



ADVANCED TECHNOLOGY & MANUFACTURING

Advanced Technology & Manufacturing is one of the six industry clusters identified in 2004 by Gov. Rick Perry as part of his long-term, strategic job creation plan. Each cluster was selected because of its powerful potential for future economic growth.

The Advanced Technology & Manufacturing cluster is made up of three subclusters: nanotechnology, semiconductors and automotive manufacturing. Texas' world-class universities and research facilities, highly trained workforce, strong government and private business support, and a thriving business climate make Texas a national and global leader in all three subclusters.

Nanotechnology

The science of very small things means big business in Texas. Nanotechnology involves the engineering of materials at the scale of atoms and molecules. Nanotech and its applications cross all six Texas industry clusters.

Texas is a global leader in nanotechnology R&D; is nationally ranked for nanotech-related activities including research, venture capital, and commercialization; and has laid claim as the birthplace of nanotechnology. In 2006, Small Times magazine ranked Texas third for venture capital in its annual ranking of top 10 micro and nanotechnology states, and Rice University in Houston ranked fourth in the top 10 list of national universities for micro and nanotechnology. Major Texas nanotech employers include LynnTech Inc., Southern Clay Products, Applied Optoelectrics Inc., Zyvex Corporation, and Molecular Imprints.

Semiconductors

Texas is the birthplace of the integrated circuit and has been a global leader in the semiconductor industry since the 1950s. Texas ranks second in high-tech employment, number of establishments and semiconductor employment, according to AeA's Cyberstates 2006. Major Texas semiconductor employers include Samsung, Texas Instruments (TI), Raytheon, Freescale Semiconductor, Advanced Micro Devices, and Labinal. Texas is home to one of the semiconductor industry's top 10 global companies (TI), one of the world's top 10 chip makers (Freescale Semiconductor), and one of the industry's leading national research consortiums (SEMATECH).

Dallas-based TI has been instrumental in many key semiconductor industry developments including the late Jack Kilby's invention of the integrated circuit (IC) in 1958. Dr. Kilby went on to hold more than 60 patents, develop popular products like the pocket calculator, and win the 2000 Nobel Prize in Physics for his role in the IC invention.

Automotive Manufacturing

Texas has been a leader in the automotive manufacturing industry for more than 50 years – in 2004, General Motors in Arlington celebrated five decades of manufacturing. The Lone Star State's auto industry shifted into the next gear in 2006 with the opening of Toyota's sixth North American plant, a new truck assembly facility in San Antonio. The new plant manufactures the popular Toyota Tundra and created more than 4,000 jobs in Texas.

Texas is No. 1 in automotive production capacity with 388,000 units expected through 2010, according to Ward's AutoWorld. The Lone Star State is the single-largest market for full-size pick-ups. In 2006, approximately 12 percent of all U.S. pick-up trucks were sold in Texas. In addition to GM and Toyota, major Texas auto manufacturing employers include Peterbilt Motors, Sanden International, Yazaki, and Stewart & Stevenson.

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AEROSPACE & DEFENSE

Texas has been on the leading edge of aerospace and defense from the beginning of manned flight. The “can-do” spirit that comes naturally to Texans has made the Lone Star State a place of many firsts in innovation and industry.

From the earliest bi-planes to high-tech vehicles capable of landing on the moon, all types of aircraft have been manufactured in Texas. Major commercial airlines were born in the Lone Star State and some of the world’s most advanced military aircraft are designed and built in Texas. Texas’ aerospace and aviation industry comprises about 200,000 jobs at 1,700 companies with workers earning an average annual salary of about \$50,000.

Other Texas statistics:

- Texas has 23 airports with Customs Service (Ports of Entry).
- Twenty colleges and universities and 14 public school districts in Texas offer aeronautical courses.
- More than 6.9 million departures and arrivals happen annually at Texas’ commercial airports.
- Fort Worth Alliance Airport is the first purely industrial airport in the Western Hemisphere.
- Dallas Fort Worth International Airport set an all-time international cargo record in 2006 with 281,486 metric tons.
- Texas has more than 47,000 licensed pilots (private, commercial and helicopter).

As a former Air Force pilot, Gov. Rick Perry understands the importance of aerospace and aviation. Gov. Perry piloted a C-130 Hercules tactical airlift aircraft in the United States, Europe and the Middle East during his military service in the 1970s.

In 2004, Gov. Perry announced a long-term, strategic job creation plan that will focus state efforts in six industry clusters, one of which is aerospace and defense. Each cluster was selected because of its powerful potential for future economic growth.

Major aerospace and aviation employers in Texas:

- American Airlines, Continental Airlines, Southwest Airlines, and ExpressJet
- American Eurocopter
- BAE Systems
- Bell Helicopter Textron
- The Boeing Company
- Gulfstream Aerospace Corporation
- Johnson Space Centers
- L-3 Communications
- Lockheed Martin
- Raytheon
- Vought Aircraft Industries

Aerospace & Aviation, within the Economic Development & Tourism Division of the Office of the Governor, works closely with decision makers in the aerospace industry, other governmental agencies and academic institutions to build a business environment that’s second to none.

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BIOTECHNOLOGY & LIFE SCIENCES

Texas continues to provide fertile ground for biotechnology and life sciences. Attractive financial incentives, a highly skilled work force, world-class educational and research institutions, and a first-rate transportation and logistics infrastructure are transforming Texas into a global leader in the biotech and life sciences industry.

Biotechnology and life sciences is one of the six industry clusters identified in 2004 by Gov. Rick Perry as part of his long-term, strategic job creation plan. Each cluster was selected because of its powerful potential for future economic growth.

A majority of the top global biotech and pharmaceutical companies have locations in Texas, underscoring the Lone Star State's vitality in these industries. Texas is home to approximately 910 traditional biotechnology, biomedical research, business and government consortia, medical manufacturing companies, and world-class universities and research facilities. These facilities and institutions employ nearly 29,000 workers at an average annual salary of \$83,772.

When defining biotechnology areas more broadly, the Texas marketplace includes approximately 3,000 establishments employing almost 79,000 workers at an average annual salary of almost \$68,293.

Texas' core biotechnology manufacturing establishments are in the Houston, Dallas-Fort Worth, Austin, and San Antonio metropolitan areas.

Major biotech and life science employers in Texas include:

- Abbott Laboratories
- Kimberly Clark
- Laboratory Corporation of America
- Southwest Research Institute
- US Oncology

Expanding the biotech and life science industry is a top priority for Texas lawmakers. In 2001, the Texas Legislature appropriated \$800 million for science, engineering, research, and commercialization activities, including \$385 million for research infrastructure. A year later, Gov. Perry established the Council on Science and Biotechnology Development.

Another visionary move came in 2005 when Gov. Perry announced the \$200 million Texas Emerging Technology Fund (ETF) to promote and finance technological innovations in multiple industries, including biotechnology.

Texas biotech and life science industry highlights:

- As of March 2007, the ETF has awarded \$18.8 million for biotech-related projects; \$8.4 million to commercialize eight biotech start-up companies and \$10.4 million to recruit high-caliber biotechnology faculty to four Texas universities.
- Texas ranked in the top 10 nationally for the number of traditional biotechnology companies located in-state, according to 2006 Ernst & Young data.
- In 2005, one of every 23 U.S. biotech employees works in Texas, according to an expanded definition of biotechnology and the most current data from the U.S. Bureau of Labor Statistics.

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ENERGY

Energy is one of the oldest and most diverse industries in Texas. Since the discovery of the Spindletop oilfield in 1901, Texas has embodied the production of Energy. In 2004, Gov. Rick Perry identified Energy as one of six industry clusters in his long-term, strategic job creation plan. Each cluster was selected because of its powerful potential for future economic growth.

The Energy cluster is made up of three subclusters: Oil and Gas Exploration and Production; Electric/Coal/Nuclear Power Generation; and Renewable and Sustainable Energy Generation. Texas' geography and natural resources, excellent transportation systems, and skilled labor force and leadership in environmental research give the state a Lone Star advantage in Energy.

Oil and Gas Exploration and Production

Oil and gas exploration and production is one of Texas' most established industries. While new oil and gas reservoirs are being discovered on an ongoing basis (61 new oil reservoirs and 110 new natural gas discoveries in 2006 alone), the largest increment of oil yet to be produced is likely to come from existing reservoirs.

Approximately 7,000 operators run more than 250,000 active wells. Of these, approximately 143,475 are producing oil wells and 78,000 are producing natural gas wells. In both crude oil and natural gas, Texas leads the United States in both production and reserves. Texas also leads the nation in enhanced oil recovery potential.

Electric/Coal/Nuclear Power Generation

The electric power industry in Texas generates approximately 12.8 million megawatthours net from electric utilities and 37.2 million megawatthours net from independent power producers, providing the highest generating capacity in the nation. Texas is the only state with its own power grid, and boasts one of the most robust, well-functioning electric markets in the world.

Texas also has approximately 4,800 megawatts (MW) of installed nuclear power capacity being generated at two plants. The Comanche Peak project is located in Somervell County, and the South Texas Project is on the Gulf Coast in Matagorda County. Nuclear energy supplies 6 percent of the electricity generated in Texas. Texas ranks fifth nationally among states with coal production, and is the largest producer of lignite. Lignite coal constitutes approximately 97 percent of the near-surface coal resources in Texas, and is most commonly used in electric generation plants.

Renewable and Sustainable Energy Generation

Texas is better known for its oil wells than its wind turbines; nonetheless, the state currently leads the nation in renewable energy potential and in wind energy production. Texas has been the top wind producer for the past two years in the United States. Texas accounted for nearly a third of the new wind power installed in 2006, and three of the five largest wind farms in the nation are located in the Lone Star State.

As of 2007, Texas has an installed wind generating capacity of 2,768 MW, which is enough power for more than 600,000 average-sized homes a year. Recent state legislation has laid the groundwork for large transmission lines, which will further accelerate the use of wind power in the state, and an additional 1,000 MW of wind power is currently under construction.

Other renewable energy technologies Texas is pursuing include solar, geothermal, wave or tidal energy, biomass and methane gas, and hydropower.

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INFORMATION & COMPUTER TECHNOLOGY

Information and Computer Technology is one of six industry clusters identified in 2004 by Gov. Rick Perry as part of his long-term, strategic job creation plan. The IT cluster was selected because of its powerful potential for future economic growth, and because it is an important contributor to the other five clusters.

The IT cluster encompasses many industry segments, including computers, software, telecommunications, and IT services. Major IT employers in Texas include Dell, Alcatel U.S.A., Texas Instruments, Nokia, Fujitsu Network Communications, Freescale Semiconductor, and Ericsson Inc.

According to the American Electronics Association (AeA) Cyberstates 2007 Report, Texas ranks second nationwide in the number of high-tech workers, in the size of high-tech payroll, and in the number of businesses. Texas ranked first in computer training employment; and second in engineering services jobs, computer and peripheral equipment manufacturing employment, and semiconductor manufacturing jobs.

Texas's high-tech industry is back on track after a national downturn following the bursting of the tech bubble in 2001. The AeA reports that the average tech industry wage in the Lone Star State pays 84 percent more than the average private sector wage, and venture capital investments in Texas high-tech rose by 28 percent in 2006.

Another recent development in the IT cluster is that in March 2007, the University of Texas at San Antonio (UTSA) received a \$3.5 million in Texas Emerging Technology Fund grants to recruit Dr. Ravi Sandhu, a nationally recognized leader in cyber security. Dr. Sandhu will be the founding executive director and chief scientist of the UTSA Institute for Cyber Security Research.

Nearly all daily functions, such as the use of electrical power, air travel and banking, depend on secure cyber systems to operate. UTSA was the first university in Texas designated as a National Security Agency Center for Infrastructure Assurance and Security by the federal government. For more than five years, UTSA has worked to build a multidimensional program to meet and overcome attacks against the United States' critical cyber infrastructure.

Computer Industry Overview

<u>Texas Industry Facts</u>		<u>How Texas Ranks</u>	
Firms	1,163	All Employees	2
Establishments	1,346	Production Workers	2
Employment	116,356	Value Added	2
Average Weekly Wage	\$2,055	Value of Shipments	2
Value Added Per Employee	\$312,715	Total Capital Investments	2
Value of Shipments	\$46.2 billion		
Total Capital Investments	\$2.8 billion		
Sources: Texas Workforce Commission - 2006Q4 Employment & Wages, Annual Survey of Manufactures, 2005		Source: Annual Survey of Manufactures, 2005	
<u>Texas Exports</u>		<u>Top Export Markets</u>	
<ul style="list-style-type: none"> In 2006, Texas computer and electrical equipment exports were valued at \$35.2 billion – up from \$31.4 billion in 2005. In 2006, computer and electrical equipment was Texas 1st largest exporting category. 		Mexico	\$12,881,983,913
Source: WISERTrade, 2006 (NAICS 334)		Canada	\$3,299,693,669
		Republic of Korea	\$2,275,906,296
		China (Mainland)	\$2,011,152,384
		Malaysia	\$1,579,467,991
		Source: WISERTrade, 2006 (NAICS 334)	

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PETROLEUM REFINING & CHEMICAL PRODUCTS

The first sighting of oil in Texas happened centuries before Spindletop. Spanish explorers saw oil floating on the surface of Gulf waters along the upper Texas coast in 1543. A handful of accidental oil discoveries followed until the first economically significant oilfield was found in 1894 near Corsicana. It wasn't until "black gold" spilled out of an oilfield called Spindletop just south of Beaumont in 1901 that Texas had a bona fide oil boom. Today, Texas is a national and global leader in Petroleum Refining and Chemical Products.

Gov. Rick Perry identified Petroleum Refining and Chemical Products as one of six industry clusters in his long-term, strategic job creation plan announced in 2004. Each cluster was selected because of its powerful potential for future economic growth.

The Petroleum Refining and Chemical Products cluster is responsible for more than \$82 billion in gross state product, almost 870,000 total jobs, and \$3.6 billion in annual state revenues. Major employers include Exxon Mobil, El Paso Corp., CITGO, Conoco Phillips Refinery, Shell Oil, and Valero.

Petroleum Refining

Across the state, crude oil and natural gas are produced in 218 of 254 counties. About 250,000 Texans are employed in oil and gas exploration, production, refining, and related industries.

Texas' oil and gas industry contributes about \$63 billion annually to the state's economy. Texas is the No. 1 producer of oil and gas, refined products, and chemicals in the United States, and its marketed production of natural gas represents one-third of total U.S. supply. As an oil and gas producer, the state of Texas also is a global leader, contributing approximately 5.3 percent of worldwide refinery capacity.

Texas is home to 26 operating refineries that produce an average of 4.3 million barrels of petroleum products per day. Natural gas production in the state exceeds 5 trillion cubic feet a year. Texas' Gulf Coast refineries account for 86.7 percent of the state's oil and gas capacity.

Texas' refinery business is working hard to reduce refinery emissions and to produce a variety of differing grades of lower-emitting fuels. Over the past decade, as much as 50 percent of the refinery industry's overall capital investment costs is spent to meet federal environmental mandates.

Chemical Products

Texas is the nation's largest chemicals producer, manufacturing 14 percent of the nation's value of chemical output. The Gulf Coast complex of chemical plants and refineries is the largest petrochemical complex in the world, home to more than 200 chemical plants. At least 124 of Texas' 254 counties have some amount of chemical manufactured output.

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