“YOU ARE CLEARED TO LAND...

IN SOUTH CAROLINA”

South Carolina Aerospace Task Force
Strategic Plan
October 3, 2013
Executive Summary

In 2012 Secretary of Commerce Bobby Hitt appointed the S.C. Aerospace Task Force, an advisory council for the development of a strategic initiative to enhance and grow the state’s aerospace industry. The group of public and private leaders was asked to recommend priorities and to support the aerospace industry through statewide communication and collaboration. By coordinating among key players and developing a statewide initiative, the strategic plan will promote continued growth in this sector of South Carolina’s economy. The aerospace industry is gravitating into the Southeastern USA, with a fair degree of success already occurring in South Carolina. Given the long-term attractiveness of this type of industry and the high-quality, well-paid jobs it produces, it is strategically important for the state to deliberately promote the growth of aerospace. South Carolina’s aerospace sector is the fastest growing in the nation. Now we should accelerate!

Aerospace has five distinct segments, which while related, require different strategies to develop:

- MRO (Maintenance, Repair and Operations – the aerospace aftermarket);
- Manufacturing (aerospace OEMs – Original Equipment Manufacturers);
- Military;
- General Aviation, including airlines, charters and flight schools; and
- Research, development, and design.

Aerospace Task Force members represent a wide variety of stakeholders with a deep understanding of the aerospace industry. Advisory Boards were established in Columbia, Greenville, Charleston, and Beaufort, optimizing the number of public and private sector participants involved in developing this report’s recommendations. The Task Force has developed the following recommendations for consideration:
1. **Workforce Development**

   **Training Pipeline:** This encompasses skills development for existing job opportunities in South Carolina, with emphasis on the vocational/technical colleges. At the same time there is a significant shortage of technically skilled workers and high unemployment among non-technically skilled individuals. Attempting to grow the aerospace industry will only exacerbate the skills shortage unless there is an intense, complementary effort to train the South Carolina workforce for these jobs. The training pipeline should correspond with skilled worker recruitment and provide support for all levels of the aerospace supply chain.

   **Education System:** The key to South Carolina’s aerospace future is developing not only the present but also the future workforce. The K-12 system must integrate Science, Technology, Engineering, and Mathematics (STEM) initiatives and consider establishing charter/magnet aerospace high schools, with vocational emphasis on preparing students for skilled manufacturing and engineering careers. Preparation for the workforce starts as early as third grade and continues through technical college and/or four-year universities, some with advanced degree programs. A specific STEM activity for aerospace industry, STEM+A, can be implemented statewide. The Boeing Company and Lockheed Martin are partners in South Carolina’s Coalition for Mathematics and Science, which is promoting STEM curriculum development and innovation in education.

   It’s not just classrooms where aerospace careers are cultivated. Programs like the Challenger Center, an interactive space science education center that is designed to increase student interest in and generate enthusiasm for the sciences, mathematics and engineering, can offer students hands-on experience, summer camps and also provide teachers a context through which these STEM skills become relevant career goals. Young Eagles, giving students flight experience, the Department of Defense’s Star Base Initiative, Civil Air Patrol squadrons, Celebrate Freedom, and Air Force Junior ROTC in high schools are also doors through which students can gain aerospace experiences.

   A great example of innovative collaboration is occurring in York County. Through the partnerships among York Technical College, five manufacturers and the York High School, twenty-seven 9th and 10th grade students are learning a manufacturing curriculum that includes mentoring, internships and two "free" classes at York Tech. When the students finish the program, they’ll have 6 hrs. college credit and are guaranteed an interview with one of the five local companies.
Military Transition Center: South Carolina’s strong defense sector is a fertile ground from which skilled veterans can transition into the civilian workforce. A more effective, permanent recruitment program could be created at each of the SC bases for placement of retiring/separating military personnel that possess the strong technical backgrounds sought by the aerospace/aviation employers in the state. These efforts should be in addition to and aligned with the Department of Defense mandated Transition Assistance Program (TAP). Beaufort’s Transitional Workforce Educational Assistance Collaboration (TWEAC) could be another major enhancement.

Continuing and Executive Education: Supervisors, middle and upper management need to keep their leadership expertise up to date with a variety of hard and soft skills. In cooperation with higher education, a curriculum should be developed that will address their on-going professional development needs in a blended learning environment of online and classroom interaction. The technical college system must also provide continuing education to technical workers to keep the SC aerospace labor force competitive.

2. Research and Innovation

Create an aerospace research center in collaboration with industry and higher education. The goal is to create an inventive and collaborative environment for academia, industry and entrepreneurship that is led by the vision and needs of industry. This will result in development of a strategically focused aerospace research campus. The model of the Clemson University International Center for Automotive Research (CU-ICAR) could be adapted to meet aerospace industry needs. The University of South Carolina’s McNAIR Center for Aerospace Research and Innovation is using the state’s SmartState program to attract scientists in materials research and education. Their work with composites, condition-based maintenance and aerospace research and development has a great future.

The center will be created around strategic research areas:

- Manufacturing and Advanced Materials
- Aerospace Vehicle Performance, Propulsion Systems
- Air-to-Air and Air-to-Ground Communication
- FAA Airway and Airport Infrastructure Improvement and Integration
- Avionics and Electronics
- Systems Integration - Human Factors
- Workforce Development
- Unmanned Aerial Systems (UAS) R&D
• Alternative Fuels

Promote collaboration among the state’s major universities and colleges to avoid duplication of programs. For example, higher education must partner with industry to serve as the foundation for aerospace R&D in SC. The leadership resulting from public/private partnerships that include the State of South Carolina and the aerospace industry will encourage development much like the model of CU-ICAR’s collaboration with BMW, Michelin, and Timken.

3. **Broad Industrial Strategy**

   **Existing Aerospace Industry:** We must focus on retention of commercial and general aviation, aerospace/defense companies, and suppliers already in SC. Part of the general aviation sector includes business aviation. Business aviation consists of companies that rely on many different types of aircraft and the airports and operators that provide services throughout the state’s airport system (including military facilities). The first priority is to maintain a fertile environment to help existing aerospace employers’ profitability and growth. Strategies to accomplish this environment start with the workforce and include evaluating regulations, infrastructure, access to markets, materials, and support for innovation.

   **Supply Chain:** We must offer support to expand and improve existing manufacturing supply chains. The state should recruit new suppliers and offer companies assistance in attaining and maintaining necessary aerospace-related standards and certifications.

   **Collaborative Environment:** Public policy must emphasize the industrial convergence and interdependence of aerospace, automotive, avionics, electronics, and advanced materials. These industrial sectors are aggregating in South Carolina and the Southeastern US, and share many common traits. Educational requirements, workforce skills, raw materials, engineering, suppliers, and manufacturing investments are somewhat similar across these industries. We will provide opportunities for these private and public sector leaders to share, develop resources and programs.

4. **Sustained Competitiveness**

   **Regulation:** Study the regulatory environments, especially in neighboring states with which we compete, to ensure SC remains competitive in terms of taxes and incentives.
Marketing: GA, FL, NC, KS, WA, and OK have strong aerospace marketing programs. We have made a good start on the new website (www.scaerospace.com) but we must continue to enhance and expand marketing beyond just a website by making the state’s attributes known throughout the US and globally.

Infrastructure: We must understand the infrastructure needs specific to the aerospace industry and respond with appropriate public investments. Conduct periodic infrastructure needs surveys to identify gaps as the industry sector grows. Infrastructure includes aerospace specific facilities such as airports as well as traditional land, water/sewer, roads, rail, utilities, broadband, and trade amenities like ports and foreign trade zones.

Advocacy: Create a permanent, ongoing organization to manage SC aerospace advancement in all of the aforementioned ways, possibly a public/private partnership called “South Carolina Aerospace Partners”. Many states, OK as an example, have an aggressive, organized approach for enhancing aerospace (Oklahoma Aerospace Partners).
South Carolina’s Aerospace Heritage

South Carolina became host to the aerospace industry over 100 years ago when the Wright Brothers moved their Augusta, Georgia operations to Aiken. Flight pioneers Samuel P. Langley and Charles M. Manly both called South Carolina home though their aviation achievements were on the Potomac in Virginia. Manly was the country’s first airplane designer, engineer, mechanic, and pilot.

Flight and development of airports took off with the exploits of WWI pilots like Elliott White Springs and barnstormers like Paul Rinaldo Redfern, who in 1927 established the state’s first commercial airport at Owens Field in Columbia. Famous aviators Amelia Earhart and Bill Winston (Lindbergh’s flight instructor) visited Columbia in the 1930’s. During that era, the state’s Aeronautics Commission began demonstrating their sense for future economic development by identifying airfield sites that became Army Air Bases. The Columbia Army Air Base in Lexington County became one of the state’s most famous WWII sites because it was there that Lt. Col. Jimmy Doolittle recruited and trained his Doolittle Raiders. More than seventy years later “Bomb Island” is still celebrated at Lake Murray. The Curtis-Wright Hangar, one of the oldest in the nation, is a historic site and rescued bombers are proudly displayed. The base became the metropolitan airport in 1947 and expanded its logistics operations by locating a UPS Hub in 1996. Some Tuskegee Airmen trained at the airport in Walterboro, SC.

After World War II, South Carolina became host to additional Army Air Bases: Donaldson AFB in Greenville, now SCTAC; Shaw AFB, Joint Base Charleston,
Beaufort MCAS, Myrtle Beach AFB and McEntire Joint National Guard Base. Today these defense facilities offer the nation strategic advantages from an established military infrastructure.

South Carolina’s native sons have impacted aviation and space travel. Charles Bolden, NASA Administrator, is from Columbia and flew on Space Shuttle missions. Astronaut Charles Duke walked on the moon and Dr. Ronald McNair, who perished in the Challenger explosion, was noted for his scientific research with lasers. Astronaut Frank Culbertson flew three Space Shuttle missions.

South Carolina citizens are proud of the state’s aviation history and support active organizations to honor aviation heroes and cultivate the aerospace innovators of the future. The SC Aviation Association maintains a Hall of Fame1 at the Jim Hamilton L.B. Owens Airport.

South Carolina’s Aerospace Landscape

Today, South Carolina is home to two aerospace giants, Lockheed Martin Corporation and The Boeing Company, in addition to four significant military air bases. South Carolina is squarely at the center of the aerospace industry’s heavy migration over the last 20 years into the Southeastern USA, with heaviest concentrations in NC, SC, GA, FL, and AL. Aviation manufacturing was originally centered in upstate South Carolina but now extends from the mountains to the sea. In 2013, there are more than 200 aerospace-related companies in South Carolina. Lockheed Martin established the state’s first large-scale aerospace MRO2 facility in Greenville’s Donaldson Center. That park is now SCTAC3 and includes a 2,600-acre aviation center/business park with an 8,000-foot runway. Lockheed Martin’s facility has 1.3 million square feet, 16 hangars and 3 million square feet of ramp space. The company employs 725 at this facility. Dozens of other companies have now also located at SC-TAC.

1 http://www.scaaonline.com
2 MRO is Maintenance, Repair and Overhaul of airplanes and other aerospace/defense airborne and ground-based products. MRO of the huge “installed base” is a significant industry because of the very long life of the assets themselves, and the need to keep them well maintained and updated with new technologies.
3 SCTAC is the South Carolina Technology and Aviation Center
The 2009 announcement by Boeing to locate a production facility in Charleston is the catalyst that launched the distinction from South Carolina’s status as a state doing aerospace manufacturing to a state that is an aerospace ecosystem. Boeing and Joint Base Charleston are both located around the Charleston International Airport. This airport has a 9,000-foot runway and is located one mile from I-26 and I-526, with easy access to the Port of Charleston. Boeing operates in six buildings with over 2 million square feet of space in Charleston and North Charleston. Present employment is more than 6,000. A recent announcement by Boeing will bring an additional $1 Billion investment and 2,000 more jobs.

**Leading Aerospace-related Manufacturers and MROs in South Carolina**

- AAI Corp.
- BAE Systems
- The Boeing Company
- Cytec Carbon Fibers LLC
- Eaton Corp.
- GE Aviation
- Honeywell International Inc.
- KEMET Electronics
- Lockheed Martin
- Michelin Aircraft Tire Co.
- Venture Aerobearings
- Zeus Industrial Products
- Carbures USA
- Stevens Aviation
- Louis Berger Services
- Chippewa Aerospace
- Hawthorne Corp
- InterTech Group
- Champion Aerospace
- SERCO
- Woven Electronics/ BE Aerospace
- TriTech USA
- United Technologies/Goodrich

South Carolina’s four military air bases and SPAWAR represent a significant economic impact to their communities, are “customers” of MRO and aerospace services and products, and provide a skilled workforce from veterans who transition to civilian jobs here. The economic impact from the five aviation-related defense facilities exceeds $10 billion a year.

Shaw AFB is located in Sumter, is the home of the 9th Air Force Headquarters, United States Air Forces Central (USAFCENT) and the 20th Fighter Wing, which is the nation’s largest combat F-16 fighting wing. Shaw’s strategic location is critical to the nation’s ability to respond to defense threats in the Middle East. The Third Army Command’s main post based at Shaw ensures rapid deployment of these land forces. Other tenant organizations at Shaw AFB include the 682nd Air Support Operations Squadron, 372nd Training Squadron (Detachment 2), 337th Recruiting Squadron, Air Force Audit Agency (Team D, Mid-Atlantic area audit office), Air
Force Office of Special Investigations (Detachment 212), and Viper East F-16 Demonstration Team.

Beaufort is home to the Marine Corps Air Station. Consisting of some 6,900 acres, the installation is home to six Marine Corps F/A-18 squadrons and two Navy F/A-18 squadrons. MCAS Beaufort is transitioning to the new F-35B and will become the main training hub for Marine Corps and international partners buying the aircraft.

McEntire Joint National Guard Base is located near Columbia. The 169th Fighter Wing is the primary unit of the South Carolina Air National Guard flying F-16s. The base hosts Army National Guard units supporting more than 1000 Army National Guard Aviation soldiers, along with support 225 fulltime employees and support contractors, and 45 SCARNG helicopters. Additionally McEntire is home to an additional 1000 ARNG ground soldiers plus 140+ fulltime employees assigned to various units stationed there. The SC Army National Guard is now building a large-scale Rotorcraft Center at SCTAC where 200 soldiers and 10 aircraft will be stationed by January 2014. Military rotorcraft has become a huge industry segment in the Southeast USA, and helicopters generally offer the most robust level of MRO due to their maintenance-intensive nature.

One of twelve joint bases, Joint Base Charleston serves as a joint logistics, transportation, and engineering hub. Joint Base Charleston is located about 10 miles from downtown Charleston and encompasses 23,777 acres, which includes 16 miles of Atlantic shoreline along with 28 miles of rail. The base shares runways with the Charleston International Airport. The host unit of the Joint Base is the 628th Air Base Wing. The wing has two operational groups consisting of 13 squadrons and one wing staff directorate. Joint Base Charleston is comprised of Air Force, Navy, Army, Marine Corps, Coast Guard, Homeland Security, and other DOD missions.

SPAWAR Systems Center Atlantic is a Department of the Navy organization that develops, acquires and provides life cycle support for command, control, communications, computer, intelligence, surveillance and reconnaissance systems, IT and space capabilities. To fulfill this worldwide mission, SSC Atlantic, located at Joint Base Charleston - Weapons Station, supports a team of military, civilian and
approximately 13,000 industry partners. A high proportion of SSC Atlantic’s expenditures are obligated to local engineering and high-tech firms. These defense contractors support thousands of high-paying jobs, making the economic “multiplier” effect of SPAWAR tremendous, and populating the region with thousands of highly skilled, experienced engineers, IT developers and scientists.

Other aviation-related military resources in the state include the 2,500-acre North Auxiliary Airfield, where the Air Force and Army train, the 12,500-acre Poinsett Weapons Range and unrestricted, offshore airspace and the computerized TACTS range controlled by Beaufort MCAS.

**Impact of SC’s Aviation-Related Military Facilities**

<table>
<thead>
<tr>
<th>DoD Air Facility</th>
<th>Direct Personnel (Military and Civilian)</th>
<th>Annual Impact</th>
<th>Economic Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaufort MCAS</td>
<td>5,012</td>
<td>$ 702 million</td>
<td></td>
</tr>
<tr>
<td>Joint Base Charleston</td>
<td>20,315</td>
<td>$4.37 billion</td>
<td></td>
</tr>
<tr>
<td>McEntire Joint NGB</td>
<td>1,742</td>
<td>$296 million</td>
<td></td>
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<tr>
<td>Shaw AFB</td>
<td>9,585</td>
<td>$1.75 billion</td>
<td></td>
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<tr>
<td>SPAWAR</td>
<td>3,673</td>
<td>$3.378 billion</td>
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**Future Potential**

The Aerospace industry is a global and national economic engine. The expansion of this sector promises to bring higher skilled jobs and increased wages as the existing OEM base expands, adds suppliers, and provides opportunities for growth to manufacturers already in the state. Some projections estimate that aerospace employment and economic impact in South Carolina will mirror that of the automotive sector within the next fifteen years. Like the automotive industry, aerospace is a high impact sector. It offers real potential to scale-up employment opportunities for South Carolina’s workers. Employment multipliers for aerospace are higher than other industry sectors, so the total economic impact is greater and ripples throughout the economy.

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4 The Impact of the Military Community in South Carolina, South Carolina Department of Commerce, November, 2012. Economic impact analyses conducted through IMPLAN modeling.

5 OEM is Original Equipment Manufacturer
Orders for new commercial airplanes to replace an aging fleet will keep OEMs backlogged for years, securing confidence in aircraft production. It is estimated that 25,000 new aircraft will come into service by 2026, with total production value of $4.4 trillion. This will also open up tremendous opportunity for the MRO market, which is estimated to grow to $68 billion per year by 2022.

This demand has been translated into economic development projects as companies expand and grow their production capacity. According to FDI Markets, a service of the Financial Times of London, between 2006-2012 there were 180 interstate and foreign investment projects in the aerospace industry where the principal activity was manufacturing, R&D or headquarters. During this period, South Carolina received 10.2 percent of the total capital investment and 11.9 percent of all job creation. Between 2006 and 2013, according to SC Department of Commerce records, the aerospace industry has invested $2.39 billion in the state, creating 10,600 new jobs.

**Aerospace-related industry sectors and target industries**

<table>
<thead>
<tr>
<th>Commercial &amp; Military Airframe</th>
<th>Satellites and Space Systems</th>
<th>Avionics</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAS (Unmanned Aerial Systems)</td>
<td>MRO (Maintenance, Repair and Overhaul)</td>
<td>Electronic Systems</td>
</tr>
<tr>
<td>Precision Metal Components</td>
<td>Software &amp; Information Technology</td>
<td>Aircraft Engines</td>
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<tr>
<td></td>
<td>Broadcast and Wireless Equipment</td>
<td>Advanced Materials/Composites</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metalworking</td>
</tr>
</tbody>
</table>

Source: SC Aerospace Task Force

The aerospace industry, military and civilian, already employs more than 65,000 people in South Carolina. The Boeing Company has committed to creating an additional 2,000 jobs in the near future, both on the production side and the engineering and information technology disciplines. A conservative economic impact multiplier yields an additional 8,000 jobs to the South Carolina economy. Those jobs will inevitably spread beyond the Trident region and into the less-developed counties along the I-95 corridor and beyond.
Analysis of Recommendations

**Workforce Development and Education**

One of the most critical challenges facing the industry is the need for both highly skilled and semi-skilled workers for aircraft parts manufacturing. This includes not only engineers and drafters who require a four-year degree, but also production workers, mechanics and aircraft technicians with degrees from a technical college or through vocational training. We need a scientifically literate population for success.

Support for the development and ongoing maintenance of curriculum by educational institutions and businesses to train the manufacturing workforce is the most critical component in building and sustaining South Carolina’s globally competitive position. With an anticipated growing workforce in the next year at Boeing alone, finding available workers is an immediate as well as a long-term requirement. A critical challenge for education and training resources is to leverage these job opportunities into quantifiable performance from the resident populations, especially in the 18-40 age cohort and unemployed and underemployed workers.

These students are the “bodies” needed for the workforce, but the gap between their skills and the minimum performance employers require is great. There is a well-documented correlation between low educational attainment and earnings, and also data that show educational attainment correlates with demonstrable skills. The aerospace industry, military and private sectors pay high wages but require strong math, science, engineering and technically skilled workers. The supply does not necessarily meet the demand of these employers in all aerospace fields. South Carolina’s high school completion rate for persons aged 25 and older is 83.6%, less than the national average of 85.4%, so there are many potential workers who need to finish high school or obtain a GED before they can consider entering a training program to qualify for an aerospace industry job. Next, according to the SC Technical College system, 42.8% of first-time students age 25 and older took developmental or remedial studies courses and 40.1% of first-time students enrolling directly from high school took Developmental Studies courses. These extensive remediation requirements decrease the likelihood of skilled worker
availability. We must develop strategies to address how these gaps can be bridged, and how we can prevent this academic underperformance in the future.

Beyond the immediate need to fulfill the need for skilled workers and in order to sustain the productivity in this sector, additional strategic initiatives must be undertaken. Long-term workforce development objectives must be articulated for K-12 and post-secondary education, and actions taken to produce the skills development programs for the future aerospace workforce.

Additionally, globally recognized knowledge certifications are critical to employment in the new economy. For graduates to be career successful and the state’s economy competitive, graduates must be equipped with 21st century skills and prepared to be highly competitive in their chosen field of study. The challenge we face is scaling educational innovations to meet the needs of all students in small and large schools, in all size districts and for all 70,000 public school students as well as technical college students in South Carolina. Resources cannot fund each District with the type of equipment and staff that, for example, the Challenger Center6 offers, so we need to plan collaboratively and share best practices that work. Courses of study and the content taught should be driven by industry needs and requirements.

An excellent example of the collaborative public-private sector partnerships that we envision is taking place between the South Carolina Army National Guard and Greenville Technical College. The South Carolina Army National Guard is partnering with Greenville Technical College’s Aircraft Maintenance Technology Program to train Army helicopter mechanics towards Federal Aviation Administration (FAA) Airframe and Power Plant Technician Certification. These mechanics will maintain the Army National Guard UH-72 Lakota aircraft,

6 Richland District One’s Challenger Center is one of 42 Centers in the US.
militarized version of the American Eurocopter’s EC145. The SCARNG vision of this partnership is to develop a world-class A&P program where students may learn composite airframe repair, latest generation turbine engine maintenance, and other cutting edge aircraft maintenance processes utilizing advanced technology and sophisticated simulation devices. In 2014, the South Carolina Army National Guard will commence construction on a multi-use facility at Donaldson Field to house two South Carolina Army National Guard aviation units plus Greenville Tech’s Aircraft Maintenance Technology Program. This new facility will provide substantially increased capacity for the Maintenance Technology Program to accommodate the Army’s training requirements along with South Carolina’s increasing aerospace maintenance training needs.

Our state has an infrastructure in place through which education/aerospace industry partnerships can be strengthened, expanded, and sustained. The twelve Regional Education Centers (REC’s) established under the Education and Economic Development Act mirror the state’s SC Works territories. The REC Boards are comprised of industry leaders, K-12 educators, technical colleges, and community representatives. The RECs are links for the workforce development initiatives like curriculum development, manufacturing certification, dual credit, teachers in industry, and STEM initiatives. K-12 career development programs, including job shadowing, mentoring, internships, and externships are coordinated through the school districts and regional RECs. One customized advanced manufacturing program established through REC initiatives is Dream It Do It™, which supports national manufacturing skills standards (MSSC) certifications. RECs are a natural conduit for workforce development and participate in this role with specific aerospace workforce development centers like CA2VES.

Critical to the sustainability of aerospace industry is the development of the workforce. Specifically, we must strengthen existing aerospace certification and apprenticeship programs to accelerate the state’s production of skilled manufacturing workers, with particular focus on serving new high school graduates and military veterans. The Technical College system and individual technical colleges have launched collaboratives, certificate and continuing education
programs like Greenville Tech’s Enterprise Campus and Trident Tech’s Boeing Training Center. These efforts should be systemic.

To succeed, government, labor, industry, and educational institutions must work together to define skill needs, build curriculum, provide internship experiences and define clear paths to employment in the aerospace sector.

**Research and Innovation**

The competitive advantage of any industry is constant improvement in products, quality and efficiency. Therefore, a foundational element of aerospace is the capability to conduct research and development (R&D) in state-of-the-art facilities. This infrastructure is not yet established in South Carolina. Some discrete efforts have been launched, but not as part of any overall, collaborative strategy or coordination of effort and resources. The Task Force advocates a “build it soon” approach but only with the collaboration and support from the private sector. This is because European aerospace, space and security industries have a competitive advantage given their consortium efforts with the European Aeronautic Defense and Space (EADS) Company that was formed in 2000. EADS includes Airbus, Astrium, Cassidian and the Eurofighter consortium, which span the aerospace sectors of commercial, military, helicopter, space, and security industries. Other aerospace-dominant states such as Kansas, Washington and Oklahoma support strong public-private partnerships for research and innovation. The National Institute for Aviation Research (NIAR) in Wichita, Kansas is one example that we should investigate.

Higher Education has begun to incorporate aerospace. The University of South Carolina established the McNAIR Center for Aerospace Research. The Clemson University Restoration Institute (CURI) is a turbine testing facility, which also operates institutes and centers for materials and composites, supply chain optimization and vehicular electronics. Trident Technical College’s Enterprise Campus is designated as an aerospace center. Additional high tech resources fit into the equation. The South Carolina Light Rail (SCLR) is a public-private partnership to provide a broadband, high-speed optical network connected to regional and national networks. The aerospace R&D will likely have very high computing requirements. The SCLR will enable the transmission of large amounts of
data between a dedicated aerospace R&D center and the Clemson Computing Information Technology Center. The difference can be hours and minutes versus days for moving large amounts of data. This advantage will enable aerospace R&D to avoid investing in on-site, large scale computing capabilities. They will be able to use computing resources off-site without experiencing adding time until final analysis is complete due to lengthy data transmission time.

If aerospace is to be successful in South Carolina, these academic R&D resources must be aligned with the interests of aerospace innovators, as is the case with the SC automotive sector, with the research center at Sheffield, the Fraunhofer model in Germany and the now worldwide University of British Columbia Composites Research Network. The Task Force believes there is value in looking at these models. We can start by asking the US aerospace industry to identify which aspects of CU-ICAR and the aforementioned examples translate to this state and what needs of the aerospace industry are not now met.

The next steps compel us to provide an environment for industry and supportive programs/institutions to conceive and create the innovations necessary for the aerospace sector to retain a global competitiveness. This report promotes the conceptual development of an Aerospace Research and Workforce Development Center that could be designed to create an inventive and collaborative environment for academia, industry and entrepreneurship. Industry and research academia would co-locate to form unique working environments. The process to develop these resources should be driven by corporate aerospace citizens and consider innovative structures that meet the state’s needs.

Cultivating a Supply Chain through SMEs

Supply chain development is an immediate need for the aerospace OEMs and the key to long term growth and stability in the industry. With the current and potential suppliers in South Carolina, a strategy to assist these companies to provide goods and services for aerospace customers is essential. Aerospace encompasses several product sectors across manufacturing, engineering and information technology

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7 SME is small to medium-sized manufacturers and services companies, generally under 100 employees.
disciplines, each with standards to meet exacting industry specifications. Markets include commercial and defense products.

The near term success of the SC aerospace initiative is contingent upon building a qualified SME base, which means that implementable goals must be articulated to help companies with improvements to their quality, production capability and workforce skills. Aerospace certifications for international and FAA standards are essential. Suppliers must meet world-class standards and certifications in order to grow, and there is not a cohesive system in place to ensure we can deliver this effectively. The SC Manufacturing Extension Partnership and Technical College system are key partners in providing these services. Funds appropriated through the General Assembly for workforce development now exist to help some companies achieve certifications such as AS-9100.

Implementing a supplier development program means establishing a platform to encourage public partners such as the SC Manufacturing Extension Partnership (SCMEP), readySC, technical colleges and other experts to design and launch program services. The Small Manufacturing Entities (SMEs) within specific industries and products need to understand they have the potential to become suppliers to the aerospace industry. The OEMs can articulate their specific supplier criteria, but to fully understand supply chain needs, we must map the supply chain of the aerospace segments to identify gaps. Then, through the existing networks and resources, we will be able to identify potential new suppliers already located in South Carolina. Understanding their capabilities vs. the sector’s needs, we will be able to design and implement services to assist SMEs in reaching required certifications to qualify as aerospace suppliers. A supplier development program would address the “basics”: AS9100 and ISO 14000 Certifications, strong business/strategic planning including a succession plan to ensure operational stability, required proximity to the OEM, equipment/asset development, compliance with federal regulations (Part 135 and Part 91) and meeting contracting requirements. Support for entrepreneurial development, including access to capital, is another essential component to support growth of local suppliers.
Public and Private Sector Collaboration

An official, statewide, public/private body can be effective to ensure coordination of resources and unified strategies to build capacity for supporting aerospace industrial development.

Turf battles are a major deterrent to effective economic development, and this has been pervasive among some state-level agencies and between institutions of higher education. Strong business-education partnerships are only found in a few regions of the state, but where they exist their impact is evident with higher job creation and higher educational attainment. Joint agency initiatives usually work when funding is available and then they dissipate as soon as internal resources need to be committed. Business surveys, conducted by the State Chamber of Commerce and Regional Education Advisory Boards often cite disappointment by industry leaders for the lack of communication between educators and industry. For the aerospace industry to prosper, effective collaboration and genuine accountability will be essential, especially in the areas of workforce development and research development.

The leadership effort between the public and private sectors to grow and sustain aerospace must be continued. The Secretary of Commerce will take the lead role as conductor of the aerospace orchestra. Additional stakeholders and representatives will be recruited to join this effort. These stakeholders will establish a consensus for using these recommendations to identify the industry’s best opportunities, barriers to industry growth, strengths and assets.

**Key South Carolina Stakeholders: Industry, Education, Government, Military**

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<tr>
<th>Stakeholder</th>
<th>Private or Public</th>
<th>Involvement</th>
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<tbody>
<tr>
<td>OEMs</td>
<td>Private</td>
<td>All areas</td>
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<tr>
<td>SCMEP</td>
<td>Public</td>
<td>SME/Supply Chain</td>
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<td>Manufacturers</td>
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<td>SME/Supply Chain</td>
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<td>All areas</td>
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<td>Local Government</td>
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<td>Infrastructure, Workforce</td>
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<td>Post-Secondary Education</td>
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<td>SC Research Authority</td>
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<td>Research</td>
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<td>Task Forces</td>
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<tr>
<td>Military Facilities</td>
<td>Public</td>
<td>All Areas</td>
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Sustaining Competitiveness

South Carolina’s aerospace ecosystem will require consistent attention to evaluate and consider aspects of the business climate that are important to retaining and growing this sector. The emphasis on enhancing further cooperative and collaborative efforts to support and sustain the private and military sectors requires an ongoing commitment and frequent surveys to assess progress towards achieving these goals.

Regulations

One factor contributing to South Carolina’s competitiveness relates to the sales tax assessed for certain parts that are used in MRO operations (the charge is then passed to the aircraft owner). Several neighboring states now exclude this sales tax, thus they enjoy a competitive advantage and are pulling away South Carolina’s market share of MRO. A review of the state’s competitors with respect to this tax and its impact to state revenue can identify whether a similar exclusion or reduction would positively influence growth in the MRO sector. This review should expand to involve a comprehensive review of all fees and taxes specific to the aerospace segments to evaluate SC’s competitiveness.

Marketing and Incentives

In order to attract business to locate to or expand in South Carolina, the marketing strategy must offer a reasoned and compelling case for excellent return on investment. The economic analysis led by the state Department of Commerce should foster consistent incentive strategies with local involvement to enable communities to better compete.

South Carolina’s attractiveness to the aerospace industry was confirmed with Boeing’s first expansion and the state has aggressively promoted SC’s business advantages at events like the Paris Air Show. The primary factors that weigh in location and expansion decisions include the low cost of doing business, a pro business environment, a strong industrial base, the deep-water port, access to major markets, labor availability and right to work.
The Task Force supports continued emphasis to present South Carolina’s advantages to prospective aerospace employers and consideration of incentives that offer benefits to small and medium (to include startups) companies as well as very large Original Equipment Manufacturers (OEM).

**Infrastructure**

Infrastructure for Aerospace includes physical space associated with sites for manufacturing and the communities in which these companies are located. As we move forward, we must analyze the state’s infrastructure assets and critical needs for Aerospace employers.

In addition to land for development and a skilled workforce, aerospace industry employers require adequate water, wastewater, utilities, roads, rail, an efficient port, and a communications network. The next step in this strategy is to correlate those priorities that intersect with the location requirements and expansion needs of Aerospace employers.

The assets South Carolina brings to the table include the diversity of potential suppliers and current resident aerospace related companies, a business friendly environment, a flexible and willing technical training system, competitive costs of doing business and available sites with good infrastructure. Over 200 aerospace-related manufacturing companies and suppliers now operate in the state, employing more than 23,000 people. The Inland Port currently being constructed at GSP International Airport, with direct
non-stop rail and inter-modal linkage to the Port of Charleston, will further enhance the twin aerospace hubs of South Carolina (Upstate and Charleston).

**Airports**

Airports have been an integral part of economic development for the movement of people and cargo, but to the Aerospace industry they have particular significance and requirements. The SC Department of Commerce identifies criteria necessary to develop an ample supply of aerospace industrial sites with proximity to airports and Foreign Trade Zones.

**SC Airports by Congressional District**

Aerospace Airport Facility Criteria include:
• Minimum Runway Length of 3,500 Feet (68 of 196 SC Airports Meet Criteria)
• On-Site Air Traffic Control Tower (12 of 196 SC Airports)
• Either Base End or Reciprocal End ILS (19 of 196 SC Airports)
• Airframe Repair and Maintenance Service Capacity (42 of 196 SC Airports)
• Capacity to Provide Power Plant Repair Service (41 of 196 SC Airports)

At present, airport facilities for both the private and public sectors are meeting the needs for current manufacturing and military users, but expansion of runways and support services may be necessary as aerospace grows. Future aerospace companies may desire ample acreage at airports and large hangars, which are not in the state’s inventory. Investments to maintain and improve these facilities (immediate and long term) should be planned with public/private needs considered.

Regional Impact

The development of the aerospace industry in South Carolina will benefit the entire Southeast region. Specifically, the impoverished I-95 corridor links Boeing in South Carolina, Gulfstream manufacturing in Savannah, Georgia and Spirit Aerosystems in Kinston, NC. All three states will benefit from a collective regional effort to develop SMEs to support the supply chains of aerospace manufacturers and to create workforce development programs to supply an ample regional workforce.

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8 ILS is Instrument Landing System
The region extends to urban, suburban and rural areas of South Carolina. Some economic projections anticipate that the Southeast will become the largest regional concentration of aerospace-related companies in North America within the next ten years.

Advocacy
The commitments already made by the state of South Carolina, philanthropic organizations and industry speak to the stability for economic development through long-term intergovernmental and public/private collaboration. The state’s commitments to Boeing and other aerospace industry expansions have set the table for future economic development. The technical college system’s investment in training programs specifically for aerospace manufacturing, the workforce training by readySC, the creation of research facilities like the USC McNAIR Center and
Clemson University Advanced Materials Center prove the state is investing in its aerospace future. We must ensure a sustained, strategic and collaborative effort with tangible results.

Cleared for Take Off

The projected job growth and expansions in aerospace are not guaranteed, but will instead require the support of the public sectors and coordinated, strategic planning. To capture this opportunity for South Carolina, we will need to invest in workforce development and infrastructure. If we develop this aerospace ecosystem, it is likely that the momentum will continue to grow as the OEMs and their supply chains will see South Carolina as the “go to” state for successful aerospace opportunities.

The South Carolina Department of Commerce and New Carolina collaborated on a grant proposal from the US Economic Development Administration in June 2013. The Investing in Manufacturing Communities Partnership (IMCP) program involves a planning grant that will enable South Carolina to build, support and grow the Aerospace industry in South Carolina. These funds, awarded in October 2013, will enable the state to complete its strategic plan for Aerospace industry development by using the recommendations outlined in this report. The activities funded in the grant include:

1. Establishing the framework for the entrepreneurial environment that is conducive to aerospace industry development.
2. Identifying any regulatory reform needed to facilitate expansion and development of the aerospace industry sector.
3. Facilitating workforce skills development initiatives, recruitment and continuing education, including military transition and managerial education programs.
4. Nurturing the adoption of K-12 curricula designed to foster STEM skills, aerospace technology and engineering throughout the South Carolina school system.
5. Fulfilling industry’s needs for research, innovation and development by encouraging collaboration with higher education and developing a strategy to establish an aerospace R&D center similar to CU-ICAR.

6. Understanding the infrastructure needs of the aerospace industry and identifying the appropriate incentives and support to develop these resources.

7. Enhancing the commercial and general aviation support sectors’ growth in the state.

8. Advising rural and underserved communities and identifying tools to enhance their opportunities to contribute to the aerospace sector.

9. Promoting South Carolina as a destination for aerospace industry.
Appendix

South Carolina Aerospace Task Force Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Company/Office</th>
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<tbody>
<tr>
<td>Dr. Marco L. E. Cavazzoni</td>
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<td>Dennis J. Encarnation &amp; Associates, LLC</td>
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<td>Director</td>
<td>The Farrell Group</td>
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<td>Michael La Pier, A. A. E.</td>
<td>Director of Airports</td>
<td>Myrtle Beach International Airport</td>
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<td></td>
<td>Moseley and Associates, LLC</td>
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<td>readySC &amp; Apprenticeship Carolina</td>
</tr>
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<td>CEO &amp; Founder</td>
<td>Ranger Aerospace LLC</td>
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<tr>
<td>Anita G. Zucker</td>
<td>Chairperson &amp; CEO</td>
<td>The InterTech Group</td>
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<tr>
<td>Robert M. Hitt III</td>
<td>Secretary of Commerce</td>
<td>SC Department of Commerce</td>
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<tr>
<td>George B. Patrick III</td>
<td>Deputy Secretary of Commerce</td>
<td>SC Department of Commerce</td>
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South Carolina Aerospace Task Force Advisory Board

Beaufort
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Gary Kubic, County Administrator
Bill Evans, Beaufort County Schools
Blakely Williams, Chamber of Commerce
Ivey Lipfert, MCAS
John “Jack” Snider (Col.), Marine Corps Community Services
Kim Statler, Lowcountry Economic Alliance
Tony Petrucci, Battery Creek High School
Jon Rembold, Beaufort County Airports Director
Columbia:
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Cantzon Foster, SC Historical Aviation Foundation
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David Smith, SC Aeronautics
Paul Werts, SC Aeronautics
John Lenti, Celebrate Freedom Foundation
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Bob Kiggans, SCRA
Sandra Lindsay, EdD, USC
John Cane, Cane Associates
Chuck deVlaming, Lt. Col., USAF (ret.)
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Dick Watson, Fighter Pilot, SCANG
Peg Jackson, Pittsburgh Institute of Aeronautics
Dixie Button, Embry-Riddle
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