

## **APPENDIX C**

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### Large Scale Aviation Examples

# **LARGE SCALE AVIATION EXAMPLES**

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## **1.0 Introduction**

A review of aviation manufacturing facilities was conducted to determine the types of businesses that might be attracted to the east airfield site. This review includes existing facilities operated by Boeing and major aircraft suppliers in order to get a sense of size and scale. Additional detail related to this facility is provided in the attachments to this section.

## **2.0 Boeing Facilities - Everett, Washington and Charleston, South Carolina**

The Boeing Company, based in Seattle, Washington, is the world's largest aircraft manufacturer. Boeing's Everett, Washington, manufacturing site serves as an assembly plant for B-747, B-767, B-777, and B-787 airplanes. The adjacent airport, Paine Field, provides the facility with access to an airfield with a 9,000 foot runway. Parts are brought into the plant by truck, rail, air and ship from more than 1,000 suppliers located in all 50 states and overseas.

The Everett, Washington, site encompasses 1,025 acres and includes more than 12 million square feet of building area. The apron has the ability to accommodate 26 aircraft concurrently and the fueling area can accommodate up to five aircraft at a time.

In October 2009, Boeing announced Charleston, South Carolina, as the site for its second B787 Dreamliner assembly plant. The existing site is home to an existing 120 acre manufacturing facility which will be doubled in size to 240 acres. In May 2010, Boeing announced that certain 787 interior parts would also be manufactured in South Carolina. The aircraft has more than 230 suppliers which could bring as many as 16,000 jobs to the area.

## **3.0 Vought Aircraft Facility – Nashville, Tennessee**

Vought Aircraft Industries Inc., is a supplier for the aerospace industry and operates eight manufacturing plants located throughout the US. Its Nashville manufacturing facility, located adjacent to Nashville International Airport (BNA), is used for the manufacture of tail or wing assemblies for Airbus A330/A340, Cessna Citation X, Gulfstream G450 and C130J aircraft. The Nashville facility has two million square feet under roof (in excess of 45 acres).



## Commercial Airplanes

### Major Production Facilities

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#### Boeing 747, 767, 777 And 787 Manufacturing Site

##### Everett, Washington

The Boeing 747, 767, 777 and 787 airplanes are manufactured in Everett, Wash., which is located 30 miles (48 kilometers) north of Seattle, near Snohomish County's Paine Field. Paine Field is a regional airport with a 9,000-foot (2,743-meter) runway.



As Boeing's largest site, Everett also is home to hundreds of employees who work in the Supplier Management organization. This organization contracts with and manages Commercial Airplanes external suppliers as well as several internal airplane components suppliers that build airplane interiors, electrical systems and commercial electronics.

The Everett plant is so large that it requires its own fire department, security force, fully equipped medical clinic, electrical substations and water-treatment plant. Storm water is controlled through a system of engineered wetlands and holding ponds, the largest of which can hold 20 million gallons (75 million liters), enough water to float an ocean-going ship. The aircraft fueling area has room for five airplanes and pre-flight areas accommodate 26 finished jetliners.

The site's main assembly building, which the *Guinness Book of World Records* acknowledges as the largest building in the world by volume, has grown over the years to enclose 472 million cubic feet of space (13.3 million cubic meters). Its footprint covers 98.3 acres (39.9 hectares). In June 1966 Boeing purchased 780 acres adjacent to Paine Field in Everett. In January 1967, the first production workers arrived at the Everett site and, on May 1 of that year, the major assembly buildings were opened at Everett.

A group of employees dubbed "The Incredibles" assembled the first 747-100 at the same time construction workers were building the first factory, which was completed in 1968. From its original size, it was expanded by more than 45 percent in 1980 to house the 767 assembly line and by another 50 percent in 1993 for 777 assembly. The site, too, has grown to 1,025 acres



(415 hectares), including 215 acres (86 hectares) of paved yards and parking, and 282 acres (113 hectares) of building area.

Each day, parts and subassemblies come to the plant from all over the globe. More than a thousand suppliers ship components by truck, rail, air and ship from throughout the world and all 50 states. The major assemblies of the 787 Dreamliner arrive by air, courtesy of a fleet of Dreamlifters, which are specially modified 747-400s.

The Everett factory accommodates production lines for the 747, 767, 777 and 787 airplanes. Production rates vary with market activity, but have been as high as seven per month for the 747 and 777 and five per month for the 767. Other manufacturing production areas at the Everett site include the paint hangars. Approximately 30,000 people on three shifts work at the Everett site.



Boeing performs pre-flight tests on all twin-aisle airplanes before the airplanes make their initial test flight at Paine Field. Following the test flight, the airplanes undergo final preparations at the Everett flight line before delivery to customers.

Today, more than 2,600 of the 3,000-plus airplanes assembled at the Everett site are in service. That represents more than 80 percent of the worldwide fleet.

Because of its size and magnitude, the Everett plant represents Boeing to the world. Dignitaries to visit the site have included former U.S. President Bill Clinton; former U.S. Vice President Al Gore; former Texas Governor and U.S. President George W. Bush; former Russian President Boris Yeltsin; Chinese President Jiang Zemin; Prime Minister Paul Keating of Australia; Prime Minister Mahathir bin Mohamad of Malaysia; President Ion Iliescu of Romania; Prince Philippe of Spain; President Meri of Estonia; King Hussein of Jordan; His Royal Highness Prince Andrew, The Duke of York; President of Slovakia, Mr. Michal Kovac; President Megawati Sukarnoputri of Indonesia; former U.S. Speaker of the House of Representatives Dennis Hastert; former U.S. astronaut Neil Armstrong; Microsoft Corporation Chief Executive Officer Steve Ballmer; Crown Prince Guillaume of Luxembourg; Crown Prince Philippe of Belgium; and Crown Prince Shaikh Salman bin Hamad Al-Khalifa of Bahrain.

The Boeing Everett tour, which is operated through the Future of Flight Aviation Center & Boeing Tour, is located just north of the Everett site in Mukilteo, Wash. The center is open year-round to the public and hosts more than 180,000 people annually.

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## **Boeing Buys Remaining Stake In Dreamliner Subassembly Plant - Update**

12/22/2009 10:32 AM ET

Boeing Co. (BA) said Tuesday that it has acquired Alenia North America's 50% stake in Global Aeronautica, LLC, a fuselage subassembly plant for the 787 Dreamliner, and is now the sole owner of that entity. Alenia North America is a subsidiary of Italy's Finmeccanica. Terms of the transaction were not disclosed. The move is part of Boeing's efforts to bring more of the Dreamliner's supply chain under its direct control.

A buyout of Global Aeronautica seals Boeing's ownership and control of the entire Charleston 787 assembly complex. Global Aeronautica sits adjacent to the Boeing Charleston site and shares a 240-acre campus.

Boeing's gradual take-over of the Charleston site was forced upon it after the company lost control of its 787 supply chain, a major cause of the almost two-and-a-half years of delay in the jet program. The delays have cost Boeing millions of dollars in penalties and concessions, and have damaged the company's credibility with customers. The 787 is the first airliner to have a body and wings made mainly of composite plastics, which are lighter than traditional aluminum and help conserve fuel.

Boeing said that the acquisition was effected through a wholly owned subsidiary of the company. Operationally, Boeing will integrate the Global Aeronautica facility with the rest of Boeing's organization in North Charleston, South Carolina.

Global Aeronautica's integration entails the joining of the mid-fuselage sections, the installation and testing of associated elements, and the application of surface finishes to more than 60% of the 787's fuselage.

The Charleston site already has two major aircraft assembly buildings, the Global Aeronautica building and one wholly-owned by Boeing where the 787 rear fuselage is built. Boeing plans to add a third major building for a new final assembly line, which means that Boeing Charleston will make two-thirds of the fuselage of every Dreamliner and eventually also host a final assembly line and delivery center.

In late October, Boeing said it has chosen the Charleston facility as the location for a second final assembly site for the Dreamliner

program. In addition to serving as a location for final assembly of Dreamliners, the facility also will have the capability to support the testing and delivery of the airplanes, the company said. The new factory is expected to speed up Dreamliner production and counter the delays.

Global Aeronautica, LLC, began operations in 2004 when Alenia North America and Vought Aircraft Industries Inc. formed a 50/50 joint venture in support of the Boeing 787 Dreamliner. In 2008, Boeing purchased Vought's interest in Global Aeronautica, making the company a 50/50 joint venture between Alenia North America and Boeing.

In July 2009, Boeing announced the completion of the acquisition of Vought's interest in the joint venture for a cash consideration of about \$580 million. Dallas-based Vought, an aerospace contractor, is owned by private-equity firm Carlyle Group. Vought has been a major supplier to Boeing's civil programs from early days of the 737 and was willing to tailor-build a factory in North Charleston to win a place on the prestigious 787 program.

Boeing was reportedly in talks with Alenia for some time now to buy out the Italian company's share of the joint venture. According to reports, the talks were held up until recently because Alenia demanded settlement of its contract claims against Boeing for payments to cover its 787 production expenses.

The delay in the Dreamliner program led to a cash crunch for the supplier partners Alenia and Vought, who were not getting enough revenue to continue work. Also, the economic crisis crippled both corporate as well as leisure travel, forcing airlines to reduce fleet, cancel or postpone orders, and in turn affecting the revenues of plane manufacturers. The strategic commitment of resources, and the partners' unwillingness to invest more money without a quicker return, has led Boeing to acquire the various parts of the complex in piecemeal fashion.

Last Tuesday, Boeing announced that the Dreamliner took its maiden test flight from Paine Field in Everett, Washington, and safely landed at Seattle's Boeing Field. The first flight of the Dreamliner, once planned for mid-2008, had been postponed several times and was about two years behind schedule.

The most recent delay was on June 23, when the company said the first flight of the Dreamliner would be postponed for the sixth time due to a need to reinforce an area within the side-of-body section of the aircraft. Deliveries were scheduled to begin in the first quarter of 2010, with the first one to Japan's All Nippon Airways Co.

meanwhile, the second test aircraft is due to fly for the first time on Tuesday, depending on weather in Seattle. Boeing has 840 orders for

the Dreamliner from fifty-five customers around the world, making the airplane the fastest-selling new commercial jetliner in history. The company has scheduled the first delivery of the 787 Dreamliner in the fourth quarter of 2010.

In Tuesday's regular trading session, BA is trading at \$55.26, up \$0.96 or 1.77% on a volume of 0.15 million shares. The stock has been trading in a range of \$29.05-\$56.56 in the past 52 weeks.

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# Boeing is a frequent topic among local economic development groups

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843-706-8145
Published Wednesday, March 3, 2010
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South Carolina officials have hailed Boeing's plans to build an assembly plant for its 787 Dreamliner in North Charleston as the biggest economic development project in state history.

The company plans to invest hundreds of millions of dollars and create about 4,000 jobs.

So what does Boeing's announcement, spurred by hundreds of millions of dollars in incentives, mean for Beaufort and Jasper counties?

Key players in the deal and local officials addressed that question in three recent meetings.

### Ric Tapp, lawyer at Nexsen Pruet

Tapp's firm worked for Boeing to help broker the deal with the state. He spoke Wednesday during a Hilton Head Island-Bluffton Chamber of Commerce business event at Hampton Hall.

He said the 230-plus suppliers that provide parts for Boeing's plane should bring about 16,000 additional jobs to South Carolina.

Some suppliers might seek locations near the assembly plant, Tapp said, but such proximity does not tend to be an important component of Boeing's supply chain.

"None of this is so just-in-time sensitive," he said.

Other suppliers might want better trained workers than those available here, Tapp said. "But your technical colleges can take care of that."

### Kim Statler, executive director, Lowcountry Economic Network

Statler, head of a public-private partnership that recruits businesses to the region, was slated to speak at another event Wednesday at Belfair in greater Bluffton.

The session -- titled "BOEING SC: Dreams Take Flight" -- was about how incentives can boost business in South Carolina.

Statler said Boeing's plant dovetails with fellow aircraft manufacturer Gulfstream's existing facility in Savannah and the arrival of the Joint Strike Fighter, a next-generation military jet. Some of the jets are expected to be based at Marine Corps Air Station Beaufort by 2014.

Network officials, who have identified the aerospace and defense industry as one of its four focus areas, are scouring supply chains to find businesses that serve one or more of those aircraft.

Such businesses "now might find South Carolina a very appealing location for (its) next manufacturing facility," Statler said. "That's the kind of thing we're looking at."

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Statler said network officials "have some good ideas" about prospects, but declined to elaborate.

Newest first

Statler plans to make the case that aviation businesses should consider the Lowcountry when she travels with state officials to England for a major trade show in July.

The region's advantages include proximity to military bases, Interstate 95 and rail lines, Statler said. CEOs also enjoy the coastal quality of life, she said.

Disadvantages include the high cost of property and "very limited" existing facilities available for light manufacturing.

Unlike Tapp, Statler said the area's workforce should be an asset because a steady rotation of people leave local military bases with aviation experience.

She cautioned the network's strategy might not bear fruit immediately, but she said the long-term outlook is promising because Boeing's arrival allows the region to seek businesses it couldn't before.

"Fifty percent of the battle is making it known what your emphasis is," Statler said.

**David Ginn, president and CEO, Charleston Regional Economic Development Alliance**

Ginn's agency works to develop the economies of Charleston, Berkeley and Dorchester counties. He spoke Feb. 16 at a Business 4 Breakfast event organized by the Beaufort Regional Chamber of Commerce at the Hilton Garden Inn.

Ginn said Wednesday local communities are ideally situated to capitalize on the presence of both nearby aircraft manufacturers.

When asked what benefit Boeing's plant might provide Beaufort and Jasper counties, Ginn said: "I would think Jasper County's position along I-95 and close proximity to both Charleston and Savannah would make it a good location for suppliers serving both the Boeing operation in our region and Gulfstream Aerospace in Savannah."

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## Boeing to Manufacture Certain 787 Interior Parts in South Carolina



PR Newswire

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NORTH CHARLESTON, S.C., May 3, 2010 /PRNewswire via COMTEX/ -- Boeing (BA 61.10, -0.05, -0.09%) announced today that it has chosen South Carolina as the location for fabrication and assembly of airplane interior parts to supply the 787 Dreamliner final assembly and delivery site currently under construction in North Charleston, S.C. The company is reviewing potential sites for the new airplane interiors facility and anticipates making a final decision by midsummer.

The new facility, Boeing Fabrication Interiors South Carolina, will be located near the North Charleston final assembly and delivery site. As many as 150 employees will work at the new interiors facility, which will serve as an extension of the existing Interiors Responsibility Center in Everett, Wash., leveraging the opportunities of a single, integrated production system. This decision is part of Boeing's plan announced in 2009 to provide an independent sourcing stream for 787 final assembly and delivery in South Carolina. The close proximity of this new facility to Boeing's Charleston site will help improve the efficiency of the final assembly and delivery process in South Carolina.

"By expanding Boeing's footprint in South Carolina, we enhance our existing foundation with Boeing Charleston and further contribute to the growth of aerospace in the region," said Ray Conner, vice president and general manager, Supply Chain Management and Operations, Boeing Commercial Airplanes. "Ultimately, the decision we made in 2009 builds on our overall strategy to successfully meet our 787 customer commitments and to optimize our production capability."

The Boeing Fabrication Interiors South Carolina team will manufacture 787 interior parts, including stow bins, closets, partitions, class dividers, floor-mounted stow bins used by flight attendants, overhead flight-crew rests, overhead flight attendant crew rests, video-control stations and attendant modules.

"Recognizing the superior quality of the products and services provided by our Interiors Responsibility Center in Everett, Boeing believes this extension is an important step in ensuring that we maintain a high level of consistency and quality in our production system," said Conner. "In the long term, we are strengthening our position in the aerospace market and ensuring that we remain competitive as a company."

Located within the Boeing Everett complex, the Interiors Responsibility Center is a focused area of excellence for the design, manufacture, assembly and integration of a wide range of interior systems for production, aftermarket and spares for Boeing commercial jets. About 1,380 people work at the IRC producing products that include crew rests, doors and doorway linings, overhead stow bins and floor-mounted stow boxes, life raft boxes, closets and partitions, secure flight deck doors, video control centers, purser work stations, dry galleys, ceilings, sidewalls, decorative laminates and proximity lighting. Engineering integration services provide customer interior solutions from concept product design through project management and certification.

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The Nashville facility, located adjacent to the Nashville International Airport, has 70 years of experience in aerospace design, manufacturing and assembly. It has produced more than 10,000 wings and tail sections for a variety of prime aircraft contractors.

**Vital Statistics:**

- Site workforce of approximately 877 - 872 employees and 5 contractors
- Total area under roof: 2 million square feet

**Products and Capabilities:**

The Nashville site specializes in long and large machining and processing of aircraft parts. The facility features a Composites and Bonding Center - dedicated to the manufacture of advanced composites and metal bonded structures. The site has design and stress test capabilities and is experienced in airworthiness certification, systems integration and CATIA software. Product lines include:

**Airbus**

- Airbus A330/A340 Family wing components (leading edge assemblies, upper panel assemblies and spars)

**Cessna**

- Citation X upper and lower wing panel assemblies

**Gulfstream**

- G450 series wing

**Lockheed Martin**

- C-130J Super Hercules empennage

**Community Involvement:**

- United Way
- March for Babies (March of Dimes)
- Vought Can Do! (to benefit agencies that feed the needy)
- American Heart Association

- American Cancer Society
- Special Olympics
- Alive Hospice
- Pencil Foundation

**Site History:**

Operations in Nashville can be traced back to 1939 when it was known as Stinson Aircraft Co. As a division of the Aviation Co., the third-largest producer of war materials during World War II, it was merged with Vultee in 1940 and merged again to form Consolidated Vultee Aircraft in 1943. In 1959, the Aviation Co. became Avco Corp. In 1966, the Nashville division was renamed Avco Aerostructures. In 1985, Avco Aerostructures became part of Textron Inc. as a result of their acquisition of Avco Corporation, and in 1987, the name changed to Textron Aerostructures. The Nashville facility was purchased in September 1996 by The Carlyle Group and renamed The Aerostructures Corp. In 1998, the businesses of Contour Aerospace and The Aerostructures Corp. were merged into a single operating company. In July 2003, The Aerostructures Corp. merged with Vought Aircraft Industries, Inc.

Notable aircraft created by Aerostructures' legacy companies include the Voyager/L-5 Sentinel, the SR-10 Reliant/UC-81, the Vultee Vengeance dive bomber, and the co-produced (with Lockheed) P-38 Lightning. The site has produced wings for the C-141 StarLifter, C-5A/B Galaxy, B-1B long-range combat aircraft, L-1011 TriStar commercial airplane, British Aerospace BAe regional jet, and Gulfstream GII, GIII and GIV business jets. In addition, the Nashville facility built the first 62 ship sets of empennages for the V-22 Osprey program. Workers at the site have produced more than 2,400 empennages for the C-130 Hercules program since that program began in the 1950s.

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