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## Site Selection in the Aerospace Industry

By Jeanette Goldsmith

They may  
be silicon...

The aerospace industry in the United States is an important engine to our nation's economy. Despite recent increases in defense spending, the past few years have been extremely difficult for all segments of the aerospace industry. However, recent announcements indicate that perhaps the industry is on the verge of a significant recovery. This recovery is being fueled not only by growth in the defense-related industry segments but also by the beginnings of a post-9/11 recovery as well as significant changes in the commercial aviation segments. The question that still remains to be answered is whether or not this recovery will result in significant new investments in terms of facilities, equipment, and technology as well as a return to pre-9/11 employment levels.

### Overview of the Aerospace Industry

Broadly defined, the aerospace industry includes the following sub-segments: aircraft and related parts; guided missiles, space vehicles and related parts, and search, detection, and navigation instruments. In addition, there are related aerospace and aviation services such as air transportation services, air courier services, airport and airport terminal services, satellite communication services, and space research and technology services. All together this industry employs over 2 million individuals, representing 1.5% of the total workforce. For the purposes of this article, we will focus primarily on the manufacturing component of the aerospace industry.

### Employment & Wages

The aerospace industry, as defined above, employed over 2 million people in 2001. From 1996 to 2001, the industry added 138,200 jobs. Nearly all of this growth was concentrated in the air transportation services industry, which includes passenger air services, air cargo services, and airport services. During the same time period, significant job losses were experienced in several key aerospace sectors, including: search, detection and navigation instruments; guided missiles, satellite communications services, and space research and technology. These losses do not include the job losses experienced in the commercial aircraft industry in the aftermath of the September 11th terrorist attacks.

In 2001, employees in the industry earned an annual average wage of \$47,700. These wages are 35% higher than the U.S. annual average wage of \$35,500. However, aerospace wages grew by only 5% from 1996 to 2001 compared to a growth rate of 11% for U.S. total wages. Chart 1 below provides a breakdown of the employment and wages by the major segments of the aerospace industry.

Chart 1:  
Aerospace Industry Employment and Wages

Aerospace Industry Segment Employment	Wages
Aircraft and related Parts	462,200 \$57,200
Guided Missiles	83,000 \$66,500
Search Detection and navigation	151,100 \$65,100
Air Transportation	1,302,900 \$40,600
Satellite Communication	18,000 \$66,100
Space Research and Technology	17,400 \$64,900

Source: Commission on the Future of the Aerospace Industry

## Sales and Revenue

Historically, the aerospace industry has been considered a low growth sector of our economy. The industry is extremely cyclical in nature and is continually plagued by low margins. One root cause is the fact that the industry is driven in large part by federal government spending. The uncertainty of the government budget process combined with the extreme ebb and flow of government spending levels (primarily in defense programs) make the aerospace industry risky and unpredictable from an investment perspective.

Aerospace sales have been steadily decreasing since 2001. This decrease has been driven largely by the sharp and sudden decrease in spending in the commercial aviation segment after the September 11th terrorist attacks.

Most of the decline in aerospace sales has been in the commercial aviation segment of the industry. That decline has been somewhat off-set by increases in sales in defense and space related aerospace segments. However, those offsets have not been enough to keep overall sales in the industry at a steady level.

Similarly, capital flow into the aerospace industry has also been on the decline. In 1980, the industry had a market capitalization of \$13 billion, which represented 2.4% of Standard & Poor's 500 at that time. In 2000, the industry's market cap represented on 0.9% of the S&P 500 (even in light of the largest proposed defense budget in history).

## The Players

Like many industries, the aerospace industry has been through a series of consolidations over the course of the past twenty years resulting in five major players (based primarily in the United States) – Boeing, Lockheed Martin, General Dynamics, Northrop Grumman, and Raytheon – also known as the Big 5. In addition to these large aerospace manufacturers, there are a number of additional companies that manufacture parts and major components for these major customers. This does not include the hundreds of companies that are involved in the air transportation services industry segment.

## Trends

There are several important trends in the commercial aviation segments of the aerospace industry to mention. First, there is increased demand in more efficient point-to-point air transportation services that have resulted in new aircraft products being designed and marketed. Secondly, there are significant changes occurring in the supply chain and logistics management that will result in new investment in both facilities and equipment. Finally, there is already an increase in employment and investment in the “after market” – i.e. maintenance and modifications – segment of the industry

## New Products

Certainly, the design and launch of The Boeing Company's 7E7 airplane is perhaps the most significant new product development in the commercial aviation segment in decades. The drivers behind this airplane are obvious: airline customers need products that are more efficient to maintain and operate and passengers are clamoring for better routes, less expensive tickets, and more pleasant flying experience. Boeing is betting that their new product will meet these demands.

However, The Boeing Company is not the only company that is trying to meet these new demands. Several companies are pushing to introduce smaller, more affordable jet airplanes designed to provide passengers more efficient travel. The last several years have witnessed a couple of notable new entrants into the aerospace industry including companies such as: Eclipse Aviation, Honda Motor Company, and Safire Aircraft. These companies are focusing on making smaller more fuel-efficient jets that are affordable for personal ownership or air taxi market.

The emerging market for these airplanes is being fueled by the dissatisfaction among business travelers primarily with conditions and large airports as well as increased security concerns. As a result, several new companies are developing "air taxi" services, which would ferry business travelers from point to point on an on-demand basis. This trend began before the 9/11 terrorist attacks and gained a significant amount of interest after the attacks and the subsequent increased security. In response, Cessna, Honda, Safire, and Eclipse have all begun to develop and test "micro jets." These jets will seat 4 to 8 passengers and two crew members, and will be considerable more affordable than other commercially available jets.

### Supply Chain

One of the most significant changes in the industry that is being introduced by The Boeing Company's 7E7 is the manner in which the airplane will be manufactured. For the first time, the company will source significant components of the airplane from its partner (or supplier) companies. Similar to automotive assembly manufacturing, Boeing is hoping that they will be able to gain efficiencies and reduce overall costs by relying on their partners to manufacture significant component parts. Also similar to their counterparts in the automotive assembly industry, Boeing is counting on their partners to produce these components in a just-in-time manner, allowing them to produce planes at a much faster production rate. Again, the goal is to create greater efficiencies. The impact of these changes will most likely be investment in new equipment and technology by partner companies and perhaps new facilities as well.

### "After market" Industry Growth

As commercial airline companies continue to face financial difficulties and continue to delay the purchase of new jetliners, they will require additional services to maintain and modernize their existing fleet. The growth in this "after market" service segment of the industry has already begun. Several companies have recently announced expansions to help serve the aging commercial jet liners, including Timco Aviation Services, which recently hired 300 additional employees at their Greensboro facility.

Similarly, as the demand for these micro jets begins to grow, one can expect that the after-market segment of the industry to grow as well. This would include companies that do modifications on the airplanes before they are delivered to the end customer, as well as companies that do maintenance on the airplanes. It will be necessary for those facilities that do after market maintenance to be geographically dispersed in order to provide easy access for their customers. In addition, as new air taxi services begin to arise, smaller

airports will open up to more commercial traffic, requiring new investment in aviation-related services.

### Site Selection Requirements

For the major players in the industry, there is unlikely to be any new siting activity in the near future as most of these companies have plenty of capacity at their existing facilities to handle any new products or programs that arise. There will likely, however, be significant new investment in equipment and technology. In many instances, that new investment could present a competitive situation between existing facilities. Communities that might be under consideration for potential new investment from an incumbent company should be prepared to assist those companies in making important upgrades in both their facilities and their workforce.

Changes in the supply chain discussed above may indeed have an impact in the current make up of existing facilities. As the demand for just-in-time production increases, some suppliers will need to relocate to be closer to their end customers. This will most likely be true for Tier 2 and Tier 3 suppliers that support the large component manufacturers. In addition, significant changes in logistics management will mean that large component manufacturers can be located anywhere in the world. Indeed, The Boeing Company has announced that it will use a modified 747 to haul major components from partner companies around the world. Finally, international aerospace companies may begin to look for U.S. locations for new investments in order to support new partnerships in this country.

In addition, changes in the commercial aviation segment of the industry will most certainly result in new facility investments and expansion of existing facilities. Many communities are already beginning to see some of this investment. In 2001, Eclipse Aviation chose Albuquerque as its new home for manufacturing the Eclipse 500 Jet. Greensboro, North Carolina is home to Honda's micro jet design and testing facilities, which it is developing in partnership with Atlantic Aero Holdings. Recently, Honda announced that it would partner with General Electric to develop the jet engines for the HondaJet.

The aerospace industry has several key siting requirements, some of which are unique to the industry.

### Competitive Cost of Doing Business

Similar to every industry, companies that are seeking to make new investments will look for locations that offer a competitive cost of doing business. Low cost is important on both an investment cost and an operating cost basis. As the major players in the industry begin to look to their partners to do more of the development of large components, those partner companies are also bearing much of the cost for the development of those components. Therefore, these supplier companies are looking for locations that can provide a low start-up cost. Of course, recurring costs – particularly employee related costs such as workers compensation and unemployment insurance – are also important factors.

For the manufacturers of smaller "micro jets", recurring costs are going to be extremely important. These companies are trying to make their new jet products affordable and, in order to do that, they will have to locate facilities in extremely cost competitive locations.

### Access to transportation and logistics networks

As the supply chain in this industry begins to move to a just-in-time manufacturing process, suppliers will require access to multi-modal logistics networks. For some companies this will require on-site rail access and runway access. In the case of Boeing's cargo freighter, suppliers will need to be located immediately adjacent to significant runway and airfield infrastructure.

### Access to a Skilled Labor Force

The aerospace industry as a whole is facing a considerable workforce crisis. The crisis stems from an aging workforce and the tremendous loss of technical talent in the recent downturn in the industry. Nearly 28% of the existing aerospace workers will retire by 2008, and in some high-tech professions the number of scientists and technicians over the age of 60 are three times the number under the age of 30. The reason is simple: the aerospace industry is not as attractive to potential employees (primarily scientists and engineers, but for production workers as well) as other high-tech sectors.

Therefore any location seeking to attract new aerospace investment must present a plan for recruiting and training top-level production and scientific talent to its location. This plan should include the involvement of local engineering schools to encourage undergraduate students to enter into fields that are critical to the aerospace industry. In addition, this plan should also emphasize the skill upgrades that will be necessary in future aerospace production jobs as the industry continues to increase its use of technology, the production workforce will also need to upgrade its science, math and computer skills.

Companies in the aerospace industry that are considering new investments will look closely at a community's ability to produce the type of talent it requires. Specifically, companies will look not only at a community's existing workforce and the skills and abilities that it possesses, but also at the education and training capacity and infrastructure in the community.

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