AEROSPACE & DEFENSE IN ARIZONA

A Sector Profile

Prepared by The Council For Community And Economic Research

ARIZONA COMMERCE AUTHORITY

Aerospace and Defense Industries in Arizona

A Sector Profile

Introduction

The Arizona aerospace and defense industry has grown out of several competitive advantages embedded in the state's natural features. Arizona's desert climate, terrain, and open spaces have enabled the state's large military installations to focus on aviation and aerospace. Companies that wish to cultivate a defense-related customer group have found it advantageous to locate their facilities in Arizona due to the presence of an established industry cluster. These firms have also taken advantage of Arizona's climate and terrain to develop and test new products.

Likewise, the wide open spaces and low volume of commercial air traffic provide an opportunity for testing unmanned armed aircraft systems. As a result, Arizona has developed a strong advantage in the defense technology area, especially in guided missiles and subsystems, defense missile and space systems, rotary wing aircraft manufacturing, and other engineering and technical services.

National trends in aerospace, defense, and aviation have been positive in recent years, and Arizona has the opportunity to create meaningful incentives to target companies in this key sector. With the Iraq and Afghanistan wars winding down and increasing concern about Federal deficits, defense spending is expected to decline in certain areas. However, there appears to be strong support for maintaining the U.S. military's deterrent capabilities and for continued research in technologies designed to protect U.S. borders from terrorist threats.

Emerging National Trends in Aerospace and Defense

National defense industry trends (Figure 1) provide the context in which Arizona's aerospace and defense industry operates. They are important to consider as they shape Arizona's overall prospects for aerospace and defense industry growth in the future.

Defense Spending Trends

Figure 1: Defense Spending Trends (in billions)

Discretionary Spending, 2010	$ 689 Billion
Discretionary Spending, 2015	$ 752 Billion
Total Defense Contracts, 2010	$ 372 Billion
Total Arizona Defense Contracts, 2010	$ 11 Billion

Sources: CBO, USASpending.gov

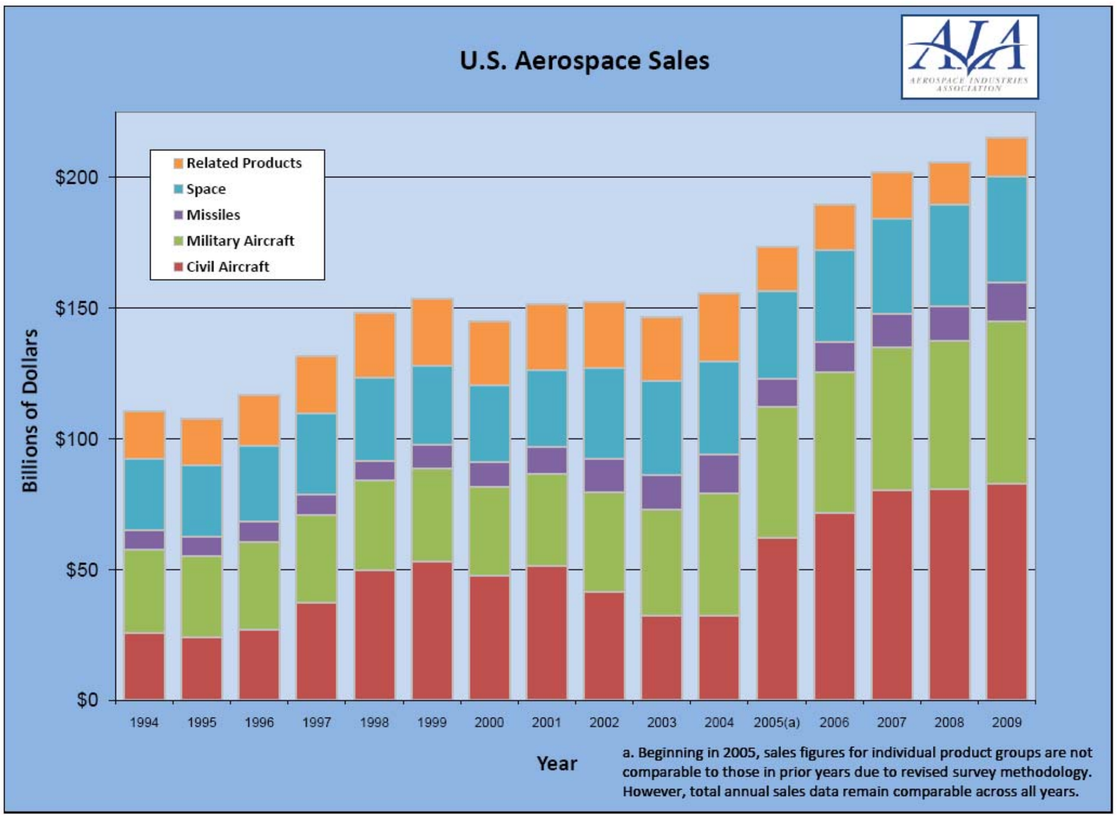
- Overall U.S. Department of Defense-related discretionary funding is projected to grow 1.8 percent annually between 2010 and 2015 based on current policy priorities.
- Arizona companies captured $10.8 billion in defense contracts in FY 2010.
- Based on the current rate of defense spending growth, Arizona companies should capture an additional $1 billion in contracts above current DoD spending in the state by 2015.

Aerospace & Aviation Sales Trends

Figure 2 illustrates historical trends in aerospace-related sales in the U.S. for the past 15 years.

- According to the Aerospace Industries Association, between 2005 and 2009, civil aviation aircraft sales increased only moderately but formed the bulk of all U.S. aerospace sales.
- Military aircraft, missile, and space-related sales remained relatively stable.

Figure 2: Aerospace Sales Trends



Source: Aerospace Industries Association

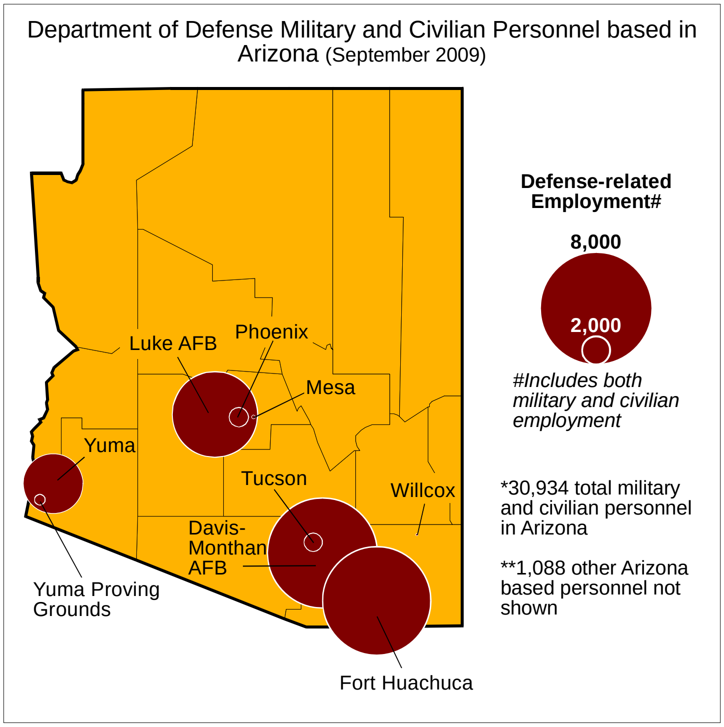
Key Assets

Arizona's key assets drive its presence in the aerospace and defense industry and help to support emerging and established companies.

Major Defense Installations

While there is large defense-related civilian employment around Tucson, Phoenix, and Yuma (Figure 3), much of the direct employment is linked to Arizona's four major defense installations. These installations include:

Figure 3: Employment at Major Defense Installations in Arizona



Source: US Office of Personnel Management

- **Davis-Monthan Air Force Base:** Air Combat Command for the 355th Fighter Wing that provides medical, logistical, and operational support to Air Force units and conducts training for personnel
- **Fort Huachuca:** Army Installation Management Command, Army Network Enterprise Technology Command, Army Intelligence Center, Military Auxiliary Radio System, Joint Interoperability Test Command, Advanced Airlift Tactics Training Center
- **Luke Air Force Base:** Air Combat Command for the 56th Fighter wing, training base for the Air Education and Training Command
- **Marine Corps Air Station Yuma:** 3rd Marine Aircraft Wing, Marine Aviation Weapons and Tactics Squadron 1, Marine Fighter Training Squadron 401

Industry Trade Associations

- There are 15 national industry and trade associations (Figure 4) relevant to the aerospace and defense industry.
- Additionally, four state or regional organizations serve the interests of the industry in Arizona, including the Arizona Aerospace and Defense Commission, Arizona Aerospace Institute Initiative, Arizona Technology Council, and the Southern Arizona Industry & Aerospace Alliance.

Figure 4: Industry & Trade Associations

Aerospace Industries Association	http://www.aia-aerospace.org/
Air Transport Association	http://www.airlines.org/pages/home.aspx
Aircraft Electronics Association	http://www.aea.net/
American Institute of Aeronautics and Astronautics	http://www.aiaa.org/
Arizona's Aerospace and Defense Commission	http://www.azcommerce.com/Councils/Arizona+Aerospace+and+Defense+Commission.htm
Arizona Aerospace Institute Initiative	http://azaerospaceinstitute.org/
Arizona Technology Council	http://www.aztechcouncil.org/
Aviation Distributors and Manufacturers Association	http://www.adma.org/
Aviation Suppliers Association	http://www.aviationsuppliers.org/
General Aviation Manufacturers Association	http://www.gama.aero/
Light Aircraft Manufacturers Association	http://www.lama.bz/
National Air Transportation Association	http://www.nata.aero/index.aspx
National Business Aviation Association	http://www.nbaa.org/
National Defense Industrial Association	http://www.ndia.org/Pages/Default.aspx
Satellite Industry Association	http://www.sia.org/
Southern Arizona Industry & Aerospace Alliance	http://www.saiaa.com/
Space Enterprise Council	http://www.techamerica.org/space
Space Foundation	http://www.spacefoundation.org/
Space Transportation Association	http://www.spacetransportation.us/index.php

Employment & Impact

Arizona's defense sector includes substantial Federal employment as well as private sector employment in aerospace and defense-related industries. This section provides an overview of employment in the public sector and describes private sector contracting activities supporting the aerospace and defense sector.

Defense Department Employment in Arizona

Department of Defense employment in Arizona (Figure 5) is an important part of the picture of aerospace and defense-related employment in the state.

- Total DoD employment in Arizona is 30,934, of which 69 percent are military (non-civilian) workers.
    - Total military employment was largest at Davis-Monthan Air Force Base (6,361 military personnel).
    - Total civilian employment was largest at Fort Huachuca (3,004 civilian personnel).
- The Yuma Proving Grounds, Tucson, and Phoenix have the most civilian DoD employment as a percentage of total employment at military facilities.

Figure 5: Department of Defense Employment, 2009

Facility	Military Employment (% of Total)	Civilian Employment (% of Total)	Total Employment
Davis-Monthan AFB	81%	19%	7,848
Fort Huachuca	61%	39%	7,733
Luke AFB	82%	18%	6,124
Yuma	85%	15%	4,278
Phoenix	26%	74%	1,384
Tucson	24%	76%	1,311
Other	57%	43%	1,088
Yuma Proving Ground	4%	96%	756
Mesa	57%	43%	278
Willcox	100%	0%	134
State Total	***69%***	***31%***	***30,934***

Source: Office of Personnel Management

Assessing the Economic Spin-off from Aerospace and Defense in Arizona

The overall economic impact of aerospace and defense firms in Arizona was recently analyzed as part of a September 2010 Arizona State University W.P. Carey School of Business report. [1]

- The Arizona aerospace and defense industry directly contributed about $300 million to state and local tax revenues in 2009 and employed 39,400 workers with a total payroll of $4.3 billion.
- The average compensation per employee in the industry in Arizona was approximately $109,000, or almost two and a half times the statewide average for all workers.
- Including indirect impacts, the Arizona aerospace and defense industry accounted for 93,800 jobs, labor income of $6.9 billion, and gross state product of $8.8 billion in 2009.

The following sections will examine different elements of the aerospace and defense-related industries as well as the industries on which they have the greatest impacts.

Identifying Related Aerospace and Defense Clusters

One approach to understanding key areas of importance in Arizona's aerospace and defense clusters is to examining how similar companies and industries link together. In this section, four broad linkages are examined using a "value chain" approach. In this model, we seek to understand how core aerospace and defense-related industries buy and sell from one another. Understanding how well Arizona companies do in terms of providing products or services offers an indication about where growth opportunities may exist for Arizona in promoting supplier relocations.

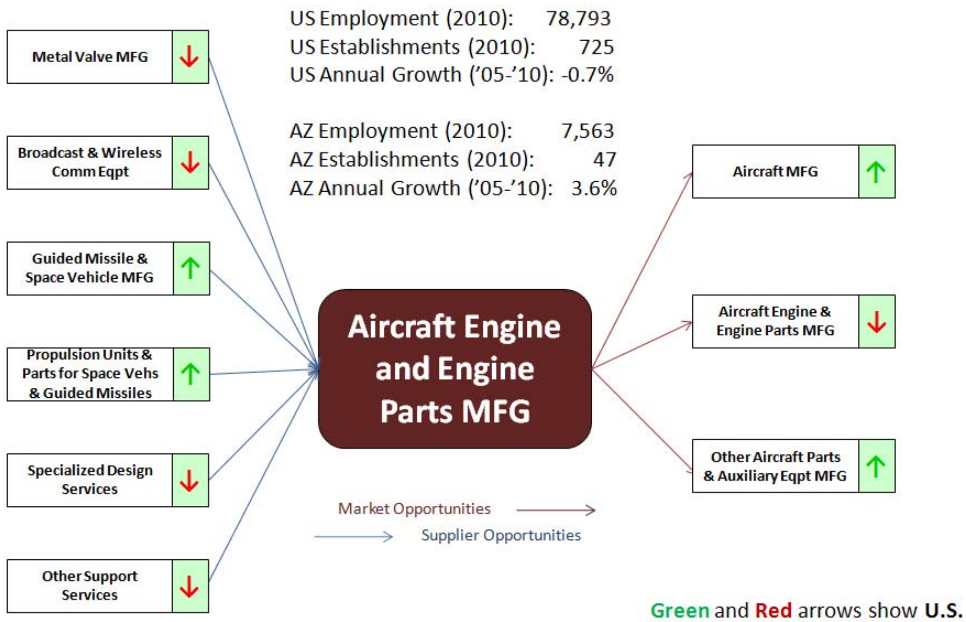
Defining Aerospace and Defense Value Chain Linkages

A value chain identifies the purchasing and sales characteristics of an industry. Figure 6 illustrates how related industries buy and sell a in key aerospace and defense industry, Aircraft Engine and Engine Parts Manufacturing. On the left side of the figure are industries that sell products to aircraft engine and engine parts manufacturers, and on the right side of the figure are industries that buy engines and engine parts. The arrows demonstrate whether employment in the related industries grew or declined nationally between 2005 and 2010. Taken together, these linkages reflect a cluster of activity. The following information is an analysis of the key characteristics of value chain (or cluster) growth in four large value chains for this industry: (1) Aircraft Engine and Engine Parts Manufacturing; (2) Search, Detection, and Navigation Instruments Manufacturing; (3) Guided Missile and Space Vehicle Manufacturing; and (4) Air Transportation.

- *Aircraft Engine and Engine Parts Manufacturing* declined by an annual average of 0.7 percent nationally, but it grew by 3.6 percent in Arizona between 2005 and 2010.
    - The most critical supplier industries and growth rates include:
        - Metal Valve Manufacturing (declined nationally and in the Arizona)
        - Broadcast and Wireless Communications Equipment (declined by 1.7 percent nationally on an annual basis, increased by 7.7 percent annually in Arizona)

[1] "The Economic Impact of Aerospace and Defense Firms on the State of Arizona," W.P. Carey School of Business, Arizona State University, September 2010.

Figure 6: Aircraft Engine & Engine Parts Manufacturing Value Chain Map



Source: EMSI & E. Feser, University of Illinois

- Guided Missile and Space Vehicle Manufacturing (grew by 0.4 percent nationally on an annual basis and 2.8 percent in Arizona)
- Propulsion Units and Parts for Space Vehicles and Guided Missiles (grew by 1.3 percent nationally on an annual basis and 2.4 percent annually in Arizona)
- Specialized Design Services (declined by 1.3 percent nationally on an annual basis and declined by 2.3 percent annually in Arizona)

o The most direct market areas for aircraft engines and engine parts include:
  - Aircraft Manufacturing and Other Aircraft Parts (increased 1.5 percent nationally on an annual base, but declined by 1.8 percent in Arizona)
  - Aircraft Engine and Engine Parts Manufacturing (decreased nationally at a rate of 0.7 percent annually, but grew by 3.6 percent annually in Arizona). This segment represents sales of products from one company in the industry to another company in the same industry.
  - Auxiliary Equipment Manufacturing also grew nationally and within Arizona.

- *Search, Detection, and Navigation Instruments Manufacturing* declined 1.3 percent nationally and 2.3 percent in Arizona between 2005 and 2010.
  - o The most critical supplier industries and growth rates include:
    - Synthetic Rubber Manufacturing (declined 5.4 percent annually in the U.S. and declined by 32 percent annually in Arizona);
    - Electricity and Signal Testing Instruments Manufacturing (declined by 4 percent annually in the U.S., but grew 4.4 percent annually in Arizona)
    - Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing; Mechanical Power Transmission Equipment (declined by 4 percent annually in the U.S., but grew 4.4 percent annually in Arizona)
  - o Key market opportunities include:

        - Aircraft Engine and Engine Parts Manufacturing (0.7 percent nationally, 3.6 percent in Arizona)
        - Ship Building and Repairing (1.7 percent nationally, no employment in Arizona)
- *Guided Missile and Space Vehicle Manufacturing* grew 0.4 percent nationally and 2.8 percent in Arizona between 2005 and 2010.
    - The most critical supplier industries and annual growth rates include:
        - Forging, Stamping, Sintering, and Crown and Closure Manufacturing (increased by 4.6 percent nationally and 6.6 percent in Arizona)
        - Coating, Engraving, Heat Treating, and Allied Activities (declined by 3.7 percent nationally, but increased by 0.2 percent in Arizona)
        - Fluid Power Process Machinery (decreased by 5.1 percent nationally, but increased by 3.8 percent in Arizona)
        - Broadcast and Wireless Communications Equipment (decreased 1.7 nationally, but increased 7.7 in Arizona)
        - Search, Detection, and Navigation Instruments Manufacturing (decreased 1.3 percent nationally and by 2.3 percent in Arizona)
        - Guided Missile and Space Vehicle Manufacturing (increased by 0.4 nationally and 2.8 percent in Arizona)
        - Propulsion Units and Parts for Space Vehicles and Guided Missiles (increased by 1.3 nationally and 2.4 percent in Arizona)
        - Gasket, Packing, and Sealing Device Manufacturing (decreased by 0.8 percent nationally and 1.9 percent in Arizona)
        - Specialized Design Services (decreased by 1.3 percent nationally and by 2.3 percent in Arizona)
        - Facilities Support Services (decreased by 1.5 percent nationally and 3.3 percent in Arizona)
    - Key market opportunities are related annual growth rates include:
        - Guided Missile and Space Vehicle Manufacturing (increased by 0.4 nationally and 2.8 percent in Arizona)
        - Propulsion Units and Parts for Space Vehicles and Guided Missiles (increased by 1.3 percent nationally and 2.4 percent in Arizona)
- *Air Transportation* decreased 1.8 percent nationally and decreased by 1.8 percent in Arizona between 2005 and 2010.
    - Supplier industries and annual growth rates include:
        - Petroleum Refineries (increased 1.7 percent nationally, but had no employment in the state)
        - Aircraft Manufacturing (increased by 1.5 percent nationally but decreased by 1.8 percent in Arizona)
        - Scenic and Sightseeing Transportation and Support Activities for Transportation (decreased by 0.4 percent nationally and by 0.6 percent in Arizona)
        - Travel Arrangement and Reservation Services (decreased by 3.3 percent nationally and by 2.5 percent in Arizona)
        - Food Services and Drinking Places (decreased by 4 percent nationally, but increased by 4.4 percent in Arizona)
    - Market opportunities and annual growth rates include:
        - Machine Shops (decreased by 1.6 percent nationally but increased by 2.7 percent in Arizona)

Defense Technologies Cluster Trends

Another way of looking at Arizona's aerospace and defense sector is to examine the role of related industries that create defense technologies. In a recent project, the Council for Community and Economic Research (C2ER) developed a different way of categorizing industries into defense and homeland security-related industry clusters. Under the C2ER classification system, key defense technologies can be organized into seven broad technology sub-clusters:

1. **Command Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR)**: includes industries that produce electronic computers, broadcast, and wireless communications equipment; electricity and signal testing instruments; switchgear and switchboard apparatuses; relay and industrial controls; and current-carrying wiring devices. The segment also includes satellite and other telecommunications as well as custom computer programming and related information technology research.
2. **Fuel & Power Sources**: includes power generation (renewable and non-renewable); turbine and turbine generator set units manufacturing; motor and generator manufacturing; and storage battery manufacturing.
3. **Human Factors**: includes computer peripheral equipment manufacturing industries; software publishing; engineering services; testing laboratories; consulting services; and social science and humanities research.
4. **Performance Materials**: includes production by nonwoven fabric mills; plastics material and resin manufacturers; and carbon graphite product manufacturers.
5. **Technologies to Restore Units to Combat Capability (RESET)**: focuses on maintenance and repair activities, including specialized parts manufacturing for DoD equipment. Examples include custom production of optical instruments and lenses; semiconductors and related devices; search, detection, and navigation instruments; as well as measuring and controlling devices. This sector also includes production and custom repair of light trucks and utility vehicles, aircraft, boats, and computer systems that help to control this equipment.
6. **Unmanned Air Systems (UAS)**: includes industries related to semiconductors manufacturing; search, detection, and navigation instruments manufacturing; aircraft manufacturing; and computer systems design services.
7. **Land Warrior Systems**: includes production of materials tied directly to the gear that soldiers carry in the field of battle. Key industries supporting this segment are fabric coating mills; miscellaneous textile product mills; communications equipment manufacturing; and primary battery manufacturing.

Figure 7 depicts combined employment in all related industries that might be tied to each of these defense and homeland security technology areas.

- The greatest employment in Arizona is found in sectors that contribute to the cluster of activities that support Human Factors and Unmanned Air Systems (UAS). UAS and related industries provided about 42,365 jobs to Arizona residents in 2010, and Human Factors provided about 36,068.
    - RESET has nearly 3.5 times as many jobs as might be expected, largely due to the production of guided missiles and related activities in the state.
    - UAS also has 1.7 times as many jobs as might be expected due to presence of production activities related to missiles and armed drones within the state.

Figure 7: Employment Trends in Defense and Homeland Security Technology Clusters

	2005 Employment	2010 Employment	2015 Employment	Change 05-10	Change 10-15	2010 Relative Concentration
Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR)	10,629	12,315	14,463	1,686	2,148	0.71
Fuel & Power Sources	811	1,043	1,019	232	(24)	0.49
Human Factors	36,361	36,068	44,301	(293)	8,233	0.92
Performance Materials	80	251	233	171	(18)	0.19
Technologies for Restoring Units to Combat Capability (RESET)	23,125	25,829	27,797	2,704	1,968	3.47
Unmanned Systems (UAS)	45,194	42,365	41,556	(2,829)	(809)	1.73
Land Warrior Systems	880	919	828	39	(91)	0.68

Source: EMSI

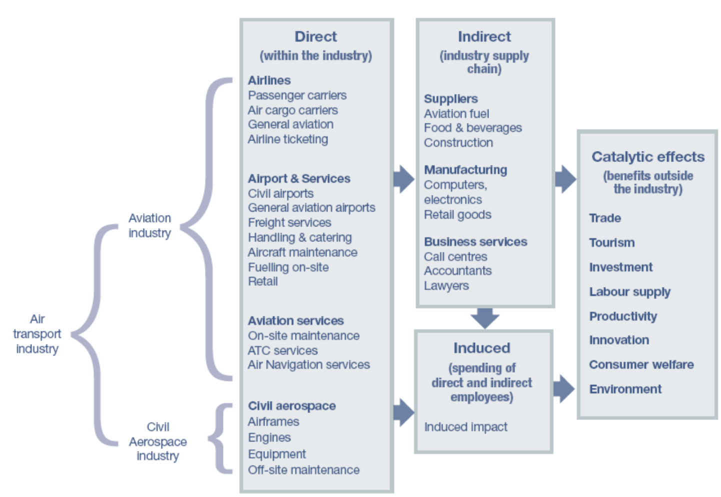
- Over the next five years, the greatest employment gains are expected in the Human Factors, RESET, and C4ISR industry clusters. Based on current projections, these three are likely to be the primary job creating aerospace and defense clusters during the next five years.

Civil Aviation: Another Aerospace and Defense Industry Cluster

Overall, the Aerospace Industry Association reports that civil aviation manufacturing in Arizona *directly* supports about 39,000 jobs in 79 establishments, generating about $2 billion in exports. The industry includes much more, but identifying the component of the manufacturing industry that is exclusively civilian is a bit more challenging. Large civil jet transport aircraft manufacturing is driven entirely by Boeing and Airbus, the two dominant manufacturers worldwide. While the state has significant directly supported aerospace manufacturing activity, there is limited evidence that civil aircraft components are manufactured in the state. For instance, although Boeing is a large employer and makes aircraft components, it is not clear whether any commercial airplane components are made to supply assembly operations in Washington, South Carolina, Oregon, Utah, Canada, and Australia.[2]

However, another way to assess industry opportunities is to focus on linkages to the rest of the economy. Figure 8 illustrates an alternative view of the state's air transport industry by representing the widespread impact it has on other sectors of the economy.[3]

Figure 8: Civil Aviation Value Chain



Source: Oxford Economics

[2] Boeing, Boeing Commercial Airplanes – Backgrounder, http://www.boeing.com/commercial/pdf/BCA_backgrounder.pdf.
[3] Oxford Economics, "Aviation: The Real World Wide Web," http://www.oxfordeconomics.com/free/pdfs/ox_econ_aviation_report/main.html.

Economic Impact of Civil Aviation

The Federal Aviation Administration completed an economic impact analysis in 2009 to assess the importance of the entire civil aviation industry to the U.S. and individual states. In Arizona, the economic impact of civil aviation is significant in terms of economic output, earnings, and employment (Figure 9).

Figure 9: Economic Impact of Civil Aviation in Arizona, 2007

	Total	Per Capita
Economic Output	$28,984,022,058	$ 4,456
Earnings	$ 8,167,700,646	$ 1,257
Employment	225,028	7.1%

Source: Federal Aviation Administration

Arizona's civil airports and related services are the primary contributors to the strength and growth of civil aviation in the state. Aviation-related jobs as a percentage of total state jobs in Arizona are approximately 7.1 percent, aviation contributed to 7 percent of Arizona's GDP, and average aviation job wages were $36,296 (full-time equivalent), higher than the U.S. average aviation job wages of $34,424.[4]

Aviation Maintenance

One of the most important components of the civil aviation industry is airline maintenance, representing about 10 percent of the total economic impact of the civil aviation industry. According to the Aeronautical Repair Station Association, civil aviation maintenance employs nearly 275,000 people across the U.S. and has an annual impact on the U.S. economy totaling more than $39 billion.[5] Nationally, the bulk of this employment (about 199,000 workers) exists at small Federal Aviation Administration-certified repair stations.

- Arizona ranks seventh nationally in employment in aviation maintenance and third in overall economic impact of aviation maintenance activities.
- The Arizona aviation maintenance industry employs nearly 13,500 workers.
  - This total includes about 5,850 at repair stations and the rest in airline base and line maintenance and parts distribution and manufacturing.
- The total economic impact of Arizona's aviation maintenance industry is about $2.7 billion
  - About $835 million of that amount results from repair stations and airline base and line maintenance activities.

Civil Aviation Transportation Assets & Employment

Relevant civil aviation assets include: Laughlin/Bullhead International Airport, Flagstaff Pulliam Airport, Grand Canyon National Park Airport, Phoenix-Mesa Gateway Airport, Page Municipal Airport, Grand Canyon West Airport, Phoenix Sky Harbor International Airport, Tucson International Airport, and Yuma International Airport. Arizona's air transportation employment totaled about 18,500 jobs in 2010. Employment growth in these industries (as defined by the North American Industry Classification System, NAICS) is expected to be modest (as shown in Figure 10).

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[4] Federal Aviation Administration, "The Economic Impact of Civil Aviation on the U.S. Economy – December 2009," http://www.faa.gov/air_traffic/publications/media/FAA_Economic_Impact_Rpt_2009.pdf.

[5] AeroStrategy Management Consulting, Aviation Maintenance Industry Employment and Economic Impact, prepared for the Aeronautical Repair Station Association, May 2010, http://www.arsa.org/files/ARSA-AeroStrategyAviationMaintenanceEmploymentEconomicImpactReport-20100505.pdf.

Figure 10: Civil Air Transportation Industry Employment in Arizona

NAICS Code	Description	2005-2010 Annual Employment Growth	2010-2020 Annual Employment Growth
481111	Scheduled Passenger Air Transportation	-2.2%	-0.4%
481112	Scheduled Freight Air Transportation	0.9%	1.3%
481211	Nonscheduled Chartered Passenger Air Transportation	2.0%	1.3%
481212	Nonscheduled Chartered Freight Air Transportation	16.0%	1.2%
481219	Other Nonscheduled Air Transportation	34.5%	5.2%
488111	Air Traffic Control	25.6%	1.6%
488119	Other Airport Operations	-1.6%	-1.7%
488190	Other Support Activities for Air Transportation	1.7%	1.6%
	Total	**-1.0%**	**0.1%**

Source: EMSI

Largest Arizona Aerospace & Defense Employers

There are many ways to examine the impacts of Arizona's aerospace and defense companies, and employment is an important component in most. Below are snapshots of the top ten aerospace and defense employers in the state (Figure 11) and a map of companies that employ more than 100 people (Figure 12).

Figure 11: 10 Largest Aerospace and Defense Employers

Name	Employment	City	Product Lines
Raytheon Missile Systems	15,000	Tucson	Missile & Space Systems, Maintenance/Repair/Overhaul, Advanced R&D
Phoenix Sky Harbor Intl-PHX	9,600	Phoenix	Commercial Air Travel
General Dynamics C4 Systems	7,000	Scottsdale	Defense Electronics & Communications Equipment, Maintenance/Repair/ Overhaul, Advanced R&D
Boeing Co.	4,000	Mesa	Aircraft Components
Honeywell Aerospace	3,300	Phoenix	Gas Turbines/Jet Engines, Fuel System Components
Honeywell Aerospace	3,000	Phoenix	Gas Turbines/Jet Engines, Fuel System Components
US Airways Group Inc	2,000	Tempe	Commercial Air Travel
US Airways Inc	2,000	Tempe	Commercial Air Travel
Bombardier Learjet	1,100	Tucson	Gas Turbines/Jet Engines
Orbital Sciences Corp	1,000	Chandler	Defense Missiles and Space Systems, Drones, R&D

Source: Reference USA

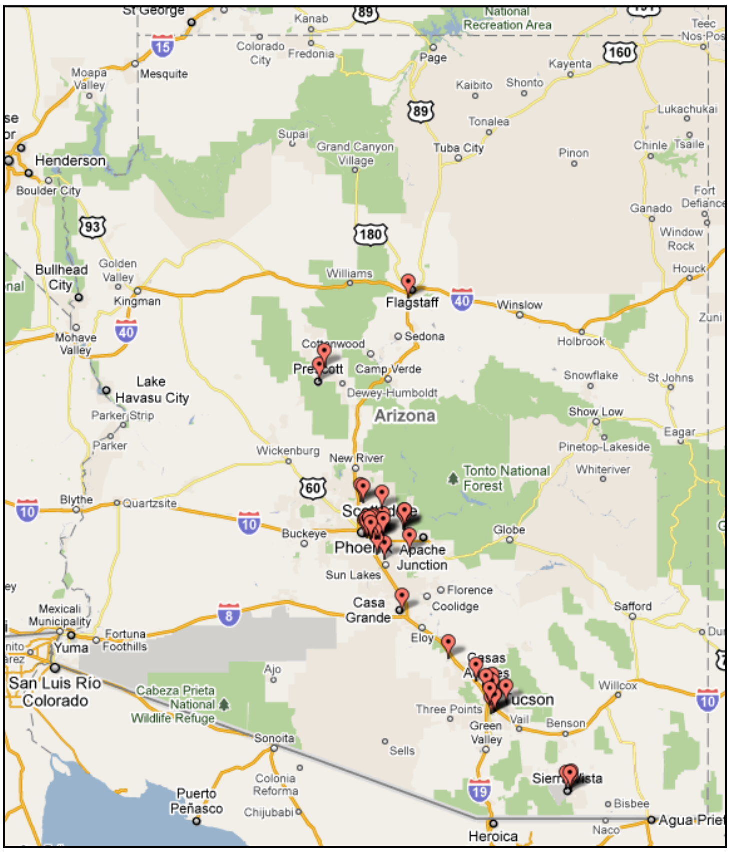
- Raytheon Missile Systems is the largest aerospace and defense employer in Arizona. Although they operate three facilities, the company's Tucson facility, by far, employs the most workers of Raytheon's three Arizona locations.
- Other major defense contractors include General Dynamics C4 Systems, Boeing, and Honeywell.
- Commercial aviation is a significant employer in the state at Phoenix Sky Harbor and US Airways.
- Other major Arizona contractors employing 200 to 1,000 employees in a single location include:
  - In the Tucson area:
    - Honeywell Aerospace – 700
    - Tucson Airport Authority – 320
    - B/E Aerospace Inc. – 315
    - Evergreen Air Center, Marana – 275
    - Universal Avionics Systems Corporation – 250
    - NOAO – 200
  - In the Phoenix area:
    - Comtech EF Data Corporation – 600
    - Hexcel Corporation, Casa Grande – 550

- Goodrich Aircraft Interior Products – 450
- L-3 Access – 310
- ATK Medium Caliber Systems Division – 250
- Triumph Air Repair – 225

o Elsewhere in Arizona:

- Flagstaff Pulliam Airport, Flagstaff – 400
- L-3 Command & Control Systems, Sierra Vista – 300
- General Dynamics Corporation, Sierra Vista – 250
- Northrop Grumman Aerospace, Sierra Vista – 220
- Fornter Aerospace Manufacturing, Prescott – 200

Figure 12: The Location of Arizona Aerospace & Defense Contractors with 100+ Employees



Source: ReferenceUSA & Google Maps

Recent Defense-related Business Expansions Across the U.S.

Recent announcements of new and expanded facilities (Figure 13) provide insight into the future direction of the aerospace and defense industry and help to identify Arizona's key competitors. Below are states with the most announced new and expanded facilities for aerospace and defense. [6]

[6] The Conway Data New Plant Report provides announcements of new or expanded facilities through the end of October 2010. Investments must be $1 million or more, have a floor area of 20,000 square feet or more, and

Figure 13: States with Multiple Aerospace & Defense Company Announcements, 2010

Company	City	Product	Category	Type
VA				
Aviation Institute of Maintenance	Prince William County	Regional aviation training	Expansion	Office
Babcock & Wilcox Company	Lynchburg	Engineering and design of the nuclear power	Expansion	Office
CACI International, Inc.	Fairfax County	Information technology consulting	Expansion	Office
InTec, LLC	Fairfax County	Information technology services	Expansion	Office
IntelliDyne, L.L.C.	Fairfax County	Provides IT solutions, consulting services	Expansion	Office
Orion Air Group	Newport News	Aviation services	Expansion	Office
Serco Inc.	Virginia Beach	Engineering services and government-related	Expansion	Office
Special Tactical Services, LLC	Virginia Beach	Security shield emplacements for entry control	Expansion	Office
NC				
Compaero	Mooresville	Aerospace components	Expansion	Manufacturing
GE Aviation	Durham	Aircraft parts	Expansion	Manufacturing
KDH Defense Systems	Eden	Military Apparel	Expansion	Manufacturing
Michelin	Norwood	Aviation Tires	Expansion	Manufacturing
SDI Corporation	Durham	Security products	Expansion	Office
IL				
Boeing Company	Mascoutah	Aircraft parts	Expansion	Manufacturing
Navistar	Lisle	Hybrid technology, military vehicle designs	Expansion	Office - Headquarters - R&D
Woodward Governor	Loves Park	Aircraft Engines	New	R&D
CO				
General Dynamics Information Technology	Westminster	Data Center	New	Office
Lockheed Martin Corp.	Denver	Cybersecurity Systems	New	Office - R&D
UQM Technologies	Frederick	Propulsion Systems	Expansion	Manufacturing
UT				
ATK Aerospace Systems	Clearfield	Aerospace	New	Manufacturing
Janicki Industries	Layton	Aircraft parts	New	Manufacturing
Northrop Grumman	Salt Lake City	Aerospace	Expansion	Manufacturing
FL				
Armorit	Sarasota	Engineering	New	Dist/Warehouse - Office
Pemco World Air Services Inc.	Tampa	Aircraft Maintenance	New	Manufacturing
TurboCombustor Technology	Stuart	Aircraft Engines	Expansion	Manufacturing
GA				
Bombardier	Macon	MRO - Aircraft	New	Manufacturing
Make Manufacturing	Macon	Aircraft parts	Expansion	Manufacturing
TIMCO Macon	Macon	MRO - Aircraft	Expansion	Manufacturing
MO				
Jet Midwest Inc.	Kansas City	Aircraft Parts (bldg 1)	New	Dist/Warehouse
Jet Midwest Inc.	Kansas City	Aircraft Parts (bldg 2)	New	Dist/Warehouse
Tech Aerospace Group Inc.	Washington	Airplane Parts	New	Manufacturing
SC				
Air Carrier Accessory Service, Inc.	Marion	Aerospace	New	Manufacturing
Boeing Fabrication Interiors SC	North Charleston	Airplane Interiors	New	Manufacturing
OR				
Boeing Co.	Gresham	Aircraft	New	Manufacturing
Garmin AT Inc.	Salem	Electronics	Expansion	Manufacturing
AZ				
Sargent Aerospace & Defense	Marana	Hydronic Controls	Expansion	Manufacturing
Sargent Aerospace & Defense	Marana	Hydronic Controls	Expansion	Manufacturing

Source: Conway Data New Plant Report

- Seemingly due to the lingering effects of the 2009 recession, very few company announcements occurred in 2010. Announcements were largely in the south Atlantic states where a number of large military bases are located.
- Virginia had the most aerospace and defense company openings or expansions in 2010 with eight announced expansions, all of which were office locations.

include companies with 50 or more employees. Leases must reflect investments of $1 million or more in lease costs, renovations, or improvements and must either add 50 or more new jobs to the lessee's payroll or consist of 20,000 or more square feet.

- North Carolina had the second largest number of openings or expansions in 2010, with five expansions, four of which were manufacturing facilities.
- Illinois, Colorado, Utah, Florida, Georgia, Missouri, South Carolina, and Oregon saw new facilities open in their states. These new facilities were a mix of office and manufacturing.
- Arizona's two announcements in 2010 were from Sargent Aerospace & Defense. The manufacturer expanded its production of hydronic controls (systems used to monitor or control water flow, temperature, and pressure in boiler systems) in Marana.

Defense Contracting Activity

Most aerospace and defense companies execute contracts exclusively with the Department of Defense. Understanding Department of Defense contracts, what states they are going to, what sectors they are in, and what states compete in these sectors provides strategic insight into what the future may hold for the industry and what can be done to cultivate key companies and product lines.[7]

Arizona's Competitor States for Defense Contracts

Figure 14 demonstrates Arizona's position among top DoD contracting states.

- In 2010, Arizona received more than $10.8 billion (3 percent) of total DoD contracts, making Arizona the ninth largest recipient state for DoD contracts for that year.
- Among the top 15 recipients of DoD contracts in 2010, Arizona ranks seventh in DoD contract dollars per capita.

Figure 14: Top State Recipients of Department of Defense Contracts, 2010

State	Total DoD Contract Dollars	Percentage of Total DoD Contract Dollars	Defense Contract Dollars Per Capita
All Other States	*$ 45,846,712,316*	*12.5%*	
California	$ 41,171,585,955	11.2%	$ 1,105
Virginia	$ 40,290,147,965	11.0%	$ 5,036
Texas	$ 29,328,035,493	8.0%	$ 1,166
Florida	$ 12,743,603,595	3.5%	$ 678
Massachusetts	$ 12,598,568,670	3.4%	$ 1,924
Pennsylvania	$ 11,886,044,240	3.2%	$ 936
Maryland	$ 11,825,717,034	3.2%	$ 2,048
Connecticut	$ 11,096,346,847	3.0%	$ 3,105
Arizona	$ 10,829,830,067	3.0%	$ 1,694
Missouri	$ 10,309,874,941	2.8%	$ 1,721
New York	$ 8,792,495,664	2.4%	$ 454
Georgia	$ 8,360,246,197	2.3%	$ 863
Wisconsin	$ 8,308,374,484	2.3%	$ 1,461
Alabama	$ 8,107,564,670	2.2%	$ 1,696
New Jersey	$ 7,855,850,266	2.1%	$ 894

Source: USASpending.gov; U.S. Census Bureau, 2010 Census

[7] Department of Defense contract information is based on place of performance, not recipient state, for the Prime Award contractor and does not reflect awards to subcontractors.

Top Arizona Defense Contractors

Five contractors account for 75 percent of all DoD contracts in the state (Figure 15).

- Raytheon Company is the dominant aerospace and defense contractor in Arizona, receiving more than 48 percent of all Arizona DoD contracts in 2010. The company produces missile and space systems; provides maintenance, repair, and overhaul operations; and conducts advanced research and development. Most of the company's activities were executed in the Tucson area.
- Boeing, Honeywell, and General Dynamics represent the next three largest Arizona DoD contractors with contracts totaling more than $1.85 billion.

Figure 15: Top 15 DoD Contractors in Arizona in 2010*

Contractor	Product Lines	Total Value of Contracts	% of Total DoD Contracts in AZ
Raytheon Company	Guided Missiles & Missile Subsystems, Maintenance/Repair/Overhaul, Bombs, Ammunition, Rocket & Pyrotechnic Launchers, Night Vision Equipment	$ 5,213,539,600	48.1%
The Boeing Company	Rotary & Fixed Wing Aircraft, Logistics Support Services, Airframe Structural Components, Weapons, Guns, Maintenance/Repair/Overhaul	$ 787,788,131	7.3%
Honeywell International Inc.	Gas Turbines & Jet Engines, Maintenance/Repair/Overhaul, Engine Fuel System Components, Fixed Wing Aircraft, Radar Equipment, Torque Converters & Speed Changers	$ 566,989,435	5.2%
General Dynamics Corporation	Defense Electronics & Communications Equipment, Engineering & Technical Services, Maintenance/Repair/Overhaul, Generators, Weapons, Radio Navigation Equipment	$ 497,587,502	4.6%
Alliant Techsystems Inc.	Ammunition, Guns, Fixed Wing Aircraft, Power Transmission Equipment, Engineering & Technical Services	$ 161,037,295	1.5%
BAE Systems PLC	Personal Armor, Rotary Wing Aircraft and Components, Maintenance/Repair/Overhaul, BasicR&D, Parachutes	$ 149,491,238	1.4%
Orbital Sciences Corporation	Missile & Space Systems, Drones, Guided Missiles and Launchers, Engineering & Technical Services	$ 123,288,839	1.1%
Trax International Corporation	Weapons Management & Support	$ 116,323,185	1.1%
Northrop Grumman Corporation	Engineering & Technical Services, Cable Cord & Wire Assemblies, Defense Missile & Space Systems, Degaussing & Mine Sweeping Equipment, Drones	$ 94,609,112	0.9%
Mantech International Corporation	Utilities, Engineering & Technical Services	$ 77,018,732	0.7%
Lockheed Martin Corporation	Engineering & Technical Services, Radar Equipment, Defense Electronics & Communications Equipment, Management & Support for Weapons	$ 65,914,926	0.6%
Nammo AS	Ammunition, Rocket Ammunition & Components, Guided Missile Remote Control Systems	$ 63,982,587	0.6%
McDonnell Douglas Helicopter	Airframe Structural Components, Defense Aircraft R&D, Guns, Helicopter Rotor Blades Drive Mechamisms & Components, Weapons, Rotory Wing Aircraft	$ 62,984,197	0.6%
Paranetics Tech	Parachutes, Aerial Pick Up Delivery Recovery Systems, Cargo Tie Down Equipment	$ 52,714,367	0.5%
Robertson Fuel Systems LLC	Airframe Structural Components, Aircraft Accessories & Components, Maintenance/Repair/Overhaul, Aircraft & Missile Engine Fuel System Components, Guns	$ 51,905,312	0.5%
	Total Value of All DoD Contracts in Arizona in 2010	**$ 10,829,410,196**	**74.7%**

Source: USASpending.gov

*This figure excludes the second largest contractor in the state, Triwest Healthcare Alliance, which received contracts totaling $1,205,039,909 in 2010 (11.1 percent of all Arizona DoD contract dollars) to provide healthcare services to Arizona's military employees.

- Other major contractors awarded more than $100 million in defense contracts in 2010 include: Alliant Techsystems, BAE Systems, Orbital Sciences, and Trax International.
- Healthcare represents the second largest DoD contract area in Arizona, accounting for 11% of all contracts in 2010.
    - Triwest Healthcare Alliance, part of Tricare, provides healthcare services to the 30,000 Department of Defense employees in Arizona. Triwest's presence as a top five DoD contractor is the result of large military employment figures in the state.
- Other important Department of Defense contract activities in Arizona in 2010 related to the production and delivery of:
    - Personal armor
    - Pressure, temperature, and humidity measuring and controlling instruments
    - Parachutes
    - Defense electronics and communications equipment
    - Drones
    - Weapons management and support
    - Ammunition and guns
    - Fixed wing aircraft
    - Rockets and rocket components
    - Radar equipment
    - Engineering and technical services

Defense Contracting by Region in Arizona

The Tucson and Phoenix areas received more than 88 percent of Arizona's $10.8 billion in Department of Defense contracts in Arizona in 2010 (Figure 16).

Figure 16: Largest Contracts by Region in Arizona, 2010

Top Contracts in Top Cities	Product	Contract Amount
Tucson (Davis-Monthan AFB, Kino, Mission, Tucson)		
Raytheon Company	Defense Missile and Space Systems -- Basic Research (R&D)	$ 586,340,881
Raytheon Company	Guided Missiles	$ 518,374,514
Raytheon/Lockheed Martin Javelin Joint Venture	Guided Missile Subsystems	$ 446,538,513
Raytheon Company	Guided Missiles	$ 410,164,007
Raytheon Company	Guided Missiles	$ 311,236,223
Total of All Tucson Contracts		**$ 5,240,581,519**
Phoenix Area (Avondale, Chandler, Gilbert, Glendale, Mesa, Phoenix, Scottsdale, Tempe, Tolleson)		
Triwest Healthcare Alliance Corporation	General Health Care Services	$ 1,213,708,976
Boeing Company	Rotary Wing Aircraft	$ 247,198,321
Honeywell International Inc.	Gas Turbines and Jet Engines Non-Aircraft; and Components	$ 163,805,712
General Dynamics C4 Systems Inc.	Defense Electronics & Communication Equipment -- Operational Systems Development (R&D)	$ 132,927,754
Boeing Company/McDonnell Douglas Helicopter Company	Aircraft Rotary Wing	$ 118,330,950
Total of All Phoenix Area Contracts		**$ 4,319,900,643**
Fort Huachuca		
Raytheon Technical Services Company LLC	Maintenance Repair and Rebuilding of Equipment -- Training Aids and Devices	$ 248,496,230
Mantech Telecommunications & Information Systems Corp.	Other Utilities	$ 76,780,501
Northrop Grumman Space & Mission Systems Corp.	Engineering and Technical Services	$ 52,013,176
STG Inc.	Other ADP & Telecommunications Services (includes data storage on tapes compact disks etc.)	$ 38,769,334
Interop II Joint Venture	Engineering and Technical Services	$ 35,565,873
Total of All Fort Huachuca Contracts		**$ 737,968,860**
Yuma (Martinez Lake, San Luis, Wellton, Yuma)		
Trax International Corporation	Weapons -- Management and Support (R&D)	$ 122,901,783
Paranetics Technology Inc.	Parachutes; Aerial Pick Up Delivery Recovery Systems; and Cargo Tie Down Equipment	$ 41,815,129
Okland Construction Company Inc.	Construction of Structures and Facilities -- Other Administrative Facilities and Service Buildings	$ 22,778,283
Pyramid Services Inc.	Facilities Operations Support Services	$ 17,456,373
URSGO-BMDC A Joint Venture	Architect - Engineer Services (including landscaping interior layout and designing)	$ 14,206,773
Total of All Yuma Contracts		**$ 330,318,701**
Luke AFB		
A&D GC Inc	Construction of Structures and Facilities -- Other Administrative Facilities and Service Buildings	$ 9,940,000
L-3 Communitcations Vertex Aerospace LLC	Maintenance Repair and Rebuilding of Equipment -- Aircraft and Airframe Structural Components	$ 7,816,486
Chenga Technology Services Co	Education Services	$ 7,362,986
Sunset Air Inc.	Maintenance Repair or Alteration of Real Property -- Miscellaneous Buildings	$ 3,373,486
RCDS Constractors Inc.	Maintenance Repair or Alteration of Real Property -- Office Buildings	$ 3,205,449
Total of All Luke AFB Contracts		**$ 65,493,596**

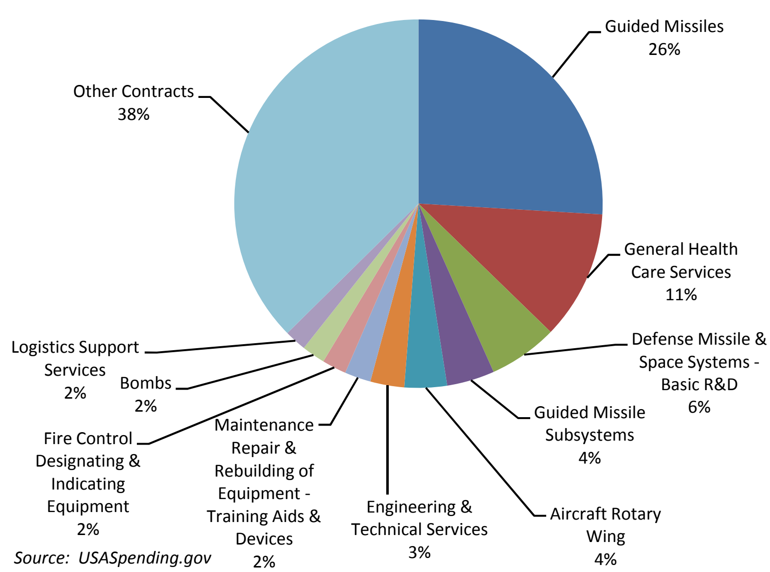
Source: USASpending.gov

- The Tucson area received the largest total value of contracts from the Department of Defense, more than $5.2 billion in 2010.
    - With the exception of the joint Raytheon/Lockheed Martin Javelin Joint Venture, all of the top five contracts were held exclusively by the Raytheon Company to develop missiles and missile systems.
- The Phoenix area received the second largest amount of contract dollars in 2010, $4.4 billion, led by a diverse mix of contractors.
    - More than 25 percent of that amount, $1.2 billion, was to support military healthcare through Triwest Healthcare Alliance Corporation. This contract was the single largest DoD contract in the state in 2010.
    - The primary products lines of other defense contractors in the Phoenix area for the Department of Defense were aircraft and defense communications equipment.
- The primary contracts at Fort Huachuca for the Department of Defense were for aircraft maintenance, repair, and overhaul services and other engineering and technical services.
- DoD contracts in Yuma related primarily to weapons management and support systems, parachutes, and other facilities operations services.

Defense Contracting by Product Line

Figure 17 demonstrates that the bulk of aerospace and defense contracts performed in the state of

Figure 17: Top Defense-related Product Lines in Arizona, 2010



Source: USASpending.gov

Arizona are in a few key product categories.

- On a 2010 contract basis, Arizona's most significant defense-related product lines are Guided Missiles, General Health Care Services, Basic Research and Development of Defense Missile and Space Systems, Guided Missile Subsystems, and Rotary Wing Aircraft (Figure 18).
- In the state's top five aerospace and defense product lines, Arizona is the number one state for contract awards in three out of five product lines.

Figure 18: Top Competitor States in Arizona's 5 Major Product Lines

Guided Missiles

State	Total Dollars	Percentage of All Guided Missiles Contracts
Arizona	$ 2,808,486,031	54.5%
Massachusetts	$ 1,288,713,578	25.0%
Florida	$ 450,325,794	8.7%
California	$ 376,476,789	7.3%
Texas	$ 85,504,561	1.7%

General Healthcare Services

State	Total Dollars	Percentage of All Healthcare Contracts
California	$ 4,403,687,421	42.7%
Kentucky	$ 2,303,409,750	22.3%
Arizona	$ 1,226,384,132	11.9%
South Carolina	$ 631,206,150	6.1%
Arkansas	$ 290,483,271	2.8%

Defense Missile & Space Systems - Basic R&D

State	Total Dollars	Percentage of All Missile & Space R&D Contracts
Arizona	$ 655,325,280	47.4%
New Jersey	$ 322,178,281	23.3%
California	$ 94,226,547	6.8%
Connecticut	$ 48,440,307	3.5%
New Mexico	$ 29,291,336	2.1%

Guided Missile Subsystems

State	Total Dollars	Percentage of All Guided Missile Subsystems Contracts
Arizona	$ 454,509,424	95.5%
New York	$ 11,884,450	2.5%
Massachusetts	$ 5,111,159	1.1%
West Virginia	$ 4,269,624	0.9%
Texas	$ 311,238	0.1%

Aircraft, Rotary Wing

State	Total Dollars	Percentage of All Rotary Wing Contracts
Texas	$ 2,963,825,067	40.1%
Connecticut	$ 2,241,900,262	30.4%
Pennsylvania	$ 1,040,181,635	14.1%
Arizona	$ 403,209,318	5.5%
New York	$ 343,216,646	4.7%

Source: USASpending.gov

- Arizona dominates the Guided Missile Subsystems market, receiving more than 95 percent of all DoD contracts related to this area in 2010.
- Arizona's number three position among all healthcare contracts awarded is driven in part by the large number of military employees in the state.
- Arizona could expand its presence in the Rotary Wing Aircraft segment, capturing just 5.5 percent of all contracts in 2010 despite being a top five product line for the state.

Furthermore, Figure 19 demonstrates the incredible growth that has occurred among several of these product lines (on a DoD contractual basis) within the past five to ten years.

Figure 19: Arizona Growth vs. National Growth in Top 5 Product Lines

Product Line	2000-2005*		2005-2010*		2000-2010*	
	U.S.	Arizona	U.S.	Arizona	U.S.	Arizona
Aircraft, Rotary Wing	9.1%	1.5%	25.7%	-9.5%	17.1%	-4.2%
Defense Missile & Space Systems - Basic R&D	57.5%	12.7%	40.8%	250.0%	48.9%	98.6%
General Health Care Services	31.1%	39.6%	8.5%	-7.2%	19.3%	13.8%
Guided Missile Subsystems	-18.7%	-23.9%	26.8%	33.1%	1.5%	0.6%
Guided Missiles	9.6%	25.1%	12.6%	5.2%	11.1%	14.7%

Source: USASpending.gov *Growth rates given as compound annual growth rates

- Arizona's annual growth in Defense Missile & Space Systems – Basic R&D and Guided Missiles outpaced national annual growth by 49.7 percent and 3.6 percent per year, respectively, between 2000 and 2010. This growth demonstrates a sustained competitive advantage in Arizona in these two product categories.

- Arizona's annual growth in Defense Missile & Space Systems – Basic R&D and Guided Missile Subsystems also outpaced national annual growth by 209.2 and 6.3 percent per year,

Figure 20: Arizona's Share of Total DoD Contracts by Product Line

Product Line	Percentage of Total DoD Contracts in Arizona - 2010
Rockets, Rocket Ammunition and Rocket Components	56%
Defense Missile and Space Systems -- Basic Research (R&D)	47%
Bombs	30%
Miscellaneous Weapons	24%
Engine Fuel System Components, Aircraft and Missile Prime Movers	18%
Defense Aircraft -- Advanced Development (R&D)	16%
Guns, over 30 mm up to 75 mm	16%
Parachutes; Aerial Pick Up, Delivery, Recovery Systems; and Cargo Tie Down Equipment	14%
Launchers, Rocket and Pyrotechnic	14%
Defense Electronics and Communication Equipment -- Advanced Development (R&D)	13%
Ammunition, 75 mm through 125 mm	13%
Aircraft Air Conditioning, Heating, and Pressurizing Equipment	10%
Helicopter Rotor Blades, Drive Mechanisms and Components	10%
Defense Missile and Space Systems -- Operational Systems Development (R&D)	9%
Defense Missile and Space Systems -- Engineering Development (R&D)	9%
Aircraft Wheel and Brake Systems	6%
Airframe Structural Components	6%
Miscellaneous Engine Accessories, Aircraft	6%
Guns, through 30 mm	6%

Source: USASpending.gov

respectively, between 2005 and 2010, demonstrating a more recently gained competitive advantage in Arizona in these two product categories.

Contracting Growth Opportunities

Based on percentages of DoD spending nationally, Figure 20 demonstrates Arizona's presence as a key place of performance in many contract areas.

- Arizona has captured significant portions of all DoD contracts in Defense Missile and Space Systems, including:
  - 47 percent of all contracts for Basic Research and Development (R&D)
  - 9 percent of all contracts for Operational Systems Development (R&D)
  - 9 percent of all contracts for Engineering Development (R&D)
- Arizona's competitive strength is in research and development functions. In addition to the R&D functions captured in the Defense Missile and Space Systems area, Arizona also has a significant R&D presence in Defense Aircraft – Advanced Development (R&D) and Defense Electronics and Communication Equipment – Advanced Development (R&D).
- Arizona has also captured a significant portion of rocket-related contracts, with 56 percent of all contracts for Rockets, Rocket Ammunition, and Rocket Components and 14 percent of all contracts for Launchers, Rocket and Pyrotechnic.
- Arizona's presence in defense aircraft manufacturing should also be noted, though the state captured smaller percentages of a larger number of contract areas, including:
  - 18 percent of all Engine Fuel System Components, Aircraft and Missile Prime Movers
  - 16 percent of all Defense Aircraft – Advanced Development (R&D)

- 14 percent of all Parachutes – Aerial Pick Up, Delivery, Recovery Systems – and Cargo Tie Down Equipment
- 10 percent of all Aircraft Air Conditioning, Heating, and Pressurizing Equipment
- 10 percent of all Helicopter Rotor Blades, Drive Mechanisms, and Components

- Finally, Arizona has a noteworthy presence in gun, bomb, and ammunition manufacturing, capturing:

Figure 21: Fastest Growing Defense Product Lines in Arizona

Product Line	2005-2010 Annual Growth
Defense Missile and Space Systems -- Basic Research (R&D)	250%
Guns, over 30 mm up to 75 mm	227%
Parachutes; Aerial Pick Up, Delivery, Recovery Systems; and Cargo Tie Down Equipment	117%
Aircraft Wheel and Brake Systems	104%
Defense Missile and Space Systems -- Applied Research and Exploratory Development (R&D)	95%
Night Vision Equipment, Emitted and Reflected Radiation	66%
Maintenance, Repair or Alteration of Real Property -- Airport Runways	63%
Defense Missile and Space Systems -- Engineering Development (R&D)	55%
Defense Aircraft -- Advanced Development (R&D)	53%
Launchers, Rocket and Pyrotechnic	35%
Bombs	31%
Ammunition, 75 mm through 125 mm	28%
Rockets, Rocket Ammunition and Rocket Components	24%
Defense Electronics and Communication Equipment -- Basic Research (R&D)	22%
Defense Missile and Space Systems -- Operational Systems Development (R&D)	13%
Defense Electronics and Communication Equipment -- Applied Research and Exploratory Development (R&D)	13%
Defense Aircraft -- Applied Research and Exploratory Development (R&D)	10%

Source: USASpending.gov

- 30 percent of all contracts for Bombs
- 24 percent of all contracts for Miscellaneous Weapons
- 16 percent of all contracts for Guns over 30 mm up to 75 mm
- 13 percent of all contracts for Ammunition 75 mm through 125 mm

Many of these contract areas are also rapidly growing within the state (Figure 21).

- Arizona has experienced significant growth in the contract areas in which it has a strong presence, including:
  - 250 percent annual growth in Defense Missile and Space Systems – Basic Research (R&D)
  - 227 percent annual growth in Guns over 30 mm up to 75 mm
  - 117 annual growth in Parachutes – Aerial Pick Up, Delivery, and Recovery Systems – and Cargo Tie Down Equipment
  - 104 percent annual growth in Aircraft Wheel and Brake Systems
  - 95 percent annual growth in Defense Missile and Space Systems – Applied Research and Exploratory Development (R&D)
- High growth areas for Arizona that are not currently top contract concentrations include:
  - Night Vision Equipment, Emitted and Reflected Radiation (66 percent annual growth between 2005 and 2010)
  - Maintenance, Repair, or Alternation of Real Property – Airport Runways (63 percent annual growth)
  - Defense Electronics and Communication Equipment – Basic Research (R&D) (22 percent annual growth)

- o Defense Electronics and Communications Equipment – Applied Research and Exploratory Development (R&D) (13 percent annual growth)
  - o Defense Aircraft – Applied Research and Exploratory Development (R&D) (10 percent annual growth).
- With the exception of Night Vision Equipment, for which companies in the state have only 2 percent of total DoD awards, Arizona already has significant concentrations in existing contract areas related to these high growth contract areas and is poised to capture additional contracts.

Finally, Arizona has adequately captured DoD spending increases nationally in important contract areas for the state (Figure 22).

Figure 22: Fastest Growing Product Lines in the U.S.

	2005-2010 Annual Growth	
Product Line	Arizona	U.S.
Maintenance, Repair or Alteration of Real Property -- Airport Runways	63.5%	35.3%
Defense Missile and Space Systems -- Engineering Development (R&D)	54.9%	25.4%
Parachutes; Aerial Pick Up, Delivery, Recovery Systems; and Cargo Tie Down Equipment	116.6%	23.4%
Defense Electronics and Communication Equipment -- Basic Research (R&D)	22.0%	20.2%
Miscellaneous Aircraft Accessories and Components	-2.6%	15.8%
Cartridge and Propellant Actuated Devices and Components	-5.7%	14.6%
Defense Missile and Space Systems -- Applied Research and Exploratory Development (R&D)	95.3%	13.7%
Guns, over 30 mm up to 75 mm	226.7%	13.0%
Airframe Structural Components	-2.7%	11.6%
Defense Aircraft -- Advanced Development (R&D)	52.9%	9.8%
Defense Electronics and Communication Equipment -- Applied Research and Exploratory Development (R&D)	13.2%	7.5%
Defense Electronics and Communication Equipment -- Advanced Development (R&D)	-0.6%	7.0%
Passenger Air Charter Service	4.3%	5.4%
Aircraft Wheel and Brake Systems	103.8%	4.7%
Defense Aircraft -- Applied Research and Exploratory Development (R&D)	9.9%	2.6%
Radar Equipment, Airborne	-16.4%	2.4%
Defense Missile and Space Systems -- Advanced Development (R&D)	6.8%	0.6%
Launchers, Rocket and Pyrotechnic	34.9%	-1.2%
Miscellaneous Engine Accessories, Aircraft	-5.7%	-1.3%
Engine Fuel System Components, Aircraft and Missile Prime Movers	-5.6%	-2.6%
Night Vision Equipment, Emitted and Reflected Radiation	66.0%	-3.7%
Gas Turbines and Jet Engines, Aircraft; Prime Moving, and Components	-1.7%	-3.8%
Defense Missile and Space Systems -- Operational Systems Development (R&D)	13.4%	-4.3%
Ammunition, 75 mm through 125 mm	28.3%	-5.0%
Aircraft Air Conditioning, Heating, and Pressurizing Equipment	-26.7%	-6.0%
Bombs	30.9%	-7.0%
Guns, through 30 mm	1.5%	-7.8%
Miscellaneous Weapons	7.7%	-8.6%
Helicopter Rotor Blades, Drive Mechanisms and Components	-14.7%	-19.7%
Rockets, Rocket Ammunition and Rocket Components	23.6%	-33.3%

Source: USASpending.gov

- Contract areas where Arizona has not captured DoD spending growth include:
  - o Miscellaneous Aircraft Accessories and Components
  - o Cartridge and Propellant Actuated Devices and Components
  - o Airframe Structural Components; Defense Electronics and Communication Equipment – Advanced Development (R&D)
  - o Radar Equipment, Airborne

2011 Defense Contract Announcements

The Department of Defense has announced a small portion of all contracts executable in 2011. Of the $700 million in new contracts announced for the first quarter of the current fiscal year, Arizona companies did not receive new contract announcements. This may be due to the timing of data releases from USASpending.gov. Figure 23 shows 2011 announcements nationally in important contract areas.

Figure 23: Largest Contract Announcements in Arizona's Key Aerospace & Defense Industries, 2011

State	Product	Company	Contract Value
Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing (NAICS 334511)			**$256,831,067**
Texas	Miscellaneous Communication Equipment	Raytheon Company	$70,373,411
New Jersey	Fire Control Radar Equipment, except Airborne	Lockheed Martin Corporation	$61,523,239
Florida	Radio Navigation Equipment, Airborne	Lockheed Martin Corporation	$29,573,023
Illinois	Electronic Countermeasures, Counter-Countermeasures and Quick Reaction Capability Equipment	Northrop Grumman Corporation	$9,100,000
Iowa	ADP Software	Rockwell Collins, Inc.	$7,832,404
Aircraft Engine and Engine Parts Manufacturing (NAICS 336412)			**$167,152,959**
Massachusetts	Gas Turbines and Jet Engines, Aircraft; Prime Moving, and Components	General Electric Company	$42,893,901
Massachusetts	Gas Turbines and Jet Engines, Aircraft; Prime Moving, and Components	General Electric Company	$30,750,000
Massachusetts	Gas Turbines and Jet Engines, Aircraft; Prime Moving, and Components	General Electric Company	$18,270,141
Massachusetts	Gas Turbines and Jet Engines, Aircraft; Prime Moving, and Components	General Electric Company	$13,579,295
Texas	Maintenance, Repair and Rebuilding of Equipment -- Engines,	Carlyle Group, L.P.	$11,705,925
Guided Missile and Space Vehicle Manufacturing (NAICS 336414)			**$278,756,151**
Colorado	Space Vehicles	Lockheed Martin	$73,044,744
Massachusetts	Guided Missiles	Raytheon Company	$66,202,700
California	Other Defense -- Operational Systems Development (R&D)	Northrop Grumman Corporation	$29,046,000
Texas	Launchers, Guided Missile	Lockheed Martin Corporation	$25,630,111
California	R&D-Space & Terrestrial-OPSY Dev	Northrop Grumman Corporation	$21,900,000

Source: USASpending.gov

- The biggest winners in the contracts awarded in the first quarter of 2011 include Raytheon, General Electric, Lockheed Martin, and Northrop Grumman.
  - Raytheon DoD contracts to date total more than $137 million and are in Texas and Massachusetts.
  - Lockheed Martin received five new major contracts totaling $190 million in New Jersey, Florida, Colorado, and Texas.
  - Northrop Grumman's five largest contracts to date for 2011 total $60 million and will be performed in Illinois and California.
- Companies in Arizona's major competitor states have succeeded in winning more contracts than Arizona firms in aircraft engine and engine parts manufacturing as well as guided missiles and space vehicle manufacturing to date.
  - The four largest DoD contracts in 2011 for aircraft engine and engine parts manufacturing were located in Massachusetts. That state also had the second largest announced contract for guided missiles and space vehicle manufacturing.
  - Massachusetts' position as a top location for aircraft engine and engine parts manufacturing is driven by the presence of General Electric, which holds four of the top five announced contracts for 2011 in this area.
- Colorado and California are the only western states to receive a top contract award in these categories in 2011.
  - These contracts were both in the guided missile and space vehicle manufacturing areas.
  - Northrop Grumman won two out of these three contracts.

Selected State-level Aerospace & Defense Business Incentives

In 2011, Arizona approved a significant new set of tax and program incentives designed to promote business investment in the state.

Arizona Business Incentives

The Arizona Competitiveness Package of 2011 enacted several key measures that will impact existing aerospace and defense companies in the state and company location decisions in the future. These provisions are:

- *Corporate Income Tax* reductions from 6.97% to below 4.9%, between FY 2014 and FY 2017. The reduction is to occur in equal increments over a four-year period.
- *100% Sales Factor* allows multi-state corporations to increase the electable sales factor from 80% to 100% in equal increments between FY 2014 and FY 2017. Under this provision, a corporation that conducts business both in-state and out-of-state must apportion its income from business activity based on the ratio of property, payroll, and sales in Arizona compared to the corporation's property, payroll, and sales everywhere.
- *R&D Tax Credit Enhancement* provides an 10% increase in the credit available for qualified expenditures made to support R&D activities at a public or private Arizona university.
- *Angel Tax Credit/Capital Gains* provisions increases the amount eligible for the Angel Investment Tax Credit from $2 million to $10 million in total assets, and they eliminates the capital gains tax on income derived from investments in small businesses that have been certified by the Arizona Commerce Authority.
- *Personal Property Tax Reform* accelerates the depreciation schedules for prospective acquisitions of commercial personal property initially placed on the tax rolls on or after 2012. The reform package also increases the exemption on personal property from the current $67,000 in Tax Year 2010 to $79,000 in Tax Year 2011 by using the Employment Cost Index (ECI) rather than the Gross Domestic Product Implicit Price Deflator (GDP IPD).
- *Commercial Property* assessment ratios were adjusted to 18% and the homeowners rebate was increased to offset this change.
- *Job Training Program* was reauthorized, providing a job-specific reimbursable grant program that provides training plans for employers creating new jobs or increasing the skill and wage levels of current employees.
- *Quality Job Tax Credit* replaces Arizona's expiring Enterprise Zone program. Each eligible job qualifies for a $3,000/year credit for three years, with a cap of 400 jobs per employer each year. The total program cap is $30 million a year, and $90 million for three years.
- *Arizona Competes Fund* provides resources to companies that achieve certain performance measures, average employee wages above the county's average wage, and other requirements similar to the existing Job Training program. The Arizona Competes Fund will generate dollars for investment in business projects that stimulate and promote industries that provide stable, high-wage jobs. The program will be funded through increases in corporate income tax withholding, and capped at $25 million.

Other important aerospace and defense incentive in Arizona are:

- *Military Reuse Zone Program*: Aviation and aerospace contractors in certain designated military reuse zones receive income tax credits for net increases in qualified employment, reclassification of qualified taxable property to reduce property tax, and an exemption from transaction privilege tax to prime contractors for the construction of certain facilities.

- *Use Tax Exemptions*: Qualified purchasers of aircraft, navigational, and communication instruments may take appropriate use tax exemptions. Machinery, tools, equipment, and related supplies used or consumed directly in repairing, remodeling, or maintaining aircraft, aircraft engines, or aircraft component parts by or on behalf of qualified parties also qualify for use tax exemptions.

Competitor State Incentives

The following business incentives provide insight into the programs used to attract businesses in Arizona's nearby competitor states for the aerospace and defense industry as well as the incentives used by states with the most company announcements in 2010.[8]

New Mexico

- *Aircraft Maintenance or Remodeling Tax Deduction*: Receipts from maintaining, refurbishing, remodeling or otherwise modifying a commercial or military carrier (aircraft) over 10,000 pounds gross landing weight may be deducted from gross receipts.
- *Aircraft Manufacturing Tax Deduction*: Receipts of an aircraft manufacturer or affiliate from selling aircraft or aircraft parts, or from selling services performed on aircraft or aircraft components, or from selling aircraft flight support, pilot training, or maintenance training services may be deducted from gross receipts.
- *Research and Development Tax Deduction*: Aerospace-related R&D services sold to the U.S. Air Force (directly or through a prime contractor) may receive a tax deduction.
- *Space Gross Receipts Tax Deduction*: There are four separate deductions connected with the operation of the New Mexico Spaceport. Businesses may deduct the receipts from launching, operating, or recovering space vehicles or payloads; from preparing a payload in New Mexico; from operating a spaceport in New Mexico; and from the provision of research, development, testing, and evaluation services for the Air Force's operationally responsive space program.

Utah

- *Industrial Assistance Fund*: Companies in target industries, including aerospace, general aviation, and composite materials, are eligible for grants to relocate to Utah or expand operations within the state for the creation of jobs paying higher than prevailing wages within the community on a post-performance basis of job creation and retention.
- *Sales and Use Tax Exemptions*: Sales of tooling, special tooling, support equipment, and special test equipment used or consumed exclusively in the performance of any aerospace or electronics industry contract/subcontract with the United States government are eligible for sales and use tax exemptions for the purchase or lease of new or replacement equipment or machinery for manufacturing facilities

Oklahoma

- *Aerospace Engineer Tax Credit* (reactivated July 1, 2011): For aerospace companies, a tax credit is offered for those that hire engineers. Ten percent of the qualified wage cost for the 1-5 years of employment is offered for graduates of Oklahoma institutions, and five percent of the qualified wage cost for the 1-5 years of employment is offered for graduates from non-Oklahoma institutions. For engineers that work for an Oklahoma aerospace company, a tax

[8] Information about other state incentives are derived from the C2ER Business Finance and Incentives Database.

credit of up to $5,000 per year for the first 1-5 years of employment is available. Finally, an employer tax credit is available for 50% of tuition reimbursed to a new engineer graduate, based on the average tuition at an Oklahoma public college or university, for the first through fourth years of employment.

Georgia

- *Strategic Industries Loan Fund*: Provides loan assistance for the purchase of fixed assets for companies in targeted industries (e.g., aerospace and defense) when a company is considering an expansion of their existing Georgia site or a relocation to Georgia from another state.

Florida

- *Qualified Defense Contractor Tax Refund Program*: Pre-approved applicants creating or retaining jobs in defense industries may receive tax refunds of $3,000-$5,000 per net new Florida full-time equivalent job created or retained and $6,000-$8,000 in an Enterprise Zone or rural county.
- *Semiconductor, Defense, or Space Technology Sales & Use Tax Exemption:* Businesses may claim sales and use tax exemptions on semiconductor, defense, and space technology-based purchases of production and/or research and development equipment.

Summary of Key Trends in Arizona's Aerospace and Defense Sector

- Arizona's existing strength in the aerospace and defense industry is driven by the strong presence of military facilities in the state and by the state's climate, which allows for testing equipment under extreme desert conditions.
- Important employment trends include:
    - Total DoD employment in Arizona is 30,934, of which 69 percent are military workers (U.S. Office of Personnel Management).
    - Estimates of total direct and indirect employment in aerospace and defense-related industries range from approximately 93,800 (Arizona State University estimate of total economic impact in 2009) to 118,790 workers (C2ER estimate of employment in defense and homeland security-related industries in 2010).
- Projected growth in defense contracting in Arizona should create between 3,000 and 6,000 new jobs for Arizonans by 2015.
- The Phoenix Area and Tucson received more than 88 percent of all DoD contract dollars in the state in 2010. Tucson – because of the presence of Raytheon – leads the state in attracting defense and aerospace contract dollars.
- Arizona was the ninth largest recipient of Department of Defense contract dollars among all states in 2010. While healthcare made up a big percentage of contracts, Arizona strongly competes for aerospace and defense technology contracts for R&D and manufacturing.
- Arizona's key competitor states for DoD contract dollars in the aerospace and defense industry are not necessarily in the Southwest.
- Arizona's greatest opportunities for strengthening the aerospace and defense supply chain within the state are in Aircraft Engine and Engine Parts Manufacturing and Search, Detection, and Navigation Instruments Manufacturing.
    - Supply chain opportunities widely exist with the state's largest contractors, especially Raytheon, Boeing, Honeywell, and General Dynamics.
    - Other key aerospace and defense supplier opportunities (based on the current mix of defense contractors) appear to include:

        - Broadcast and Wireless Communications Equipment
        - Guided Missile and Space Vehicle Manufacturing
        - Propulsion Units and Parts for Space Vehicles and Guided Missiles
        - Electricity and Signal Testing Instruments Manufacturing
        - Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing
        - Mechanical Power Transmission Equipment
        - Fluid Power Process Machinery
    - Triwest Healthcare Alliance could offer other potential competitive strengths in non-defense industries, especially in health insurance as the state creates its health care exchange in response to the Affordable Care Act of 2010.
- Based on product line growth and trends in aerospace and defense contracting nationally, important opportunities for contract area growth include:
    - Night Vision Equipment, Emitted and Reflected Radiation
    - Maintenance, Repair, or Alternation of Real Property – Airport Runways
    - Defense Electronics and Communication Equipment – Basic Research
    - Defense Electronics and Communications Equipment – Applied Research and Exploratory Development (R&D)
    - Defense Aircraft – Applied Research and Exploratory Development
    - Miscellaneous Aircraft Accessories and Components
    - Cartridge and Propellant Actuated Devices and Components
    - Airframe Structural Components
    - Defense Electronics and Communication Equipment – Advanced Development (R&D)
    - Radar Equipment, Airborne
- Arizona's competitive advantage in research and development functions will help to sustain the continued attraction of priority investments for national defense in border security and unmanned airborne systems.