



AEROSPACE

Colorado Industry Cluster Profile

The aerospace industry cluster includes companies that develop products and systems for commercial, military and space applications. This industry cluster includes companies that manufacture guided missiles and space vehicles, satellite telecommunications and search/detection instruments in addition to research and development companies. The aerospace industry cluster also produces planetary spacecraft, space launch systems, ground systems, antennas, satellites and electro-optic instruments.

Colorado's aerospace industry has critical mass. Colorado is home to four military commands, six major space contractors and several universities involved in leading space research. There are 141 companies that are classified as aerospace companies. Add about 200 companies that have either some aerospace operations or serve as suppliers to the aerospace industry and Colorado boasts over 300 companies in the space industry. Direct employment in the aerospace industry totals 24,600 private workers and 29,300 military personnel. These 53,900 workers in the aerospace industry support an additional 110,600 workers in all industries throughout Colorado, bringing direct and indirect employment supported by the aerospace industry to 164,500 workers.

Colorado ranks second in the U.S. for private aerospace employment concentration in 2005. With direct private aerospace employment of 24,600 workers, Colorado ranks third in total private employment among the 50 states.

Private Aerospace Cluster Snapshot*

| | Colorado | U.S. |
|--|-----------------|-------------|
| Direct Employment 2005 | 24,577 | 363,004 |
| Total Direct Employment Growth 2000-2005 | 19.8% | 2.0% |
| Avg. Annual Direct Employment Growth 2000-2005 | 3.7% | 0.4% |
| Number of Direct Industry Cluster Companies 2005 | 141 | 4,753 |
| Direct Employment Concentration | 1.1% | 0.3% |

*Data reflects only private aerospace employment in Colorado, excludes military employment.

Major Aerospace Contractors

Six of the country's major space contractors have a significant presence in Colorado. These companies assist the Department of Defense in procuring, placing and managing national space assets to protect our country and increase the nation's military capabilities. They also provide unmanned spacecraft, instrumentation and ground control services for NASA and other agencies.

- **Lockheed Martin** employs over 10,300 people in Colorado, with 5,500 people working at the Space Systems unit that is headquartered in Jefferson County. Space Systems designs, develops, tests and manufactures a variety of advanced technology systems for space and defense.
- **Ball Aerospace and Technologies Corp.** employs 3,800 people in Colorado. The company provides imaging, communications, information systems, products, software and services to its government and commercial aerospace customers.
- **Raytheon Company** manages spacecraft missions and analyzes their data after launch. The company employs nearly 2,500 people in the state with the majority of the employees located in Aurora.

- **Northrop Grumman** provides a diverse portfolio of innovative products, services and solutions in systems integration, defense electronics, information technology, battle management and command control systems, advanced aircraft, unmanned aerial vehicles, missile and missile defense systems, shipbuilding and space technology. The company employs about 2,900 people throughout the state.
- **Boeing Company** has several major defense units in Colorado including Boeing Missile Defense Systems, Integrated Defense Systems, Homeland Security and Services/Support Operations, and Space and Intelligence Systems. The company's nearly 2,300 Colorado employees are primarily located in Colorado Springs and Pueblo.
- **ITT Industries Inc. Systems Division** employs nearly 1,000 people in Colorado Springs. The company provides radar and communications systems for the military.

Major Private Companies

- Ball Aerospace and Technologies Corp.
www.ball.com/aerospace
- Boeing Company
www.boeing.com
- DigitalGlobe, Inc.
www.digitalglobe.com
- GeoEye
www.geoeye.com
- ITT Systems Division
www.ittsystems.com
- Lockheed Martin Corp.
www.lockheedmartin.com
- Northrop Grumman Corp.
www.northropgrumman.com
- Raytheon
www.raytheon.com

Military Bases

Colorado is home to a diverse mix of Department of Defense (DoD) military installations, fostering important synergies between private aerospace companies and governmental entities.

- **Buckley Air Force Base**, located in Aurora, is home to the 460th Space Wing and supports 38 tenant organizations located on and off base.
- The Peterson Complex in Colorado Springs includes Peterson Air Force Base, Cheyenne Mountain Air Force Station and Schriever Air Force Base.
 - **Cheyenne Mountain Air Force Station** hosts four major military headquarters - North American Aerospace Defense Command (NORAD), U.S. Northern Command (USNORTHCOM), Air Force Space Command (AFSPC) and U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (SMDC/ARSTRAT).
 - **Peterson Air Force Base** is the home of the 21st Space Wing, the Air Force's only organization responsible for worldwide missile warning and space control.
 - **Schriever Air Force Base** is home to the Air Force Space Command's 50th Space Wing which commands and controls the DoD weather, warning, navigation and communications satellites.
- The **United States Air Force Academy** in Colorado Springs was established in 1954. Since its inception, more than 35,000 cadets have graduated in 44 classes.

Military Aerospace Profile

| Government Installation | Personnel |
|--------------------------------|------------------|
| Buckley Air Force Base | 9,700 |
| Peterson Complex* | 8,400 |
| U.S. Air Force Academy | 8,200 |
| Schriever Air Force Base | 3,000 |
| Total Employment | 29,300 |

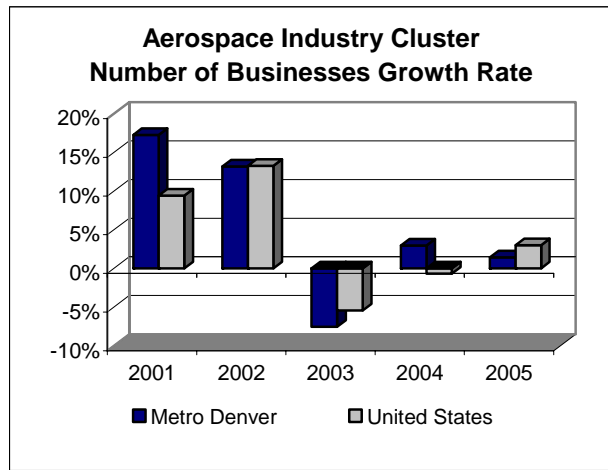
*Peterson Complex personnel includes Peterson Air Force Base and Cheyenne Mountain Air Force Station (including NORAD, USNORTHCOM, AFSPC and SMDC/ARSTRAT).

Aerospace Economic Profile

The aerospace industry cluster is defined by twenty six-digit North American Industry Classification System (NAICS) codes including search, detection and navigation instrument manufacturing, guided missile and space vehicle manufacturing, satellite telecommunications and research and development. Colorado has more than 140 aerospace companies employing about 24,600 workers.

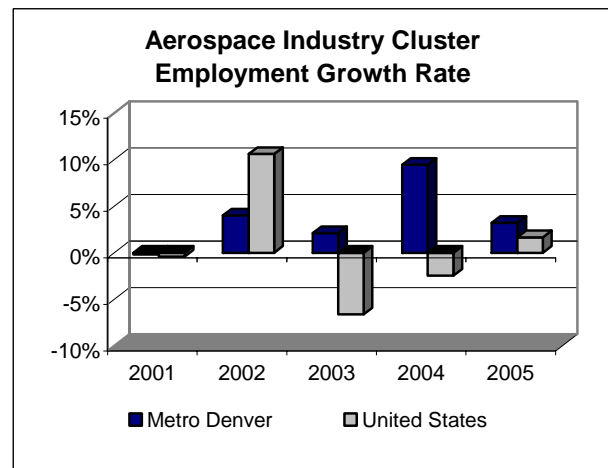
Private Companies

- About 141 aerospace companies were located in Colorado during 2005.
- About 53% of the companies employ less than 10 people while 14% of the companies employ more than 250 employees.
- The number of aerospace companies in Colorado increased 28.2% from 2000 through 2005 compared to a 19.9% increase nationally.
- More than half of Colorado's aerospace companies are involved in manufacturing search and navigation equipment or optical instruments.
- The majority of Colorado's aerospace companies are located in Boulder and El Paso counties. About 66% of aerospace companies are located in Metro Denver.



Private Employment

- Aerospace companies employ about 1.1% of Colorado's total employment base, compared to a 0.3% concentration nationally.
- Aerospace companies directly employ about 24,600 people in Colorado.
- Total Colorado aerospace employment increased 19.8% from 2000 to 2005 compared to a 2.0% increase nationally. Employment growth in Colorado averaged 3.7% per year over the past five years.
- Most aerospace employees are involved in manufacturing search and navigation equipment and guided missiles and space vehicles.
- Over half of the aerospace employment is located in Jefferson and Arapahoe counties. More than three-fourths of aerospace employees work in Metro Denver.



Wages

The aerospace industry payroll in 2004 was nearly \$2.3 billion in Colorado. The 2004 average salary for an aerospace worker in Colorado was \$93,400 compared to the national average of \$75,600.

Colorado Occupational Salaries, 2004

| | |
|--|----------|
| Aerospace Engineers | \$75,190 |
| Aerospace Engineering and Operations Technicians | \$61,410 |
| Aircraft Structure, Surfaces, Rigging and Systems Assemblers | \$46,110 |

Source: U.S. Bureau of Labor Statistics, Occupational Salary Data, November 2004, www.bls.gov

Key Reasons for Aerospace Companies to Locate in Colorado

Colorado is a top aerospace location offering:

1. The ability to recruit and retain technical and scientific employees.

- With 33.7% of the adult population having completed a bachelor's degree or higher, Colorado ranks as the fourth most educated state in the country, behind Massachusetts, Maryland and Connecticut. (*American Community Survey, 2004*)
- Colorado ranks fourth in the number of science and engineering graduate students enrolled in doctorate-granting institutions. (*Corporation for Enterprise Development, 2006*)
- Colorado ranks 14th in the number of PhDs and engineers in the workforce, indicating a large potential pool of innovators in the state. (*Corporation for Enterprise Development, 2006*)
- Colorado ranks fourth in scientists and engineers as a share of the workforce among the fifty states. Colorado also ranks fourth in computer specialists as a share of the workforce. (*National Science Board, 2006*)
- Colorado ranks second in the percent of total wage and salary jobs in high technology industries behind Washington state. The high proportion of advanced technology industries is an indicator of economic dynamism. (*Corporation for Enterprise Development, 2006*)

2. Proximity to vendors and customers.

- The aerospace industry in Colorado is anchored by six large prime contractors (Lockheed Martin, Ball Aerospace, Boeing, Raytheon, Northrop Grumman and ITT Industries).
- Major military operations in the state include Buckley AFB, Peterson AFB, Schriever AFB and Cheyenne Mountain Air Force Station. In addition, the U.S. Air Force Academy is located outside of Colorado Springs.
- Cheyenne Mountain Air Force Station hosts four military commands - North American Aerospace Defense Command (NORAD), U.S. Northern Command (USNORTHCOM), Air Force Space Command (AFSPC) and U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (SMDC/ARSTRAT).
- The prime contractors and military installations support over 300 Colorado aerospace businesses and suppliers. (*Colorado Space Coalition, April 2005*)
- Colorado recipients were awarded more than \$217.7 million in NASA prime contracts, including \$140.4 million in business contracts and \$77.4 million in educational and non-profit contracts in 2004. Colorado ranked ninth out of all states in NASA funding. (*National Aeronautics and Space Administration, 2004*)
- Colorado ranked third in 2004 in NASA contract awards among states without a NASA facility. (*National Aeronautics and Space Administration, 2004*)

3. Low to moderate costs of doing business.

- Colorado has the 12th most business-friendly tax climate in the nation according to the State Business Tax Climate Index. Colorado ranks sixth in the corporate tax index, a sub-index of the overall tax climate index. Colorado has one of the lowest corporate income tax rates in the nation with a rate of 4.63 percent. (*The Tax Foundation, 2005*)
- Natural gas prices in Colorado are the 4th lowest out of the 44 states that were ranked. (*Energy Information Administration, 2005*)
- Denver office occupancy costs are lower than most worldwide cities. With an annual occupancy cost of \$17.76 per square foot, Denver is just slightly above the lowest rate of \$13.21 per square foot in Christchurch, New Zealand. (*CB Richard Ellis, August 2005*)

4. Pro-business and flexible state and local governments.

- Colorado places second in the U.S. Economic Freedom Index which also notes that Colorado has the fewest regulatory barriers and ranks high in the fiscal sector. (*Pacific Research Institute for Public Policy, 2004*)
- Based on competitiveness of existing businesses and entrepreneurial energy, Colorado ranks first in business vitality and was one of only 11 states to receive an A for its business vitality. (*Corporation for Enterprise Development, 2006*)
- Colorado has representation on the U.S. House of Representatives Science Committee (Representative Mark Udall) which has jurisdiction over all non-defense federal scientific R&D. (*U.S. House of Representatives House Committee on Science, 2006*)

5. Proximity to Colleges/Universities

- Two academic institutions in Colorado offer nationally ranked aerospace programs or degrees. (*U.S. News & World Report, 2006*)
 - The number two aerospace engineering undergraduate program in the country is at the U.S. Air Force Academy, located in Colorado Springs.
 - The University of Colorado at Boulder (CU-Boulder) offers a top 20 ranked aerospace engineering doctorate program. CU-Boulder is a member of the recently appointed U.S. Air Force Space Education Consortium.
- The U.S. Air Force designated the University of Colorado at Colorado Springs as the lead university in the Space Education Consortium, which provides courses and curriculum throughout the country to help educate the future space workforce.
- In 2003, Colorado's academic institutions spent more than \$76 million in aerospace R&D expenditures or 11.0% of total academic R&D expenditures. (*National Science Foundation, 2005*)
- The University of Colorado at Boulder received the most NASA research money of any other public university in the U.S. in fiscal year 2004 or the 2nd most funding of any public entity. (*National Aeronautics and Space Administration, 2004*)
- Colorado ranks eighth in the number of patents issued per one million people. This measure aims to capture the rate of innovation in a state. (*Corporation for Enterprise Development, 2006*)
- Colorado has three institutions that are members of the Universities Space Research Association all of which have graduate programs in space sciences or engineering: University of Colorado at Boulder, Colorado School of Mines and University of Denver.

Aerospace Industry Cluster Definition

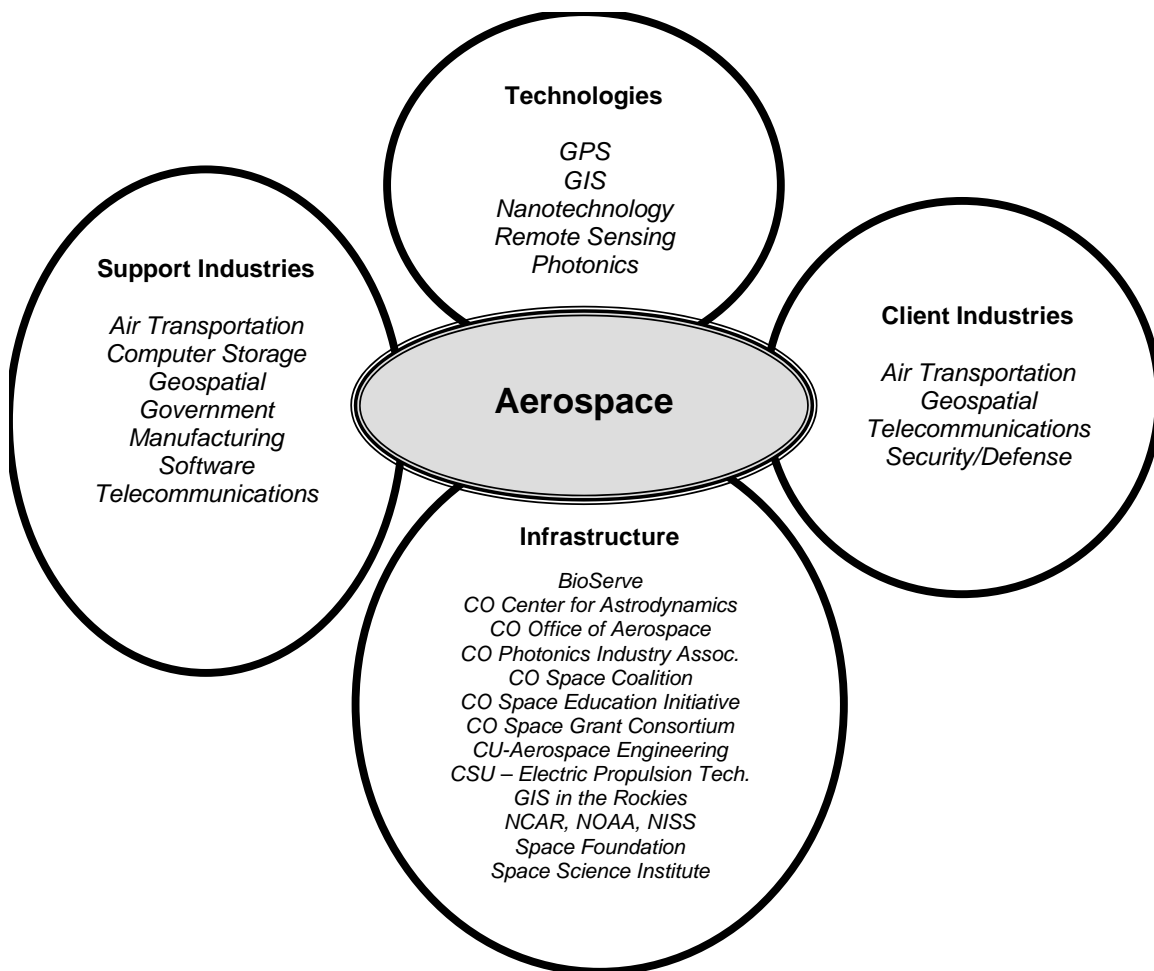
| NAICS | NAICS Description | SIC | SIC Description |
|--------------|---|------------|---|
| 336414 | Guided Missile & Space Vehicle Mfg | 3761 | Guided Missiles & Space Vehicles |
| 336415 | Guided Missile & Space Vehicle Propulsion Unit & Parts Mfg | 3764 | Space Propulsion Units & Parts |
| 336419 | Other Guided Missile & Space Vehicle parts & Aux. Equipment Mfg | 3769 | Space vehicle equipment NEC |
| 334511 | Search, Detection & Navigation Instrument Mfg | 3812 | Search, Detection, Navigation, Guidance |
| 333314 | Optical Instrument & Lens Mfg | 3827 | Optical Instruments & Lenses |
| 927110 | Space Research & Technology | 9661 | Space Research & Technology |
| 331512 (P) | Steel Investment Foundries | 3324-9901 | Aerospace investment castings, ferrous mfg |
| 331524 | Aluminum Foundries (except Die-Casting) | 3365-0201 | Aerospace castings, aluminum mfg Aerospace castings, nonferrous: except aluminum mfg |
| 331528 (P) | Other Nonferrous Foundries (except Die-Casting) | 3369-9901 | Space simulation chambers, metal plate mfg |
| 332313 (P) | Plate Work Manufacturing | 3443-1104 | Missile and ordnance forgings mfg |
| 332111 (P) | Iron and Steel Forging | 3462-05 | Nonferrous Missile and ordnance forgings mfg |
| 332111 (P) | Iron and Steel Forging | 3463-02 | Decontaminating and cleaning of missile or satellite parts mfg |
| 332813 (P) | Electroplating, Plating, Polishing, Anodizing and Coloring | 3471-0204 | Arming & fusing devices for missiles mfg |
| 332993 | Ammunition (except Small Arms) Manufacturing | 3483-0101 | Missile warheads mfg |
| 332993 | Ammunition (except Small Arms) Manufacturing | 3483-9910 | Space satellite communications equipment mfg |
| 334220 (P) | Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing | 3663-9910 | Space suits mfg |
| 339113 (P) | Surgical Appliance and Supplies Manufacturing | 3842-0113 | |

Aerospace Industry Cluster Definition (continued)

| NAICS | NAICS Description | SIC | SIC Description |
|--------|---|-----------|--|
| 927110 | Space flight operations | 4789-9902 | Space flight operations, except government Satellite master antenna systems services (SMATV) |
| 517510 | Cable and Other Program Distribution | 4841-9905 | Satellite earth stations |
| 517212 | Cellular & Other Wireless Telecommunications | 4899-9902 | Missile tracking by telemetry or photography |
| 517410 | Satellite Telecommunications | 4899-9905 | Aircraft and space vehicle supplies and parts - Wholesale trade |
| 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers | 5088-0300 | Guided missiles and space vehicles - Wholesale trade |
| 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers | 5088-0305 | Space propulsion units and parts - Wholesale trade |
| 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers | 5088-0307 | Wholesale trade |

*(P) indicates that only part of the NAICS industry category is represented in the Aerospace Industry Cluster definition.

Aerospace Industry Cluster Relationships



For additional information, contact us:



Metro Denver
Economic Development Corporation

1445 Market Street
Denver, CO 80202-1790
303.620.8092
e-mail: info@metrodenveredc.org
www.metrodenveredc.org