the U.S. Census Bureau's 2003 Annual Survey of Manufactures, Texas ranked in the top five nationally in the semiconductor and electronics components industry area for capital investments, employees, value added per employee, and value of shipments. The Dallas-Fort Worth, Houston, Austin, and San Antonio metropolitan areas account for most of the state's semiconductor industry employment.

The following chart provides a snapshot of the 2005Q1 Texas semiconductor industry using the major industry codes (NAICS).

| 2005Q1 TEXAS SEMICONDUCTOR INDUSTRY INFORMATION | | | | | |
|---|---|------------------|-----------------------|-------------------------|------------------------|
| <i>NAICS</i> | <i>Description</i> | <i>Employees</i> | <i>Establishments</i> | <i>Ave. Weekly Wage</i> | <i>Ave. Annual Pay</i> |
| 3344 | Semiconductor and Electronic Components | 51,129 | 441 | \$1,941 | \$100,932 |
| 333295 | Semiconductor Machinery Manufacturing | 506 | 19 | \$1,460 | \$75,920 |
| OVERALL TOTALS / AVERAGES * | --- | 51,635 | 460 | \$1,700.50 * | \$88,426 * |

Source: Texas Workforce Commission Quarterly Employment & Wages

Private establishments only

The following chart provides information from the most recent U.S. Census Bureau's Annual Survey of Manufactures (ASM) on the Texas semiconductor industry using the major industry codes (NAICS). Note the ASM only provides data to the four-digit level and the NAICS 3344 data are incomplete.

| 2003 TEXAS & U.S. SEMICONDUCTOR MANUFACTURING INFORMATION | | | | | |
|--|---|------------------|-----------------------|---------------------------|----------------------------------|
| <i>Region</i> | <i>NAICS/Description</i> | <i>Employees</i> | <i>Value Added</i> | <i>Value of Shipments</i> | <i>Total Capital Investments</i> |
| TEXAS | 3344/Semiconductor and Electronic Components | 40,225 | \$5.95 Billion | \$13.3 Billion | \$1.13 Billion |
| U.S. | 3344/Semiconductor and Electronic Components | 388,604 | \$72.7 Billion | \$113.2 Billion | \$5.62 Billion |
| TEXAS NATIONAL RANKING | --- | 2 | 4 | 2 | 1 |

Source: Annual Survey of Manufactures, 2003

The following chart lists some of the leading companies operating in the Texas semiconductor industry.

**TOP SEMICONDUCTOR COMPANIES IN TEXAS
(ARRANGED BY EMPLOYMENT)**

| Company | City | Business Description |
|-------------------------------------|-------------------|---|
| Freescale Semiconductor | Austin | Semiconductors and integrated circuits |
| IBM Corporation | Austin | Advanced information technologies, including microelectronics |
| Raytheon Systems | Garland, McKinney | Electronic Components |
| Advanced Micro Devices | Austin | Microchips |
| Applied Materials | Austin | Semiconductor production equipment manufacturing |
| Texas Instruments | Dallas, Sherman | Semiconductors |
| Sollectron Texas | Austin | Computer circuit boards |
| Dallas Semiconductor | Dallas | Electronic chips & chip-based subsystems |
| STMicroelectronics | Carrollton | Electronic Components |
| Samsung Austin Semiconductor | Austin | Dynamic Random Access Memory (DRAM) chips |

Sources: 2005 Directory of Texas Manufacturers, published by Manufacturers News Inc.; InfoUSA's ReferenceUSA dataset of Texas companies; company websites; Austin Chamber of Commerce website at <http://www.austin-chamber.org/DoBusiness/GreaterAustinProfile/business.html>

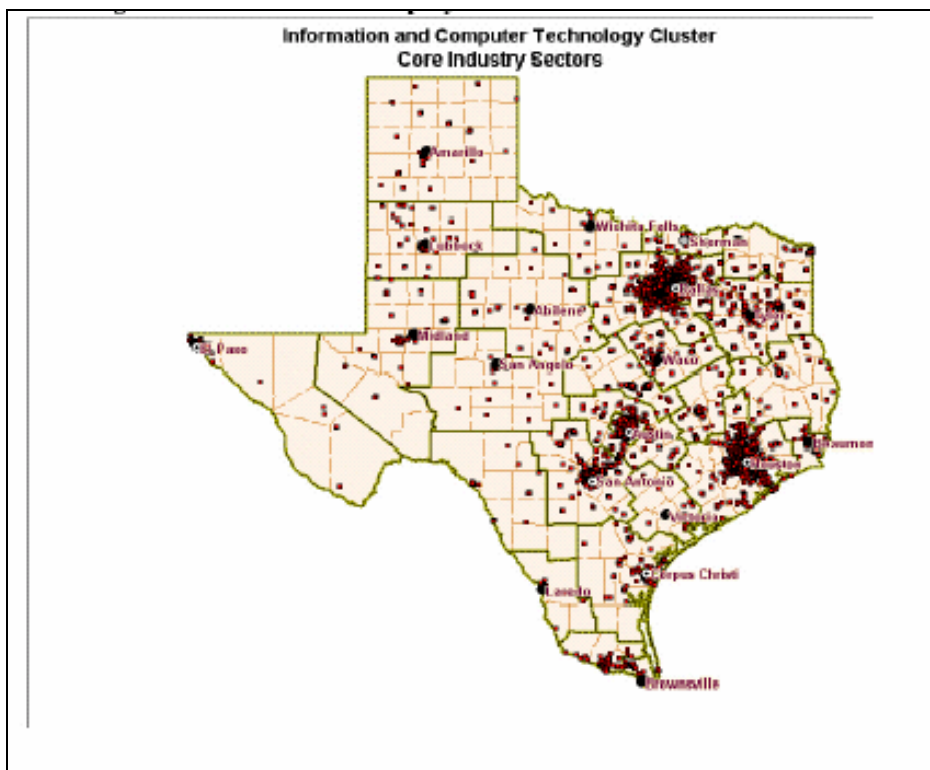
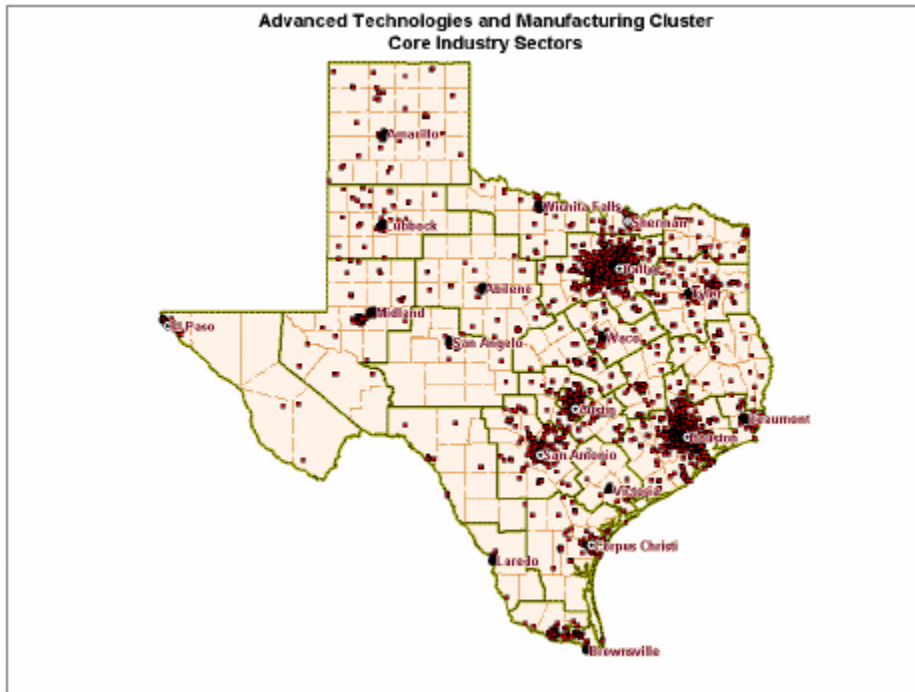
A selection of Texas semiconductor industry statistics highlights follow:

- In 2005Q1 and 2005Q2, venture capital (VC) firms invested \$63 million in the Texas semiconductor industry according to the PriceWaterHouseCoopers MoneyTree Survey. In 2004, \$112 million was invested in the Texas semiconductor industry. Texas ranked third in the nation for semiconductor VC investment in 2004 and in 2005 to date.
- In 2004, Texas exports for computer and electrical equipment (NAICS 334), which includes semiconductor manufacturing, were valued at \$31.65 billion – up from \$28.38 billion in 2003. NAFTA partners Canada and Mexico accounted for most of this trade.
- From 2000 to 2005 to date, the U.S. Department of Defense (DoD) granted Texas approximately \$9.9 million in unclassified semiconductor-related SBIR awards. DoD classified awards aren't disclosed.
- From 1999 to 2005 to date, the National Science Foundation (NSF) granted Texas \$2.3 million in semiconductor-related SBIR (Small Business Innovation Research) awards.
- According to the AeA's (formerly the American Electronics Association) publication *Cyberstates 2005*:
 - In 2003, Texas ranked second nationally in *semiconductor manufacturing* and high-tech employment at an estimated 36,900 jobs.
 - In 2004, Texas ranked second nationally in high-tech exports at an estimated \$34.7 billion. This figure represents 30 percent of total 2004 Texas exports.
 - In 2004, Texas ranked third nationally in venture capital investments at \$1.1 billion.
 - In 2003, Texas ranked second nationally for high-tech payroll, employment, and establishments and engineering services employment.
 - In 2002, Texas ranked fourth nationally in R&D expenditures at an estimated \$14.2 billion. ^v

TEXAS SEMICONDUCTOR INDUSTRY CLUSTER MAPS

The Texas Workforce Commission (TWC) has created a mapping tool to track the Texas industry clusters announced by Governor Perry in October 2004. The following *Advanced Technologies and Manufacturing* and *Information and Computer Technology* industry clusters maps both contain semiconductor elements. The TWC maps substantiate that the Dallas-Fort Worth, Houston, Austin, and San Antonio metropolitan areas account for most of the state's semiconductor industry employment. ^{vi}

Core Business Employment in Two Texas Industry Clusters



Source: Industry Clusters GIS at <http://www.texasindustryprofiles.com/apps/gis/clustersgis/>

TEXAS SEMICONDUCTOR INDUSTRY PATENTS AND EDUCATION STATISTICS

Texas public universities and other educational institutions are significantly invested in semiconductor industry-related research and development (R&D), leading to continual discoveries. A selection of state statistics follows:

- In 2004, R&D expenditures in Texas public universities for microelectronics & computer technology were \$56 million.
- In 2004, 14.2 percent of total R&D expenditures in Texas public higher education institutions were for engineering at \$319.1 million. Computer science accounted for another \$49.5 million. The state's total 2004 R&D expenditures in higher educational institutions were estimated at \$2.25 billion.
- In 2003, Texas ranked second nationally in science and engineering R&D expenditures at universities and colleges. Expenditures were estimated at \$2.76 billion according to the National Science Foundation.
- In 2002, Texas ranked fourth nationally in total R&D expenditures, which were estimated at \$14.2 billion according to the AeA's publication *Cyberstates 2005*.
- In 2001, Texas received almost \$3 billion for total R&D from federal agencies. Most of this funding came from the Department of Defense (\$1.1 billion) and primarily supported industrial firms (\$.8 billion).
- Between 2000 and 2004, an estimated 2,966 Texas semiconductor utility patents were issued. Semiconductor device manufacturing patents accounted for most of these patents. From 2002 to 2004, Texas ranked third in the nation for patent class 438 and fourth in the nation for patent class 257.

The following chart provides more Texas semiconductor patent data. ^{vii}

2000-2004 TEXAS SEMICONDUCTOR UTILITY PATENTS

| <i>Class</i> | <i>Class Title</i> | <i>2000</i> | <i>2001</i> | <i>2002</i> | <i>2003</i> | <i>2004</i> | <i>Total</i> |
|--------------|---|--------------|--------------|--------------|--------------|--------------|---------------|
| 438 | Semiconductor Device Manufacturing: Process | 326 | 343 | 290 | 240 | 267 | 1466 |
| 716 | Design and Analysis of Circuit or Semiconductor Mask (Data Processing) | 20 | 23 | 42 | 55 | 44 | 184 |
| 257 | Active Solid-State Devices (e.g., Transistors, Solid-State Diodes) | 182 | 140 | 121 | 121 | 138 | 702 |
| 327 | Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems | 86 | 92 | 84 | 92 | 62 | 416 |
| 326 | Electronic Digital Logic Circuitry | 42 | 44 | 31 | 33 | 35 | 185 |
| 117 | Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus | 3 | 3 | 4 | 3 | 0 | 13 |
| --- | TEXAS TOTALS | 659 | 645 | 572 | 544 | 546 | 2,966 |
| --- | U.S. TOTALS | 4,275 | 5,099 | 5,428 | 5,628 | 5,579 | 26,009 |

Source: United States Patent and Trademark Office at <http://www.uspto.gov/web/offices/ac/ido/oeip/taf/tecstc/classes.htm>

The following chart lists fiscal year 2004 semiconductor-related R&D expenditures at selected Texas public universities. It also indicates the top five institutions in each subject area.

**FISCAL YEAR 2004 HIGHEST SEMICONDUCTOR-RELATED R&D EXPENDITURES AT
SELECTED TEXAS PUBLIC UNIVERSITIES**

| <i>Selected Texas Institutions</i> | <i>Microelectronics & Computer Technology</i> | <i>Computer Science</i> | <i>Engineering</i> | <i>Manufacturing Technology</i> |
|--|---|-------------------------|----------------------|---------------------------------|
| Texas A&M University and Services | <i>\$4,810,658</i> | <i>\$8,938,716</i> | <i>\$121,707,373</i> | <i>\$6,456,816</i> |
| Texas Tech University | <i>\$3,248,366</i> | <i>\$863,059</i> | <i>\$12,256,615</i> | <i>\$2,478,651</i> |
| University of Texas at Arlington | <i>\$4,942,111</i> | <i>\$2,870,931</i> | <i>\$9,113,443</i> | <i>\$2,428,487</i> |
| University of Texas at Austin | <i>\$33,225,421</i> | <i>\$22,191,391</i> | <i>\$128,816,119</i> | <i>\$1,083,627</i> |
| University of Texas at Dallas | <i>\$1,203,798</i> | <i>\$3,813,979</i> | <i>\$6,657,797</i> | <i>\$318,697</i> |
| University of Texas – Pan American | <i>\$467,712</i> | <i>\$467,712</i> | <i>\$878,169</i> | <i>\$527,693</i> |
| University of Houston | <i>\$5,749,014</i> | <i>\$5,405,868</i> | <i>\$13,605,268</i> | <i>\$309,536</i> |
| SELECTED TEXAS UNIVERSITIES' TOTALS | \$53,647,080 | \$44,551,656 | \$293,034,784 | \$13,603,507 |
| ALL TEXAS PUBLIC UNIVERSITIES' TOTALS | \$55,993,225 | \$49,518,031 | \$311,993,095 | \$14,128,747 |

Italicized numbers indicate the five highest in each category.

Source: Texas Higher Education Coordinating Board at <http://www.theccb.state.tx.us/reports/pdf/0836.pdf>

TEXAS NANO-ELECTRONICS: SEMICONDUCTOR INDUSTRY AREA

The term *nanoelectronics* refers to electronics at the sub-micron or molecular level. Nanoelectronics is one application of nanotechnology, the science of developing materials at the atomic and molecular level which encompasses diverse industries including electronics and biotechnology. The semiconductor industry has pioneered the use of nanotechnology to miniaturize electronics, a process critical to industry advances.

Texas is a leader in nanoelectronics. The state actively supports nanoelectronics research and commercialization efforts and is experiencing steady growth within the marketplace. Twenty-one Texas universities and 30 to 50 commercial businesses are researching and developing nanotechnology and nanoelectronics-derived products and services. A selection of recent Texas nanoelectronics industry area activities and statistics follows:

- In June 2005, the Advanced Materials Research Center (AMRC) announced financial backing for three Texas-based startup companies working in lithography, optical interconnects, and nanomaterials. The companies are Austin-based Molecular Imprints and Xidex, and Dallas-based Zyvex. Funding details weren't disclosed.
- In March 2005, Small Times Magazine ranked Texas fifth in its annual ranking of the top ten micro and nanotechnology states.

- In April 2005, NASA awarded Rice University's Carbon Nanotechnology Laboratory a four-year, \$11 million contract to produce a prototype power cable made entirely of carbon nanotubes.
- In 2004, the Nanoelectronics Research Initiative (NRI) was approved by SIA as a consortium of SIA companies seeking to develop accelerate research in nanoelectronics for the benefit of the semiconductor industry. SIA companies chartered the Nanoelectronics Research Corporation (NERC), an SIA organization, to develop and administer a university-based program to address issues around emerging areas in electronics at the nanoscale. All the SIA companies participating in this effort have a Texas connection, including Texas-based TI and Freescale Semiconductor and Texas-located AMD, IBM, Intel, and MICRON Technology.
- From 2000 to 2005 to date, the U.S. Department of Defense (DoD) granted Texas approximately \$4.5 million in unclassified nanoelectronics-related SBIR (Small Business Innovation Research) awards. DoD classified awards aren't disclosed.
- From 1999 to 2005 to date, NSF granted Texas \$769,292 in nanoelectronics-related SBIR awards.
- In 2002, NASA's Office of Aerospace Technology established seven University Research, Engineering and Technology Institutes (URETI), each in an area of long-term strategic interest. Texas A&M University was awarded a NASA contract and selected to lead a URETI team of six Texas universities to study next generation nanotechnology materials for aerospace. ^{viii}

SELECTED RECENT TEXAS SEMICONDUCTOR INDUSTRY ACTIVITIES

A selection of recent, major Texas semiconductor industry activities follows.

- In early October 2005, Advanced Micro Devices Inc. (AMD) submitted plans to the City of Austin for the development a large \$200 million corporate campus in Southwest Austin. Construction on the new campus is set to begin in early 2006, with employees beginning to move there in early 2007. The campus is expected to be completed by mid-2007.
- On September 28, 2005, Samsung Electronics Co. Ltd. announced it will become a full member of SEMATECH, the Austin-based semiconductor research consortium. As one of the top global semiconductor manufacturers, Samsung's decision is a significant endorsement of Texas and SEMATECH. Earlier in 2005, Samsung joined the International Sematech Manufacturing Initiative (ISMI), a SEMATECH subsidiary.
- In December 2004, Freescale Semiconductor, Inc. was officially spun-off from Motorola, Inc. In April 2005, Freescale announced it will locate its global headquarters in Austin, Texas. Freescale Semiconductor was ranked as one of the top ten largest global chip makers in 2004.
- In November 2004, Texas Instruments (TI) broke ground on a new \$3 billion, 1 million square foot wafer fabrication research and manufacturing plant in Richardson. Simultaneously, The University of Texas at Dallas (UTD) broke ground on a new \$85 million research facility. Both were predicated by Texas Governor Perry's June 2003 announcement of a \$50 million grant from the Texas Enterprise Fund to enhance engineering and computer science programs at UTD. The investment played a key

role in TI's decision to build a new fabrication plant in Texas. The new TI plant will employ 1,000 workers. TI's expansion was the largest job creation announcement in the nation in 2003.

- In July 2004, Samsung Austin Semiconductor L.L.C. broke ground on its 34,000 square foot expansion in Austin, which will produce next generation nano-scale semiconductor memory technology. The company announced its three year, \$500 million investment to expand and upgrade its Austin facility in May 2003.
- In July 2004, SEMATECH announced the creation of an independent subsidiary of its R&D wafer fab and associated analytical laboratories. Advanced Technology Development Facility, Inc. (ATDF) is a privately held, for-profit corporation co-housed and co-based in Austin with SEMATECH. ATDF serves as SEMATECH's primary R&D facility under a service contract and offers customized services to an expanded customer base.
- In March 2004, Texas Governor Perry announced a \$40 million grant from the Texas Enterprise Fund to help launch the Advanced Materials Research Center (AMRC) in conjunction with SEMATECH, the semiconductor industry consortium based in Austin. The AMRC will work with Texas universities, focus on cutting-edge technologies including semiconductors and nanotechnology, accelerate technological commercialization, create an estimated 4,000 Texas high-tech jobs over the next 10 years, and help keep Texas competitive.
- In January 2004, SEMATECH's new International Sematech Manufacturing Initiative (ISMI) consortium began operations in Austin. ISMI is dedicated to helping semiconductor manufacturers cooperate, reduce costs, drive productivity, and development new products.
- In December 2003, Maxim Integrated Products announced a commitment of \$100 million capitol investment toward a new semiconductor facility in San Antonio that should create 600 new jobs over three to four years. Texas Governor Perry announced a \$1.5 million grant from the Texas Enterprise Fund to help secure the facility. ^{ix}



INDUSTRY RESOURCES

AeA (formerly the American Electronics Association) at <http://www.aeanet.org/>

A national non-profit trade association representing all segments of the electronics industry, including semiconductors. AeA offers some free industry data and publications on its website.

The Federal Reserve Bank of Dallas at www.dallasfed.org

A U.S. government website profiling Texas economic and demographic data. Note the *Hot Stats – Texas High Tech Employment* report, updated regularly, at <http://www.dallasfed.org/data/hotstats/techempl.html>.

Nanotechnology Foundation of Texas (NFT) at <http://www.nanotechfoundation.org/>

NFT is a non-profit research initiative approved by the Semiconductor Industry Association in 2004 to develop nanoelectronics in Texas. The website offers news, statistics, industry information, reports, a calendar, and more.

National Science Foundation (NSF) at <http://www.nsf.gov/>

NSF is a federal agency that promotes the progress of science. The NSF website has a wealth of publications and statistics covering many aspects of science and engineering on the state, national, and international levels.

SEMATECH at <http://www.sematech.org>

SEMATECH is a Texas-based consortium of global semiconductor companies. The website includes some publications such as a semiconductor dictionary, news items, links to other websites including the Texas Technology Initiative, AMRC, and the International Technology Roadmap for Semiconductors.

SEMI at <http://www.semi.org/>

This global semiconductor industry association website offers free market data and statistics, news, events information, and more.

Semiconductor Industry Association (SIA) at www.sia-online.org/

SIA is a U.S. trade association. The SIA website offers U.S. and global market statistics, press releases, industry facts and history, and more.

Texas Nanotechnology Initiative (TNI) at <http://www.texasnano.org/>

TNI is a consortium of Texas-based academic, business, and political entities and individuals interested in promoting the state as a leader in nanotechnology, including nanoelectronics. The website offers news items, a calendar, related links, and more.

World Semiconductors Trade Statistics (WSTS) at <http://www.wsts.org/>

WSTS is a nonprofit association. The website offers semiconductor business resources, including world market statistics. Most resources are available to members only.

ENDNOTES

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