# Aero-Economic Development: Strategies and Actions to Leverage Smith Reynolds Airport for Winston-Salem's Business Development and Overall Competitive Advantage

Final Report Prepared for the Winston-Salem

Chamber of Commerce

Submitted by

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December 4, 2017



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## ACKNOWLEDGMENTS

This final report conveys an Air Commerce strategy for Winston-Salem prepared by Aerotropolis Business Concepts for the city's Chamber of Commerce. As such, it offers information, insights, guidelines, strategies and recommendations to better leverage Smith Reynolds Airport for a more competitive and prosperous Winston-Salem economy. It could not have been conducted without the contributions of many.

Aerotropolis Business Concepts is indebted to the Chamber leadership, especially Gayle Anderson and Jill Atherton, for providing highly useful data and information and assisting in setting up interviews with numerous stakeholders. We would also like to thank the many business, government, education and aviation-sector executives who generously offered their opinions, insights and visions during the information-gathering process of this project (Appendix 1).

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## APPENDICES

## EXECUTIVE SUMMARY

Historically, Smith Reynolds Airport played a highly significant role in Winston-Salem's economy. Now, due to a confluence of forces that consolidated and redefined commercial aviation, the perceived importance of the airport has diminished. It has become low-priority infrastructure deemed of little economic value serving a handful of elite organizations and elite users. Economic development priorities in Winston-Salem today prioritize innovative, tech and bio-intensive industries. The role that Smith Reynolds Airport might have in the city and region's future is largely overlooked.

Countering the divergence of the historical and contemporary priorities for economic development is the growing importance of speed, agility and connectivity in securing commercial advantage at many levels – firm, community, and region. Stated a bit differently, aviation and Air Commerce has become essential to securing business and place advantage in the 21st. century time-critical networked economy.

At the request of the Greater Winston-Salem Chamber of Commerce, Aerotropolis Business Concepts examined questions concerning the importance of Air Commerce to the city's economic future, the capacity of Smith Reynolds Airport to be an asset in supporting Air Commerce, how the city might best capitalize on its aviation assets and opportunities and how those assets might be applied to leverage other emerging opportunities for economic growth, such as the pending development of the Whitaker Park properties.

### Findings

Major findings were derived from rigorous analysis of the Piedmont Region's and Winston-Salem's assets arrayed against the new aero-economy and aero-industry principles as applied to smaller airports. Consultations with airport administration and resident corporate officials informed scenarios for planned and prospective market-articulated enhancements. Analysis of datasets on 20,000+ bespoke aviation industry and aviation–enabled economic development prospect firms identified and characterized economic development prospects. Market signals garnered from 45+ key

informant interviews were used to define aviation-derived value propositions for Winston-Salem's existing industrial portfolio and its emergent knowledge economy.

A summary of findings includes:

1. **The aerotropolis model is relevant to Smith Reynolds Airport.** A mini-aerotropolis centered on and around Smith Reynolds airport can capitalize on existing Winston-Salem assets and function to unlock the city's full economic potential by not only attracting new businesses and industries but also strengthening existing businesses and industries.

2. **All economic development stakeholders in Winston-Salem need to better understand the aerotropolis model.** Smith Reynolds Airport can be a major asset in recruiting investors to area properties, including Whitaker Park.

3. **Air Commerce already makes a significant contribution to Winston-Salem's economy**. Winston-Salem's economic history and the current economic utility of the Smith Reynolds Airport indicates that Air Commerce is continuing to yield significant economic outcomes through the location of firms directly engaged in Aviation Industry Cluster activities and firms that capitalize on business aviation as a competitive advantage.

4. **Proactive efforts are needed to secure economic benefits accruing to communities served by airports.** Economic spillover benefits to host communities do not accrue through passive osmosis; they require deliberate efforts to achieve community development outcomes.

5. **Winston-Salem is late to recognizing and acting on the economic potential of enhanced Air Commerce around Smith Reynolds**. Comparable airports have implemented development strategies designed to capitalize on opportunities available to Winston-Salem.

6. **Smith Reynolds Airport is insufficiently integrated into economic development strategies.** An underestimation of the airport's economic role and potential value

has led to its marginalization as a factor in Winston-Salem's economic development strategies.

7. **Smith Reynolds Airport can provide focus to Whitaker Park Development.** The airport's ability to provide national level service minutes away should be central to defining the market and presenting the Whitaker Park space to prospective tenants.

8. **Proximity is the airport's competitive advantage.** The location of the airport is unparalleled in terms of convenience— this is a major competitive advantage that is under-recognized and under-utilized.

9. **Aviation can be a major asset for Winston-Salem's thriving medical sector**. With its world-class medical facilities, attractive downtown and relatively nearby leisure assets, Winston-Salem has an opportunity to become a United States center for affluent medical tourism.

10. **Aviation assets are important to the missions of area's universities.** The relationship between Smith Reynolds Airport and the diverse and growing interests of area universities and research institutions is an undocumented success story.

11. **Smith Reynolds Airport is important to Innovation in Winston-Salem.** A comprehensive aerotropolis vision can substantially support the think-and-do centers in the Innovation Quarter (IQ), the N.C. School of the Arts and a revitalized Whitaker Park business and industrial zone.

12. **Winston-Salem can be important to innovation in aviation.** Winston-Salem's experience and success in capitalizing on research and innovation has application to designing and executing an Air Commerce economic development strategy responsive to emergent market opportunities in the aviation sector.

13. **Smith Reynolds Airport needs to become a better aesthetic portal. T**he visual impact of Smith Reynolds Airport forms the first and often last impression for air visitors of all types to the Winston-Salem area.

14. **Planned renovations could revitalize awareness and appreciation of the airport**. After a perceived period of senescence, Smith Reynolds Airport has a program of current and planned improvements that could revitalize the facility for expanded business aviation activity and significantly grow its economic contributions.

15. **Physical and location constraints limit airport development.** Apparent conflicts exist between the airport's Master Plan options for using existing and potentially available land to expand operations and services and external plans for expanded residential development in areas immediately adjacent to the airport. It is vital that planning efforts of the airport and other economic and community development stakeholders be optimized.

16. **Smith Reynolds Airport is not cost competitive.** Non-competitive fuel prices, double property taxes and perceived lack of appropriate hangar space are significant barriers to expanded use across a broad category of potential users.

17. **Growing the aviation workforce needs to start early.** The demand for skilled aviation industry workers in the region is growing. Workforce development and jobs creation are inextricably tied and needs to engage all levels of education with a focus on local youth.

18. **Winston-Salem's aviation cluster is narrow and shallow.** Compared to a set of peer regions, the area has relatively few firms actively engaged in aviation and is especially deficient in cluster density, lacking breadth in the variety of aviation businesses.

19. **Characteristics of the region's aviation cluster point to opportunities to attract firms.** Opportunity exists in the attraction and development of mid-range firms for which the region's mix of cost advantages, workforce availability, infrastructure proximity, and quality of life appeal to growth-oriented executive teams.

20. **Identified gaps in the Triad's Aviation Cluster are ready targets of opportunity.** The presence of Air Commerce firms in the Aviation Cluster Sectors of peer airports

represent validated and credible “targets of opportunity” for a Smith Reynolds Airport-centered Air Commerce economic development strategy.

21. **Whitaker Park facilities could meet the requirements of identified Air Commerce targets**. The facility requirements of target aviation firms meet available industrial facilities in the proximity of Smith Reynolds Airport—including the Whitaker Park complex.

22. **Universities’ and Colleges’ experience in attracting talent would inform Winston-Salem’s Air Commerce strategy.** Winston-Salem’s universities and colleges understand the value of the region’s assets that they use to attract talented students, researchers and faculty to the area and the value Smith Reynolds Airport affords in facilitating travel to their campuses. Those values will also appeal to the next generation of innovative businesses. The universities and colleges could be valuable in guiding Winston-Salem’s Air Commerce strategy.

23. **Business Aviation is bigger than corporate jets**. Encouraging the use of business aviation through Smith Reynolds Airport potentially has a greater economic impact than successful industrial development due to the larger, more diverse population of growth firms that can utilize Smith Reynolds Airport.

24. **Business aviation at Smith Reynolds Airport can be a significant contributor to a Triad regional Air Commerce strategy.** Smith Reynolds can perform an important role in the broader Piedmont Triad Aerotropolis by utilizing its business aviation specialization and assets to complement commercial aviation at PTI, thus providing the Piedmont Triad Aerotropolis with dual growth engines.

25. **Specialized Aviation Industry knowledge is needed to guide the integration of aviation into the Winston-Salem economic development mindset.** The Air Commerce industry is similar to other focused economic categories—Life Sciences, Automotive, Sports—in that effective economic development interaction with industry participants requires specialized knowledge.

## Recommendations

The potential for growth in Air Commerce in Winston-Salem and the region can be significant. Recommendations for developing the Air Commerce sector and enhancing its strategic and economic contribution to Winston-Salem, Forsyth County and the Piedmont Triad region were derived from rigorous analysis of the Piedmont Region's and Winston- Salem's assets arrayed against the new aero-economy and aero-industry principles as applied to smaller airports.

The overarching premise binding these recommendations is that Smith Reynolds Airport needs to be better connected to other elements of Winston-Salem's economic development machine. To this end and other presented in the report our summary of recommendations follow. A formal structure in the form of an Air Commerce Task Force that is possibly administered by the Winston-Salem Chamber of Commerce can be the vehicle for effecting substantive integration of Air Commerce and Smith Reynolds Airport into the economic strategies driving growth in Winston-Salem.

A summary of recommendations includes:

1. ***Operationalize Air Commerce in Economic Development:*** The Chamber should lead in the organization of a Winston-Salem Air Commerce Strategy Implementation task force, supported by staff with specialized aviation industry expertise.

2. ***Harmonize constraining land use plans***: City, county and airport land use plans need to be harmonized and integrated into a common long-term strategic vision for developing commercial and residential in the area surrounding Smith Reynolds Airport and between the airport and Whitaker Park.

3. ***Expedite infrastructure to leverage aerotropolis benefits:*** Unobstructed multi-lane transportation between Whitaker Park and Smith Reynolds Airport that is augmented by inter-modal rail facilities needs to become a priority.

4. ***Assert Winston-Salem leadership in NC's aviation industry:*** The absence of a coherent, active effort on the part of the state to promote business aviation creates an opportunity for Winston-Salem to assert a leadership role in developing the business aviation industry locally, regionally and in North Carolina.

5. ***Conduct site visits to Air Commerce comparable airports:*** Comparable airports have implemented development strategies designed to capitalize on some aspects—air cargo, corporate aviation, aircraft maintenance—of the opportunities available to Winston-Salem. The Chamber should organize site visits to regional airports implementing comparable Air Commerce strategies.

6. ***Conduct an Industrial Facility Assessment of Smith Reynolds Vicinity***: A detailed Industrial Facility Assessment of the airside, landside and proximate industrial properties must be performed to authoritatively determine their availability and suitability to targeted Air Commerce sector prospects.

7. ***Conduct a Surface Transportation Assessment of Smith Reynolds access routes:*** Efficient surface transportation of freight, cargo, equipment and people is vital to expanding Smith Reynolds Airport's role in Air Commerce. An updated surface transportation assessment of routes accessing Smith Reynolds Airport needs to be performed to identify and remedy impediments to facilitated business transport between Whitaker Park and the airport.

8. ***Implement Aviation Industry supplier programs***: A scarcity of local suppliers and service providers undermines regional operational efficiencies further weakening the region's Aviation Industry Cluster. The Chamber should develop and execute a program of education and promotion to encourage aviation buyer/supplier network development among Winston-Salem manufacturers and suppliers.

9. ***Convene Air Commerce Prospect executive focus groups:*** The Chamber should convene focus groups of founders of representative firms of Aviation Portfolio Target Sectors to develop a program of proactive Air Commerce prospect identification and development to test and adjust the strategy.

10. ***Create an Air Commerce "Closing Fund":*** The Chamber should collaborate with Forsyth County and Winston-Salem to adapt the state's OneNC incentive program in the creation of a "closing fund" for proactive targeting of Air Commerce prospects.

11. ***Expand Business Aviation through prioritized development of appropriate facilities:*** Resource and space limitations at Smith Reynolds Airport necessarily results in the need to impose strategic considerations in planning future development.

12. ***Incent the location of desired Business Aviation providers:*** Attract air charter, fractional ownership and other innovative providers of business aviation capabilities that mediate cost barriers to prospective users from among Winston-Salem's growth companies

13. ***Develop an Integrated strategy to grow Business Aviation:*** Winston-Salem has the diverse set of educational, aviation and economic development resources to brand the city as the place where "competitive advantage is in the air". A comprehensive effort should involve various economic development stakeholders focused on educating potential users of business aviation.

14. ***Position the airport as a launch pad for new ventures****:* Entrepreneurial companies engaged in aviation-related or enabled developments, such as drone manufacturers, can benefit from being located at Smith Reynolds Airport, where a number of relatively unrefined and/or vacant buildings could provide the room and obscurity needed in prototyping facilities.

15. ***Reanimate Brookwood Business Park as an Innovation Destination:*** The Park should be re-branded as an aviation-inclusive Innovation Destination with additional speculative space as a landing pad for entrepreneurial startups and recruited companies' beachheads.

16. ***Create an Air Commerce Innovation Seed Fund****:* The airport, in collaboration with IQ, the Chamber and other stakeholders, could make support for aviation and Air Commerce innovation tangible by creating a pool of seed capital.

17. ***Implement an Up-dated Smith Reynolds Airport Master Plan:*** The Airport Master Plan needs to be updated to comprehend and support the needs a more demanding market to enable the airport to add more value to potential development at Whitaker Park and more broadly in Winston-Salem.

18. ***Prioritize competitive pricing, telecommunications and services***: In today's new speed-driven economy businesses demand access to state-of-the-art telecommunications services to support redundant, real-time tracking and communication. The airport, Whitaker Park and locations in between have to offer these services. Costs—fuel prices, property tax, hangar fees—of operating an airplane at Smith Reynolds needs to be competitive as well.

19. ***Improve aesthetics for priority purposes****:* Planning for Smith Reynolds Airport and potential strategic linkages with Whitaker Park and other elements of the Winston-Salem Innovation Triangle should give high priority to aesthetics and environmental sustainability.

20. ***Engage existing employers in aviation training design****:* The Forsyth Technical Community College aviation campus at Smith Reynolds Airport will be a powerful asset in workforce development for the region's aviation industry. Existing aviation companies should be engaged in optimizing the curriculum developed for the aviation training center.

21. ***Think beyond aviation****:* The aviation workforce should be expanded through development of expedited programs for workers transitioning from fields and sectors who possess compatible experience; conversely, support for expanded aviation training can be leveraged from other sectors that could benefit from the availability of workers with aviation sector skill sets.

22. ***Educate growth company management on aviation strategies***: The Chamber should convene area business schools leaders to conceptualize an executive education business aviation program serving management of growth-positioned Winston-Salem companies.

23. ***Grow the next aviation generation***: Workforce development and jobs creation are inextricably tied and needs to engage all levels of education, with a focus on local youth.

24. ***Transform Smith Reynolds Airport into an enticing portal***: Airport management should engage with terminal tenants, local artists, economic development stakeholders and the Chamber to re-imagine and re-brand Smith Reynolds Airport as an enticing front door to the city.

25. ***Connect with the Public***: Airport leadership and management should host regular public engagement events; air shows are absolutely necessary but insufficient events that need to be augmented with other efforts.

**END**

## PREFACE -- CONNECTIONS: LEVERAGING AN AVIATION FUTURE

Connections - at every level - are the foundation of competitiveness and urban economic growth. Connections operate in many directions and through diverse means, to local and distant markets, supply chains, clients, governments, and skilled workers and the education and training sectors that develop them.

Globalization has increased the scope, scale and span of what it means to be connected and competitive. At every level-corporate, community and region-there is a compelling need to develop the capacity to reach further faster. Aided by explosive growth of Internet-enabled communications and web-based logistics, the role of Air Commerce in delivering people, products and information just-in-time has become achievable for companies of all sizes and business sectors where economies of speed is becoming as important as economies of scale and economies of scope. Airports are the concrete infrastructure providing local connectivity to distant suppliers, customers and markets but they have to be appropriately appreciated and integrated into economic development strategies to deliver on their business and investment-generating potential.

Winston-Salem has in Smith Reynolds Airport a rich asset that in many respects is under-appreciated and under-resourced for unlocking the city's economic potential. It is especially disconcerting that an airport that for years powered connections between Winston-Salem and the entire United States and indeed much of the world has become largely disconnected from a city so close to its runways. Extensive interviews spanning various stakeholders and constituencies in the city and region document the lack of connection that characterizes the airport today – so proximate yet so strategically, functionally, culturally, financially and logistically disconnected. This disconnection is profound, extending to both internal and external stakeholder groups in many ways.

Connection is a bi-directional phenomenon – the point is not to "fix" Smith Reynolds Airport but to increase awareness of its potential role in attracting and growing businesses and to identify strategies for leveraging the contribution it and aviation in general can make to strengthen the economy of Winston-Salem and the broader

Piedmont Triad region. The market-based approach that guided development of the assessments and strategies we present support the conclusion that Winston-Salem still needs its airport, with old connections renewed and new ones initiated in order for the city to prosper in the decades ahead.

## INTRODUCTION: MACRO CONTEXT, CRITICAL ISSUES AND REPORT DEVELOPMENT

With speed and connectivity shaping the new rules of business location, Winston-Salem is at an economic development crossroads. Strategies generated and introduced over the coming year affecting speed and connectivity will heavily influence the future direction the city goes in terms of commercial investment, business development, job creation, income levels and overall quality of life.

The overarching question being addressed is whether, and how, Smith Reynolds Airport can be become a stronger asset for economic and community development in Winston-Salem by providing speed and connectivity to distant places. A number of challenges surround this question:

1. Will Winston-Salem progress beyond its successful biomedicine initiatives to develop other high tech and higher-value business services sectors?
2. Will biomedicine and the city's newly emerging other modern sectors be able to compete nationally (and worldwide) in the decades ahead?
3. Will job creation in Winston-Salem over the next ten years achieve the goals in quantity, quality, and equitable opportunity set by its business and government leaders?
4. How can better synergies between Smith Reynolds Airport and the large Whitaker Park complex nearby be created and leveraged to attract businesses to the property and mutually reinforce the airport through greater passenger and perhaps air cargo services?
5. Will logistics, industrial, commercial, and urban development on, around, and outward from Smith Reynolds Airport be economically efficient, attractive, and environmentally sustainable, presenting positive first and last impressions to aviation visitors and potential business investors while becoming an enduring magnet for modern economy workplaces and workers?

Responding to these challenges will require creative approaches based on sound analysis of the assets of Smith Reynolds Airport, Winston-Salem and the Piedmont region. It will also require the introduction of new aero-economy and aero-industry strategies (see www.aerotropolis.com) geared to smaller airports that will better capitalize on Smith Reynolds Airport and its nearby Whitaker Park property. Our report focuses on leveraging these two assets in a strategic but data (and information)-based approach. The Aerotropolis model for Air Commerce planning and economic development, presented in Section 1, provides our conceptual framework for understanding the aviation-related strengths, weaknesses and opportunities confronting Winston-Salem and the Piedmont Triad Region and the potential to drive development outward from Smith Reynolds Airport.

Section 2 presents the rigorous, data-driven and ground-truthed process illustrated in Figure 1 below to answer these questions. This section draws on extensive market research, cluster definition and comparisons with peer aviation centers and key informant interviews to assess the current status of the airport and Air Commerce in Winston-Salem. Hurdles are identified – internal and external; tangible and intangible – that need to be addressed to realize the real potential of airport-driven development for the City and the broader Triad region.

**Figure 1**

The market-based analysis described in Section 2 assessed Winston-Salem's Air Commerce economic development opportunities identified through establishment-level Aviation Industry Cluster comparative analysis of United States and Peer regional economies. This analysis defined Air Commerce Target Sectors and a highly-curated portfolio of representative economic development prospects mapped against currently-available physical properties, as well as describing opportunities capitalizing on the Smith Reynolds Airport to support Winston-Salem's aviation enabled high growth firms.

Section 3 distills the results of quantitative and qualitative analysis into findings that speak to the capacity of Smith Reynolds Airport, Winston-Salem and the Piedmont Triad region to expand Air Commerce visibility, capacity, utilization and economic growth.

In Section 4 ground-truthed and market-validated findings are arrayed against best practice principals for optimizing aviation assets, resulting in the specification of strategic and tactical recommendations organized in core areas of action.

Appendices providing detail on study research processes including annotated summaries of key informant interviews; detailed establishment-level information on Aviation Industry Clusters at the national, regional and local levels; and a list of individuals who contributed time, data and opinions and assistance to this study complete the report.

## SECTION 1

## AEROTROPOLIS: A PROMISING MODEL FOR WINSTON-SALEM'S ECONOMIC DEVELOPMENT

Transportation infrastructure has always fueled business location and urban economic development. Its impacts have operated through waves that transitioned over time from ports to rivers to rail to interstate highways to a fifth wave where airports have become contemporary drivers of business location, success and urban commercial growth. Air connectivity has become vital to firms and places that depend on fast and efficient long-distance transport of executives, professionals, clients and goods. Such rapid connectivity has been key to cities and regions seeking to diversify and modernize their economies, boost their exports of high-value goods and high-end services, attract investments and even draw tourists.

With speed generating currency in today's commercial environment, aviation operates as a "physical Internet", moving products and people quickly around the nation and the world. Airports of many scales can offer competitive advantages that attract businesses seeking to leverage rapid long-distance connectivity. Speed-to-market (response time) over long distances is particularly critical to high-tech industries and high-value perishables sectors (such as biopharmaceuticals and biological materials).[1] While economic realities and airport size impose certain limits of economic impact all communities with air infrastructure assets can leverage the smart and collaborative principles of aviation-enabled development to attract business and grow their economies.

In the Aerotropolis model (airport-linked urban development) airports increasingly serve as investment magnets, business anchors, and regional economic catalysts. Their roles as strategic infrastructure for time-critical businesses and engines for economic development are becoming more substantial as the 21st century progresses. Recognition of the considerable importance aviation has in the competitiveness of firms

[1] Rajan Suri, It's About Time: The Competitive Advantage of Quick Response Manufacturing (New York: Productivity Press, 2010).

and places have led many communities to make airports central to their investment attraction and business development strategies. What emerges from this is the concept of an airport-centered urban economic complex known as an aerotropolis.

The United States Congress has defined an aerotropolis as "*a planned and coordinated multimodal freight and passenger transportation complex which provides efficient, cost-effective, sustainable and intermodal connectivity to a defined region of economic significance centered around a major airport.*[2] An aerotropolis is essentially a city built around an airport offering its businesses speedy connectivity to their suppliers, clients, and enterprise partners nationally and world-wide. These businesses, many in the high-tech and high-value business service sectors, are often more dependent on distant suppliers, resources and clients than those located in the close-by metropolitan regions. The aerotropolis model is about fostering aviation-oriented modern business clusters that increase the economic impact of the airport on the local community and its broader region. Such clusters have been shown to generate quality jobs, higher incomes, more tax revenues, and overall greater community prosperity, as is extensively documented in the publication links found at www.aerotropolis.com .

At full development, an aerotropolis also contains a complete set of logistics and commercial facilities that support aviation-linked businesses and air travelers who pass through the airport annually. These include, among others, freight forwarding; bonded warehouses; logistics and distribution facilities; office buildings; hotels; convention and exhibition complexes; medical, research and education services; as well as shopping, dining, entertainment and leisure venues. Appropriately-sized institutions and commercial centers service residential areas that house many of the employees of businesses surrounding or depending upon the airport.

As an increasing number of these aviation-oriented businesses and commercial service providers cluster around airports and outward along their highway corridors, the aerotropolis emerges where air travelers and locals alike work, shop, meet, exchange knowledge, conduct business, eat, sleep and are entertained, often without going more

[2] United States Congress [112th] House of Representatives bill 658, Aerotropolis Act 2011

than 15 minutes from the airport. A dynamic urban complex emerges with multimodal transportation infrastructure (air, highway, rail and links to ports) connecting its businesses and people to markets near and far, undergirding the growing local, regional, national and global significance of the Aerotropolis. For example, so important has air service become to the commercial, financial, tourist, and health services sectors of Dubai, Hong Kong and Singapore that they may be effectively described as aviation hubs with city-states attached. Their remarkable success in capturing global business, via excellent aviation connectivity testifies that it is no longer the big eating the small, but the fast eating the slow.

Aerotropolis planning is unique in that business, urban, airport, and surface transport objectives are addressed as an integrated whole to create economically efficient, attractive and sustainable airport area development. Such integrated planning is required to prevent the chaos, confusion, congestion, and unsightliness often seen at and around many airports, large and small, which detract from their image and that of the city and region they serve.

Experience has proven the value of applying Aerotropolis principles to planning efforts surrounding major airports whose scale and profile of substantial commercial aviation are mostly found in a large set of urban centers. Yet, application of smart, holistic planning concepts that are the foundation of the Aerotropolis model to smaller cities with general aviation airports and their surrounding communities can yield a more integrated approach that challenges the fragmented planning silos typifying less competitive environments. While the specific challenges and opportunities that define smaller-scale potential aerotropolises will differ from those that are centered on major commercial airports, the principles and end goals are the same – achieving an integrated coalition among the airport, its aviation sector, local businesses, nearby municipalities and the broader region that actively recognizes and builds on synergies among their elements to create a more vibrant and sustainable growth economy.

## Aerotropolis Planning Principles

Basic principles that apply to commercial real estate investment and urban planning in general apply to airport city and broader aerotropolis commercial development. Yet, some specific principles are especially germane to strategically planning and developing the aerotropolis.

1. Aerotropolises are not simply major capital investments which must deliver positive financial return over many decades. They are also major "public goods." Therefore, careful long-term planning is called for to ensure maximum value is created for users, investors, nearby communities, and the metropolitan region.
2. Aerotropolis development is part of a broader investment and commercial location system. Aerotropolis planning must be cognizant of the direction of local development and competing facilities in the region. Sites in the path of outward development from the central city will typically benefit while alternative sites in the region may compete with them for commercial facilities investment.
3. Aligning key stakeholders is essential for successful aerotropolis development. Aerotropolis development is a fundamentally collaborative venture among government bodies, landowners, investors, developers, commercial facility end users, and infrastructure and aviation service providers. Therefore, aerotropolis planning needs to understand not only the potential costs and market considerations which may influence the location decisions and facility investments of potential aerotropolis businesses, but also how local government support and investment in their airport may impact business investment and location decisions.
4. Regional economic conditions and real estate market demands shape the development pace and characteristics of each aerotropolis. Since form follows function, both proposed airport-area commercial property planning and greater aerotropolis facility planning should be coordinated and supported by an ever-improving analysis of unmet regional business needs and local real estate demand in order to manage investor risk and to better position aerotropolis

offerings. Aerotropolis planning is not only urban planning; it is also economic planning based on business logic. It has been our experience that airport-area commercial facilities underpinned by solid documentation of market demand usually get funded and prosper. Careful assessments of market conditions, investment risk, and regional competitors are prerequisites all too often overlooked in airport area planning. This issue is a focus of Chapter 4.

5. In the aerotropolis model, the 3A's (accessibility, accessibility, accessibility) is as important as the 3L's (location, location, location) as the pertinent commercial real estate development principle. With time, on the one hand, being cost and, on the other, currency for many aerotropolis businesses, minimizing time-cost access to the airport and other critical metropolitan nodes is a primary objective of efficient aerotropolis planning.

6. Businesses should be steered to locate in proximity to the airport based on their frequency of use of the airport. Airport area goods-processing activities (manufacturing, warehousing, trucking) should be spatially segregated from white-collar business service facilities, leisure and entertainment venues, and airport passenger flows. All noise and emissions-sensitive commercial development should be situated outside main flight paths.

7. Aerotropolis residential communities housing airport area workers and frequent air travelers should be developed that are welcoming, provide a sense of place, and offer on-site or nearby services and urban amenities appealing to modern life-styles. These communities should likewise be built outside of the airport's high-noise contours, but in proximity to aerotropolis job clusters and surface transportation (including public transport) to reduce commute times and costs.

8. Cluster, rather than strip development, should be encouraged along airport surface transportation corridors with sufficient green space between clusters. Firm-based codes should establish general design standards within these clusters and other airport-area buildings, walkways, travel lanes, landscaping, and public space.

9. Aerotropolis development and “smart” urban growth can and should go hand-in-hand. Redensification around airports and planned cluster development outward can be an antidote to sprawl and other haphazard development that detracts from airport area functionality, sustainability, and the image of the city the airport serves.

10. The ultimate success of the aerotropolis rests on the aviation-enabled advantages it provides to firms and the value it brings to cities and their residents. These will be measured primarily in terms of business investment and revenues, aggregate urban wealth, and quality of life generated.

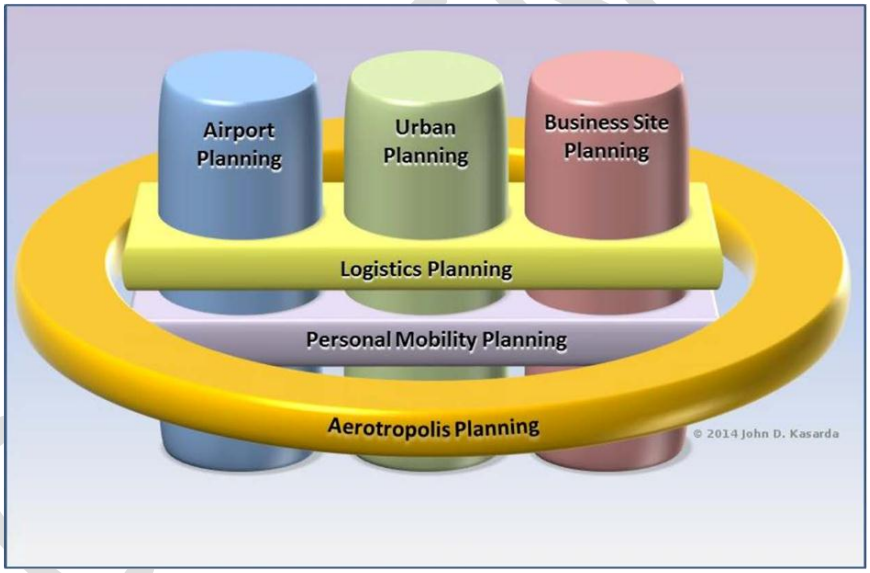
11. A successful aerotropolis will build on evolving economies of speed, scale, and scope in providing benefits to tenants, users, investors, businesses, and the region. Yet, those economies usually only fully exist at or near aerotropolis development maturity. Therefore, planners need to construct development pathways which will generate shorter-term investment returns and continued infrastructure improvements in the earlier stages of airport area commercial property development.

12. Getting the aerotropolis right will require integrating airport planning, urban planning, and business site planning. In absence of such integrated planning, the aerotropolis will not be as economically efficient, attractive, or as environmentally and socially sustainable as it might be.

Building on this last principle for aerotropolis development, success requires that the airport has to be connected in multiple senses to both community and businesses; it has to be an asset - visually, functionally and strategically. Opportunities exist to infuse more energy into major developments underway and pending in Winston-Salem by examining Smith Reynolds Airport in the context of a new, general aviation airport–focused aerotropolis model. Planned investments need to include consideration of the costs and benefits of (1) inside the airport fence, (2) mutually beneficial outside the fence, and (3) last-mile (close to the destination) developments holistically, achieving synergies where few currently exist.

Figure 2 illustrates the idealized golden ring of Aerotropolis planning which crosses (and integrates) airport, urban, and business site planning domains. Aerotropolis planning is unique in that business, urban, airport, and surface transport objectives are addressed together to foster personal and logistics mobility along with economically and socially desirable urban development. Such integrated planning can serve as an antidote to the chaos, congestion, and unsightliness that have resulted from organic, haphazard development around so many airports, detracting from the operational functionality and image of these areas. When a prospect arises to link airport development with other emerging opportunities, such as a Whitaker Park, communities can proactively address the silo-ed (fragmented) efforts that result in sub-optimal results for the airport, aviation-impacted businesses, surrounding municipalities, and the broader region.

**Figure 2**




In August 2017 the Winston-Salem Chamber of Commerce engaged the consultants to assist the Chamber in developing a strategy applying aerotropolis principles in leveraging Smith Reynolds Airport to enhance the city's economic development efforts. In particular, that strategy would address the airport's role as a complementary and reinforcing asset to the Whitaker Park and Innovation Quarter development initiatives.

While it is unlikely that Smith Reynolds Airport will become a commercial airport again, the airport area (including Winston-Salem's development of Whitaker Park) still stands to benefit significantly from implementing a number of aerotropolis principles. The key is to manage development according to a plan that identifies and recognizes the strengths and weaknesses of the airport and its surrounding area and also identifies the appropriate opportunities to leverage the aerotropolis model.

## SECTION 2

## MARKET OPPORTUNITIES AND VALIDATION

### Economic Impact of Aviation and Air Commerce

The United States Federal Aviation Administration (FAA) describes Air Commerce as any commercial activity - foreign Air Commerce, interstate Air Commerce, cargo transportation or operation of aircraft - that takes place within the limits of a Federal airway. It further defines civil aviation as all non-military aviation, both private and commercial, involving either 1) Commercial Aviation engaged in the scheduled air transport of passengers and cargo flights or 2) General aviation including all other civil flights, private or commercial. Regardless of how you describe it – civil aviation, aeronautics, or Air Commerce – the aviation industry is a major source of economic impact in the United States and in North Carolina.

In its September 2017 study, “The Economic Impact of Civil Aviation”, the United States Department of Transportation’s Federal Aviation Administration reported that in 2014, civil aviation accounted for $1.6 trillion in United States economic activity (5.1% of United States GDP) and supported 10.6 million jobs with $446.8 billion in earnings. The same study reported that civil aviation in North Carolina had an economic impact of more than $30 billion (3.5% of the State GDP) creating 200,207 jobs with $7.9 billion in earnings.

Such economic impacts are likely to expand as the upward trends in the national economy further advances the United States aviation industry. Industry-wide passenger traffic grew by 6.3 percent in 2016 and according to the latest International Air Transport Association (IATA) figures, commercial airlines posted their strongest financial performance ever in 2016 — reporting $35.6 billion in net profit, just a bit above 2015 results but nearly double those of 2014. Business jet and other private aircraft orders are rebounding as well, boosting the bottom lines of their manufacturers. Thus, airports of all sizes are benefiting with the national economic recovery and growth of commercial and business aviation. Communities are seeking to capitalize on the aviation sector’s

short-term growth and position themselves to capture new business in the future based on strongly-positive forecasts for both commercial and general aviation which are expected to more than double over the next 15-20 years.

We turn now to discussing Smith Reynolds Airport and its opportunities to be greater leveraged in the local economic context. We then discuss the data, methods and strategies we employ to validate these opportunities. Validations will include benchmarking of Smith Reynolds Airport (and identifying targets of opportunity) against 6 “Peer” airports and the local economies they set up. Interviews with a range of key stakeholders round out our validation process.

## Smith Reynolds Airport

Smith Reynolds Airport is a public airport located three miles northeast of the city of Winston-Salem, North Carolina (Figure 3). It has two runways, and is used primarily for business and general aviation, flight training, and aircraft maintenance services. The

**Figure 3**

airport serves 87 aircraft based there and has approximately 45,000 take-offs and landings (operations) annually. It retains its status as one of only 84 airports (out of 2,954 Public Use Airports) designated by the Federal Aviation Authority (FAA) as a "National" airport in recognition of its role in local providing communities with access to markets throughout the United States.

Historically Smith Reynolds Airport occupied a large role in Winston-Salem's culture and economic history but its current status is that of a modest general aviation airport. For much of its history from its founding in 1927 the airport was a center of civic identity and pride. In its early decades the airport aided the national expansion of many of Winston-Salem's pioneering industrialists, with commercial aviation and private business aircraft commuter flights serving East Coast major cities. By the early 1960s operations at Smith Reynolds Airport had grown to make it the most active airport in North Carolina and among the most active in the nation.

In addition to providing substantial commercial and business aviation services supporting growth of the City's industrial sectors, Smith Reynolds Airport also served as an "incubator" for the development of Piedmont Airlines, a seminal airline in the Southeast United States. Piedmont Airlines was founded in 1940, originally as an airplane repair service and a pilot training school. From its base at Smith Reynolds Airport, Piedmont Airlines evolved into a pioneering provider of passenger flight service in the southeast. Piedmont Airlines eventually grew into a national leader before being acquired in 1989 by USAir. In its decades of hub operation in Winston-Salem, Piedmont Airlines created a legacy of technical and management expertise that seeded the region's aviation industrial cluster. Arguably, without the economic ancestry of Piedmont Airlines there would be no TIMCO/HAECO, Honda Aircraft or B/E Aerospace.

The cessation of commercial passenger service at Smith Reynolds Airport in 2000 has contributed to a gradual diminution of public awareness and perceived value of the airport. Nonetheless the airport continues an important though less visible role as a center of business aviation for a significant amount of corporate jet and large aircraft charter activity. With its proximity to downtown Winston-Salem the airport provides an

effective base of operations for corporate aircraft, air charter services, general aviation, and air cargo. Corporate executives from large and expanding, mid-sized Winston-Salem companies often travel into and out of Smith Reynolds Airport in order to conduct normal business between their home and satellite offices. Officials and group travelers associated with Wake Forest University and Wake Forest Baptist Medical Center make frequent use of private, corporate and charter air services.

Smith Reynolds Airport also continues an important role in aircraft maintenance, repair and overhaul (MRO) operations and a variety of aviation-related industrial and commercial development. The airport's buildings and facilities consist of over 565,000 square feet, with a current occupancy rate of 88 percent.

The airport is in the midst of several current and pending improvements that will enable improved and expanded present-day activities and the initiation of new activities that will increase the airport's value proposition. Runway and terminal ramp improvements are underway and taxiway and hangar expansions are planned. Signature Flight Support, the airport's Fixed Based Operator (FBO) which provides fueling, aviation ground handling and support, aircraft hangars, and passenger services, is planning to relocate into the renovated Main Terminal. This move will enhance pilot and air visitor experience while revitalizing the iconic historic terminal. The relocation will also add available industrial space by repurposing the former Signature facility.

Perhaps the most significant new development is the planned construction and operation of the Forsyth Technical Community College (FTCC) Aviation Center to be located in the airport property on a three-acre, runway-adjacent site. Funded as part of the recent publicly-approved $65 million bond referendum, the FTCC Aviation Center will consist of a 52,000 square foot facility containing classroom and instructional hangar space to train technicians and mechanics for area aviation maintenance and service companies such as North State Aviation, Rockwell Collins (B/E Aerospace), Aero 8 Inc. and Signature Flight Support. The college plans to offer an associate degree in aviation technology at its airport campus and is considering a FAA-certified aviation electronics program that would train people to work on the electronics in

planes. We will propose other potential aviation education and training functions for the FTCC Aviation Center in the final report.

**Smith Reynolds Airport Air Commerce Opportunities**

Winston-Salem has a strong aviation heritage. Aviation has been a source of economic growth through both the development of business directly engaged in aviation industrial activities and through Winston-Salem firms capitalizing on the competitive advantages of business aviation to expand their market reach. For many of these firms - from Reynolds Tobacco to Wachovia Bank to Piedmont Airlines to B/E Aerospace – Smith Reynolds Airport played a pivotal role in their ability to use aviation in their business models. While a number of factors have acted to reduce the community's awareness of the airport, Smith Reynolds Airport remains a unique strategic asset to support another generation of Winston-Salem's next great entrepreneurial companies.

The Smith Reynolds Airport's value to Winston-Salem and Forsyth County has been recognized and acknowledged by city and county leadership. That is demonstrated within the currently adopted "Legacy 2030" comprehensive plan for the City and County, a shared policy document adopted by both the City Council and County Commissioners (and supported by the Chamber). Legacy 2030 states in the chapter on Economic Development that the potential of Smith Reynolds Airport for economic development related to the Aerotroplis concept should be fully explored and activated. The reiteration of this potential in Legacy 2030 as a policy and action agenda element emphasizes that leveraging Smith Reynolds Airport as an economic development asset is a policy priority recognized by both county and city elected bodies. Such agreement is a foundation for action to be capitalized upon in implementing an Air Commerce strategy.

The Smith Reynolds Airport area has many advantages that could be capitalized upon to foster greater local economic development. Its facilities are already well suited for general aviation, business aircraft maintenance, repair and overhaul (MRO) and a variety of aviation-related industrial and commercial functions. The nearby Whitaker Park offers development opportunities for a broad industry spectrum of corporate and

entrepreneurial initiatives, including those targeted to next-generation, high-growth firms. The capable efforts already underway for the repurposing of Whitaker Park can only benefit from a synergistic strategy capitalizing on the advantages offered by its proximity to Smith Reynolds Airport.

But it is even more significant that both Smith Reynolds Airport and Whitaker Park are located minutes away from downtown Winston-Salem, North Carolina. Ranked by Forbes Magazine as the 18th best place in United States for business, Winston-Salem is a fertile mixture of economic maturity and entrepreneurial modernity. Its communities offer the infrastructure, skilled labor force, and business services essential to companies varying in age, size and industry sector. Equally important, the Winston-Salem area offers rich educational, residential and cultural amenities that attract and sustain innovative entrepreneurial firms and their educated professionals.

The value of this combination is demonstrated by the success of the Innovation Quarter and the emergence of a dynamic life sciences research and industrial economy in Winston-Salem leveraged by Wake Forest University's medical school and associated bioscience departments. A parallel opportunity exists to capitalize on Smith Reynolds-Whitaker Park strategies to generate additional business, industrial and commercial growth building on the Innovation Quarter precedent. Specifying and leveraging potential synergies to attract aviation-oriented industries and advanced business services can markedly expand economic benefits, such as those achieved through the Innovation Quarter.

**Market-Truthing the Smith Reynolds Airport Air Commerce Opportunity**

In economic development strategy the best evidence of the possible is the existence of the actual. Therefore a foundation for this project was the establishment of a clear identification and description of the Winston-Salem economic sectors that have demonstrated the competitive advantages conveyed by the aviation-related capabilities enabled by the Smith Reynolds Airport. A lack of awareness of the pervasive role of aviation can often lead to an under-estimation of the economic development value of

aviation resources. However the Winston-Salem area is already home to significant populations of firms in aviation-related and Air Commerce-dependent industry clusters that clearly demonstrate the area's aviation value proposition.

Emphasis was placed on the development of a comprehensive analysis that included not only the conventionally-defined aviation manufacturing and business services industry clusters but also captures the broad array of firms frequently treated as outside the mainstream aviation sectors – such as the life sciences - for which business aviation is critical to the execution of their growth strategies.

Two primary categories for Winston-Salem Air Commerce economic development opportunities were identified as the base for study investigation and market validation:

1. Aviation Industry Cluster Firms are those businesses engaged in the network of input-output activities that constitute an Aviation Industry Cluster. These include firms directly involved in the production of aircraft and the provision of air transportation as well as the variety of maintenance, suppliers, logistics and distribution companies, training establishments, and hundreds of other related businesses that support aviation.

2. Business Aviation-Enabled Firms are businesses from across a variety of industries that capitalize on air transportation "economies of speed" as a competitive advantage. These firms often use business aviation and commercial aviation to efficiently deploy/employ people and goods to targeted high-value markets.

Any economic development opportunity, however promising it appears, should be thoroughly vetted and validated prior to – and as a means of – mobilizing public and private support that would be required to develop and implement appropriate strategies. In the case of the opportunity to leverage Smith Reynolds Airport to promote Air Commerce this "market-truthing" process required engaging the founders, owners and management of aviation businesses themselves to validate Winston-Salem's and the region's existing/prospective aero-economic assets, identify the actions required to

further enhance those assets to market readiness, and identify the industry sectors and representative firms most likely to appreciate their potential to start, locate and grow in Winston-Salem.

**Methodology**

Aerotropolis Business Concepts employed a rigorous, granular market-articulated approach to assessing economic growth potential and designing economic development strategies. Methodology employed in this project utilizes a bottom-up additive analysis wherein each phase of the research is designed to inform and direct the subsequent research. This process ensures that the research will deliver evidence-based, actionable economic development results.

Successful Air Commerce development relies on informed market-articulated development strategies. Therefore, this phase of the study captured insights on Winston-Salem's perceived aero-industry strengths, weaknesses, and development priorities through direct market interrogation with regional and national industry leaders and researchers.

This process involved a combination of literature research, individual executive interviews and small group interactions to access a representative cross-section of the Air Commerce population. Participant responses elaborated on the findings of the preceding economic scan and cluster analysis by highlighting both personal and business perspectives influencing their location decisions and their experience with Smith Reynolds Airport.

Contrasting market-defined priorities with the current resource inventory delineates the Piedmont region's, Winston-Salem's, and Smith Reynolds Airport's competitive advantages while revealing the highest leverage enhancement options. These findings will provide the foundation for a regional, city, and Smith Reynolds Airport aero-industry development strategy design encompassing a range of factors.

Regional cluster information was combined with the market-defined priorities to construct a “Virtual Portfolio” of achievable business attraction outcomes. By presenting representative business examples this Virtual Portfolio provided a substantive basis to demonstrate resource requirements and potential economic impacts.

**The United States Aviation Industry**

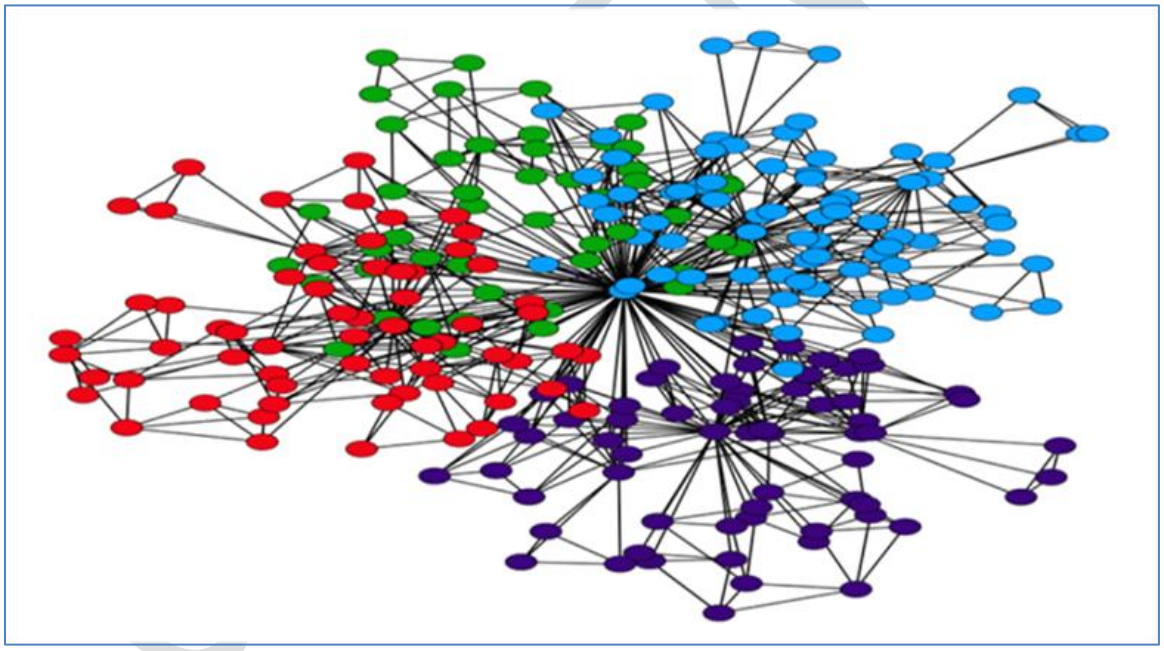
The Aviation Industry in the United States is multi-faceted and can be defined in many ways. Perceptions of the industry’s status are dominated by the fortunes of the highly visible Commercial Airlines sector. From that limited perspective the United States Aviation Industry is in the midst of a strong growth cycle. Industry-wide passenger traffic grew by 6.3 percent in 2016 and according to the latest International Air Transport Association (IATA) figures, commercial airlines posted their strongest financial performance ever in 2016 — reporting $35.6 billion in net profit, just a bit above 2015 results but nearly double those of 2014.

Recent positive assessments of the status and prospects of the United States’ Aviation Industry are encouraging to economic developers with aspirations to grow aviation-related activities in their communities. Unfortunately national aviation statistics yield little in the way of actionable insights to inform regional Air Commerce economic development strategies.

## The United States Aviation Industry though a Cluster Lens

Looking at the industry through an “Industry Cluster” analytical lens provides a more precise examination. An industry cluster is a regional concentration of related industries in a particular location. They consist of companies, suppliers, and service providers, as well as government agencies and other institutions that provide specialized training and education, information, research, and technical support (Figure 4). Clusters enhance productivity and spur innovation by bringing together technology, information, specialized talent, competing companies, academic institution, and other organizations. Close proximity, and the accompanying tight linkages, yield better market insights, more refined researches agendas, larger pools of specialized talent, and faster deployment of new knowledge.

**Figure 4**



Clusters exist where the economic activities in a set of related industries in a given location reach critical mass. It is at this point that local linkages begin to have a meaningful impact on the performance of companies, and that important opportunities for local collaboration among firms and other organizations in the relevant fields arise. Clusters emerge naturally in the market process, providing productivity benefits to

companies as they grow in size. They become attractive to companies looking for a new location and grow through the performance of companies already located there.

Economic development can both capitalize on and accelerate the process of cluster formation by enhancing the availability of a particular cluster's requisite resources and making access to those resources as efficient as possible. Effective economic development strategies require a thorough understanding of the status of the targeted regional industry cluster. That status is most relevantly assessed as it is revealed through market behavior at the establishment level through the location and expansion decisions made by the founders and management of the individual companies that constitute a regional industry cluster. This "establishment-level" analytical approach further informs regional economic planning by more clearly differentiating those sectors of an industry cluster that are both conspicuously present and absent in a community relative to the United State and to that community's economically comparable regions. Such comparisons can delineate a community's competitive advantages as recognized by the private enterprise market.

**The United States Aviation Industry Cluster**

The Aviation Industry Cluster definition used consisted of 60 Standard Industrial Classification (SIC) sectors that comprehensively captured the relevant range of inter-linked industrial and commercial aviation activities engaged in Air Commerce. (Figure 5) The Standard Industrial Classification is a system for classifying industries established in the United States in 1937. The numbers of digits used – ranging from 2 to 6 digits – are used to increasingly differentiate industry within a given sector. The Aviation Industry Cluster used was based on 6-digit SIC to more precisely isolate aviation-specific activities from other similar industries. Most businesses' activities would encompass a range of different classifications. Because companies are required self-identify the classification most descriptive of their primary activity, the more clearly aviation-delineated codes used in the SIC system was used in preference to the alternative North American Industry Classification System (NAICS).

Multiple public and proprietary corporate information sources were used to construct a national-level database of companies constituting representative cross sections of the identified Aviation Industry Cluster sectors. Information from the database was used to develop demographic profiles of the firms to delineate critical economic development location factors including ownership status, employment, facility scale; and location.

Analysis of the national database described a United States Aviation Industry Cluster consisting of 26,919 establishments as of the date of the database construction in October 2017. An “establishment” or firm is defined as an economic unit that produces and/or sells goods or services, and operates from a single physical location. Therefore, for a company that has several such locations, each of those individual locations is termed an establishment or firm. The dynamic nature of business activity results in a constantly changing number of establishments in any industry cluster.

**Figure 5**

| US Aviation Industry Cluster Sectors and Firms | | |
|---|---|---|
| SIC | **SECTOR DESCRIPTION** | **# FIRMS** |
| 372101 | Aircraft-Manufacturers | 422 |
| 372102 | Aircraft Interior Redesigning (Mfrs) | 21 |
| 372103 | Aircraft/Aircraft Equip Testing (Mfrs) | 30 |
| 372106 | Gliders (Mfrs) | 22 |
| 372107 | Aircraft Designing (Mfrs) | 12 |
| 372401 | Aircraft Engines to Manufacturers | 13 |
| 372402 | Aircraft Tooling (Mfrs) | 2 |
| 372403 | Jet Propulsion Equipment (Mfrs) | 9 |
| 372498 | Aircraft Engines & Engine Parts to Mfrs | 172 |
| 372801 | Aircraft Components to Manufacturers | 596 |
| 372802 | Aircraft Equipment Mfrs | 204 |
| 372803 | Aircraft Machine Work (Mfrs) | 8 |
| 372804 | Aircraft Ground Support & Svc Equip to Mfrs | 11 |
| 372805 | Aircraft Modifications (Mfrs) | 9 |
| 372806 | Aircraft Parts to Assemblers (Mfrs) | 16 |
| 372807 | Aircraft Flight Training Equip (Mfrs) | 24 |
| 372809 | Aircraft Research & Development (Mfrs) | 7 |
| 372814 | Aircraft Industrial Fasteners (Mfrs) | 5 |
| 381201 | Aerospace Industries (Mfrs) | 2,231 |
| 451201 | Airline Companies | 1,844 |
| 451202 | Air Cargo Service | 2,702 |
| 452206 | Airplane Rides | 12 |
| 458101 | Aircraft Ground Support & Service Equip | 169 |
| 458102 | Aircraft Engines to Servicing & Maintenance | 71 |
| 458103 | Aircraft Ferrying & Transporting Svc | 18 |
| 458104 | Aircraft Servicing & Maintenance | 2,926 |
| 458105 | Aircraft Storage | 76 |
| 458106 | Airports | 5,677 |
| 458107 | Aircraft Upholsterers | 33 |
| 458108 | Helicopter to Servicing & Maintenance | 32 |
| 458109 | Air Traffic Control Tower | 47 |
| 458110 | Aircraft Refinishing & Painting | 39 |
| 458111 | Airline Support Services | 452 |
| 458112 | Aircraft Hangars to Rental & Sales | 48 |
| 458114 | Aircraft Support Services | 24 |
| 458116 | Aircraft to Restore & Customize | 7 |
| 472901 | Airline Ticket Agencies | 320 |
| 508809 | Aircraft Parts to Reclaiming (Whls) | 6 |
| 508814 | Aircraft Brokers (Whls) | 136 |
| 508817 | Aircraft Avionics to Sales & Service (Whls) | 257 |
| 508819 | Aircraft Engines (Whls) | 49 |
| 517223 | Aviation Fuel (Whls) | 121 |
| 559905 | Aircraft-Dealers | 2,457 |
| 559907 | Hang Gliders | 83 |
| 559908 | Aircraft Equipment Parts & Supplies | 1,768 |
| 559912 | Aeronautical Supplies | 10 |
| 594523 | Airplanes to Model | 18 |
| 731903 | Advertising to Aerial | 110 |
| 733509 | Aerial Patrol & Inspection Service | 5 |
| 735939 | Aircraft Charter Rental & Leasing Svc | 1,626 |
| 762214 | Aircraft Radio Servicing | 16 |
| 769994 | Propellers-Repairing | 16 |
| 829917 | Aircraft Schools | 976 |
| 829943 | Flight Aircraft Instruction | 261 |
| 871185 | Aviation Engineers | 14 |
| 874109 | Aircraft Management Services | 48 |
| 874402 | Aerospace Support Services to Technical | 61 |
| 874822 | Aviation Consultants | 555 |
| 899944 | Air Flight Attendants | 5 |
| 962108 | Aircraft Inspection | 10 |
| | **TOTAL FIRM POPULATION** | **26,919** |

## United States Aviation Industry Cluster Firms Characterization

Economic discussions of industries – whether aviation, automotive, finance, or information technology - often refer to the subject industry monolithically without recognizing the variations and dichotomies that pervade all industries. Industry Cluster Analysis is an especially useful tool in disaggregating the multiplicity of activities with disparate resources and location issues critical to effective economic development strategy design. Cluster analysis of the United States Aviation Industry provided the foundation for understanding the best strategies available for leveraging the economic potential of the Smith Reynolds Airport.

US Aviation Industry Cluster Firm Activity Distribution

As reflected in Figure 5, activity by aviation establishments is distributed widely but unevenly across the constituent sectors of the Aviation Industry Cluster. The 60 constituent Aviation Industry Cluster sectors vary widely in their specificity and therefore drawing conclusions about industry composition from the share of firms in any given sector is problematic. The number of establishments range from the largest number of 5,677 in the Airports sector (SIC 458106) to as few as 2 establishments in the Aircraft Tooling sector (SIC 372402).

It is nonetheless apparent that the distribution of the aviation industry establishments is relatively concentrated in a small set of industry cluster sectors. The ten largest sectors constitute 22,803 establishments or 85 percent of the Aviation Industry Cluster establishment population (Figure 6). Such concentration can reasonably be interpreted to indicate that certain sets of activities are essential and fundamental to the vitality of any region's Air Commerce economy.

**Figure 6**

| 10 Largest US Aviation Cluster Sectors | # Firms | % Firms |
|---|---|---|
| **1. Airports** | 4,716 | 18.5% |
| **2. Aircraft Servicing & Maintenance** | 2,964 | 11.6% |
| **3. Aircraft to Dealers** | 2,613 | 10.2% |
| **4. Aerospace Industries Manufacturers** | 2,308 | 9.0% |
| **5. Airline Companies** | 1,896 | 7.4% |
| **6. Aircraft Equipment Parts & Supplies** | 1,778 | 7.0% |
| **7. Aircraft Charter Rental & Leasing Svc** | 1,651 | 6.5% |
| **8. Aerial Applicators** | 1,156 | 4.5% |
| **9. Aircraft Schools** | 1,008 | 3.9% |
| **10. Aircraft Components to Manufacturers** | 600 | 2.3% |
| ***Other 50 Cluster Sectors*** | *4,116* | *15.0%* |

US Aviation Industry Cluster Firms Size Distribution

Public perceptions of the United States Aviation Industry are dominated by the heavily promoted brands – Delta, American, United, Boeing, Lockheed Martin – of United States.-based global airlines and aerospace companies. These enormous companies with their tens of thousands of employees at dozens of subsidiaries and branch locations account for a large share of the jobs and revenues generated by the United States Aviation Industry. But in economic development it is critical to recognize that these firms are the exceptions, not the norm. In reality the vast majority of United States Aviation Industry Cluster firms, and therefore the most likely prospects in an Air Commerce economic development strategy, differ dramatically from the aviation industry's most iconic companies.

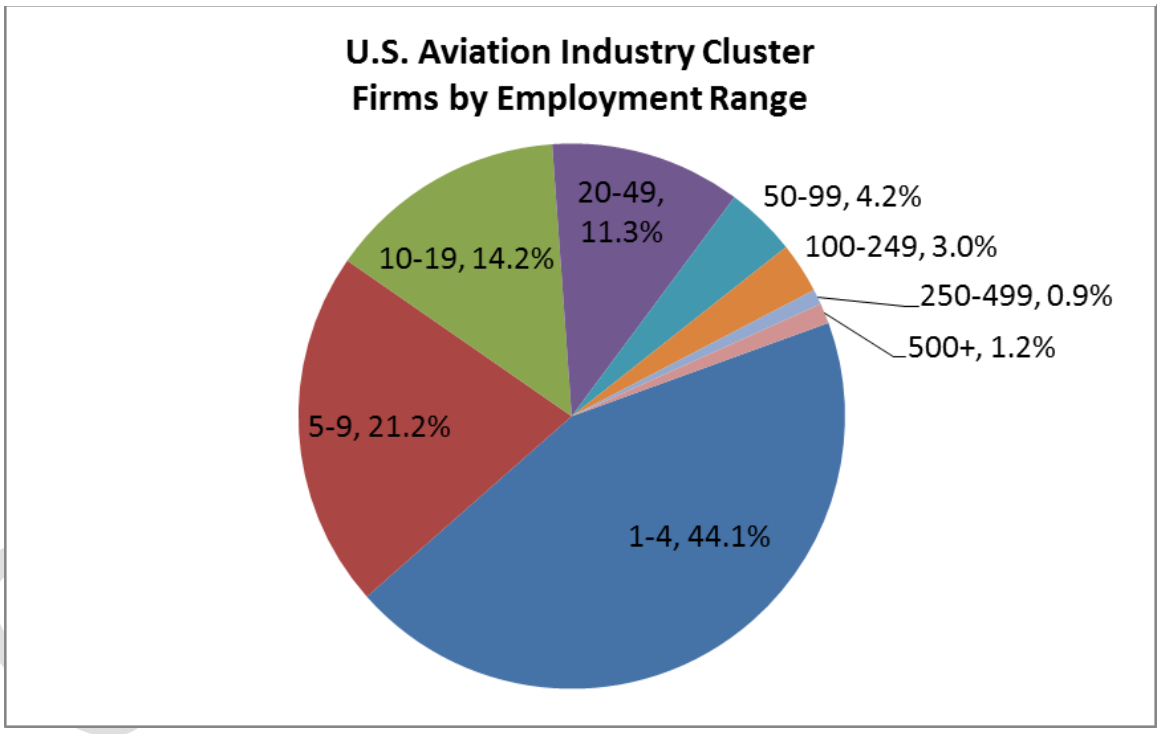
Employment

The dichotomy between public perception and reality is clear in the distribution of Aviation Industry Cluster firms by employment size and revenues. In contrast to the public image, the Aviation Industry Cluster firm population parallels that of the United States economy in general in being overwhelming small businesses. The largest share (44%) of United States Aviation Industry Cluster firms employ fewer

than 5 people and nearly two-thirds (65.2%) of the industry has fewer than 10 employees (Figure 7).

Firms in this size range are generally not the targets of conventional economic development strategies which require larger individual firm economic impacts to justify the time and effort required for successful outcomes. But the dominance of smaller firms should not obscure the sizable population of Aviation Industry Cluster firms whose larger impacts validate them as significant Air Commerce economic development prospects. There are nearly 6,000 aviation firms employing more than 50 people, 1,300+ employing more than 100 people, and 540 with more than 250 employees.

**Figure 7**

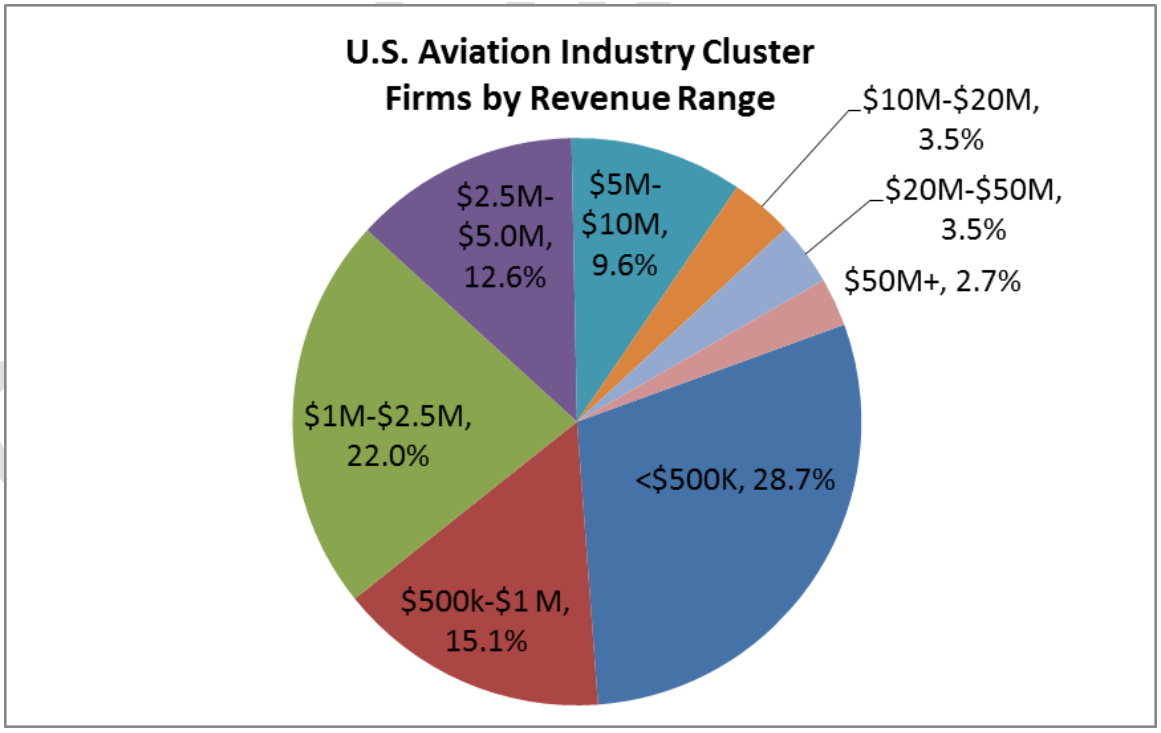


Revenues

The revenues of United States Aviation Industry Cluster firms exhibit a similar population skewing toward smaller firms while still representing a large cohort of high-impact prospects. The higher value-added nature of the Aviation Industry is reflected in the larger share of firms in the high end of annual revenues (Figure 8). Over a third (34.3%) of the Aviation Industry Cluster firm population reports annual revenues greater than $2.5 Million – a revenue level attained by less than 5 percent of all United States businesses.

There are 700 aviation firms with annual revenues exceeding $50 Million. This distribution indicates an industry encompassing a differentiated, disproportionately high-impact pool of prospects constituting substantial economic development opportunities.

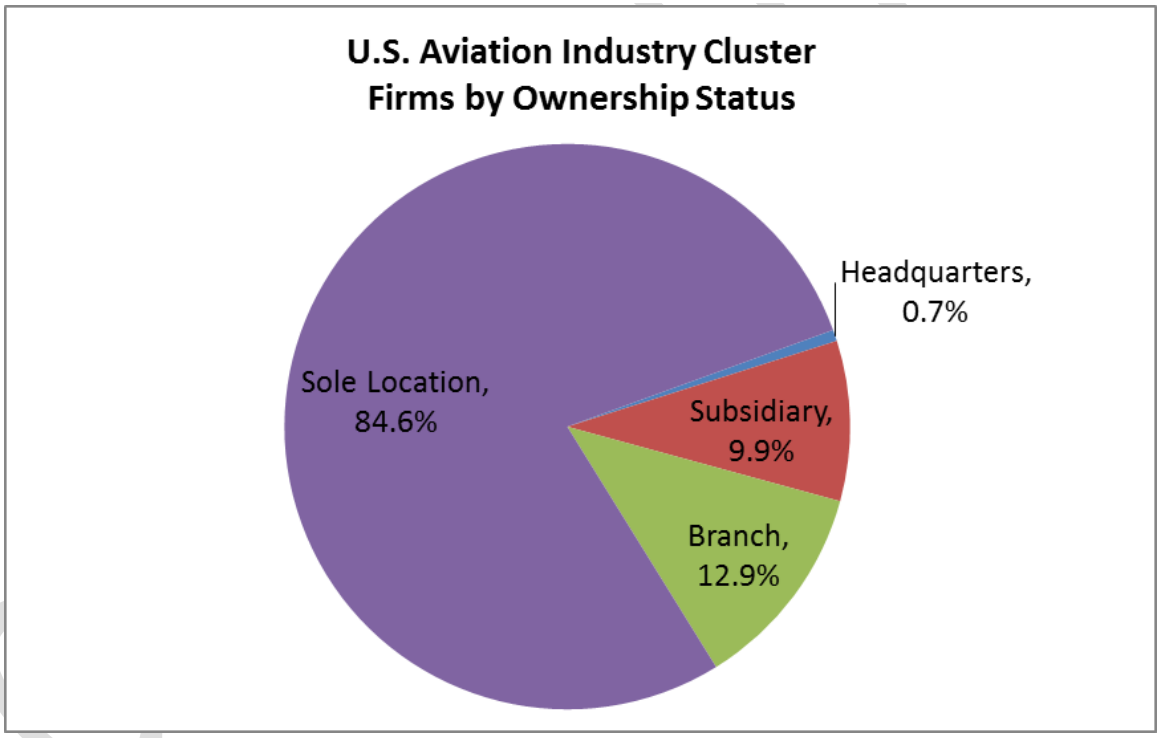
**Figure 8**



US Aviation Industry Cluster Firms Ownership

A critical consideration in economic development is accessing and influencing the executives involved in location and expansion decisions. Therefore it is important to understand the ownership structure of the targeted industries. A company considering the location of a branch or subsidiary operation will be concerned about the operational advantages of a candidate location. For company executives who are themselves the owners of the relocating business they will also be concerned - perhaps chiefly concerned – with the quality of life for themselves and their families of a potential relocation community.

**Figure 9**




For the Aviation Industry Cluster the vast majority of all firms are either Headquarters or Sole Locations. Headquarters are defined as firms that serve as the administrative base for companies with multiple additional locations of either Subsidiary firms or Branch operations. As such their resident personnel include company founders, presidents, CEOs and other executives. Similarly Sole

Locations designate those firms that are entirely based at a single site and consist of both executive management and operational personnel.

In the population of Aviation Industry Cluster firms more than 85 percent of firms (Figure 9) are either Headquarters or Sole Locations. In either category, because their personnel include leading executives and decision-makers, company location decisions will likely involve combinations of personal and business considerations. These situations can advantage those communities, such as Winston-Salem, that offer both competitive business climates and attractive executive residency attributes.

Airports and Aviation Industry Cluster Firms Geographic Distribution

The locations of 26,919 Aviation Industry Cluster firms were identified to analyze establishment siting factors. Firm site locations distribution was compared with the locations of airports to assess an expected correspondent relationship between aviation infrastructure and aviation industry activity. This analysis found a concentration of aviation activity that mirrored concentrations of the industry by other parameters. The population of Aviation Industry Cluster firms was found to be geographically agglomerated relatively, but not absolutely consistently, with the presence of airports.

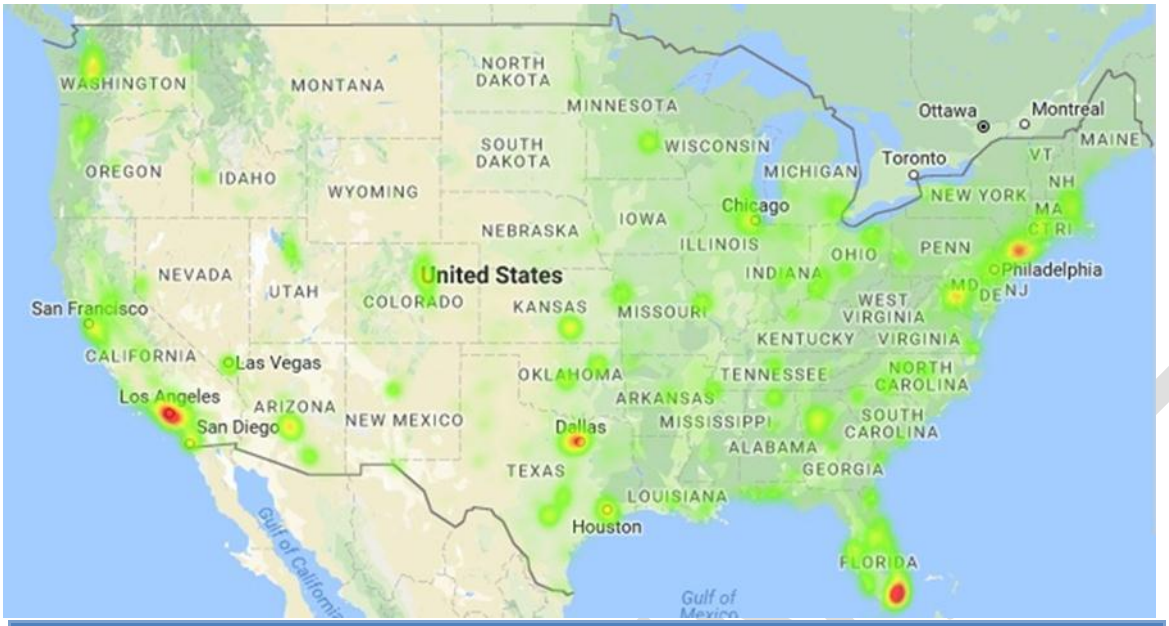
The population of the U.S.'s 26,919 Aviation Industry Cluster firms was found to be highly concentrated in a relatively few geographic areas. The top-ten states for Aviation Industry Cluster firms (Figure 10) are the location of 13,301 or essentially half (49.5%) of all cluster firms. The top three states alone - California with 3,285 firms (1st), Florida with 2,663 firms (2nd) and Texas with 2,230 firms (3rd) – accounted for nearly a third (30.4%) of all Aviation Industry Cluster firms. Despite having the 9th largest GDP among states, North Carolina's 523 firms ranked 15th.

Given the centrality of airports to aviation activity one would reasonably expect that the geographic concentration of Aviation Industry Cluster firms was a function of the

locations of airports themselves. Airports (SIC 458106) constitute the largest sector of the Aviation Industry Cluster with 4,716 airports of widely varying types, scales and locations being widely dispersed throughout the United States.

Airports inherently play crucial roles in the location and type of aviation economic activity with those roles being as highly varied as the tremendous variation in scale and activity among the airports themselves. That diversity is reflected in the United States Department of Transportation's Federal Aviation Administration formal classification of airports by type and function:

**Figure 10**




| 10 Largest US Aviation Cluster States | # Firms | % Firms |
|---|---|---|
| **1. California** | 3,285 | 12.2% |
| **2. Florida** | 2,663 | 9.9% |
| **3. Texas** | 2,230 | 8.3% |
| **4. New York** | 931 | 3.5% |
| **5. Washington** | 820 | 3.0% |
| **6. Georgia** | 716 | 2.7% |
| **7. Arizona** | 701 | 2.6% |
| **8. Alaska** | 688 | 2.6% |
| **9. Colorado** | 637 | 2.4% |
| **10. Ohio** | 630 | 2.3% |
| ***15. North Carolina*** | *523* | *1.9%* |

**FAA Definition of Airport Categories**

- Commercial Service Airports are publicly owned airports that have at least 2,500 annual passenger boardings and scheduled passenger service. This category is further differentiated into 1) Nonprimary Commercial Service Airports with 2,500 to 10,000 passenger boardings each year and 2) Primary Airports with more than 10,000 passenger boardings annually.

- Cargo Service Airports are airports that, in addition to any other air transportation services that may be available, are served by aircraft providing air transportation of only cargo with a total annual landed weight of more than 100 million pounds. An airport may be both a commercial service and a cargo service airport.

- Reliever Airports are airports designated by the FAA to relieve congestion at Commercial Service Airports and to provide improved general aviation access to the overall community.

- General Aviation Airports are public-use airports that do not have scheduled service or have less than 2,500 annual passenger boardings. Approximately 88 percent of airports are classified as General Aviation.

Smith Reynolds Airport, like the great majority of United States airports - nearly 3,000 - is classified as a General Aviation (GA) Airport. The FAA further differentiates General Aviation Airports into five categories that differentiate the diverse functions and economic contributions GA airports make to their communities and the Nation. The highest of these levels is the designation of a National Airport as being one that supports the national and state system by providing communities with access to national and international markets in multiple states and throughout the United States. Smith Reynolds Airport is categorized as a National Airport, one of only 84 such National airports in the United States.

**Distribution of United States Aviation Infrastructure and Economic Activity**

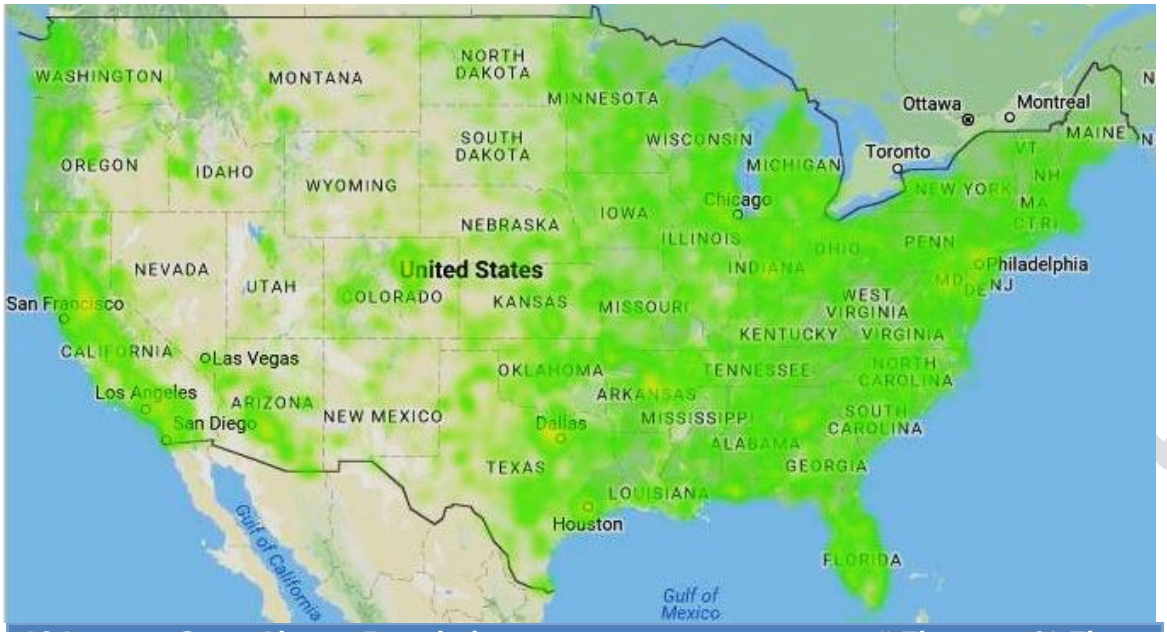
A map of all United States airports (Figure 11) shows the highly dispersed distribution pattern of their locations. A more precise analysis of the distribution of airports reveals that the top ten states for Aviation Industry Cluster firms account for the location of 1,814, or slightly more than a third (38%), of all airports. The top three states – California with 343 airports (1st), Texas with 246 airports (2nd), and Alaska with 211 airports (3rd) – accounted for only 17 percent of all airports. North Carolina's 121 airports ranked it 14th among states.

While this is a significant concentration it is actually less than the aggregate of these top ten states' Gross Domestic Products (GDP), suggesting that the locations of airports are not inherently a function of economic activity and population, but can also be a reflection – as with Alaska – of population dispersion and geographic expanse necessitating air transportation and commerce.

The greater geographic concentration of Aviation Industry Cluster firms compared to the geographic distribution of airport infrastructure suggests that a broad and varied range of location factors affect siting decisions that affect the development of an Air Commerce economy. While such development may be anchored by the presence of an active airport, the existence of an airport is only a necessary – not a sufficient – condition for attracting a robust, dense Aviation Industry Cluster of firms.

The operation of any airport itself involves inherently activities and employment yielding inevitable, though perhaps minimal, economic effects within its host region. The greater concentration of Aviation Industry Cluster firms around some airports indicates that other factors determine the extent to which any airport contributes to its regional economy.

**Figure 11**

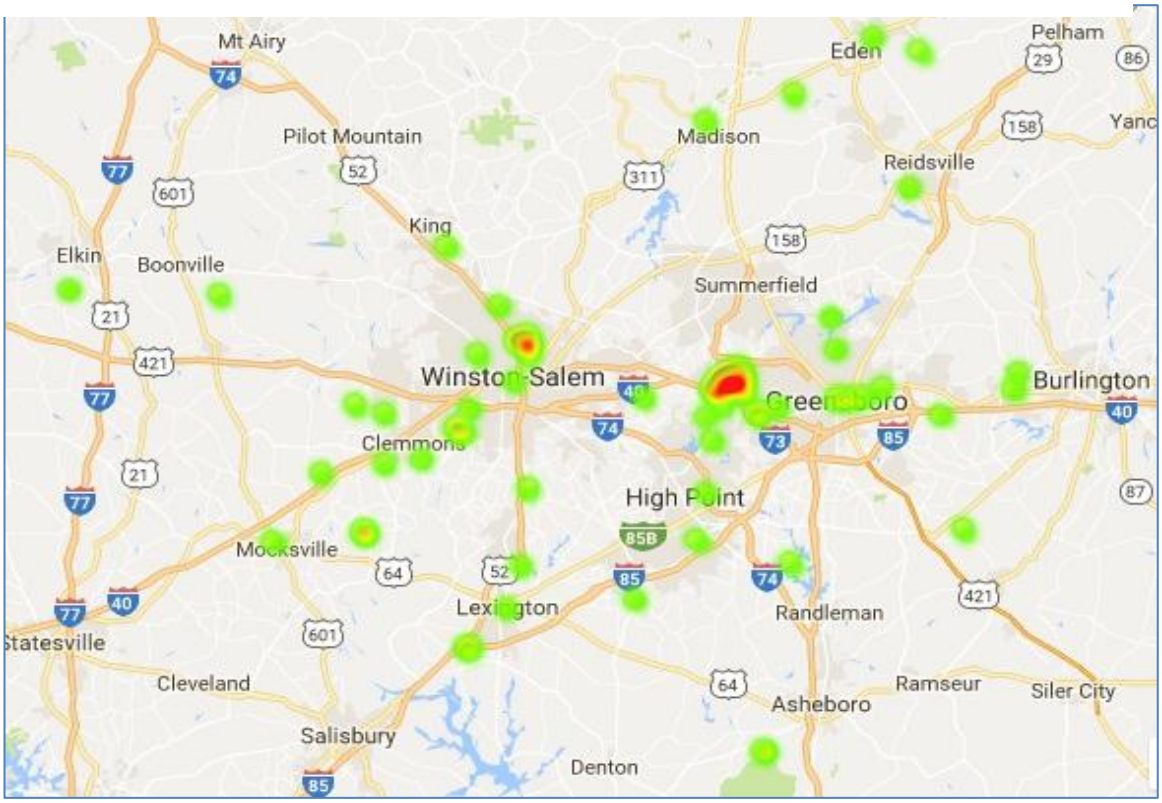



| 10 Largest State Airport Populations | # Firms | % Firms |
|---|---|---|
| **1. Texas** | 247 | 5.2% |
| **2. California** | 343 | 7.3% |
| **3. Alaska** | 211 | 4.5% |
| **4. Florida** | 169 | 3.6% |
| **5. Minnesota** | 151 | 3.2% |
| **6. Michigan** | 146 | 3.1% |
| **7. Ohio** | 146 | 3.1% |
| **8. Arkansas** | 141 | 3.0% |
| **9. Pennsylvania** | 131 | 2.8% |
| **10. Indiana** | 129 | 2.7% |
| ***14. North Carolina*** | 121 | 2.6% |

## Winston-Salem and the Piedmont Triad Regional Aviation Cluster

The United States Aviation Industry Cluster dataset was used to derive comparative analysis subset populations of Aviation Cluster firms for the Winston-Salem MSA/Greensboro MSA Metropolitan Combined Statistical Area (CSA) – known as the Piedmont Triad Region. The population of Aviation Cluster firms in Winston-Salem and the Piedmont Triad area was compared to the national and regional firm populations to assess the area's distinguishing characteristics and relative regional strengths. This comparison shows that while the aviation industry has a strong presence across the Piedmont Triad the population of establishments that constitute the region's Aviation Cluster is relatively undiversified and is lacking in breadth and depth.

**Figure 12**



## Aviation - A Billion Dollar Impact in the Piedmont Triad

Aviation is a $1 Billion industry with economic impacts occurring throughout the Piedmont Triad economy (Figure 12). The region is home to 90 Aviation Cluster establishments employing nearly 8,000 people. Collectively these firms occupy over 5 million square feet of facilities and generate over $980 million in annual revenues.

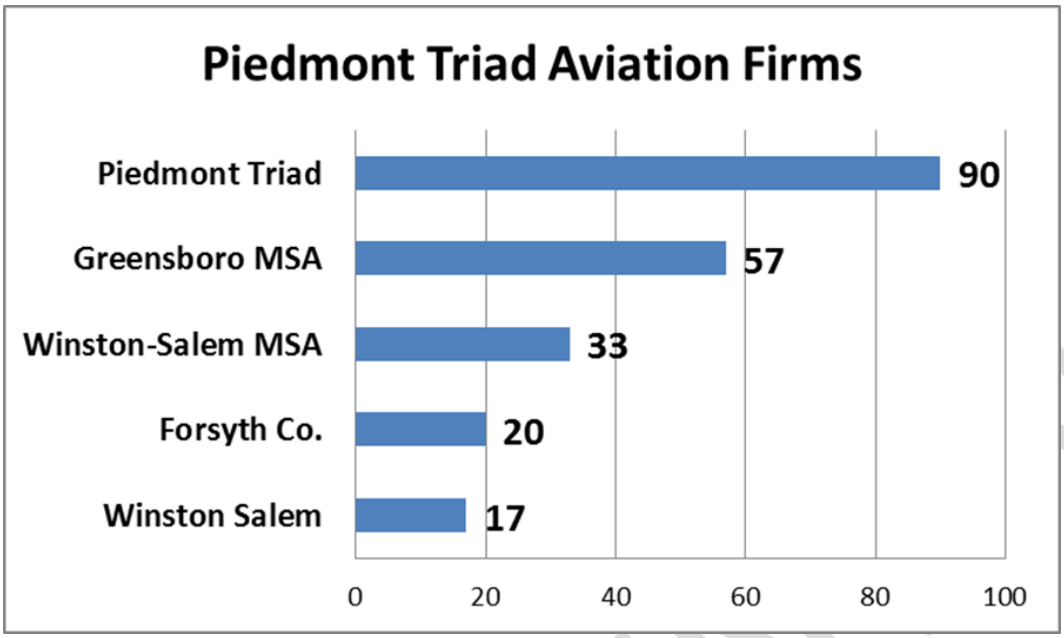
**Figure 12**

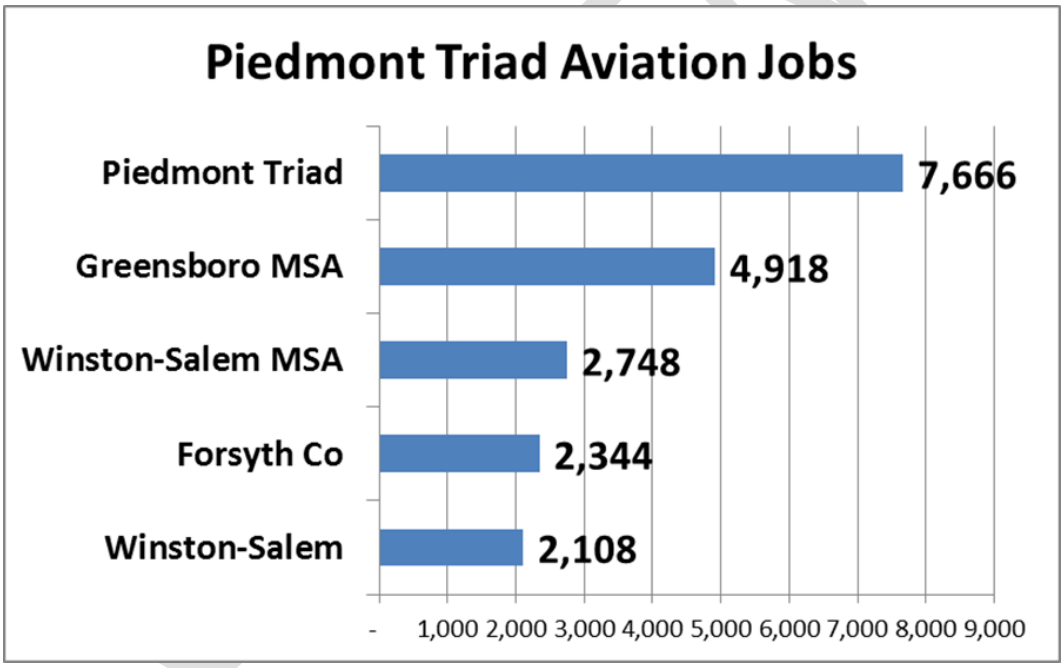
| Piedmont Triad Regional Aviation Cluster | |
|---|---|
| **Establishments** | 90 |
| **Employment** | 7,666 |
| **Facilities** | 5,013,000 square feet |
| **Revenues** | $980,973,000 |

The economic impact of the aviation industry occurs across the Piedmont Triad region almost – but not quite – proportionately with the region's population distribution (Figure #13). The Greensboro MSA, with 53 percent of the region's population is home to 63 percent (57) of the region's aviation establishments and 64 percent (4,918) of its aviation jobs. The Winston-Salem MSA, with 47 percent of the Piedmont Triad's population, accounts for 37 percent (33) of the aviation firms and 36 percent (2,748).

While less than that accruing to the Greensboro MSA, the economic impact of aviation in Forsyth County and the City of Winston-Salem remains substantial (Figure 13). The 20 aviation establishments in Forsyth County employ 2,344 workers. Of these, the 17 firms located in the City of Winston-Salem employ 2,108 people.

**Figure 13**


Piedmont Triad Aviation Firms
Piedmont Triad
Greensboro MSA
Winston-Salem MSA
Forsyth Co.
Winston Salem
90
57
33
20
17
0
20
40
60
80
100


Piedmont Triad Aviation Jobs
Piedmont Triad
Greensboro MSA
Winston-Salem MSA
Forsyth Co
Winston-Salem
7,666
4,918
2,748
2,344
2,108
-
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000

## Piedmont Triad Aviation Industry Cluster Firms Characterization

The 90 firms that constitute the Piedmont Triad Aviation Industry Cluster can be compared to the United States population to characterize them relative to their peer firms. This comparison found that the distribution of the Piedmont Triad region's Aviation Industry Cluster firm population is skewed toward larger firms relative to the overall United States aviation industry. As a result, most of the region's economic impact from aviation is derived from a relative handful of larger firms and the role of smaller firms is diminished. Most conspicuously, this comparison revealed that the Piedmont Triad's aviation industry is concentrated within a comparatively few of the 60 sectors that constitute the United States Aviation Industry Cluster.

### Aviation Firm Size

A comparison of United States and Piedmont Triad Aviation Industry Cluster firms by share of employment range found that the Piedmont Triad has fewer, smaller aviation firms and more, larger firms than the overall United States aviation industry (Figure 14). While the small size of the Piedmont Triad firm population makes comparisons subject to high volatility, the difference is potentially significant in its implications for Air Commerce economic development strategy design. In the United States more than two-thirds (66%) of aviation-related firms employ fewer than 10 workers (Figure 14). In the Piedmont Triad Aviation Industry Cluster only 50 percent of firms have fewer than 10 employees.

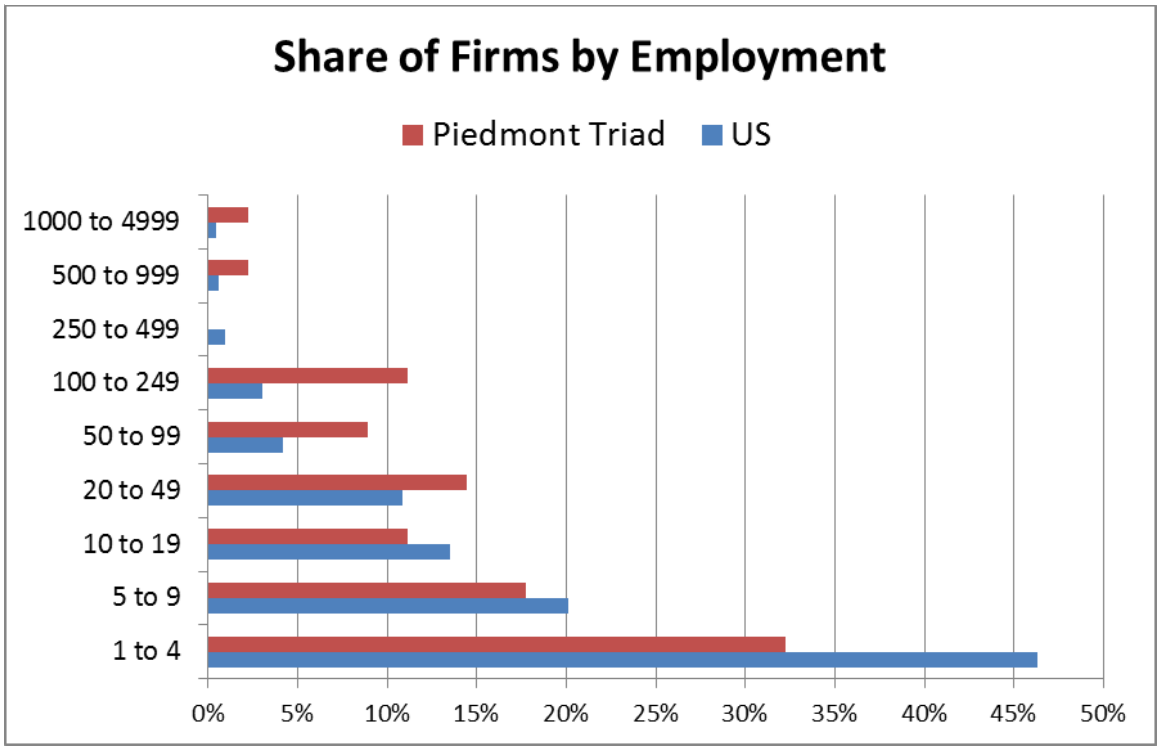
Conversely, in the United States firms with more than 50 workers are only 9 percent of the Aviation Industry Cluster firm population whereas in the Piedmont Triad 22 percent of its Aviation Industry Cluster firms have more than 50 employees (Figure 15). This skewing toward larger firms in the Piedmont Triad population may be indicative of competitive advantages upon which to capitalize in attracting additional larger Aviation Industry firms to the region. But it can equally - and given the comparatively low number of aviation-related firms in the region – can perhaps more plausibly be explained as a relative scarcity of new entry via entrepreneurship or in-migration of the smaller firms

that provide local supplier and specialized services that are essential to a robust industry cluster.

**Figure 14**

| | United States | | Piedmont Triad | |
|---|---|---|---|---|
| **Employment** | #Firms | %Firms | #Firms | %Firms |
| **1 to 4** | 11,999 | 46% | 29 | 32% |
| **5 to 9** | 5,219 | 20% | 16 | 18% |
| **10 to 19** | 3,501 | 14% | 10 | 11% |
| **20 to 49** | 2,818 | 11% | 13 | 14% |
| **50 to 99** | 1,075 | 4% | 8 | 9% |
| **100 to 249** | 780 | 3% | 10 | 11% |
| **250 to 499** | 242 | 1% | 0 | 0% |
| **500 to 999** | 161 | 1% | 2 | 2% |
| **1000 to 4999** | 117 | 0% | 2 | 2% |

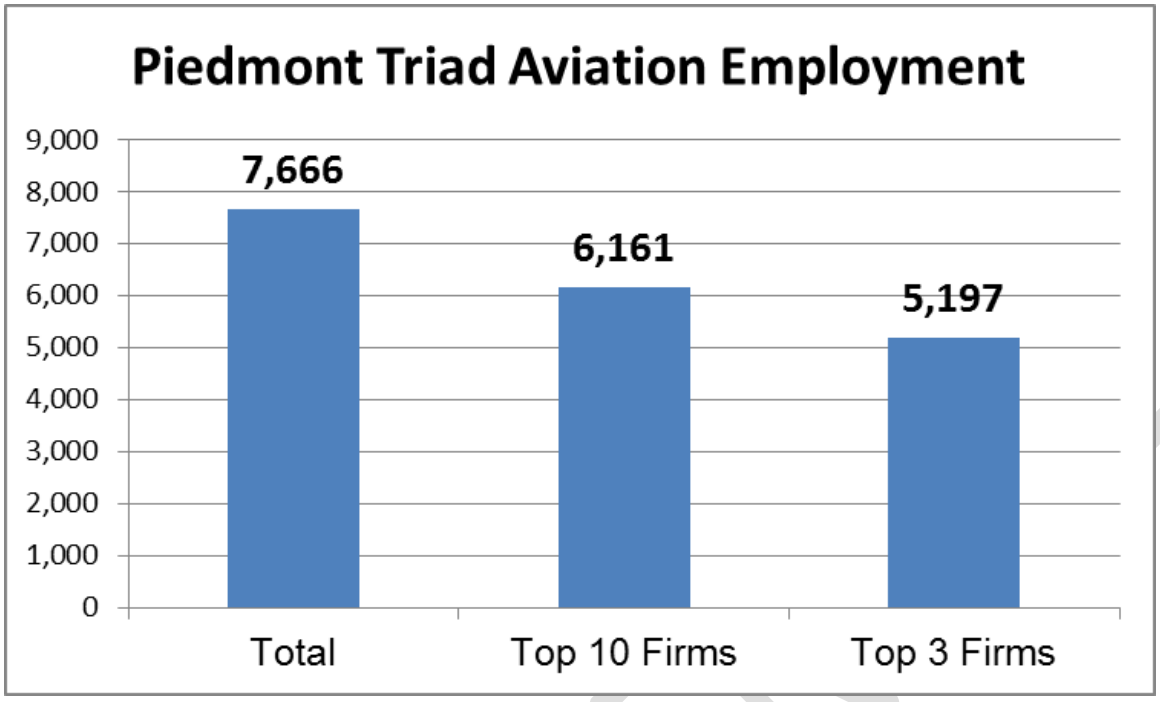
**Figure 15**



The Piedmont Triad region's skew toward larger Aviation Industry Cluster firms is reflected in the disproportionately large share of the region's aviation-related employment derived from its largest companies. The region's 10 largest firms (Figure 16) account for 80 percent of the aviation employment and the largest three firms – Honda Aircraft, HAECO and Rockwell Collins – employ 68 percent of the total Piedmont Triad aviation workforce.

Nationally the presence of large firms creates opportunities for the establishment and growth of numerous smaller firms as suppliers and service providers. In the Piedmont Triad the current dominance of large firms and the relative scarcity of smaller firms suggest that the region's aviation cluster remains relatively immature. It is likely that the rapid pace of larger firm development in the region has not been matched by a comparable rate of growth by the region's population of aviation industry suppliers.

**Figure 16**




| Company | Cluster Sector | Location | | Jobs |
|---|---|---|---|---|
| **1. Honda Aircraft Co LLC** | Aircraft Manufacturers | Greensboro | Guilford | 1,900 |
| **2. HAECO Americas** | Aircraft Maintenance | Greensboro | Guilford | 1,650 |
| **3. Rockwell Collins** | Aircraft Components (Mfrs) | Winston-Salem | Forsyth | 1,647 |
| **4. Aerospace Products Intl** | Aerospace Industries (Mfrs) | Winston-Salem | Forsyth | 180 |
| **5. Franklin Aerospace** | Aerospace Industries (Mfrs) | Thomasville | Davidson | 180 |
| **6. Sabeti Wain Aerospace** | Aerospace Industries (Mfrs) | Mocksville | Davie | 180 |
| **7. Landmark Aviation** | Aircraft Maintenance | Winston-Salem | Forsyth | 154 |
| **8. Beta Systems** | Aircraft Ground Equipment (Mfrs) | Reidsville | Rockingham | 140 |
| **9. Sky Lease Cargo** | Air Cargo Service | Greensboro | Guilford | 130 |
| **10. Cessna Aircraft** | Aircraft Servicing & Maintenance | Greensboro | Guilford | 120 |

**Piedmont Triad Aviation Industry Cluster Firm Diversity**

The Piedmont Triad region's apparent dearth of diverse, smaller aviation-related businesses was examined by assessing the presence or absence of Piedmont Triad Aviation Industry Cluster firms in each of the United States Aviation Industry Cluster's constituent sectors of business activity. This analysis confirmed the relative scarcity of aviation industry suppliers and service companies in the Piedmont Triad region with that condition being manifested in a "low density" determination for the region's Aviation Industry Cluster.

The United States Aviation Industry Cluster consists of an interlinked network of "buyer and supplier" firms occupying 60 Standard Industrial Classification (SIC) sectors. Aviation activity is present across the United States in differing levels with the most active industry concentrations typically in regional economies possessing numerous firms across a broad range of aviation industry cluster sectors. Regional economies in which most of these 60 cluster sectors are occupied by firms can be considered to have a "high density" aviation cluster in which a diversified supplier network provides competitive advantages for industry growth as well as a means for the regional dissemination of economic benefits.

By this measure the Piedmont Triad's Aviation Industry Cluster is "low density" as its aviation activity in concentrated in a comparatively few industry cluster sectors. The region's 90 aviation establishments are active in only 19 of the 60 United States Aviation Industry Cluster sectors. These unpopulated industry categories, indicated as black gaps in Figure 17, amount to a cluster density factor of only 32 percent within the Piedmont Triad aviation economy. The 33 aviation firms located in the Winston-Salem MSA are even more concentrated, being present in only 13 of the 60 - only 21.7 percent - of United States Aviation Industry Cluster sectors.

This scarcity suggests that the region may lack local suppliers and service providers whose absence can undermine regional operational efficiencies. At the same time, such "cluster gaps" (Figure 18) can also represent "targets of opportunity" for economic

development that expand the Aviation Cluster, which in turn creates stronger markets for existing and new local services and goods input providers.

**Figure 17**

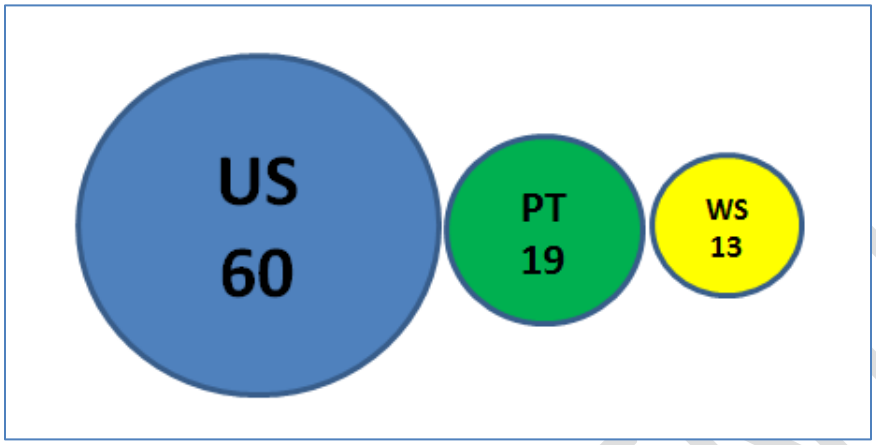


**Figure 18**

| Aviation Firms by Cluster Segments | | | |
|---|---|---|---|
| SIC | Description | US | Piedmont Triad |
| 372101 | Aircraft-Manufacturers | 422 | 3 |
| 372102 | Aircraft Interior Redesigning (Mfrs) | 21 | 1 |
| 372103 | Aircraft/Aircraft Equip Testing (Mfrs) | 30 | |
| 372106 | Gliders (Mfrs) | 22 | |
| 372107 | Aircraft Designing (Mfrs) | 12 | |
| 372401 | Aircraft Engines to Manufacturers | 13 | |
| 372402 | Aircraft Tooling (Mfrs) | 2 | |
| 372403 | Jet Propulsion Equipment (Mfrs) | 9 | |
| 372498 | Aircraft Engines & Engine Parts to Mfrs | 172 | |
| 372801 | Aircraft Components to Manufacturers | 596 | 5 |
| 372802 | Aircraft Equipment Mfrs | 204 | 1 |
| 372803 | Aircraft Machine Work (Mfrs) | 8 | 1 |
| 372804 | Aircraft Ground Support & Svc Equip to Mfrs | 11 | 1 |
| 372805 | Aircraft Modifications (Mfrs) | 9 | |
| 372806 | Aircraft Parts to Assemblers (Mfrs) | 16 | |
| 372807 | Aircraft Flight Training Equip (Mfrs) | 24 | |
| 372809 | Aircraft Research & Development (Mfrs) | 7 | |
| 372814 | Aircraft Industrial Fasteners (Mfrs) | 5 | |
| 381201 | Aerospace Industries (Mfrs) | 2,231 | 12 |
| 451201 | Airline Companies | 1,844 | 8 |
| 451202 | Air Cargo Service | 2,702 | 9 |
| 452206 | Airplane Rides | 12 | |
| 458101 | Aircraft Ground Support & Service Equip | 169 | |
| 458102 | Aircraft Engines to Servicing & Maintenance | 71 | |
| 458103 | Aircraft Ferrying & Transporting Svc | 18 | |
| 458104 | Aircraft Servicing & Maintenance | 2,926 | 11 |
| 458105 | Aircraft Storage | 76 | |
| 458106 | Airports | 5,677 | 11 |
| 458107 | Aircraft Upholsterers | 33 | |
| 458108 | Helicopter to Servicing & Maintenance | 32 | |
| 458109 | Air Traffic Control Tower | 47 | |
| 458110 | Aircraft Refinishing & Painting | 39 | |
| 458111 | Airline Support Services | 452 | 1 |
| 458112 | Aircraft Hangars to Rental & Sales | 48 | |
| 458114 | Aircraft Support Services | 24 | |
| 458116 | Aircraft to Restore & Customize | 7 | |
| 472901 | Airline Ticket Agencies | 320 | 3 |
| 508809 | Aircraft Parts to Reclaiming (Whls) | 6 | |
| 508814 | Aircraft Brokers (Whls) | 136 | |
| 508817 | Aircraft Avionics to Sales & Service (Whls) | 257 | |
| 508819 | Aircraft Engines (Whls) | 49 | |
| 517223 | Aviation Fuel (Whls) | 121 | |
| 559905 | Aircraft-Dealers | 2,457 | 2 |
| 559907 | Hang Gliders | 83 | |
| 559908 | Aircraft Equipment Parts & Supplies | 1,768 | 5 |
| 559912 | Aeronautical Supplies | 10 | |
| 594523 | Airplanes to Model | 18 | |
| 731903 | Advertising to Aerial | 110 | |
| 733509 | Aerial Patrol & Inspection Service | 5 | |
| 735939 | Aircraft Charter Rental & Leasing Svc | 1,626 | 4 |
| 762214 | Aircraft Radio Servicing | 16 | |
| 769994 | Propellers-Repairing | 16 | 1 |
| 829917 | Aircraft Schools | 976 | 7 |
| 829943 | Flight Aircraft Instruction | 261 | |
| 871185 | Aviation Engineers | 14 | |
| 874109 | Aircraft Management Services | 48 | |
| 874402 | Aerospace Support Services to Technical | 61 | |
| 874822 | Aviation Consultants | 555 | 4 |
| 899944 | Air Flight Attendants | 5 | |
| 962108 | Aircraft Inspection | 10 | |
| | TOTAL FIRM POPULATION | 26,919 | 90 |
| | CLUSTER SECTOR DENSITY | 60 (100%) | 19 (32%) |

## Specifying Winston-Salem Air Commerce Targets of Opportunity

A simple comparison of the United States Aviation industry to that of Winston-Salem and the Piedmont Triad identifies gaps in the area's aviation cluster but is it insufficient to differentiate opportunities for targeted economic development. Instead, "market-truthing" the opportunities to leverage Smith Reynolds Airport to enhance the Winston-Salem aviation economy requires a more precise comparison between the Winston-Salem region and relevant United States regional analogues.

Peer regions containing general and business aviation airports roughly comparable to Smith Reynolds Airport were identified to enable such external market validation analysis. The regional aviation economies associated with these peer airports provided appropriate bases for assessing the relative status of Winston-Salem's aviation industry and to identify those aviation industry sectors where the market experience of peer economies suggest development opportunities for the Winston-Salem area.

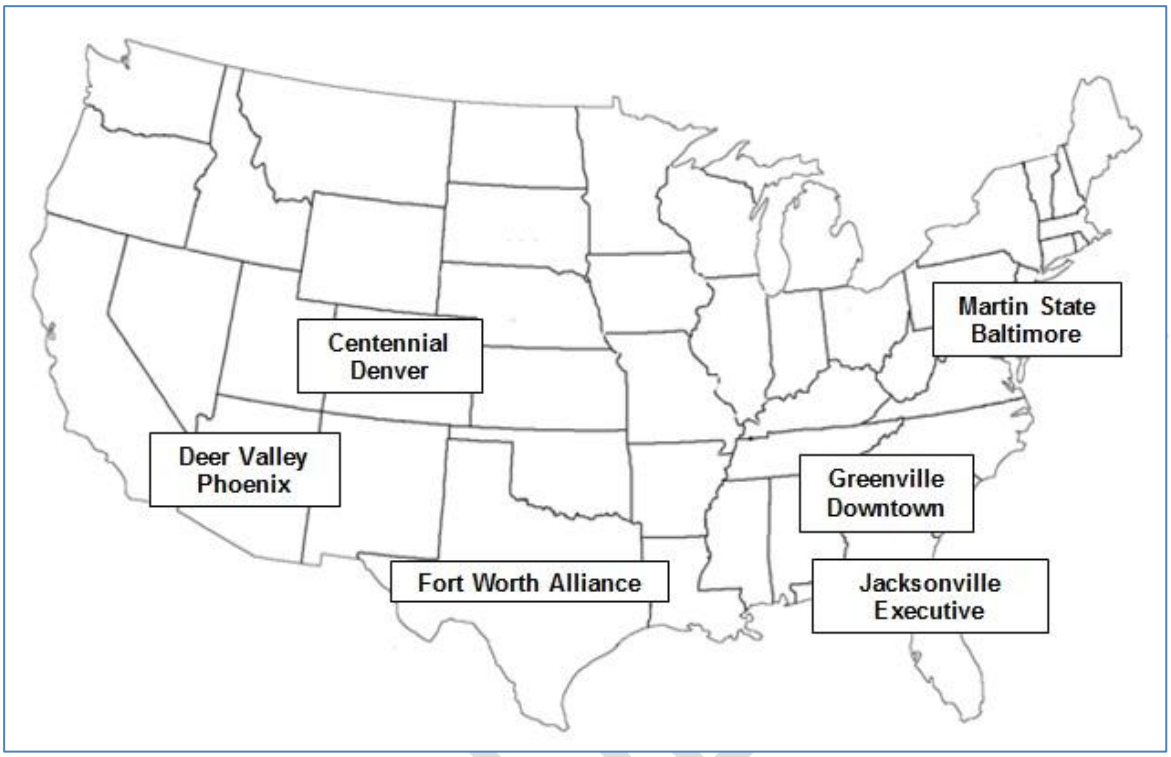
Smith Reynolds Airport Peers

Consultation with the Smith Reynolds Airport administration identified six peer airports based on parallels in aviation physical characteristics, economic context and proximities to nearby urban centers (Figure 19):

- Martin State (Baltimore MD)
- Centennial (Denver CO)
- Fort Worth Alliance (Fort Worth TX)
- Greenville Downtown (Greenville SC)
- Phoenix Deer Valley (Phoenix AZ)
- Jacksonville Executive (Jacksonville FL)

These airports scanned a wide spectrum of aviation activity, varying widely in scale and scope of facilities and aircraft operations. But they shared the characteristics of being general aviation airports located near cities and metropolitan areas ranging from the smaller population Greenville-Spartanburg MSA to the larger Dallas-Fort Worth and Denver MSAs.

**Figure 19**




| Peer Airports | City Distance (mi.) | Daily Operations | Based Aircraft |
|---|---|---|---|
| Smith-Reynolds | 3 | 127 | 87 |
| Martin State (Baltimore) | 9 | 232 | 254 |
| Centennial (Denver) | 15 | 880 | 1000 |
| Fort Worth Alliance | 14 | 308 | 26 |
| Greenville Downtown | 3 | 121 | 179 |
| Phoenix Deer Valley | 15 | 956 | 960 |
| Craig Executive (Jacksonville) | 8 | 435 | 209 |

**Smith Reynolds Peer Airports**

Martin State Airport (Baltimore MD)

Martin State Airport (MTN) is a joint civil-military public use airport located 10 miles east of the central business district of Baltimore, Maryland. Maryland Aviation Administration operates the airport on behalf of the Maryland Department of Transportation. MTN is designated a general aviation relief airport. MTN opened in 1940 as the former plant airport for the Glenn L. Martin Company which produced a large number of military aircraft at this location between the 1920s and 1960s.

Martin State Airport covers an area of 747 acres. It has one asphalt paved runway and one helipad. There are 254 aircraft based at the airport and aircraft operations average 232/day. It houses over 130,000 square feet of heated hangar space and 190 smaller aircraft T-hangars. Professional office suites and light industrial space is also available for lease.

Martin State Airport serves a wide variety of general aviation and commercial operators. It is home base to many helicopter operations including local news helicopters and the aviation units for the Maryland State Police, Baltimore County Police, and the Baltimore City Police. There is also a wide variety of flight training activities at the airport's two flight schools.

Centennial Airport (Denver CO)

Centennial Airport (APA) is a public use airport owned by the Arapahoe County Public Airport Authority located 17 miles southeast of downtown Denver, Colorado. The National Plan of Integrated Airport Systems categorizes the airport as a reliever airport. Opened in 1968, Centennial is an international airport with continuous United States Customs services and is one of the busiest general aviation airports in the United States.

Centennial Airport covers 1,400 acres with three asphalt runways. There are 1,000 aircraft based at the airport and aircraft operations average 880/day. The airport described itself as “One of the nation's premier business airports, Centennial is located in the heart of the Denver Tech Center, surrounded by 23 business parks and 6,000 businesses that produce more than 27 percent of the state's GDP.”

Two companies, Key Lime Air and Air Methods, have their corporate headquarters on the airport property. The airport and its immediate vicinity is the base for numerous firms including avionics and maintenance services, aircraft charter and management, flight training schools, aircraft sales companies, aerial photography services, helicopter services, air ambulance companies, corporate flight departments and private aircraft.

Fort Worth Alliance (Fort Worth TX)

Fort Worth Alliance Airport (AFW) is a city-owned public-use airport located 14 miles north of the central business district of Fort Worth, Texas. Opened in 1988, AFW was developed in a joint venture between the City of Fort Worth, the Federal Aviation Administration, and the Hillwood Development Company, a real estate development company owned by Ross Perot, Jr.

Fort Worth Alliance Airport covers an area of 1,198 acres which contains two concrete paved runways There are 26 aircraft based at the airport and aircraft operations average 308/day. Besides general aviation services, the airport serves as the southwest regional hub for FedEx Express. It formerly served as a maintenance hub for Dallas-Fort Worth (DFW) Airport-based American Airlines.

The airport is operated by privately-held Alliance Aviation Services. Described as “the world's first industrial airport” it is the centerpiece of a 20,000 acre master-planned development known as Alliance Texas with 20,000 S.F. of customer service areas and office space, and multiple hangars with shop and office space. Corporate tenants include Bell Helicopter, DynCorp, FedEx Express, and GDC Technics. The airport is also home Tarrant County College’s Aviation Learning Center.

Greenville Downtown Airport (Greenville SC)

Greenville Downtown Airport (GMU) is a general aviation facility owned by the Greenville Airport Commission and is located three miles east of Greenville, in Greenville County, South Carolina. GMU opened in 1928 and until 1962 served as the commercial airport for the Greenville area.

Greenville Downtown Airport covers 385 acres with two asphalt runways and two helipads. There are 177 aircraft based at the airport and aircraft operations average 134/day. The Greenville Downtown Airport is governed by a 5-person appointed Commission with two appointees each from City and County Councils and one at-large.

Located at GMU are many companies that provide aviation services like aircraft rental and flight instruction, aircraft maintenance, helicopter services and flight instruction, aircraft management, fuel service, aircraft sales, air charter and air taxi services. GMU has a restaurant, the Runway Café and a public park where people can learn about aviation.

Phoenix Deer Valley (Phoenix AZ)

Phoenix Deer Valley Airport (DVT) is a public airport 17 miles north of Phoenix, Arizona. It is owned by the City of Phoenix and is categorized it as a reliever airport for Phoenix Sky Harbor International Airport.

Phoenix Deer Valley Airport covers 914 acres with two asphalt runways. There are 955 aircraft based at the airport and aircraft operations average 956/day. It is described as the busiest general aviation airport in the country. Charter service is available through several companies, including one charter airline, Westwind Air Service. Two large flight schools, Westwind School of Aeronautics and TransPac Aviation Academy, are located at Deer Valley.

The airport has five airside and landside parcels available for industrial and commercial development. It houses a full-service Restaurant, an Aviation Museum Display and a public Observation Deck. Deer Valley Airport has hosted various air shows of vintage World War II aircraft.

Jacksonville Executive (Jacksonville FL)

Jacksonville Executive at Craig Airport (CRG) is a public airport located eight miles (13 km) east of the central business district of Jacksonville, Florida. It is owned by the Jacksonville Aviation Authority. It is a mid-sized general aviation airport that handles personal aircraft and small commuter planes. It previously served as a joint civil-military airport hosting an Army Aviation Support Facility and helicopter units of the Florida Army National Guard.

Jacksonville Executive at Craig Airport covers an area of 1,432 acres which contains two asphalt paved runways. There are 209 aircraft based at the airport and aircraft operations average 435/day. The airport has 2 FBOs on the field, including Craig Air Center.

Jacksonville Executive at Craig Airport is managed by the Jacksonville Aviation Authority as a component of Jacksonville Airport System, a diversified airport system that “serves the commercial, business and recreational aviation needs of the City of Jacksonville, Northeast Florida and Southeast Georgia.” The Jacksonville Airport System is comprised of Jacksonville International Airport (JAX), Jacksonville Executive at Craig Airport (CRG), Herlong Recreational Airport (HEG) and Cecil Airport (VQQ).

## Peer Aviation Cluster "Gap Analysis"

The economic experience of these Peer airports provides applicable insights into the types of additional aviation firms that might be attracted or grown by better leveraging Smith Reynolds Airport as an economic development asset. The study compiled a database of the combined Aviation Industry Cluster firm population of the Peer airports' economic regions.

This Peer Cluster Firm population was compared to the Aviation Industry Cluster firm populations of Winston-Salem and the Piedmont Triad region to isolate those industry sectors in which the Peer Population had significant firm populations that were absent from the Winston-Salem and the Piedmont Triad cluster. The identified Target Sectors were then analyzed to describe each sectors' firm population and to characterize those firms in terms of their location, employment, facilities and organizational structure.

### Peer Cluster Firm Population

Collectively the Peer Cluster regions contained an Aviation Industry Cluster firm population of 1,830 firms distributed unevenly across the six regions (Figure 21) varying from the most (832) establishments in the metropolitan area of the Fort Worth Alliance airport to the fewest (59) in the Greenville (South Carolina) Downtown airport metro area. Significantly the Peer Cluster includes firms in 51 (85% density) of the 60 United States benchmark Aviation Industry Cluster categories. This contrasts sharply with the 19 sectors represented in the Piedmont Triad and 13 sectors in the Winston-Salem MSA (Figure 20).

**Figure 20**

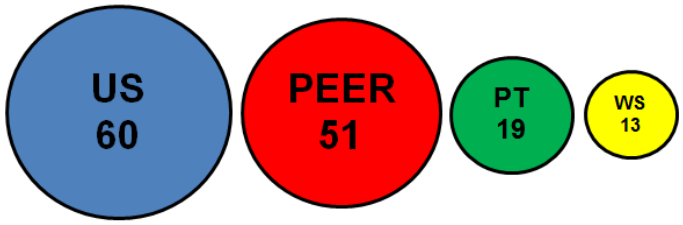
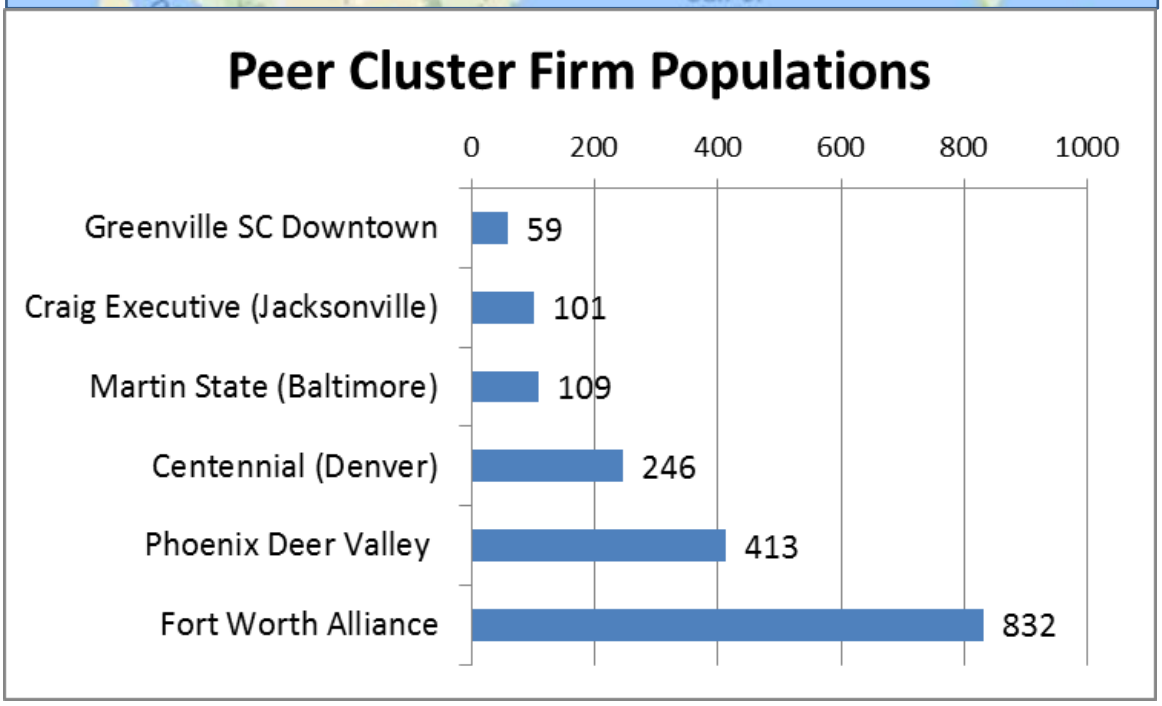


**Figure 21**


WYOMING
NEBRASKA
IOWA
Chicago
ILLINOIS
INDIANA
OHIO
PENN
United States
UTAH
COLORADO
KANSAS
MISSOURI
WEST VIRGINIA
KENTUCKY
VIRGINIA
Las Vegas
OKLAHOMA
TENNESSEE
CAROLINA
ARKANSAS
ARIZONA
NEW MEXICO
MISSISSIPPI
SOUTH CAROLINA
ALABAMA
GEORGIA
TEXAS
LOUISIANA
Houston
FLORIDA
Gulf of


Peer Cluster Firm Populations
0
200
400
600
800
1000
Greenville SC Downtown
59
Craig Executive (Jacksonville)
101
Martin State (Baltimore)
109
Centennial (Denver)
246
Phoenix Deer Valley
413
Fort Worth Alliance
832

**Winston-Salem Aviation Industry Cluster Target Sectors**

Shared economic, physical and geographic attributes suggest that disparities between the 19 Aviation Industry sectors occupied by Piedmont Triad Aviation Industry Cluster firms and the 51 sectors occupied by firms from the Peer Cluster populations may contain attainable "Target Sectors" for the Winston-Salem Air Commerce economic development strategy. These Target Sectors were identified through a comparative analysis of the respective Aviation Industry Cluster firm populations for the U.S., the six Peer Clusters and the Piedmont Triad (Figure 22).

The analytical method used recognized that not all of the Peer Clusters' 51 occupied cluster sectors possessed enough firms to indicate those sectors' viability as targets. In several instances the occupied Peer Cluster sectors were represented by singular establishments or were present at a single Peer airport. Such instances constituted exceptions that were not representative of the Peer Cluster cohort and therefore offered poor precedence as Target Sectors for the Piedmont Triad region. As a result not all of the occupied 51 Peer Cluster sectors qualified as Target Sectors.

Instead Winston-Salem Target Sectors were identified as those of the 51 Peer Cluster Aviation Industry Sectors in which:

1. the Peer Clusters exhibited a firm population proportionate to the United States firm population for the same sector; and
2. the Piedmont Triad cluster firm population for the equivalent sector was proportionately under-represented (or absent) compared to the Peer Clusters

This analysis identified 20 qualifying Aviation Industry Cluster sectors as Target Sectors for the Winston-Salem Air Commerce economic development strategy (Figure 23). These sectors are not the only viable categories of prospects for this strategy. They are intended to provide a market-validated quantitative framework for strategy design.

## Figure 22

| Aviation Cluster Segments | | | | |
|---|---|---|---|---|
| SIC | SIC Description | US | PEER | PT |
| 372101 | Aircraft-Manufacturers | 422 | 21 | 3 |
| 372102 | Aircraft Interior Redesigning (Mfrs) | 21 | 2 | 1 |
| 372103 | Aircraft/Aircraft Equip Testing (Mfrs) | 30 | - | |
| 372106 | Gliders (Mfrs) | 22 | 1 | |
| 372107 | Aircraft Designing (Mfrs) | 12 | 3 | |
| 372401 | Aircraft Engines to Manufacturers | 13 | - | |
| 372402 | Aircraft Tooling (Mfrs) | 2 | - | |
| 372403 | Jet Propulsion Equipment (Mfrs) | 9 | 1 | |
| 372498 | Aircraft Engines & Engine Parts to Mfrs | 172 | 17 | |
| 372801 | Aircraft Components to Manufacturers | 596 | 43 | 5 |
| 372802 | Aircraft Equipment Mfrs | 204 | 20 | 1 |
| 372803 | Aircraft Machine Work (Mfrs) | 8 | - | 1 |
| 372804 | Aircraft Ground Support & Svc Equip to Mfrs | 11 | - | 1 |
| 372805 | Aircraft Modifications (Mfrs) | 9 | 1 | |
| 372806 | Aircraft Parts to Assemblers (Mfrs) | 16 | 1 | |
| 372807 | Aircraft Flight Training Equip (Mfrs) | 24 | 1 | |
| 372809 | Aircraft Research & Development (Mfrs) | 7 | 1 | |
| 372814 | Aircraft Industrial Fasteners (Mfrs) | 5 | - | |
| 381201 | Aerospace Industries (Mfrs) | 2,231 | 250 | 12 |
| 451201 | Airline Companies | 1,844 | 102 | 8 |
| 451202 | Air Cargo Service | 2,702 | 96 | 9 |
| 452206 | Airplane Rides | 12 | - | |
| 458101 | Aircraft Ground Support & Service Equip | 169 | 13 | |
| 458102 | Aircraft Engines to Servicing & Maintenance | 71 | 5 | |
| 458103 | Aircraft Ferrying & Transporting Svc | 18 | 2 | |
| 458104 | Aircraft Servicing & Maintenance | 2,926 | 198 | 11 |
| 458105 | Aircraft Storage | 76 | 7 | |
| 458106 | Airports | 5,677 | 187 | 11 |
| 458107 | Aircraft Upholsterers | 33 | 4 | |
| 458108 | Helicopter to Servicing & Maintenance | 32 | 6 | |
| 458109 | Air Traffic Control Tower | 47 | 6 | |
| 458110 | Aircraft Refinishing & Painting | 39 | 5 | |
| 458111 | Airline Support Services | 452 | 30 | 1 |
| 458112 | Aircraft Hangars to Rental & Sales | 48 | 6 | |
| 458114 | Aircraft Support Services | 24 | 1 | |
| 458116 | Aircraft to Restore & Customize | 7 | 1 | |
| 472901 | Airline Ticket Agencies | 320 | 13 | 3 |
| 508809 | Aircraft Parts to Reclaiming (Whls) | 6 | - | |
| 508814 | Aircraft Brokers (Whls) | 136 | 17 | |
| 508817 | Aircraft Avionics to Sales & Service (Whls) | 257 | 22 | |
| 508819 | Aircraft Engines (Whls) | 49 | 6 | |
| 517223 | Aviation Fuel (Whls) | 121 | 6 | |
| 559905 | Aircraft-Dealers | 2,457 | 234 | 2 |
| 559907 | Hang Gliders | 83 | 3 | |
| 559908 | Aircraft Equipment Parts & Supplies | 1,768 | 202 | 5 |
| 559912 | Aeronautical Supplies | 10 | 1 | |
| 594523 | Airplanes to Model | 18 | 2 | |
| 731903 | Advertising to Aerial | 110 | 5 | |
| 733509 | Aerial Patrol & Inspection Service | 5 | 1 | |
| 735939 | Aircraft Charter Rental & Leasing Svc | 1,626 | 98 | 4 |
| 762214 | Aircraft Radio Servicing | 16 | 4 | |
| 769994 | Propellers-Repairing | 16 | 1 | 1 |
| 829917 | Aircraft Schools | 976 | 87 | 7 |
| 829943 | Flight Aircraft Instruction | 261 | 19 | |
| 871185 | Aviation Engineers | 14 | 1 | |
| 874109 | Aircraft Management Services | 48 | 4 | |
| 874402 | Aerospace Support Services to Technical | 61 | 5 | |
| 874822 | Aviation Consultants | 555 | 66 | 4 |
| 899944 | Air Flight Attendants | 5 | - | |
| 962108 | Aircraft Inspection | 10 | 2 | |
| | TOTAL FIRM POPULATION | 26,919 | 1,830 | 90 |
| | CLUSTER SECTOR DENSITY | 60 (100%) | 51 (85%) | 19 (32%) |

Figure 23

| Aviation Industry Cluster Target Sectors | SIC |
|---|---|
| 1. Aircraft-Manufacturers | 372101 |
| 2. Aircraft Engines & Engine Parts to Manufacturers | 372498 |
| 3. Aircraft Equipment Manufacturers | 372802 |
| 4. Aerospace Manufacturers | 381201 |
| 5. Air Cargo Service | 451202 |
| 6. Aircraft Ground Support & Service Equipment | 458101 |
| 7. Aircraft Servicing & Maintenance | 458104 |
| 8. Aircraft Storage | 458105 |
| 9. Aircraft Upholsterers | 458107 |
| 10. Helicopter Servicing & Maintenance | 458108 |
| 11. Airline Support Services | 458111 |
| 12. Aircraft Avionics to Sales & Service (Wholesalers) | 508817 |
| 13. Aircraft Engines (Wholesalers) | 508819 |
| 14. Aviation Fuel (Wholesalers) | 517223 |
| 15. Aircraft Equipment Parts & Supplies | 559908 |
| 16. Aircraft Charter Rental & Leasing Service | 735939 |
| 17. Flight Aircraft Instruction | 829943 |
| 18. Aircraft Management Services | 874109 |
| 19. Aerospace Support Services | 874402 |
| 20. Aviation Consultants | 874822 |

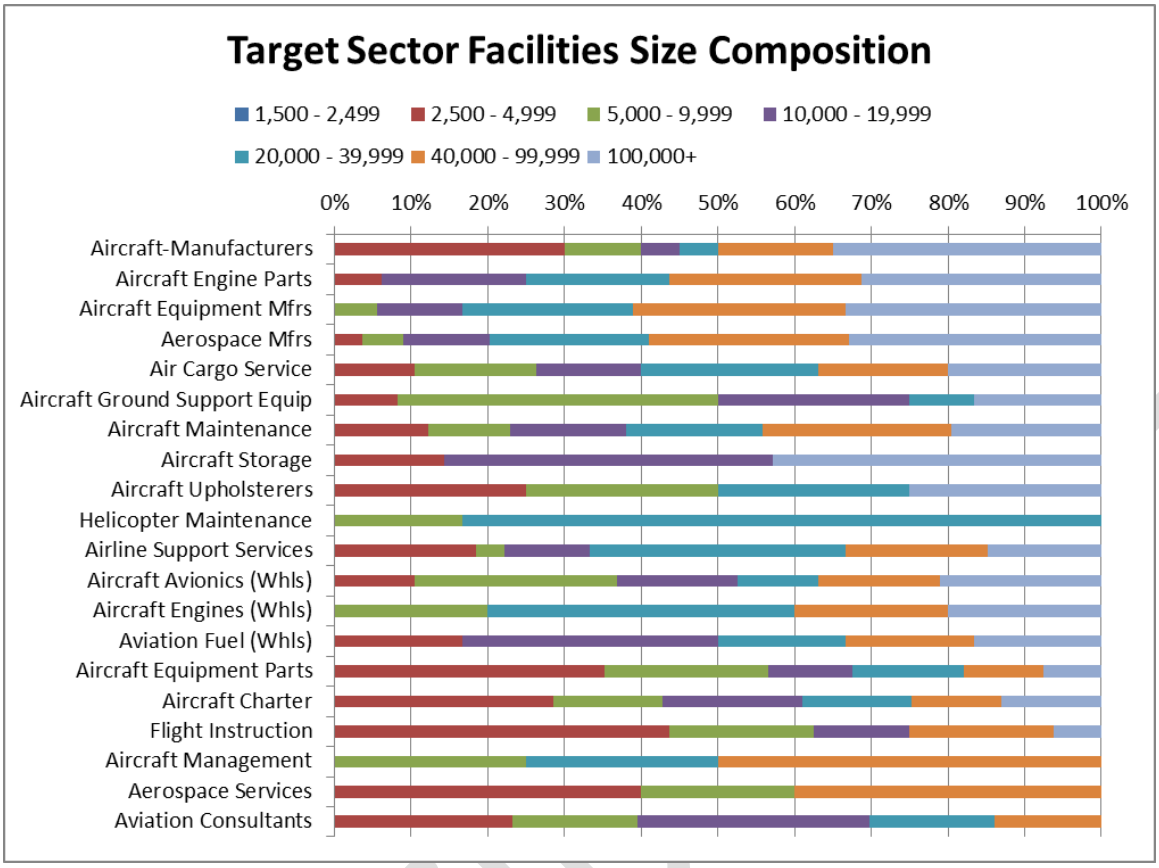
## Identifying Target Sector Prospects and Virtual Portfolio

The Aviation Industry Cluster Target Sectors were be used to identify the firms within those sectors that are best matched to the location and facility resources in the vicinity of the Smith Reynolds Airport. This is done by analyzing the infrastructure characteristics of Peer Cluster firms in the Target Sectors and comparing them to the location and availability of current and planned facilities in Winston-Salem that would leverage the presence of, and access to, Smith Reynolds Airport. The Peer Cluster firm populations in the 20 Target Sectors totaled 1,073 establishments. Facility size ranges (Table 24) for these firms and facility size composition (Figure 25) were determined for each of the Target Sectors.

**Figure 24**

| Target Sectors<br>Firm Facility Range (s.f.) | 1,500 - 2,499 | 2,500 - 4,999 | 5,000 - 9,999 | 10,000 - 19,999 | 20,000 - 39,999 | 40,000 - 99,999 | 100,000+ | Total |
|---|---|---|---|---|---|---|---|---|
| Aircraft-Manufacturers | 1 | 6 | 2 | 1 | 1 | 3 | 7 | 21 |
| Aircraft Engine Parts | 1 | 1 | 0 | 3 | 3 | 4 | 5 | 17 |
| Aircraft Equipment Mfrs | 2 | 0 | 1 | 2 | 4 | 5 | 6 | 20 |
| Aerospace Mfrs | 4 | 9 | 13 | 28 | 51 | 64 | 81 | 250 |
| Air Cargo Service | 0 | 10 | 15 | 13 | 22 | 16 | 19 | 96 |
| Aircraft Ground Support Equip | 1 | 1 | 5 | 3 | 1 | 0 | 2 | 13 |
| Aircraft Maintenance | 18 | 22 | 19 | 27 | 32 | 44 | 35 | 198 |
| Aircraft Storage | 0 | 1 | 0 | 3 | 0 | 0 | 3 | 7 |
| Aircraft Upholsterers | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 4 |
| Helicopter Maintenance | 0 | 0 | 1 | 0 | 5 | 0 | 0 | 6 |
| Airline Support Services | 2 | 5 | 1 | 3 | 9 | 5 | 4 | 30 |
| Aircraft Avionics (Whls) | 2 | 2 | 5 | 3 | 2 | 3 | 4 | 22 |
| Aircraft Engines (Whls) | 1 | 0 | 1 | 0 | 2 | 1 | 1 | 6 |
| Aviation Fuel (Whls) | 0 | 1 | 0 | 2 | 1 | 1 | 1 | 6 |
| Aircraft Equipment Parts | 40 | 51 | 31 | 16 | 21 | 15 | 11 | 202 |
| Aircraft Charter | 17 | 22 | 11 | 14 | 11 | 9 | 10 | 98 |
| Flight Instruction | 2 | 7 | 3 | 2 | 0 | 3 | 1 | 19 |
| Aircraft Management | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 4 |
| Aerospace Services | 0 | 2 | 1 | 0 | 0 | 2 | 0 | 5 |
| Aviation Consultants | 14 | 10 | 7 | 13 | 7 | 6 | 0 | 66 |

**Figure 25**



## Virtual Portfolio Construction

Representative examples of aligned Target Sector firms were used to construct and populate a Virtual Portfolio illustrating attainable outcomes of a Winston-Salem Air Commerce plan while informing the design of an economic development strategy to achieve those results. By presenting representative business examples, this Virtual Portfolio provided a substantive basis to demonstrate resource requirements and potential economic impacts.

Average firm characteristics were calculated for each of the Target Sectors. These parameters were used to identify representative companies to serve as models for each of the 20 Virtual Portfolio sectors. The Virtual Portfolio constituent firms were constructed based upon the Target Sectors firm populations at Peer Airports but underrepresented in the Piedmont Triad region at the 5 percent parity threshold.

Those sectors were analyzed against the Peer Airport firm population in those sectors to calculate the target number of firms required to reach parity threshold. The Virtual Portfolio is composed of representative firms for the 20 target cluster sectors at the number of firms that achieved parity with the Peer Airport firm populations. This analysis indicated that the Virtual Portfolio (Figure 25) would consist of 35 firms across the 20 Target Sectors. Examples of representative firms for each Target Sector were drawn from the Peer Cluster Aviation Industry Cluster Sector.

A detailed profile was developed for each of the 20 Target Sectors containing information including:

- A narrative description of the sector business activity and summarizing both Piedmont Triad and Peer Cluster firms
- Peer Cluster firm employment and facilities characteristics
- Cross-sectional examples of a Peer Cluster sector firms
- Representative firm Virtual Portfolio Entry for the Target Sector

**Figure 25**

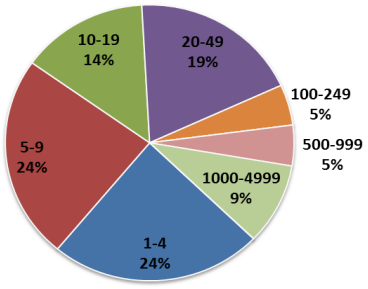
| Virtual Portfolio Sectors | Avg Emp | Avg S.F. | #Firms | Total Emp | Total S.F. | Example | Location |
|---|---|---|---|---|---|---|---|
| **Aircraft Manufacturers** | 411 | 126,047 | 1 | 411 | 126,047 | Lockheed Martin | Clarksburg WV |
| **Aircraft Engines & Engine Parts** | 110 | 68,868 | 2 | 219 | 137,735 | Euless Aero Components | Euless TX |
| **Aircraft Equipment Manufacturers** | 64 | 70,575 | 1 | 64 | 70,575 | March Aviation | Mesa AZ |
| **Aerospace Industries** | 79 | 74,877 | 1 | 79 | 74,877 | Champion Aerospace | Liberty SC |
| **Air Cargo Service** | 14 | 51831 | 1 | 14 | 51,831 | Freedom Freight Service | Jacksonville FL |
| **Aircraft Ground Support Equip** | 9 | 32,173 | 2 | 19 | 64,346 | Business Air Management | Denton TX |
| **Aircraft Servicing & Maintenance** | 31 | 50287 | 1 | 31 | 50,287 | TAC Air Company | Greenville SC |
| **Aircraft Storage** | 44 | 71,250 | 1 | 44 | 71,250 | Addison Hangar Rental | Addison TX |
| **Aircraft Upholsterers** | 19 | 47,813 | 1 | 19 | 47,813 | Global Aircraft Interiors | Islip NY |
| **Helicopter Servicing & Maintenance** | 11 | 26,250 | 1 | 11 | 26,250 | HASE Inc. | Pensacola FL |
| **Airline Support Services** | 13 | 43,200 | 2 | 26 | 86,400 | Konfara Company | Scottsdale AZ |
| **Aircraft Avionics to Sales & Service** | 52 | 43,852 | 2 | 104 | 87,705 | Simtek Inc. | Euless TX |
| **Aircraft Engines (Whls)** | 19 | 48,250 | 1 | 19 | 48,250 | Magellan Aerospace Turbine | Glendale AZ |
| **Aviation Fuel (Whls)** | 14 | 47,292 | 1 | 14 | 47,292 | Allied Aviation | Floral Park NY |
| **Aircraft Equipment Parts & Supplies** | 22 | 20,230 | 5 | 108 | 101,151 | Weatherford Aerospace | Weatherford TX |
| **Aircraft Charter Rental & Leasing** | 14 | 29,306 | 2 | 28 | 58,612 | Middle River Aviation | Baltimore MD |
| **Flight Aircraft Instruction** | 24 | 23,342 | 2 | 48 | 46,684 | Alliance Flight Training | Watkins CO |
| **Aircraft Management Services** | 10 | 44,375 | 1 | 10 | 44,375 | Coffman Company | Scottsdale AZ |
| **Aerospace Support Services** | 15 | 31,000 | 1 | 15 | 31,000 | Dallas Aeronautical Services | Dallas TX |
| **Aviation Consultants** | 6 | 14,496 | 6 | 35 | 86,977 | Flight Services & Systems | Dallas TX |
| | | **TOTAL** | **35** | **1,319** | **1,359,456** | | |

## Aircraft Manufacturers
## SIC 372101

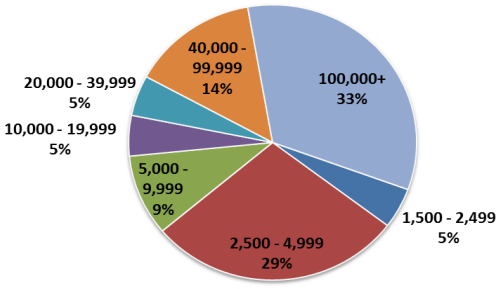
Firms in this sector are primarily engaged in manufacturing or assembling complete aircraft but it also includes producers of sub-elements and components. Of the 422 firms in this sector, 21 are located in Peer Airport regions. A large share of the sector's firms employs a relatively small number of workers but approximately half of the firms occupy facilities larger than 40,000 square feet. The 3 firms identified in the Winston-Salem/Greensboro area are Honda Aircraft corporate entities.

| Aviation Cluster Sector Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **372101** | **Aircraft Manufacturers** | **422** | **21** | **3** |

**Firm Employment**
**Aircraft Manufacturers (SIC 372101)**




**Firm Facility Size (sf)**
**Aircraft Manufacturers (SIC 372101)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aeroworks Inc** | Denver | CO | 15 | 10,000 - 19,999 | $11,828 | Single Loc |
| **Airbus Helicopters Inc** | Grand Prairie | TX | 500 | 100,000+ | N/A | Subsidiary |
| **Boeing Co** | Jacksonville | FL | 27 | 40,000 - 99,999 | $16,575 | Branch |
| **Bombardier Corp** | Baltimore | MD | 7 | 40,000 - 99,999 | $2,859 | Single Loc |
| **Honeywell Aerospace** | Phoenix | AZ | 1500 | 100,000+ | $903,852 | Branch |

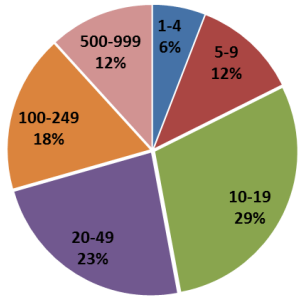
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Manufacturers |
| **Company** | Lockheed Martin |
| **Location** | North Central West Virginia Airport in Clarksburg WV |
| **Employment** | 82 |
| **Facility** | 65,000 s.f. |
| **Description** | The Lockheed Martin Clarksburg facility builds subassemblies for the C-130 Hercules aircraft. |

## Aircraft Engines & Engine Parts-Manufacturers
## SIC 372498

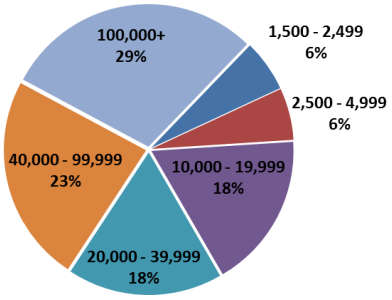
Firms in this sector are primarily engaged in manufacturing aircraft engines and engine parts. This industry also includes establishments owned by aircraft engine manufacturers and primarily engaged in research and development on aircraft engines and engine parts whether from enterprise funds or on a contract or fee basis. Of the 172 firms in this sector, 17 are located in Peer Airport regions but there are no sector firms in the Winston-Salem/Greensboro area. The majority of the sector's firms employ between 10 to 50 workers but over half of the firms occupy facilities larger than 40,000 square feet.

| Aviation Cluster Sector | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **372498** | **Aircraft Engines & Engine Parts to Mfrs** | **172** | **17** | **0** |

**Firm Employment**
**Aircraft Engines & Engine Parts (SIC 372498)**




**Firm Facility Size (sf)**
**Aircraft Engines & Engine Parts (SIC 372498)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aircraft Engine & Accessory** | Dallas | TX | 13 | 10,000 - 19,999 | $4,334 | Single Loc |
| **HM Dunn Aero Systems Inc** | Euless | TX | 176 | 100,000+ | N/A | Subsidiary |
| **Pratt & Whitney** | Jacksonville | FL | 15 | 40,000 - 99,999 | $7,350 | Branch |
| **Turbine Aero Inc** | Tempe | AZ | 170 | 100,000+ | $81,894 | Branch |
| **Warnke's Machining** | Arlington | TX | 7 | 10,000 - 19,999 | $5,447 | Single Loc |

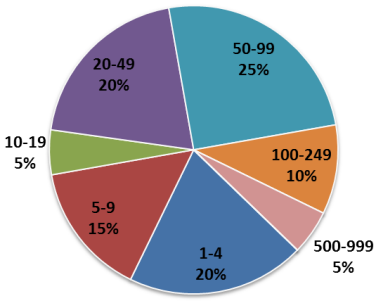
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Engines & Engine Parts to Manufacturers |
| **Company** | Euless Aero Components |
| **Location** | Euless, Texas |
| **Employment** | 40 |
| **Facility** | 40,000 - 99,999 s.f. |
| **Description** | Euless Aero is a manufacturer performing design, engineering and programming for precision aircraft machined components. |

## Aircraft Equipment Manufacturers
## SIC 372802

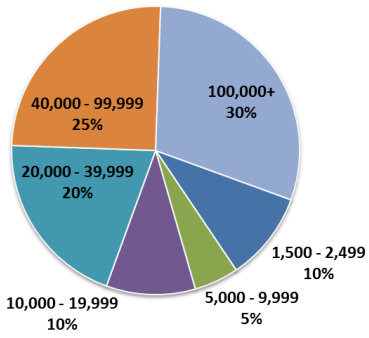
Firms in this sector are primarily engaged in manufacturing aircraft parts and auxiliary equipment including establishments owned by manufacturers of aircraft parts and auxiliary equipment and primarily engaged in research and development on aircraft parts. Of the 204 firms in this sector, 20 are located in Peer Airport regions with only 1 sector firm – Aero Accessories of Gibsonville - in the Winston-Salem/Greensboro area. The majority of the sector's firms employ between 10 to 50 workers but over 50 percent of the firms occupy facilities larger than 40,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **372802** | **Aircraft Equipment Manufacturers** | **204** | **20** | **1** |

**Firm Employment**
**Aircraft Equipment Mfrs (SIC 372802)**




**Firm Facility Size (sf)**
**Aircraft Equipment Mfrs (SIC 372802)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| Aero Components Inc | Fort Worth | TX | 65 | 100,000+ | $36,538 | Single Loc |
| Brown Aircraft Supply | Jacksonville | FL | 4 | 1,500 - 2,499 | $1,198 | Single Loc |
| GE Aviation | Piedmont | SC | 20 | 40,000 - 99,999 | $4,245 | Single Loc |
| Harter Aerospace | Tempe | AZ | 79 | 40,000 - 99,999 | N/A | Subsidiary |
| Honeywell | Greer | SC | 600 | 100,000+ | $127,325 | Branch |

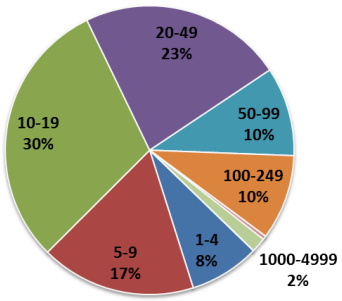
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Equipment Manufacturers |
| **Company** | Marsh Aviation |
| **Location** | Mesa, Arizona |
| **Employment** | 100 |
| **Facility** | 100,000+ s.f. |
| **Description** | Marsh Aviation is an engineering, design, maintenance, and re-manufacturing company designing and manufacturing aircraft components and sub-systems. |

## Aerospace Industry Manufacturers
## SIC 381201

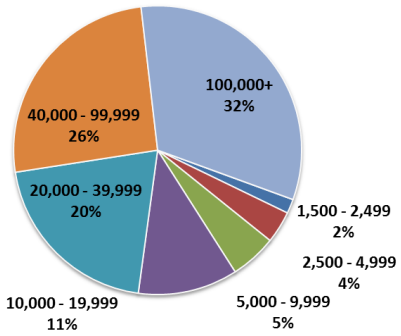
Firms in this sector are primarily engaged in manufacturing search, detection, navigation, guidance, aeronautical, and nautical systems and instruments. Products include radar and sonar systems, flight and navigation sensors, transmitters, and displays. It is one of the largest aviation categories with 2,231 United States firms of which 250 are located in Peer Airport regions and 12 firms in the Winston-Salem/Greensboro area. The sector's diversity is reflected in a broad disaggregation of employment sizes. The majority of the sector's firms employ between 10 to 50 workers and over 50 percent of the firms occupy facilities larger than 40,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **381201** | **Aerospace Industry Manufacturers** | **2,231** | **250** | **12** |

**Firm Employment**
**Aerospace Industry Mfrs (SIC 381201)**




**Firm Facility Size (sf)**
**Aerospace Industry Mfrs (SIC 381201)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Advanced Integration Tech** | St Augustine | FL | 10 | 20,000 - 39,999 | $1,764 | Single Loc |
| **Axon Products** | Greenville | SC | 40 | 40,000 - 99,999 | $6,958 | Single Loc |
| **Kaman Aerospace Corp** | Jacksonville | FL | 250 | 100,000+ | $30,010 | Branch |
| **Mountain Aerospace Inc** | Broomfield | CO | 5 | 10,000 - 19,999 | $1,333 | Single Loc |
| **Orbital ATK** | Gilbert | AZ | 400 | 100,000+ | $128,955 | Branch |

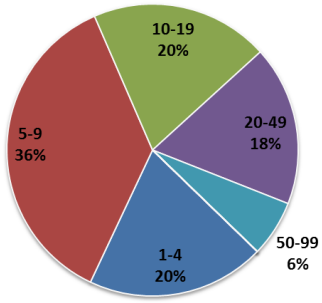
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aerospace Industry Manufacturers |
| **Company** | Champion Aerospace |
| **Location** | Liberty, South Carolina |
| **Employment** | 250 |
| **Facility** | 100,000+ s.f. |
| **Description** | Champion Aerospace is a supplier of aerospace ignition systems and airframe components at the Liberty, S.C., manufacturing facility where it maintains its headquarters. |

## Air Cargo Services
## SIC 451202

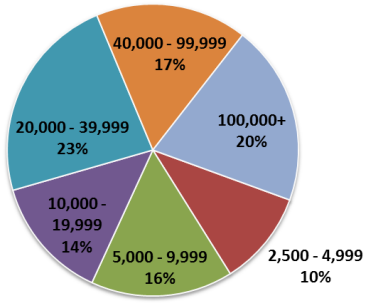
Firms in this sector are primarily engaged in the air transportation of packages, parcels, and other forms of cargo on both scheduled and non-scheduled basis. It is one of the largest aviation categories with 2,702 United States firms of which 96 are located in Peer Airport regions and another 12 firms in the Winston-Salem/Greensboro area. The sector's diversity is reflected in a broad disaggregation of employment sizes that tend to smaller scale. The majority of the sector's firms employ fewer than 20 workers and over 50 percent of the firms occupy facilities smaller than 40,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **451202** | **Air Cargo Services** | **2,702** | **96** | **12** |

**Firm Employment**
**Air Cargo Service (SIC 451202)**




**Firm Facility Size (sf)**
**Air Cargo Service (SIC 451202)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Advanced Integration Tech** | St Augustine | FL | 10 | 20,000 - 39,999 | $1,764 | Single Loc |
| **Distribution By Air** | Littleton | CO | 8 | 5,000 - 9,999 | $6,409 | Single Loc |
| **Mach 1 Air Svc** | Coppell | TX | 20 | 100,000+ | $14,245 | Single Loc |
| **Quantem Aviation Services** | Jacksonville | FL | 50 | 100,000+ | $31,678 | Single Loc |
| **Tailwind International Inc** | Addison | TX | 12 | 20,000 - 39,999 | $8,547 | Single Loc |

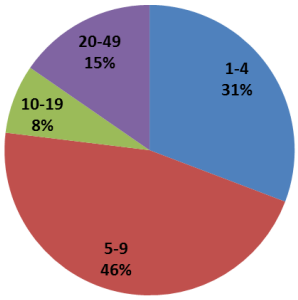
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Air Cargo Services |
| **Company** | Freedom Freight Service |
| **Location** | Jacksonville, Florida |
| **Employment** | 15 |
| **Facility** | 10,000 – 19,000 s.f. |
| **Description** | Freedom Freight Service provides parcel air transportation and logistical linkages. |

## Aircraft Ground Support & Service Equipment
## SIC 458101

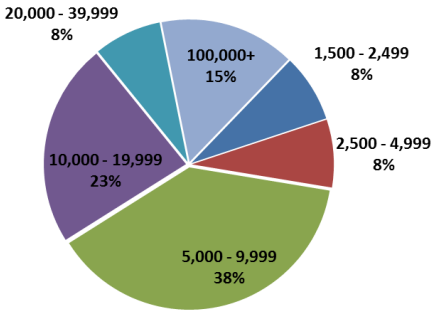
Firms in this sector are primarily engaged in operating and maintaining airports and flying fields and in furnishing coordinated handling services for airfreight or passengers at airports. This sector has 169 United States firms of which 13 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The sector is dominated by smaller firms with more than 50 percent having fewer than 20 employees and facilities of less than 20,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458101** | **Aircraft Ground Support & Service Equipment** | **169** | **13** | **0** |

**Firm Employment**
**Aircraft Ground Service Equip (SIC 458101)**




**Firm Facility Size (sf)**
**Aircraft Ground Service Equip (SIC 458101)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **GAT Airline Ground Support** | Jacksonville | FL | 25 | 100,000+ | $3,600 | Branch |
| **Global Aviation Svc** | Phoenix | AZ | 4 | 10,000 - 19,999 | $539 | Branch |
| **Parisa Travel** | Plano | TX | 1 | 5,000 - 9,999 | $152 | Single Loc |
| **Pegasus Flight Support** | Addison | TX | 9 | 10,000 - 19,999 | $1,596 | Single Loc |
| **Western Air Crews Intl LLC** | Mesa | AZ | 10 | 5,000 - 9,999 | $1,348 | Single Loc |

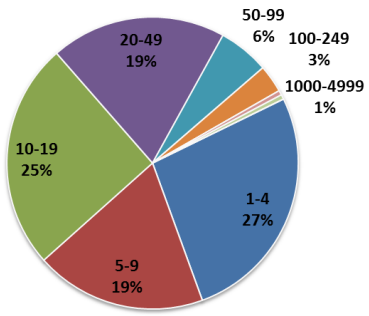
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Ground Support & Service Equipment |
| **Company** | Business Air Management |
| **Location** | Denton, Texas |
| **Employment** | 5 |
| **Facility** | 10,000 – 19,999 s.f. |
| **Description** | Business Air Management offers executive lounge, conference room, pilot lounge, and weather and flight planning station services. |

## Aircraft Servicing and Maintenance
## SIC 458104

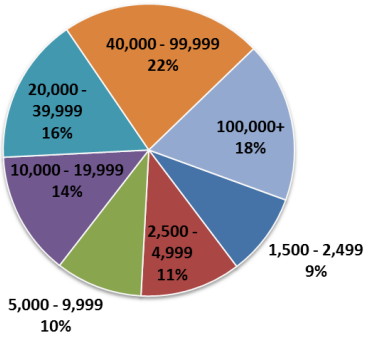
Establishments primarily engaged in operating and maintaining airports and flying fields; in servicing, repairing (except on a factory basis), maintaining, and storing aircraft; and in furnishing coordinated handling services for airfreight or passengers at airports. This sector is extraordinarily large with 2,926 United States firms of which 198 are located in Peer Airport regions and 11 in the Winston-Salem/Greensboro area. The sector is dominated by smaller firms with nearly 50 percent having fewer than 10 employees and facilities of less than 40,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458104** | **Aircraft Servicing and Maintenance** | **2,926** | **198** | **11** |

**Firm Employment**
**Aircraft Service & Maintenance (SIC 458104)**




**Firm Facility Size (sf)**
**Aircraft Service & Maintenance (SIC 458104)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Applied Aerodynamics Inc** | Dallas | TX | 67 | 40,000 - 99,999 | $11,877 | Single Loc |
| **Greenville Jet Center** | Greenville | SC | 24 | 100,000+ | $3,391 | Single Loc |
| **Ross Denver Air LLC** | Broomfield | CO | 25 | 100,000+ | $4,135 | Single Loc |
| **Servisair** | Denver | CO | 100 | 100,000+ | $9,946 | Branch |
| **Sky Harbor Aviation** | Jacksonville | FL | 15 | 40,000 - 99,999 | $2,160 | Single Loc |

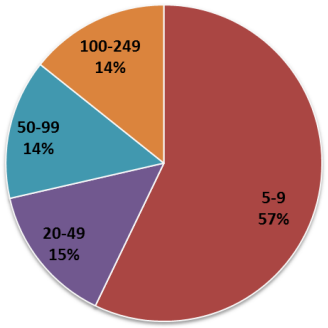
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Servicing and Maintenance |
| **Company** | TAC Air Company |
| **Location** | Greenville, South Carolina |
| **Employment** | 26 |
| **Facility** | 20,000 - 39,999 |
| **Description** | TAC Air Company is an aviation services provider focusing on traditional fixed base operation (FBO) services for all segments of aviation, including general aviation, military/government, and commercial air carriers. |

## Aircraft Storage
## SIC 458105

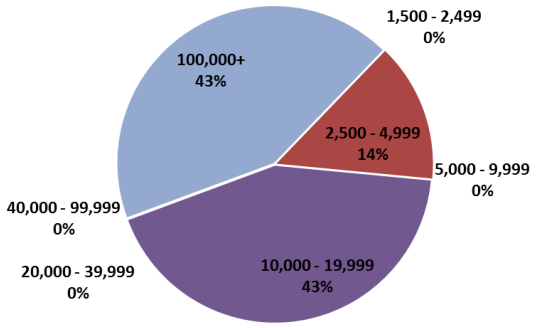
Firms in this sector are primarily engaged in maintaining, and storing aircraft; and in furnishing coordinated handling services for airfreight or passengers at airports. This sector has 76 United States firms of which 7 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The sector is dominated by firms having fewer than 10 employees but typically with very large facilities, with 43 percent being larger than 100,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458105** | **Aircraft Storage** | **76** | **7** | **0** |

**Firm Employment**
**Aircraft Storage (SIC 458105)**




**Firm Facility Size (sf)**
**Aircraft Storage (SIC 458105)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Ambassador Jet Center** | Dallas | TX | 8 | 10,000 - 19,999 | $1,584 | Single Loc |
| **Island Aviation Inc** | Fernandina Beach | FL | 6 | 2,500 - 4,999 | $574 | Single Loc |
| **Ross Aviation** | Scottsdale | AZ | 50 | 100,000+ | $6,738 | Branch |
| **Texas Jet Inc** | Fort Worth | TX | 30 | 100,000+ | $4,575 | Single Loc |
| **United Air Temp** | Jacksonville | FL | 6 | 10,000 - 19,999 | $864 | Single Loc |

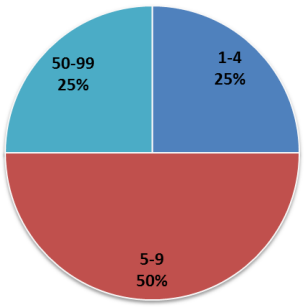
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Storage |
| **Company** | Addison Airport-Hangar Rental |
| **Location** | Addison, Texas |
| **Employment** | 8 |
| **Facility** | 10,000 – 19,999 s.f. |
| **Description** | Addison Airport-Hangar Rental offers hangar storage of small single and twin-engine aircraft. |

## Aircraft Upholsterers
## SIC 458107

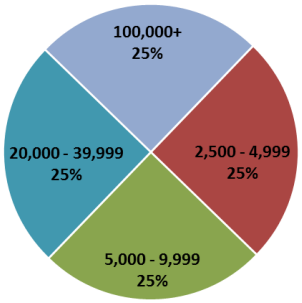
Firms in this sector are primarily engaged in the specialty of the customization and renewal of aircraft interiors especially fabrics and leather appointments. The specialized nature of this sector is reflected in its sparseness with only 33 United States firms of which just 4 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The small size of the sector makes scale distribution analysis problematic and lacking in clear differentiation.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458107** | **Aircraft Upholsters** | **33** | **4** | **0** |

**Firm Employment**
**Aircraft Upholsterers (SIC 458107)**




**Firm Facility Size (sf)**
**Aircraft Upholsterers (SIC 458107)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Arizona Aircraft Interior** | Mesa | AZ | 8 | 20,000 - 39,999 | $1,078 | Single Loc |
| **Greiner Purtec** | Fort Worth | TX | 60 | 100,000+ | $9,150 | Single Loc |
| **JBS Interiors** | Carrollton | TX | 6 | 5,000 - 9,999 | $1,064 | Single Loc |
| **Scott's Pro Upholstery** | Jacksonville | FL | 1 | 2,500 - 4,999 | $144 | Single Loc |

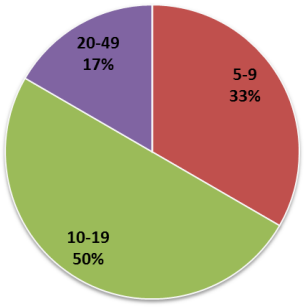
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Upholsterers |
| **Company** | Global Aircraft Interiors |
| **Location** | Ronkonkoma, New York |
| **Employment** | 10 |
| **Facility** | 40,000 – 99,999 s.f. |
| **Description** | Global Aircraft Interiors performs aircraft interior customizations for corporate and business aviation clients. |

## Helicopter Maintenance
## SIC 458108

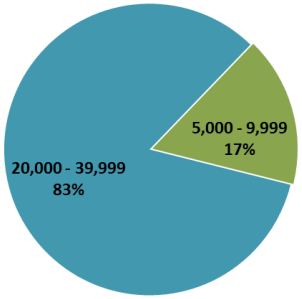
Firms in this sector are primarily engaged in maintaining rotor aircrafts. The specialized nature of this sector is reflected in its sparseness with only 32 United States firms of which just 6 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The small size of the sector makes scale distribution analysis problematic and lacking in clear differentiation.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458107** | **Helicopter Maintenance** | **32** | **6** | **0** |

**Firm Employment**
**Helicopter Maintenance (SIC 458108)**




**Firm Facility Size (sf)**
**Helicopter Maintenance (SIC 458108)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aero Tech Svc** | Addison | TX | 10 | 20,000 - 39,999 | $1,773 | Single Loc |
| **IAC Ltd** | Fort Worth | TX | 12 | 20,000 - 39,999 | $1,830 | Single Loc |
| **Phoenix Heliparts** | Mesa | AZ | 20 | 20,000 - 39,999 | $2,695 | Single Loc |
| **Tempco** | Aubrey | TX | 5 | 5,000 - 9,999 | $614 | Single Loc |
| **Uniflight LLC** | Grand Prairie | TX | 14 | 20,000 - 39,999 | N/A | Subsidiary |

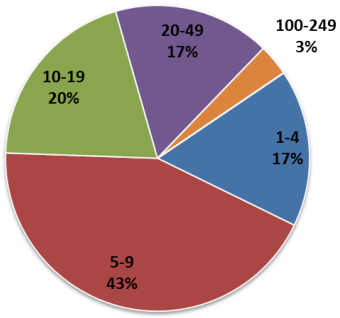
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Helicopter Maintenance |
| **Company** | Helicopter Accessory Service East |
| **Location** | Pensacola, Florida |
| **Employment** | 10 |
| **Facility** | 20,000 – 39,999 s.f. |
| **Description** | Helicopter Accessory Service East specializes in maintenance services for hydraulic accessories fitted to Bell, Sikorsky, and Eurocopter helicopters including servos, pumps, dampers, valves and filter units. |

## Airline Support Services
## SIC 458111

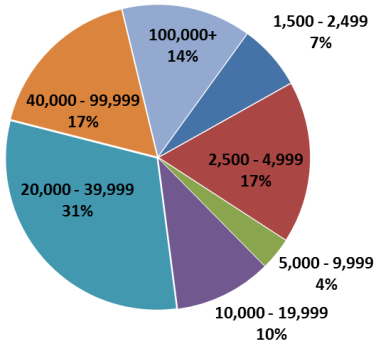
Firms in this sector are primarily engaged in a broad array of airline service provision at airports. This sector has a large and diversified set of firms and activities with 452 United States firms of which 29 are located in Peer Airport regions but only a single firm – Dakota Aviation Services - in the Winston-Salem/Greensboro area. The sector is dominated by smaller firms, with more than 63 percent having fewer than 20 employees and facilities of less than 20,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458111** | **Airline Support Services** | **452** | **29** | **1** |

**Firm Employment**
**Airline Support Services (SIC 458111)**




**Firm Facility Size (sf)**
**Airline Support Services (SIC 458111)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aviation Solutions** | Plano | TX | 3 | 20,000 - 39,999 | $455 | Single Loc |
| **Lemac Aviation** | Mesa | AZ | 8 | 20,000 - 39,999 | $1,078 | Single Loc |
| **Sandpiper Aviation** | Fort Worth | TX | 6 | 10,000 - 19,999 | $915 | Single Loc |
| **Sibran Properties LLC** | Phoenix | AZ | 8 | 2,500 - 4,999 | $1,078 | Single Loc |
| **Strom Aviation Inc** | Fort Worth | TX | 6 | 20,000 - 39,999 | $736 | Single Loc |
| **Swissport Fueling Inc** | Phoenix | AZ | 7 | 2,500 - 4,999 | $944 | Branch |

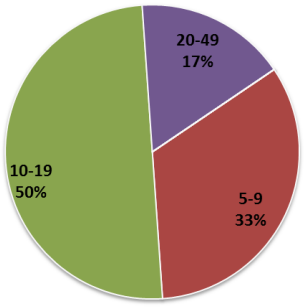
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Airline Support Services |
| **Company** | Konfara Company |
| **Location** | Scottsdale, Arizona |
| **Employment** | 22 |
| **Facility** | 40,000 – 99,999 s.f. |
| **Description** | Konfara Company is an aviation support provider specializing in ground and cargo handling, passenger handling, and mail operations. |

## Aircraft Hangars Rental & Sales
## SIC 458112

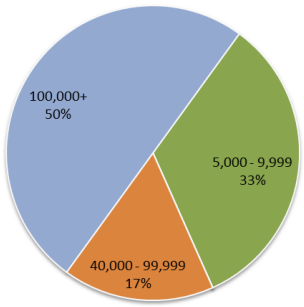
This sector consists of firms primarily engaged in operating and maintaining hangar facilities for maintaining, and storing aircraft. This sector is relatively limited with 48 United States firms of which 6 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The sector is dominated by small employer firms with large facilities, with 50 percent larger than 100,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458112** | **Aircraft Hangars Rental & Sales** | **48** | **6** | **0** |

**Firm Employment**
**Aircraft Hangars Rentals/Sales (SIC 458112)**




**Firm Facility Size (sf)**
**Aircraft Hangars Rentals/Sales (SIC 458112)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Horizon Air Group** | Dallas | TX | 10 | 100,000+ | $1,773 | Single Loc |
| **Jet Linx** | Scottsdale | AZ | 8 | 5,000 - 9,999 | $1,078 | Single Loc |
| **Jet Linx** | Englewood | CO | 12 | 100,000+ | $1,685 | Single Loc |
| **Jet Linx** | Dallas | TX | 10 | 100,000+ | $1,773 | Single Loc |
| **Jet Linx** | Fort Worth | TX | 6 | 5,000 - 9,999 | $915 | Single Loc |

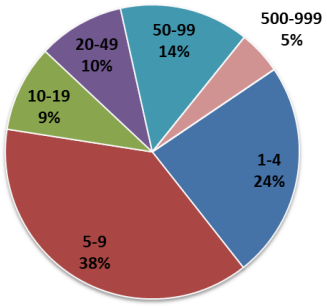
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Hangars Rental & Sales |
| **Company** | Richardson Aviation |
| **Location** | Fort Worth, Texas |
| **Employment** | 41 |
| **Facility** | 40,000 – 99,999 s.f. |
| **Description** | Richardson Aviation is an aviation support provider specializing in ground and cargo handling, passenger handling, and mail operations. |

## Aircraft Avionics Sales & Service
## SIC 508817

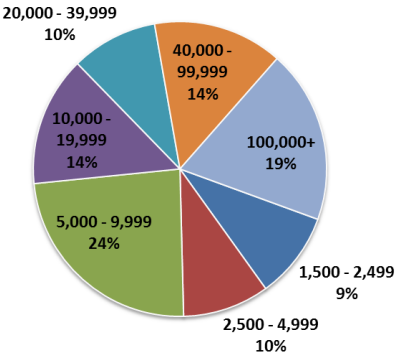
This sector consists of firms primarily in the wholesale distribution of transportation equipment and supplies. This sector has 136 United States firms of which 17 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The sector is has a wide range of sizes, with 50 percent of the firms employing more 20 and occupying more than 20,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **508817** | **Aircraft Avionics Sales & Service** | **136** | **17** | **0** |

**Firm Employment**
**Aircraft Avionics Sales/Service (SIC 508817)**




**Firm Facility Size (sf)**
**Aircraft Avionics Sales/Service (SIC 508817)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aviation Communication** | Phoenix | AZ | 310 | 100,000+ | $502,714 | Single Loc |
| **Fieldtech Avionics & Instrs** | Fort Worth | TX | 50 | 100,000+ | $100,987 | Single Loc |
| **Freedom Air Avionics** | Broomfield | CO | 10 | 40,000 - 99,999 | $17,117 | Single Loc |
| **LSI Inc** | Jacksonville | FL | 500 | 100,000+ | $853,870 | Single Loc |
| **Million Air** | Addison | TX | 85 | 100,000+ | $180,201 | Branch |
| **Panasonic Avionics Corp** | Coppell | TX | 31 | 40,000 - 99,999 | $65,721 | Branch |
| **Simtek Inc** | Euless | TX | 60 | 40,000 - 99,999 | $121,184 | Single Loc |

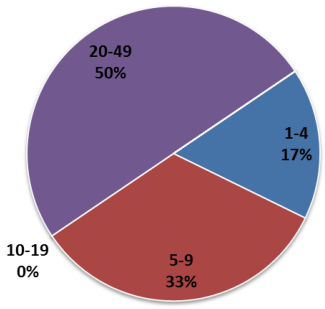
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Avionics Sales & Service |
| **Company** | Simtek Inc |
| **Location** | Euless, Texas |
| **Employment** | 60 |
| **Facility** | 40,000 - 99,999 |
| **Description** | Simtek, Inc. is a manufacturer of simulated instruments, displays and control panels used in commercial and military flight simulators and training devices. |

## Aircraft Engines (Wholesalers)
## SIC 508819

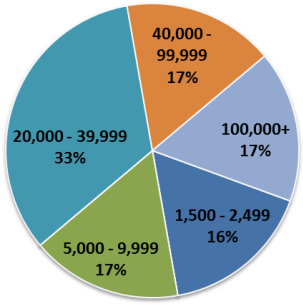
The sector consists of establishments primarily engaged in the wholesale distribution of aviation transportation equipment and supplies. This sector is relatively limited with 49 United States firms of which 6 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The sector is dominated by small employer firms with large facilities, with 50% larger than 100,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **508819** | **Aircraft Engines (Wholesalers)** | **49** | **6** | **0** |

**Firm Employment**
**Aircraft Engines (Whls) (SIC 508819)**




**Firm Facility Size (sf)**
**Aircraft Engines (Whls) (SIC 508819)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aeromaritime America** | Mesa | AZ | 26 | 100,000+ | $42,164 | Single Loc |
| **Aircraft Engine Specialist** | Chandler | AZ | 30 | 40,000 - 99,999 | $48,650 | Single Loc |
| **Cherokee Products Inc** | Fort Worth | TX | 3 | 1,500 - 2,499 | $6,060 | Single Loc |
| **G E AVIATION Materials LP** | Grand Prairie | TX | 6 | 20,000 - 39,999 | $12,721 | Single Loc |
| **Smithwest** | Tempe | AZ | 5 | 5,000 - 9,999 | $8,109 | Single Loc |

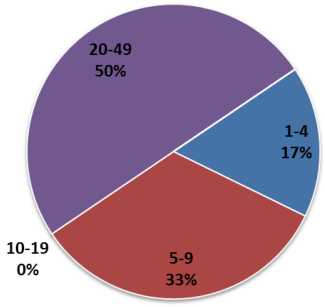
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Engines (Wholesalers) |
| **Company** | Magellan Aerospace Turbine |
| **Location** | Glendale, Arizona |
| **Employment** | 45 |
| **Facility** | 20,000 - 39,999 s.f. |
| **Description** | Magellan Aerospace Corporation is a manufacturer of aerospace systems and components. Magellan also repairs and overhauls, tests, and provides aftermarket support services for engines, and engine structural components. |

## Aviation Fuel (Wholesalers)
## SIC 517223

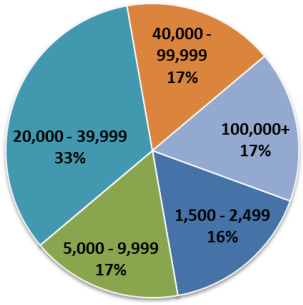
The sector consists of establishments primarily engaged in the wholesale distribution of aviation fuel. This sector is an active one 121 United States firms of which 6 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The sector is dominated by modest scale firms with none larger than 50 employees, while the facility sizes varied widely.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **517223** | **Aviation Fuel (Whls)** | **121** | **6** | **0** |

**Firm Employment**
**Aircraft Engines (Whls) (SIC 508819)**




**Firm Facility Size (sf)**
**Aircraft Engines (Whls) (SIC 508819)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aero Teams** | Tempe | AZ | 7 | 20,000 - 39,999 | $95,700 | Single Loc |
| **Aircraft Services Intl Group** | Denver | CO | 40 | 100,000+ | $310,384 | Branch |
| **AV Serve** | Greenville | SC | 3 | 2,500 - 4,999 | $33,393 | Single Loc |
| **Jacksonville Jet Port** | Jacksonville | FL | 25 | 40,000 - 99,999 | $3,600 | Single Loc |
| **Talon Industries Inc** | Arlington | TX | 5 | 10,000 - 19,999 | $64,813 | Single Loc |
| **TWS Aviation Fuel Systems** | Watkins | CO | 6 | 10,000 - 19,999 | $46,592 | Single Loc |

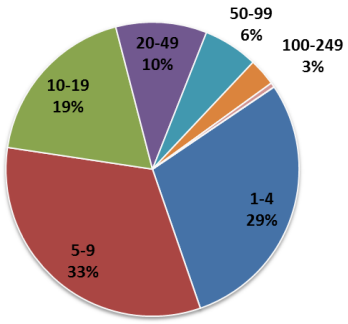
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aviation Fuel (Wholesalers) |
| **Company** | Allied Aviation |
| **Location** | Floral Park, New York |
| **Employment** | 50 |
| **Facility** | 10,000 – 19,999 |
| **Description** | Allied Aviation is an independently owned and operated company whose core business is providing fueling services for the commercial aviation industry at some of the largest airports in the United States. |

## Aircraft Equipment Parts & Supplies
## SIC 559908

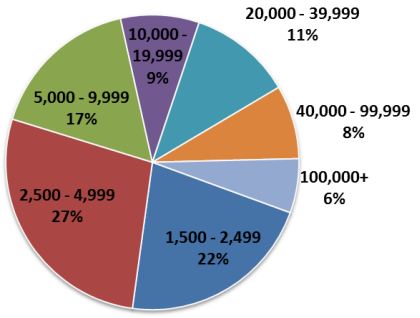
The establishments in this sector are primarily engaged in the retail sale of aircraft equipment part and supplies. This sector is a large and diversified set of firms with 1,768 United States firms of which 202 are located in Peer Airport regions and 5 in the Winston-Salem/Greensboro area. The sector is dominated by small-to-modest scale firms with the majority employing fewer than 10 and occupying facilities smaller than 10,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **559908** | **Aircraft Equipment Parts & Supplies** | **1,768** | **202** | **5** |

**Firm Employment**
**Aircraft Equipment Parts (SIC 559908)**




**Firm Facility Size (sf)**
**Aircraft Equipment Parts (SIC 559908)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Av-Ex Aviation Excellence** | Irving | TX | 20 | 40,000 - 99,999 | $7,836 | Single Loc |
| **KRN Aviation Svc** | Chandler | AZ | 18 | 2,500 - 4,999 | $12,041 | Single Loc |
| **Team JAS** | Jacksonville | FL | 50 | 40,000 - 99,999 | $16,710 | Single Loc |
| **Van Bortel Aircraft Inc** | Arlington | TX | 40 | 20,000 - 39,999 | $14,136 | Single Loc |
| **W G Henshen Co** | Scottsdale | AZ | 20 | 10,000 - 19,999 | $13,379 | Single Loc |

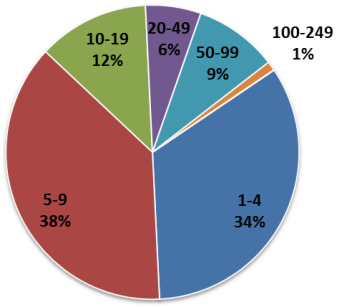
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Equipment Parts & Supplies |
| **Company** | Weatherford Aerospace |
| **Location** | Weatherford, Texas |
| **Employment** | 33 |
| **Facility** | 40,000 - 99,999 |
| **Description** | Weatherford Aerospace performs machining and fabrication for aviation and aerospace applications. |

## Aircraft Charter Rental & Leasing
## SIC 735939

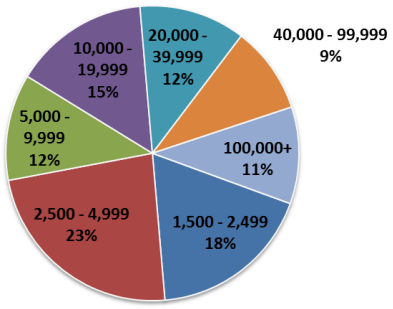
The establishments in this sector are primarily engaged in renting or leasing of aircraft and the provision of charter aircraft services. This sector is a large and diversified set of firms with 1,626 United States firms, of which 98 are located in Peer Airport regions and 4 in the Winston-Salem/Greensboro area. The sector is dominated by small-to-modest scale firms with the majority employing fewer than 10 and occupying facilities smaller than 10,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **735939** | **Aircraft Charter Rental & Leasing** | **1,626** | **98** | **4** |

**Firm Employment**
**Aircraft Charter/Rental/Lease (SIC 735939)**




**Firm Facility Size (sf)**
**Aircraft Charter/Rental/Lease (SIC 735939)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Airwest Helicopters** | Glendale | AZ | 25 | 10,000 - 19,999 | $6,052 | Single Loc |
| **Pinnacle Air Charter** | Scottsdale | AZ | 12 | 20,000 - 39,999 | $2,905 | Single Loc |
| **RVR Aviation** | Arlington | TX | 20 | 20,000 - 39,999 | $6,073 | Single Loc |
| **Sawyer Charter Svc** | Scottsdale | AZ | 10 | 40,000 - 99,999 | $2,421 | Single Loc |
| **Sky Helicopters** | Garland | TX | 12 | 10,000 - 19,999 | $3,656 | Single Loc |

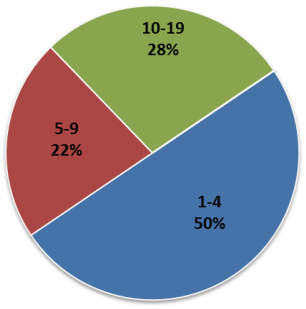
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Charter Rental & Leasing |
| **Company** | Middle River Aviation |
| **Location** | Baltimore, Maryland |
| **Employment** | 15 |
| **Facility** | 20,000 - 39,999 |
| **Description** | Middle River Aviation offers the area's largest fleet of rental aircraft, ranging from two seat trainers to high performance, cross country travelers for day trips and tours. |

## Fight Aircraft Instruction
## SIC 829943

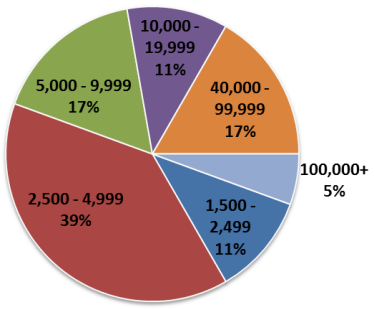
The establishments in this sector are primarily engaged in offering flight training and educational courses and services. This sector is widely distributed with 261 United States firms of which 18 are located in Peer Airport regions but none in the Winston-Salem/Greensboro area. The sector is dominated by small firms with the majority employing fewer than 10 people and occupying facilities smaller than 10,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **829943** | **Fight Aircraft Instruction** | **261** | **18** | **0** |

**Firm Employment**
**Fight Aircraft Instruction (SIC 829943)**




**Firm Facility Size (sf)**
**Fight Aircraft Instruction (SIC 829943)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Alliance Flight Training** | Watkins | CO | 7 | 2,500 - 4,999 | N/A | Single Loc |
| **Flight Safety Intl Inc** | Denver | CO | 5 | 2,500 - 4,999 | N/A | Single Loc |
| **Flight Training** | Denver | CO | 3 | 2,500 - 4,999 | N/A | Single Loc |
| **Panam Academy** | Denver | CO | 4 | 5,000 - 9,999 | N/A | Branch |
| **Plus 5 Aviation LLC** | Phoenix | AZ | 2 | 1 - 1,499 | N/A | Single Loc |
| **Sawyer Aviation** | Scottsdale | AZ | 10 | 40,000 - 99,999 | N/A | Single Loc |
| **Slipstream Aviation** | Dallas | TX | 4 | 1,500 - 2,499 | N/A | Single Loc |

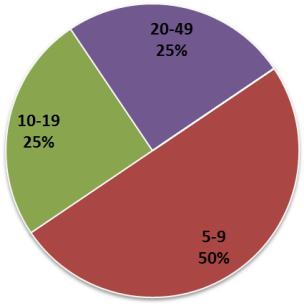
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Flight Aircraft Instruction |
| **Company** | Alliance Flight Training |
| **Location** | Watkins, Colorado |
| **Employment** | 7 |
| **Facility** | 2,500 – 4,999 |
| **Description** | Alliance Flight Training provides FAA-certification pilot instruction from its flight school office located in Watkins, Colorado at Front Range Airport. |

## Aircraft Management Services
## SIC 874109

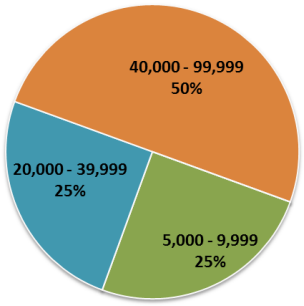
The establishments in this sector are primarily engaged in furnishing specialized administrative management services on a day-to-day basis and on a contract or fee basis to clients in the aviation sector. This sector is a small and specialized set of firms with 48 United States firms, of which 4 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The sector is dominated by small-to-modest scale firms with the majority employing fewer than 10 people yet occupy significant facilities with 50% in facilities between 40,000 and 100,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **874109** | **Aircraft Management Services** | **48** | **4** | **0** |

**Firm Employment**
**Aircraft Management Services (SIC 874109)**




**Firm Facility Size (sf)**
**Aircraft Management Services (SIC 874109)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **All-Star Aviation Svc** | Dallas | TX | 5 | 20,000 - 39,999 | $887 | Single Loc |
| **Avmax Montana Inc** | Jacksonville | FL | 6 | 5,000 - 9,999 | $879 | Single Loc |
| **Broadie's Aircraft** | Fort Worth | TX | 20 | 40,000 - 99,999 | $2,643 | Single Loc |
| **Coffman Co** | Scottsdale | AZ | 10 | 40,000 - 99,999 | $1,457 | Single Loc |

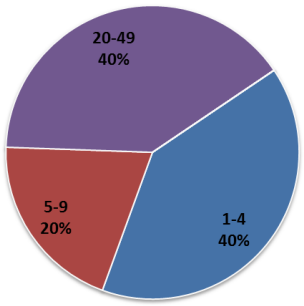
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aircraft Management Services |
| **Company** | Coffman Company |
| **Location** | Scottsdale, Arizona |
| **Employment** | 10 |
| **Facility** | 40,000 - 99,999 |
| **Description** | Coffman Company provides clients and firms with private and corporate aircraft management services in lieu of in-house flight departments. |

## Aerospace Support Services
## SIC 874402

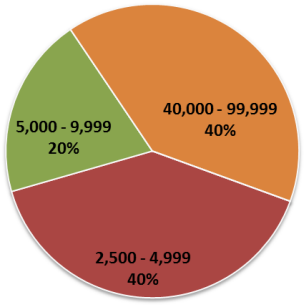
The firms in this sector are primarily engaged in furnishing personnel to perform a range of services in support of the operations of aviation, airline and aerospace establishments or in renting or leasing of aircraft and the provision of charter aircraft services. This sector is small, with 61 United States firms of which 5 are located in Peer Airport regions and none in the Winston-Salem/Greensboro area. The sector is dominated by modest-scale firms, with the majority employing fewer than 10 but the largest share (40%) occupy significant facilities between 40,000 and 100,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **874402** | **Aerospace Support Services** | **61** | **5** | **0** |

**Firm Employment**
**Aerospace Support Services (SIC 874402)**




**Firm Facility Size (sf)**
**Aerospace Support Services (SIC 874402)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aerospace Systems Inc** | Roanoke | TX | 8 | 5,000 - 9,999 | $741 | Single Loc |
| **Dallas Aeronautical Services** | Cedar Hill | TX | 45 | 40,000 - 99,999 | $5,781 | Single Loc |
| **Link Aviation** | Lewisville | TX | 1 | 2,500 - 4,999 | $93 | Single Loc |
| **Rocket Air Supply** | Arlington | TX | 20 | 40,000 - 99,999 | $1,944 | Single Loc |
| **Westar Display Technologies** | Mesa | AZ | 3 | 2,500 - 4,999 | $468 | Branch |

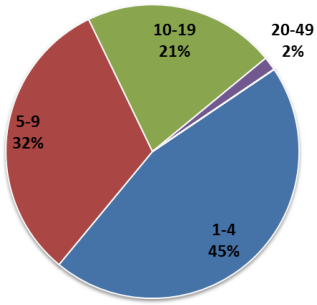
| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aerospace Support Services |
| **Company** | Dallas Aeronautical Services |
| **Location** | Dallas, Texas |
| **Employment** | 45 |
| **Facility** | 40,000 - 99,999 |
| **Description** | Dallas Aeronautical Services specializes in the repair & overhaul of corporate aircraft composites, structures & thrust reversers. |

## Aviation Consultants
## SIC 874822

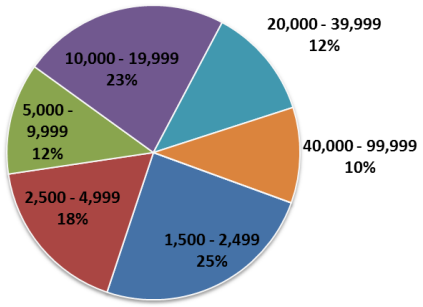
The establishments in this sector are primarily engaged in furnishing business consulting services on a variety of aviation-related issues ranging from aircraft acquisition to fleet management to technical issues in service and production. This sector includes a diversified set of firms with 555 United States firms, of which 6 are located in Peer Airport regions but none in the Winston-Salem/Greensboro area. The sector is dominated by small firms employing fewer than 10 people and a majority of firms occupy facilities smaller than 10,000 square feet.

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **874822** | **Aviation Consultants** | **555** | **66** | **0** |

**Firm Employment**
**Aviation Consultants (SIC 874822)**




**Firm Facility Size (sf)**
**Aviation Consultants (SIC 874822)**




| Peer Area Firm Examples | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Skytech Inc** | Baltimore | MD | 4 | 5,000 - 9,999 | $392 | Single Loc |
| **Special Services Corp** | Greenville | SC | 8 | 2,500 - 4,999 | $603 | Single Loc |
| **Tag One** | Phoenix | AZ | 7 | 5,000 - 9,999 | $785 | Branch |
| **Vector Aerospace** | Grapevine | TX | 11 | 20,000 - 39,999 | $1,111 | Single Loc |
| **Wing Aero Products** | Rowlett | TX | 14 | 5,000 - 9,999 | $2,121 | Single Loc |

| Virtual Portfolio Entry | |
|---|---|
| **Aviation Sector** | Aviation Consultants |
| **Company** | Flight Services & Systems |
| **Location** | Dallas, Texas |
| **Employment** | 10 |
| **Facility** | 10,000 - 19,999 |
| **Description** | Flight Services & Systems provides aviation staffing service and human resource management technology to airports and airlines. |

## Meeting Virtual Portfolio Firm Facilities Needs

The Virtual Portfolio tool enables a calculation and characterization of the physical facilities requirements of the Aviation Cluster Firms to be attracted to the Winston-Salem area. Those requirements can be compared to the currently available inventory of appropriate properties to assess the adequacy of available properties and the priority of planned facilities to the implementation of an Aviation Industry economic development strategy. Such an assessment of the targeted aviation industry cluster sectors identified in the Virtual Portfolio suggests that their individual and collective facility requirements align with the known inventory of available and planned business properties in the relevant vicinity of Smith Reynolds Airport.

## Virtual Portfolio Firm Facility Characteristics

This conclusion was arrived at by querying the Virtual Portfolio Firm data to forecast facility requirements of a successfully implemented Aviation Industry Cluster economic development strategy. This forecast calculated that collectively the targeted 35 Virtual Portfolio firms would require approximately 1.4 million square feet of a mixed inventory of industrial and commercial facilities.

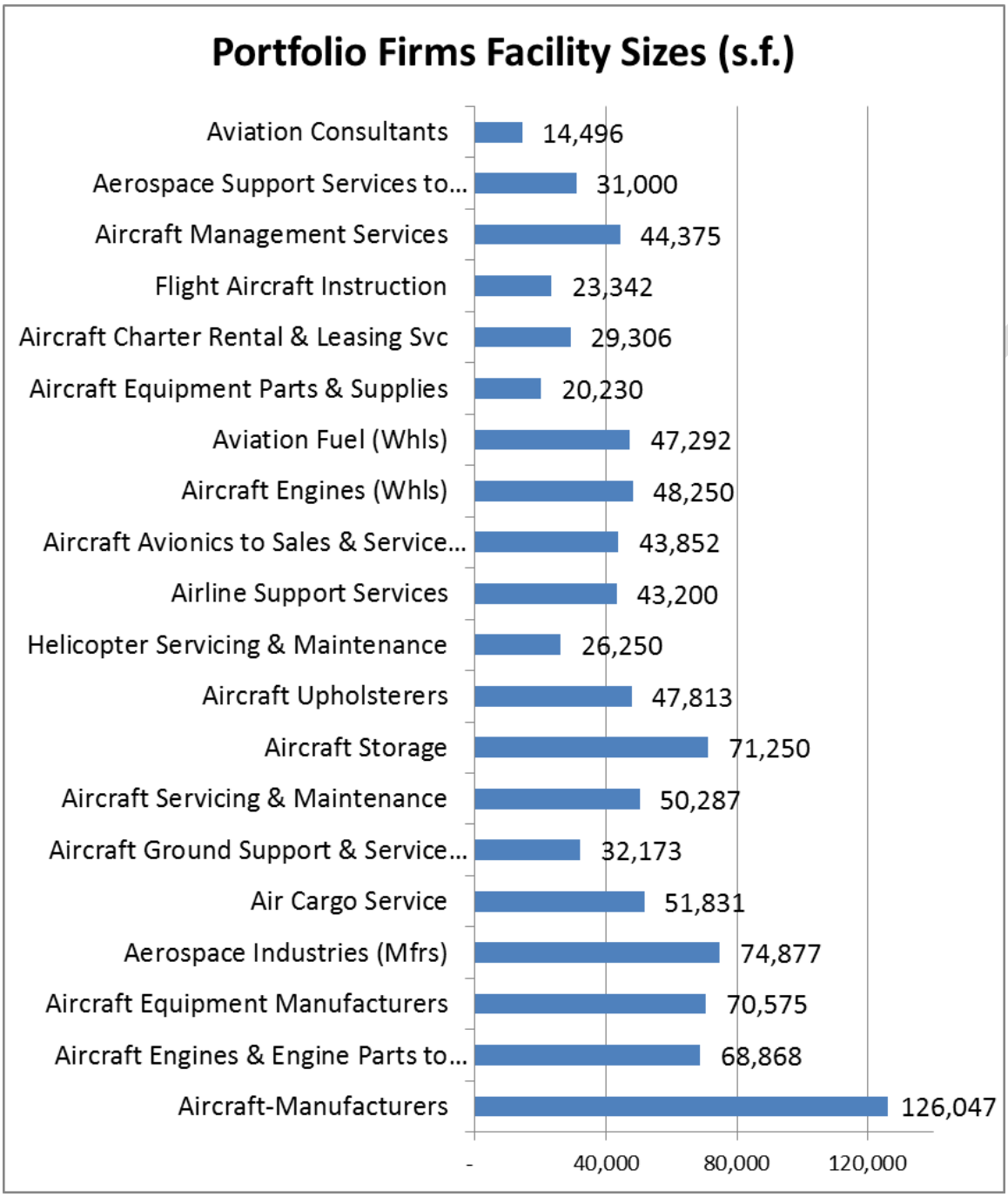
The rarified public image of aviation and aerospace activities can create expectations of exotic or highly specialized physical facility requirements. While some aviation activities may require technically-sophisticated conditions - environmentally controlled environments, high strict measures, access controls - most aviation firm facility requirements parallel those of other, more generic industrial and manufacturing uses. If the facility requirements of the firms constituting the Aviation Industry Virtual Portfolio exhibit any distinctions it is that their status as mostly small headquarters or sole locations of growth-oriented businesses is reflected in a predominant requirement for mixed, flexible industrial and administrative/executive office spaces.

**Aviation Firm Facilities Characteristics**

A summary of the Virtual Portfolio firms' buildings (Figure 26) indicates a need for a diversified spectrum of facilities ranging between 15,000 to 150,000+ square feet that encompasses conventional industrial use characteristics:

- Flex Space that can be used as industrial space (generally as light manufacturing) and including office space
- Manufacturing buildings used for production typically with heights in the range of 13' - 18' with loading docks and grade access
- Hangar/Warehouse/Distribution buildings with large storage and transfer areas, with heights ranging from 20' - 24', loading docks and intermodal transport access
- Office buildings are used for business operations like accounting, insurance, services, etc. These office buildings are further categorized by quality and size including Class A (highest quality or new construction), Class B (older buildings with fewer amenities) and Class C (lowest quality and lowest rents)

**Figure X**

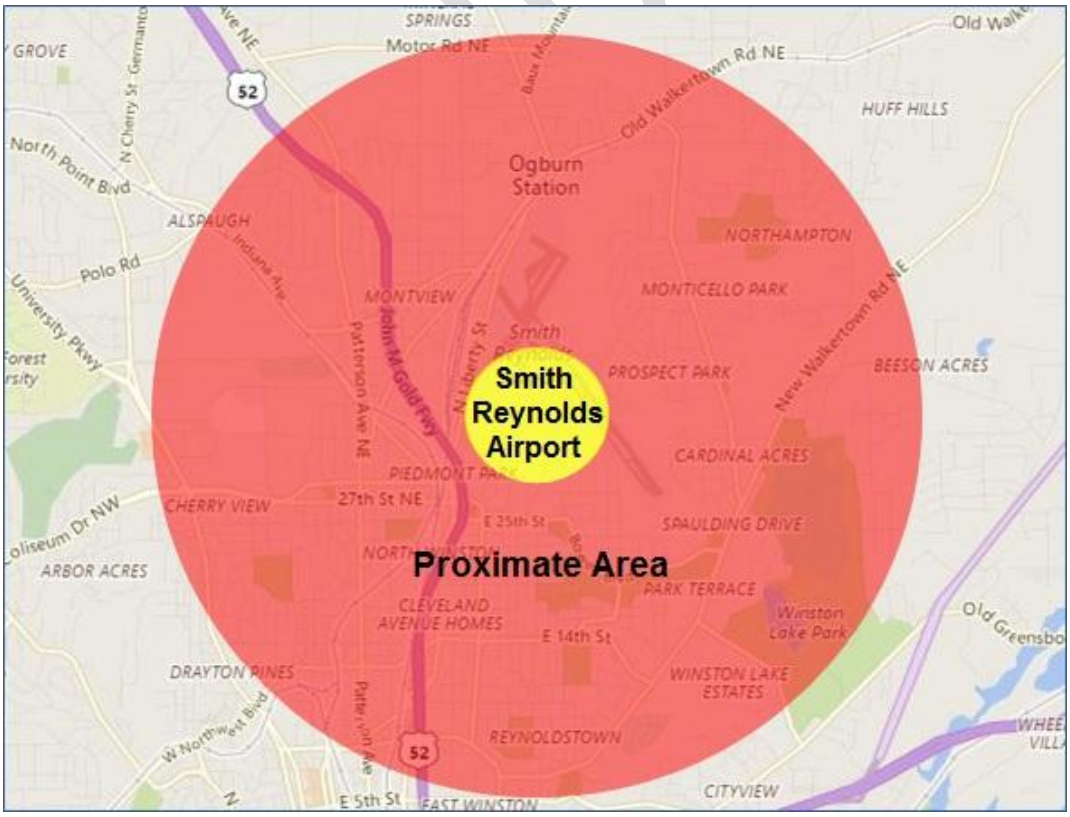

Portfolio Firms Facility Sizes (s.f.)
Aviation Consultants
14,496
Aerospace Support Services to...
31,000
Aircraft Management Services
44,375
Flight Aircraft Instruction
23,342
Aircraft Charter Rental & Leasing Svc
29,306
Aircraft Equipment Parts & Supplies
20,230
Aviation Fuel (Whls)
47,292
Aircraft Engines (Whls)
48,250
Aircraft Avionics to Sales & Service...
43,852
Airline Support Services
43,200
Helicopter Servicing & Maintenance
26,250
Aircraft Upholsterers
47,813
Aircraft Storage
71,250
Aircraft Servicing & Maintenance
50,287
Aircraft Ground Support & Service...
32,173
Air Cargo Service
51,831
Aerospace Industries (Mfrs)
74,877
Aircraft Equipment Manufacturers
70,575
Aircraft Engines & Engine Parts to...
68,868
Aircraft-Manufacturers
126,047
-
40,000
80,000
120,000

## Aviation Firm Facilities Locations

In assessing facility availability for Smith Reynolds Airport-associated aviation development the study defined three location parameters:

- Airside is a codified airport term to describe property – typically within the boundary of the airport itself – that includes all areas accessible to aircraft, including runways, taxiways, apron/ramps, and most hangars.
- Landside is similarly a codified airport term to describe property – also typically within the boundary of the airport itself – that includes areas such as the passenger terminal, parking lots, access roads and immediately adjacent parcels
- Proximate is a study-defined term describing non-airport properties located with a 3-mile radius (Figure 27) of Smith Reynolds Airport. Functionally efficient ground transportation connectivity can enable such locations to provide a virtual air- and landside presence for aviation industry activities

**Figure 24**



**Smith Reynolds Airport Vicinity Available Facilities**

The targeted aviation industry cluster sectors identified in the Virtual Portfolio have facility requirements including airside, landside and proximate locations in a variety of configurations and a range of scales. Those site parameters are well aligned with the inventory of available and planned business properties in the immediate vicinity of Smith Reynolds Airport.

Such properties include:

1. Existing available industrial and commercial properties
2. Brookwood Business Park
3. Planned airport property facilities included in the Smith Reynolds Master Plan
4. The industrial and business properties under development at Whitaker Park

**Existing Available Industrial Properties**

The North Carolina Department of Commerce's ACCESSNC statewide database of available economic development properties was queried to identify Winston-Salem area facilities appropriate to the requirements of the Virtual Portfolio Aviation Cluster firms. The database was searched for building scale and characteristics matches within the Smith Reynolds Airport's Airside, Landside and Proximate (3-mile radius) locales.


Access NC system queries identified 13 currently available properties - ranging from 22,000 to 190,000 square feet - totaling 1,018,778 square feet:

**Figure X**

| Address | Size (sf): | Type | Location |
|---|---|---|---|
| 1. 1100 Fairchild Road | 22,180 | Flex industrial | Proximate |
| 2. 1325 Ivy Avenue | 110,000 | Flex industrial | Proximate |
| 3. 200 Kapp Street | 54,000 | Flex industrial | Proximate |
| 4. 3102 Shorefair Drive | 190,000 | Flex industrial | Proximate |
| 5. 3290 N. Liberty Street | 32,611 | Flex industrial | Landside |
| 6. 3800 Liberty Street | 55,600 | Flex industrial | Landside |
| 7. 3817 North Liberty Street | 33,587 | Manufacturing | Landside |
| 8. 4410 Indiana Avenue | 20,000 | Flex industrial | Proximate |
| 9. 740 Twenty Seventh Street | 90,000 | Industrial, warehouse | Proximate |
| 10. 76 W. 32nd Street | 105,000 | Flex industrial | Proximate |
| 11. 811 E 24th Street | 115,000 | Flex industrial | Proximate |
| 12. 1325 Ivy Ave | 130,000 | Flex industrial | Proximate |
| 13. 4001 N. Liberty Street | 60,800 | Flex industrial, office | Airside |

http://accessnc.nccommerce.com

**Whitaker Park**

Whitaker Park is a 220-acre manufacturing complex recently donated by Reynolds-American to Winston-Salem and Forsyth County. The complex is two miles north of downtown Winston-Salem, directly adjacent to Wake Forest University, and only two miles west of Smith Reynolds Airport. The Whitaker Park Development Authority (WPDA) is redeveloping the properties as a multi-facility industrial complex.

The Whitaker Park complex consists of a number of existing buildings that will be available for uses ranging from light manufacturing to residential to R&D. In addition to the re-use of the existing buildings, vacant property will be available for speculative and build-to-suit opportunities. Design estimates prepared for WPDA indicate that in excess of two (2) million square feet of new space can be built out on developable land.


**Available Facilities**

The available buildings total approximately 1.7 million square feet of a variety of industrial manufacturing and office space:

| Building | Size (sf): | Type | Location |
|---|---|---|---|
| 1. Whitaker Park West: 601-1 | 851,250 | Manufacturing | Proximate |
| 2. Whitaker Park West: 601-11 | 426,800 | Flex industrial | Proximate |
| 3. Whitaker Park East: 605-7/605-10 | 26,450 | Flex industrial | Proximate |
| 4. Whitaker Park East: 605-11 | 95,000 | Flex industrial | Proximate |
| 5. Whitaker Park East: 605-12 | 95,000 | Flex industrial | Proximate |
| 6. Whitaker Park East: 605-13 | 33,587 | Manufacturing | Proximate |
| 7. Whitaker Park East: 605-11, 605-1, 605-13, 130 | 248,513 | Flex industrial | Proximate |
| 8. Whitaker Park East: 630-2 | 50,000 | Industrial laboratory | Proximate |
| 9. Whitaker Park East: 2-1 & 2-2 | 215,325 | Flex industrial | Proximate |

**Brookwood Business Park**

The Brookwood Business Park is approximately 45 acres of city-owned property located near the Smith Reynolds Airport. The park was originally conceived and developed in 2000 as the “Airport Business Park” to attract businesses needing access to air transportation, and for high-tech and medical businesses needing warehouse and distribution facilities.


The land is divided into 9 tracts that are ready for commercial construction and use. The City of Winston-Salem developed a 7,500 square feet light manufacturing “spec” commercial building in 2014 on one of the tracts. In 2016 that building was sold to an entrepreneurial life sciences firm that had originated in the city’s Innovation Quarter and whose growth required larger facilities. The City and Forsyth County collaborated to

construct a Joint Public Safety Firearms & Training facility on another tract. The remaining seven tracts remain available for development.

**Smith Reynolds Airport**

Smith Reynolds Airport itself manages a significant inventory of facilities that serve an important role as locations for firms engaged in aircraft maintenance, repair and overhaul (MRO) operations and a variety of aviation-related industrial and commercial development. The airport's buildings and facilities consist of over 565,000 square feet with a current occupancy rate of 88 percent.

Current Facilities

1. Aircraft Maintenance/Storage Administration (former Piedmont Aviation)
   3820 N. Liberty Street, Winston-Salem NC 27105
   Facilities
   - Total area approximately 8.073 acres
   - Hangar Complex ..... 75,419 s.f.
   - Hangar space ..... 26,298 s.f.
   - Shop space ..... 33,900 s.f.
   - Office space ..... 15,221 s.f.

2. Smith Reynolds Airport Terminal Building
   3801 N. Liberty Street, Winston-Salem NC 27105
   Facilities
   - Professional office space approximately 540 square feet
   - 4 Individual Offices
   - Airline/Charter Space

3. Manufacturing/Storage Facility
   3817 N. Liberty Street Winston-Salem NC 27105
   33,587± s.f. total

- 24,621± s.f. production area
- 7,062± s.f. mezzanine
- 1,904± s.f. office

Available Land for Development

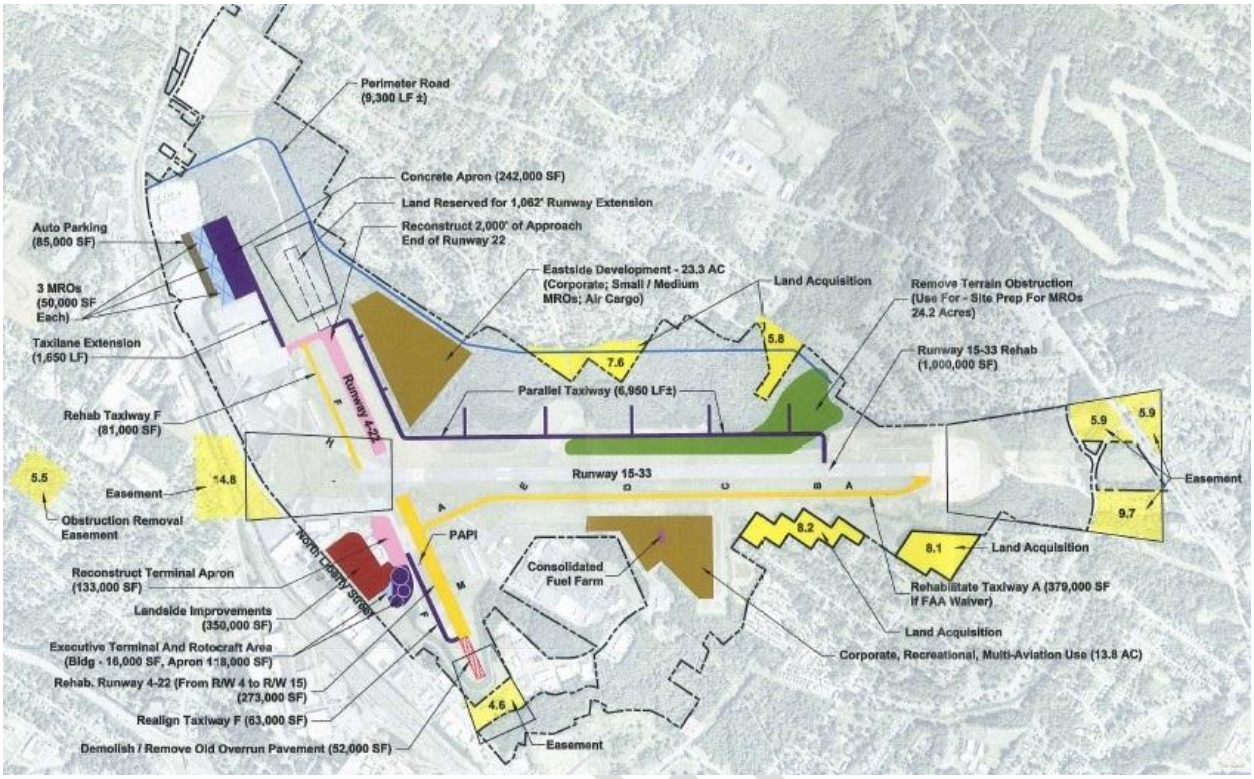
In addition to the other business opportunities, the Airport offers land for commercial development.

1. Smith Reynolds Site 1, Airside, 9.7 acres
2. Smith Reynolds Site 1, Airside, 23 acres
3. Smith Reynolds Site 3, Airside, 75 acres
4. Smith Reynolds Site A, Airside, 14 acres

Masterplan Proposed Facilities

Proposed additional facilities in Master Plan Preferred Option

1. Three hangars that collectively will provide 303,000 square feet of space for additional aviation maintenance, cargo, or other aviation related activities.
    - Two 50,000 square foot hangars which are slated for future MRO facilities
    - One 203,000 square foot hangar for aircraft maintenance
2. A 16,000 square foot executive terminal
3. 13.8 acres of land for the construction of t-hangers, box hangers and additional apron as needed to accommodate aircraft storage for corporate and recreational aircraft
4. 23.3 acres of property that can be used for corporate development, air cargo, and/or small to medium MRO facilities.


Perimeter Road
(9,300 LF ±)
Concrete Apron (242,000 SF)
Land Reserved for 1,062' Runway Extension
Reconstruct 2,000' of Approach
End of Runway 22
Auto Parking
(85,000 SF)
3 MROs
(50,000 SF
Each)
Taxilane Extension
(1,650 LF)
Eastside Development - 23.3 AC
(Corporate; Small / Medium
MROs; Air Cargo)
Land Acquisition
Remove Terrain Obstruction
(Use For - Site Prep For MROs
24.2 Acres)
Runway 15-33 Rehab
(1,000,000 SF)
7.6
5.8
Parallel Taxiway (6,950 LF±)
Rehab Taxiway F
(81,000 SF)
Runway 4-22
5.9
5.9
Easement
5.5
Easement
14.8
Runway 15-33
Obstruction Removal
Easement
PAPI
8.2
8.1
Land Acquisition
Reconstruct Terminal Apron
(133,000 SF)
Consolidated
Fuel Farm
Rehabilitate Taxiway A (379,000 SF
If FAA Waiver)
Landside Improvements
(350,000 SF)
Land Acquisition
Executive Terminal And Rotocraft Area
(Bldg - 16,000 SF, Apron 118,000 SF)
Corporate, Recreational, Multi-Aviation Use (13.8 AC)
Rehab. Runway 4-22 (From R/W 4 to R/W 15)
(273,000 SF)
Realign Taxiway F (63,000 SF)
4.6
Demolish / Remove Old Overrun Pavement (52,000 SF)
Easement

## Virtual Portfolio Facilities Summary

This apparent adequacy of facility supply is an encouraging but not definitive indication that the leveraging the Smith Reynolds Airport for economic development is supported by the prevailing industrial property inventory (Figure 28). There remains significant uncertainty about the condition and appropriateness of the identified existing facilities and the timelines and probabilities of proposed facility development developments at Whitaker Park and at Smith Reynolds Airport itself. Therefore implementation of an Air Commerce economic development strategy will require a detailed evaluation of the status of existing and planned properties to determine their appropriate availability.

**Figure 28**

| Virtual Portfolio Firm Facility Characteristics | | | |
|---|---|---|---|
| **Aviation Cluster Sector** | **Facility Type** | **Size (s.f.)** | **Location** |
| **Aircraft Manufacturers** | Flex, Manufacturing | 100,000+ | Airside, Landside |
| **Aircraft Engines & Engine Parts to Manufacturers** | Flex | 68,868 | Landside, Proximate |
| **Aircraft Equipment Manufacturers** | Flex, Manufacturing | 70,575 | Proximate |
| **Aerospace Industries Manufacturers** | Flex, Manufacturing | 74,877 | Proximate |
| **Air Cargo Service** | Flex, Warehouse | 51831 | Landside, Proximate |
| **Aircraft Ground Support & Service Equip** | Flex | 32,173 | Proximate |
| **Aircraft Servicing & Maintenance** | Flex, Hangar | 50287 | Airside, Landside |
| **Aircraft Storage** | Flex, Hangar | 71,250 | Airside, Landside |
| **Aircraft Upholsterers** | Flex | 47,813 | Proximate |
| **Helicopter Servicing & Maintenance** | Flex, Hangar | 26,250 | Airside, Landside |
| **Airline Support Services** | Flex, Office | 43,200 | Proximate |
| **Aircraft Avionics to Sales & Service (Whls)** | Flex, Office | 43,852 | Proximate |
| **Aircraft Engines (Whls)** | Flex, Warehouse | 48,250 | Landside, Proximate |
| **Aviation Fuel (Whls)** | Flex, Warehouse | 47,292 | Landside |
| **Aircraft Equipment Parts & Supplies** | Flex, Warehouse | 20,230 | Proximate |
| **Aircraft Charter Rental & Leasing** | Flex, Office | 29,306 | Proximate |
| **Flight Aircraft Instruction** | Office | 23,342 | Landside |
| **Aircraft Management Services** | Office | 44,375 | Landside, Proximate |
| **Aerospace Support Services to Technical** | Flex, Office | 31,000 | Proximate |
| **Aviation Consultants** | Office | 14,496 | Proximate |

## Winston-Salem's Business Aviation Opportunity

The second major market opportunity involves attracting businesses from across a variety of industries that could capitalize on Smith Reynolds Airport and other Winston-Salem assets to efficiently deploy/employ people and goods to targeted high-value markets. This category captures the broad array of firms outside the mainstream aviation sectors for which business aviation is critical to the execution of their growth strategies; for example: life sciences, professional services, and information and communication technologies.

As a subset of general aviation, business aviation is commonly defined as the use of general aviation aircraft for business purposes. Business aircraft include helicopters, piston-powered propeller-driven airplanes and turbine-powered turboprops and turbojets. In the future, drone aircraft will likely be added.

While the public image of business aviation may be luxury aircraft shuttling CEO billionaires between international firm locations, the reality is decidedly more inclusive and utilitarian. Only about 3 percent of United States business aircraft are flown by Fortune 500 companies, while the remaining 97 percent are operated by a broad cross-section of organizations, including governments, universities, charitable organizations and businesses – large, medium and small.

United States business aviation is used by 11,000 companies across the spectrum of sectors to efficiently access disparate destinations for a variety of business purposes:

- The majority (85%) of business aircraft users are small and mid-size businesses often based in areas with limited commercial air service
- Business aviation accesses 10 times the number of United States airports (5,000) than are served by commercial airlines (500), giving it much greater geographic reach.
- The majority of business aircraft are modest four-to-six passenger planes flying average trips of less than 1,000 miles

Most business aviation flights involve time-critical trips by sales, technical and middle management employees - rather than “C-Suite” executive travel. The most common use of business aircraft is to transport a company’s own employees to client meetings and regional offices or to bring customers and suppliers to visit company facilities. Business aviation is also used to move time-critical and sensitive documents and cargo between company facilities and externally among suppliers, customers and potential customers.

Broader use of business aviation is constrained by its relative high cost compared to other transportation options, especially for less time-sensitive business categories. But recent and emerging innovative business models are shifting the cost-effectiveness curve downward and increasing the pool of potential business aviation users. Currently most business aircraft are owned by the individuals or smaller companies that fly them. But an increasing share of business aviation is occurring through less expensive arrangements such as chartering, fractional ownership, leasing, and time-share agreements.


Fractional ownership, where multiple owners share the costs of purchasing, leasing and operating aircraft, has been a particularly fertile area of innovative entrepreneurship by firms like NetJets, Flexjet, and Executive AirShare. Most recently, the disruptive automotive transportation firm Uber has turned its sights on air transportation through its “Elevate” concept of urban air taxi service. The collective effect of varying initiatives will be to decrease the cost of business aviation and expand the market of prospective users for which business aviation will provide competitive advantages in a variety of industry sectors.

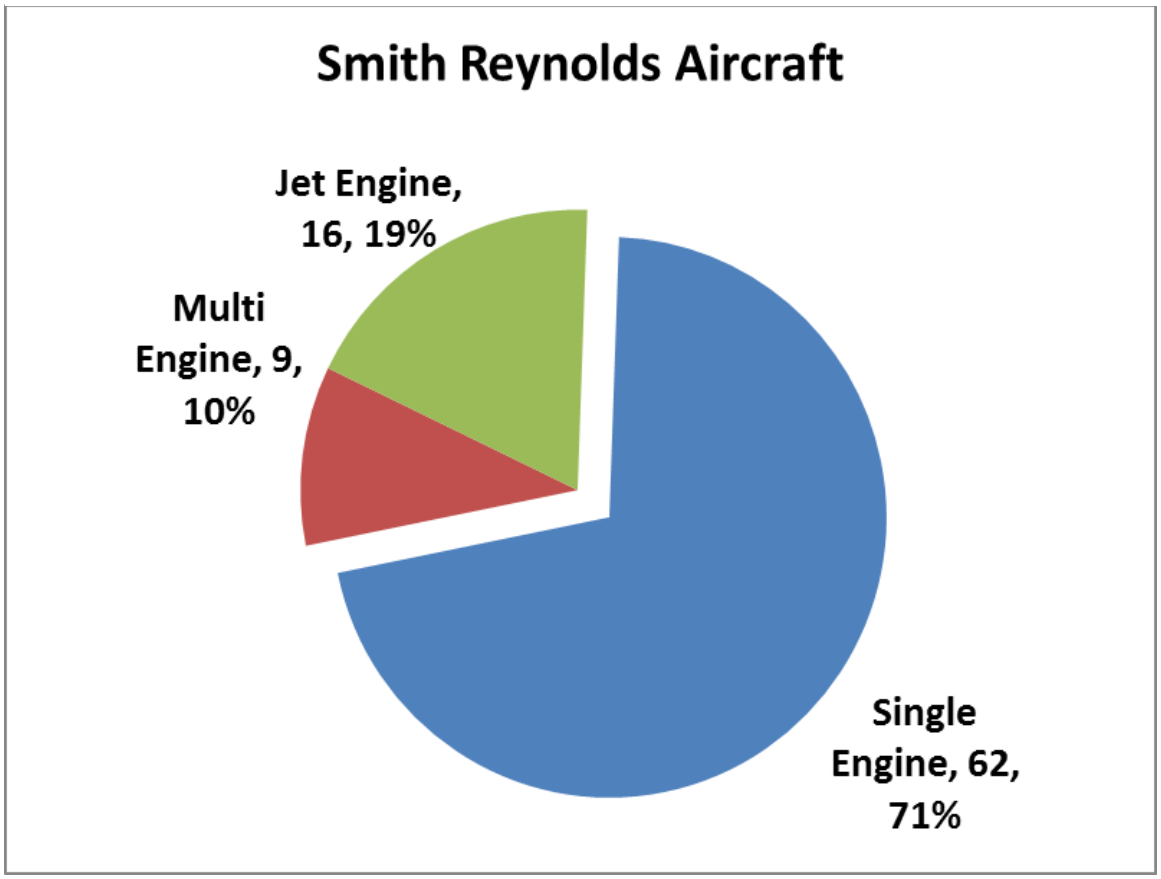
## Winston-Salem's Business Aviation Opportunity

While the cessation of commercial passenger service at Smith Reynolds Airport in 2000 has led to a substantially diminished public profile, the airport remains a potent economic asset in its role as Winston-Salem's base for general and business aviation. The 87 aircraft based at the airport includes numerous business and corporate jets and propeller airplanes. The airport also serves as a prominent portal to the Winston-Salem area for external business aviation-based visitation by individuals with strategic roles in the city's business, education and philanthropic communities. Information produced in this study is identifying opportunities leveraging the airport's business aviation current and potential to enhance the Winston-Salem economy.

## Business Aviation in Winston-Salem and Forsyth County

Business aviation use accounts for a significant share of the 45,000 annual take-offs

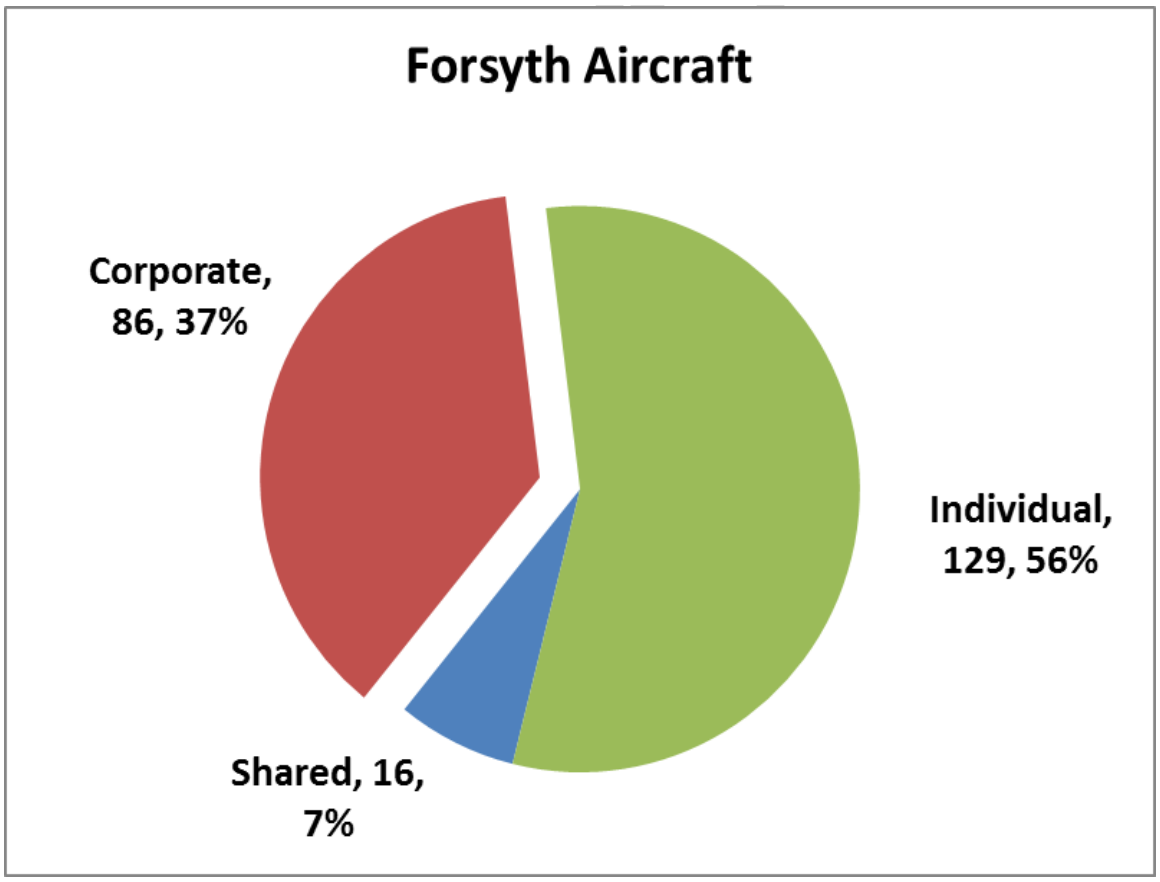
**Figure 29**



and landings (operations) at Smith Reynolds Airport. The 87 aircraft based at the airport include 62 single-engine, 9 multi-engine and 16 jet aircraft, many of which are used in business aviation activities by local companies and individuals. (Figure 29)

But the 86 aircraft based at Smith Reynolds Airport are a small portion of the total of 231 aircraft registered in Forsyth County. Over a third (37%) of these 231 aircraft are registered to corporations and it is likely that many of the other aircraft registered to individuals or partnerships are also used in business aviation to some extent (Figure 29). At least several of these crafts' owners might prefer to be based at the airport if impediments such as overlapping county and city property taxes and limited hangar space were remediated. This market opportunity is evidenced by the presence of 43 requests on the airport's August 2017 hangar waiting list.

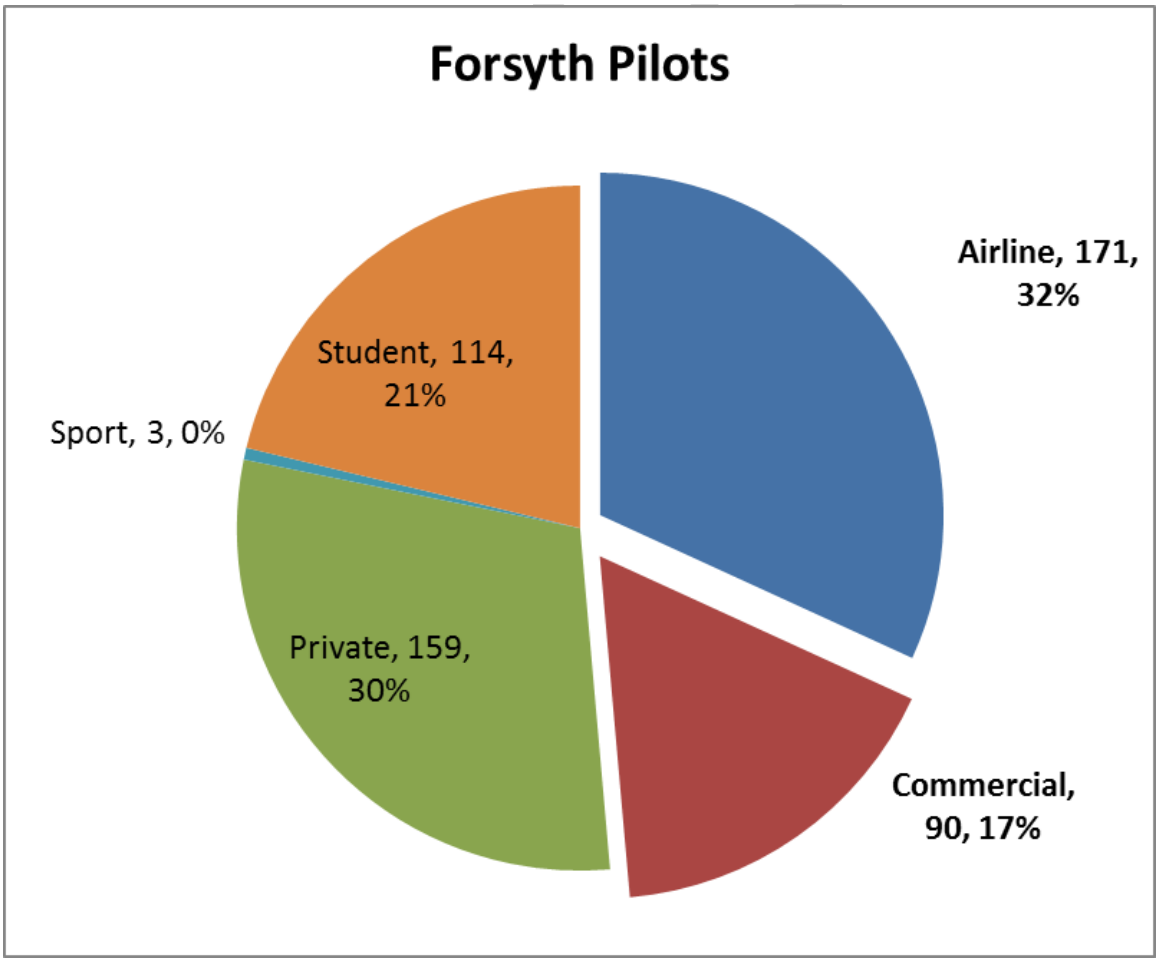
**Figure 30**



Forsyth Pilots

The depth of the Winston-Salem aviation sector is further revealed by the significant population of active pilots registered in Forsyth County. As of October 2017 there are 537 licensed pilots in the county. This total includes 261 people certified as either Commercial (90) or Airline Transport (171) Pilots (Figure 31). A commercial pilot license permits the holder to act as a pilot of an aircraft and be paid for his/her work. An Airline Transport Pilot (ATP) certificate, the highest level of aircraft pilot certificate, authorizes the holder to act as a pilot-in-command on scheduled air carrier service.

**Figure 31**



## Business Aviation-Enabled Prospect Dataset Construction

The economic contribution of the Smith Reynolds Airport would increase if the airport supported more business aviation by existing firms in the area and by new firms attracted to Winston-Salem. A dataset of United States, Peer and Winston-Salem Aviation-Enabled prospect firms was constructed to examine the scale and characteristics of that opportunity. Industry literature on business aviation use parameters was incorporated to define the relevant population of current and prospective Business Aviation users for the United States Peer and Winston-Salem:

- Ownership: Headquarters and Sole Locations
- Industry sectors: Manufacturing, Finance, Insurance, Real Estate, Business, Professional and Medical Services
- Annual Revenues > $5 Million

These parameters defined prospect populations for the United States (257,669), the six Peer regions (4,119) and the City of Winston-Salem (218). Comparative analyses were used to differentiate firm characteristics in industry distribution, employment scale and revenues to identify prospects for a potential Business Aviation development strategy.

### Industry Sector Distribution

The industry sector distribution of business aviation prospects (Table 32) in Winston-Salem reveals the city's emergent comparative advantage in the life sciences and knowledge economy. Compared to both the United States and Peer region populations, Winston-Salem has a more pronounced concentration of substantial company headquarters in medicine and information technologies.

The continuing growth and economic influence of Wake Forest University and the Wake Forest Baptist Hospital, along with the maturation of firms emanating from the Innovation Quarter are likely to accentuate this distinctiveness. Enabling these firms to benefit from the competitive advantages offered by increased Smith Reynolds Airport-

based business aviation is an opportunity warranting further market substantiation as an economic development priority.

**Figure 32**

| BUSINESS AVIATION PROSPECTS – TOP 5 INDUSTRY SECTORS | | |
|---|---|---|
| **UNITED STATES** | **PEER REGIONS** | **WINSTON-SALEM** |
| Computer Software | Computer Software | Physicians & Surgeons |
| Physicians & Surgeons | Attorneys | Computer Software |
| Attorneys | Physicians & Surgeons | Clinics |
| Clinics | Clinics | Surgical Centers |
| Nursing/Convalescent | Real Estate | Hospitals |

## Business Size Distribution

An examination of the distribution of business size by employment and revenue (Figures 33 and 34) suggests Winston-Salem offers comparative advantages among the mid-size firms better positioned to utilize business aviation strategies for growth. The city has a disproportionately larger population share of local firms with revenues between $20-$50 million and 50-99 employees. Incorporating business aviation into their business models could enable regional and national expansion.

**Figure 33**

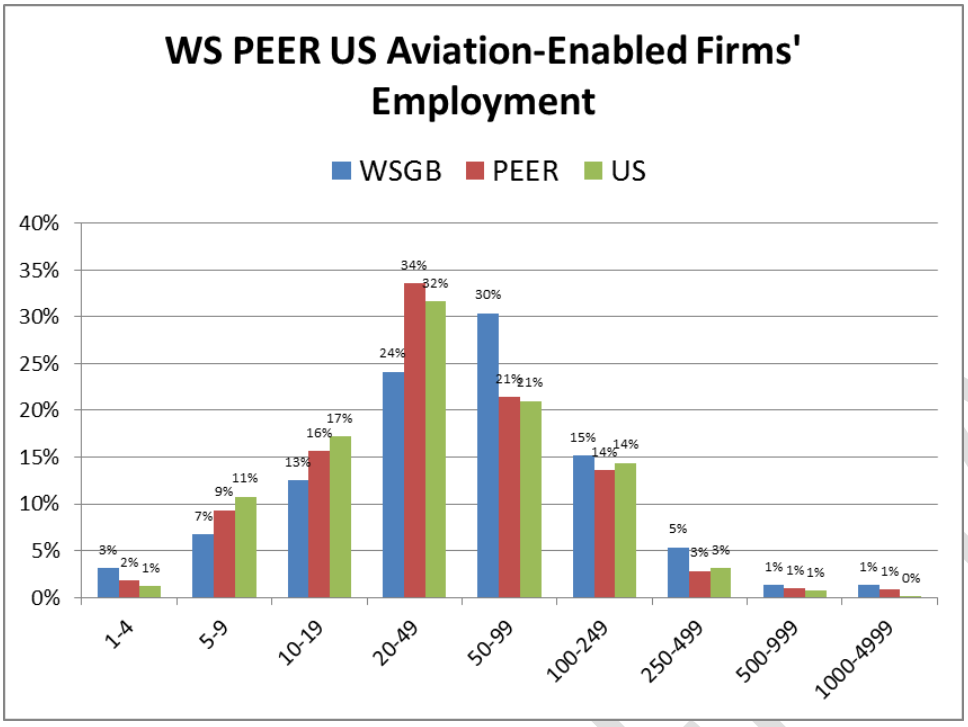
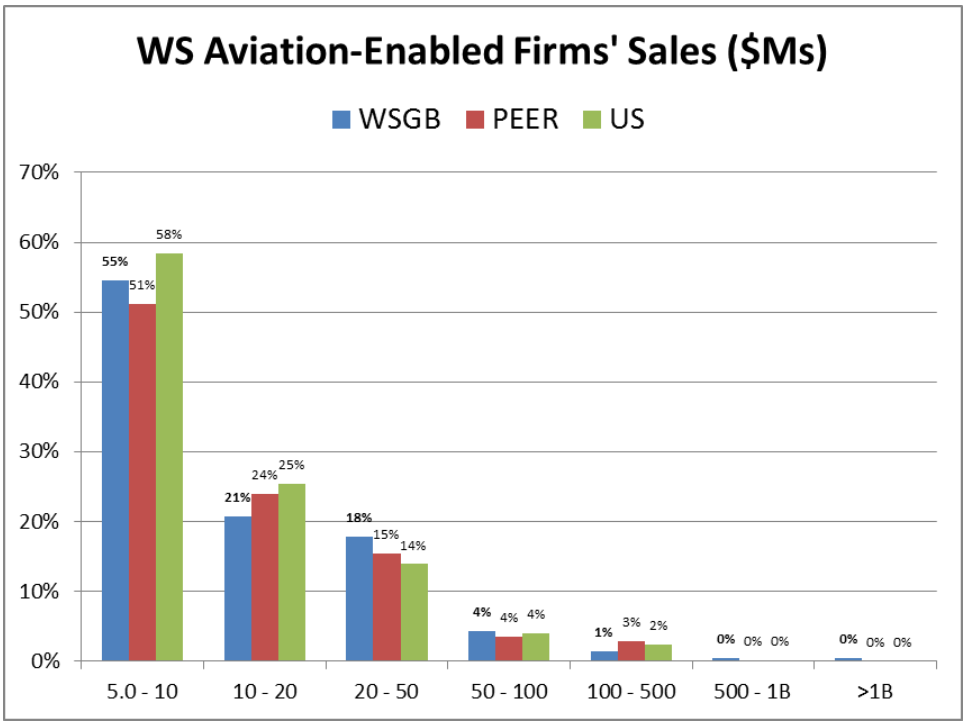



**Figure 34**



## Economic Significance

That Winston-Salem has a comparative advantage among mid-size and larger business aviation prospect firms means that growth either in the number of such firms or in their individual expansion has a compounded economic significance in employment and tax base. The largest share of the City's firms is in the 50-99 employee range (Figure 35). It is remarkable that the largest number (92) of the firm population is those occupying facilities exceeding 100,000 square feet (Figure 36), indicating the significance of the firms' tax base contribution and their relevance to large-scale facility availability such as that at Whitaker Park.

**Figure 35**

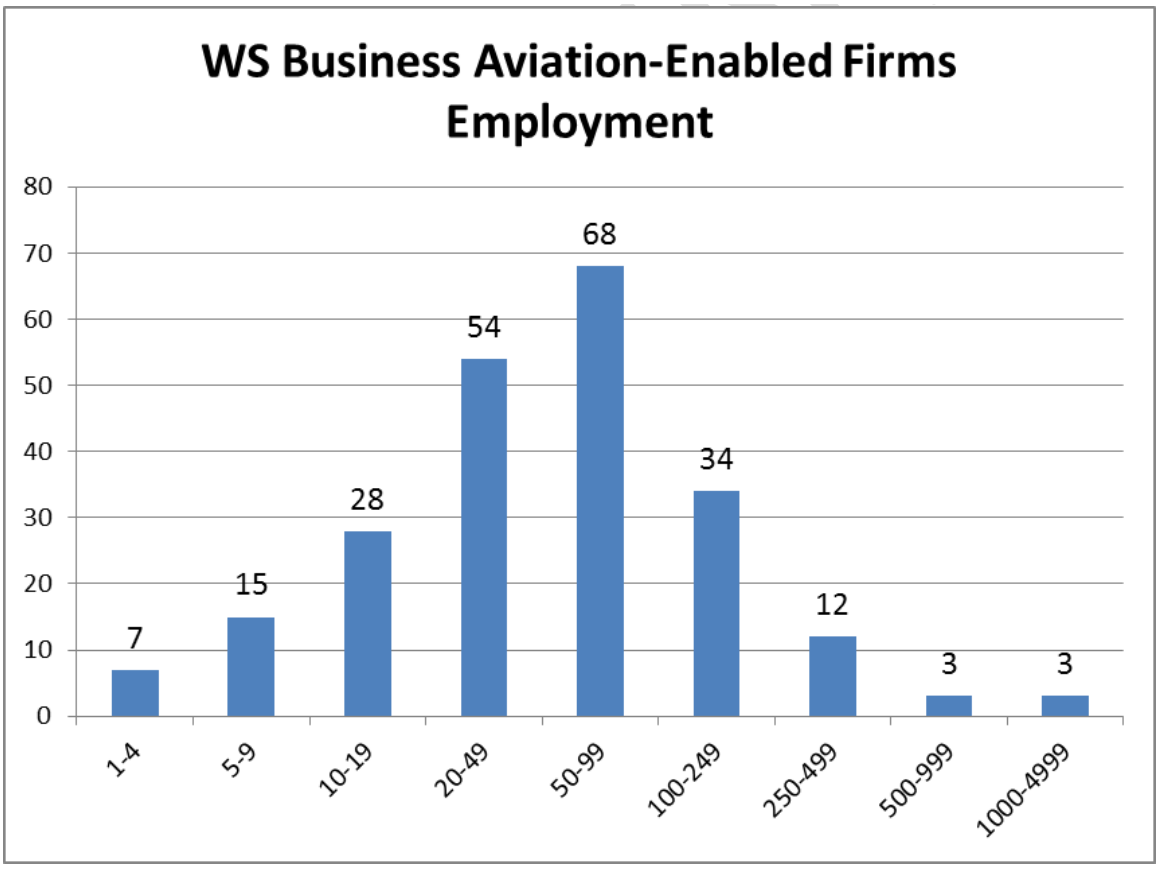
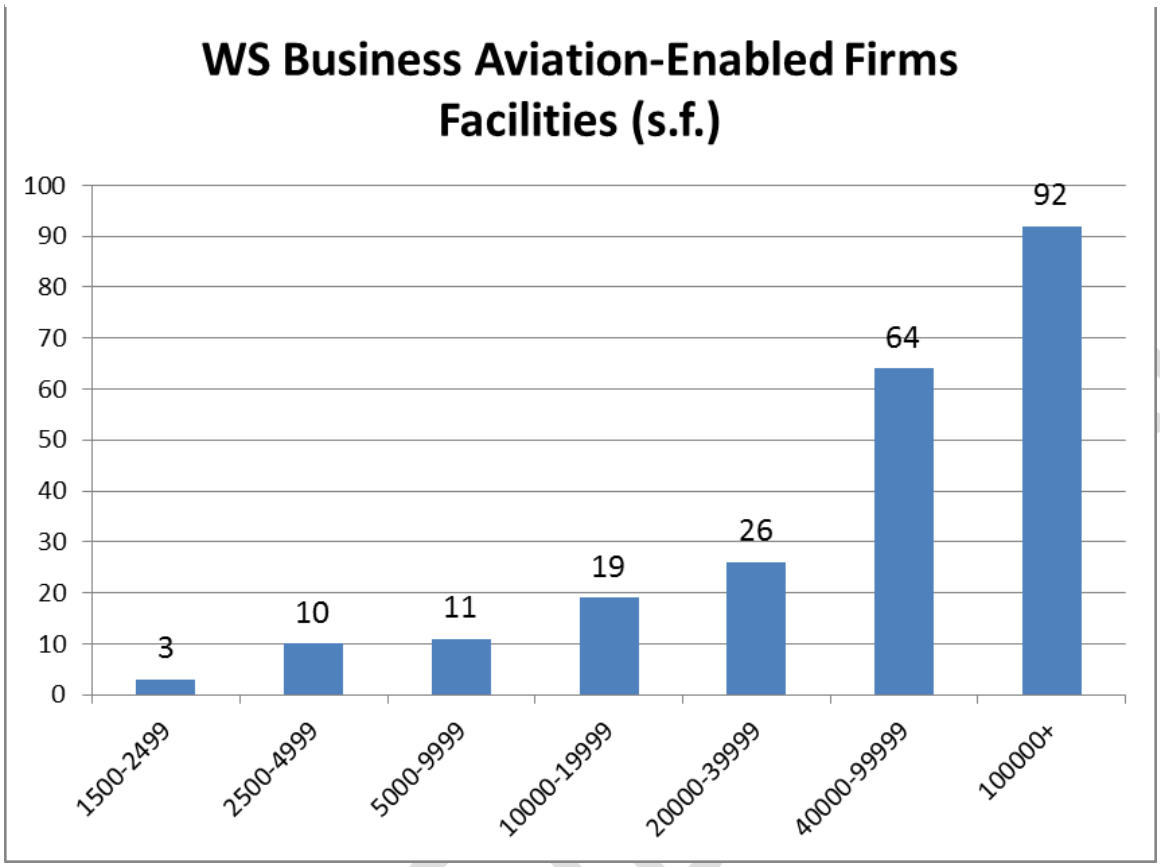
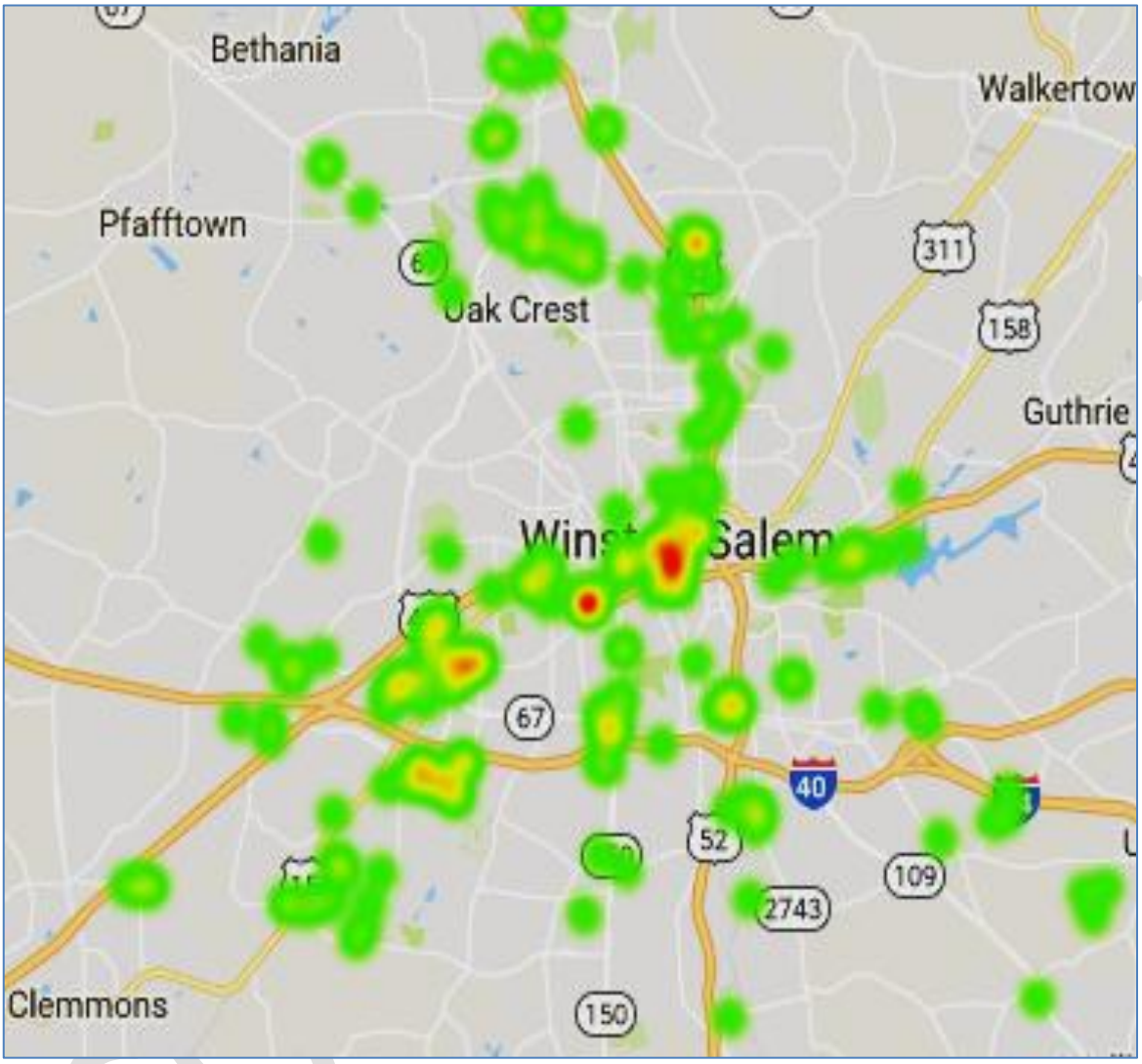


**Figure 36**




Economic strategies enabling the faster growth of existing firms and the attraction of additional comparable firms can be projected to make large contributions to both employment and tax base growth. Moreover, the broad geographic distribution of this firm population (Figure 37) indicates that these economic benefits are likely to accrue across many areas of Winston-Salem and Forsyth County.

**Figure 37**

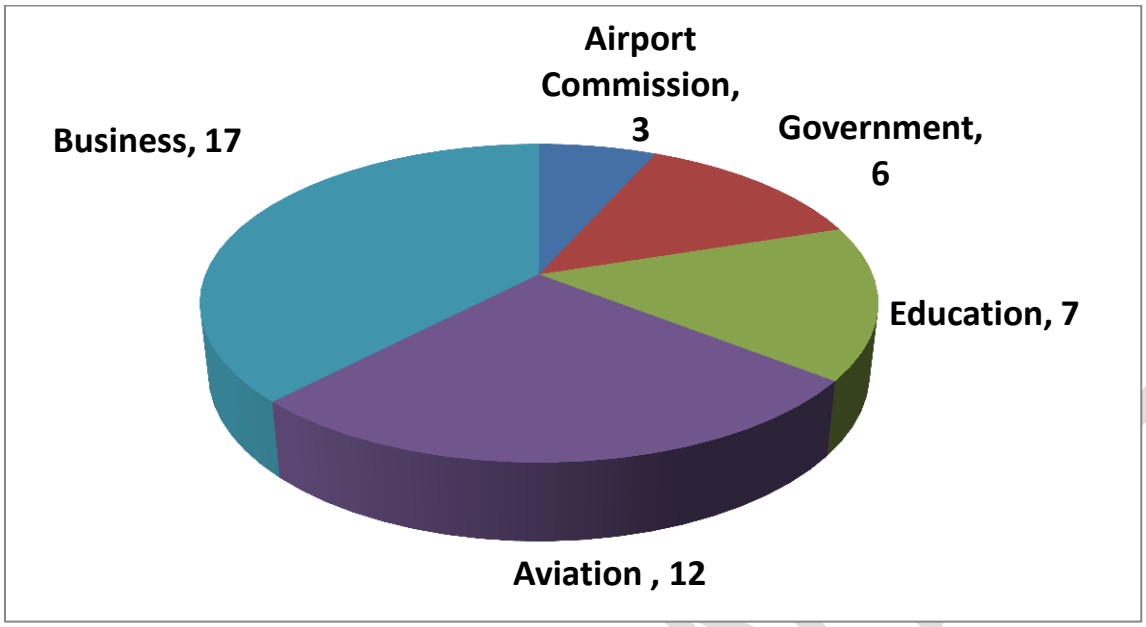

Bethania
Walkertow
Pfafftown
Oak Crest
311
158
Guthrie
Salem
67
40
52
109
2743
Clemmons
150

## Ground-Truthing through First-Person Interviews

The future of Smith Reynolds Airport is at an inflection point: it can continue as is, self-directed and largely unconnected strategically from other players in the Winston-Salem economy, or it can become a proactive and integrated lever in the innovation-led Knowledge Economy that is the developing vision for Winston-Salem. Smith Reynolds Airport was important in establishing Winston-Salem as a place where innovation happens and it could be important in carrying that vision forward but right now it cannot be described as integrated, innovative or vibrant. Charting a path forward requires understanding the airport's past, present and future potential and this understanding requires conversations with the individuals with first-hand experiences and knowledge.

To that end, extensive interviews were conducted with government, business, airport and Chamber membership, current airport users, and opinion leaders in high-growth sectors in Winston-Salem. While such field research can be difficult and time consuming it is unparalleled in providing ground-truthed information; this approach can also be a powerful tool for building awareness and interest in the work that is behind the research. An initial list of potential informants provided by the Chamber was expanded through suggestions provided by other opinion leaders in the Winston-Salem area. Ultimately we interviewed more than 45 individuals. Each interview lasted approximately 45-60 minutes. Fortunately, individuals contacted as potential interviewees were universally positive in their willingness to participate in this process and in their interest in the role that Air Commerce might play in Winston-Salem's future. The relative share by sector of the pool of interviewees is reflected in Figure 38.

**Figure 38**




Each interviewee's experience with Air Commerce and/or Smith Reynolds Airport and their opinions on the role the airport might play in melding a more synergistically powerful strategy to support innovation-led enterprises in Winston-Salem is unique, but a number of common themes emerged from the collective interviews. Summary points from individual anonymized interviews are presented in the following pages while a higher-level distillation of the ideas expressed by interviewees is synthesized below.

**Composite Perspectives on Smith Reynolds Airport and Air Commerce**

Smith Reynolds Airport is perceived as being at the trailing edge of the old economy; the current challenge is how to move it to the leading edge of the new economy. There was a surprising disconnection between the level of activity and developments reported by airport leaders and the descriptions of senescence provided by external observers. Confounding progress further is another conundrum: public investment is needed to underwrite needed infrastructure investments, such as runway extensions and hangar construction, but the public will not invest in private aviation unless public purpose is demonstrated. The economic case for the use of Business/Air Commerce is well-understood by some businesses but generally under-appreciated. Opportunities exist to

leverage nascent synergies between the airport and the various growth engines in Winston-Salem that can result in the airport being fully integrated into sustaining growth in the region.

Many of the separate elements that Winston-Salem needs to be a greater player in the Knowledge Economy are in place: vibrant research universities, an active arts scene, excellent quality of life. Realizing this vision of Winston-Salem's place as a player in the Knowledge Economy includes an innovation triangle with vertices at Smith Reynolds Airport, Winston-Salem State University and Wake Forest University, a triangle whose area encompasses the think-and-do centers in the Innovation Quarter, the N.C. School of the Arts and a revitalized Whitaker Park production zone. What emerges from these interviews is a sense that 1) Smith Reynolds Airport's size and fit within the broader aviation ecosystem says that it probably cannot be the spear of economic strategies 2) Smith Reynolds Airport is an under-appreciated, special asset that can be integral to supporting the growth of the types of companies that will define a more prosperous Winston-Salem.

**Common Themes and Highlights from Interviews**

1. *Location of Smith Reynolds Airport is unparalleled* in terms of convenience - this is a major competitive advantage that is *under-recognized and under-utilized*. Smith Reynolds Airport is rated as a national airport which supports high-value adding services. There are no comparable, national airports so proximate to urban centers.

2. *Smith Reynolds Airport should be linchpin of economic development strategy* – but for Whitaker Park, Smith Reynolds Airport would not be the focus of this visioning effort but the reverse should be true. Strategically-located airports do not happen anymore while industrial parks, even extraordinarily large ones, are more achievable assets. The airport's ability to provide national level service minutes away should be central to defining the market and presenting the Whitaker Park space to prospective tenants.

3. The relationship between Smith Reynolds Airport and the diverse and growing interests of area universities is *an undocumented success story that needs to be made explicit.* The airport already serves local athletics teams, parents and alumni flying in for events, visiting officials, transport of perishable medical product, health tourists, etc. Defining this contribution in economic and intangible terms will help define value-adding roles for the airport in supporting sectors that will define Winston-Salem's future.

4. Recruitment needs to *target firms that appreciate the value proposition of business aviation and cutting edge innovative* firms in new and existing sectors, such as drones, robotics, medical tourism, maker spaces/incubators.

5. As a *portal to Winston-Salem, Wake Forest University and the region, Smith Reynolds Airport is terrible.* Described repeatedly as run-down, dated, moribund, dirty, lacking amenities, unattractive, the terminal makes a bad first and last impression on air visitors.

6. *Liberty Street and Akron Drive may be negative barriers between two growth poles.* Both streets are universally seen as visually off-putting. Serious environmental issues on tracts immediately adjacent to the airport, lack of ready-use spaces, and access problems will require concerted efforts and investment to remediate.

7. The *under-appreciated, under-developed market value of airport-adjacent locations* is further documented the lack of success surrounding the Brookwood Business Park, which is all but invisible to all but the most informed person; interviewees were generally unaware of its existence or status. Although developed as Aviation Business Park in the early 2000s it now has a non-descript name and has only recently obtained its first commercial tenant.

8. Pilots' perspectives are mixed: on the positive, Smith Reynolds Airport is a *pilots' airport* – totally utilitarian, the infrastructure is good, all the requirements of a major airport without the hassles and traffic of larger airports. On the negative,

*non-competitive fuel prices, double property taxes and perceived lack of appropriate hangar space* are significant barriers to expanded use across different categories of potential users. Fuel prices are a particularly sensitive issue that is a make-or-break factor in decisions to land or keep a plane at an airport.

9. *Workforce development and jobs creation are inextricably tied and need to engage all levels of education with a focus on local youth:* the Forsyth Technical Community College aviation training center is a good and necessary start but efforts needs to reach back to middle/high schools, especially those in central and east Winston-Salem to generate interest in aviation-related careers.

10. *Smith Reynolds Airport needs to be developed on two fronts:* 1) as a fitting *portal to the city and area universities,* reflecting its historic role in creating the global aviation industry and as a symbolic entryway to a region being catapulted forward by creativity and innovation; and 2) *as an economic engine* active in workforce development, recruiting aviation cluster companies and start-ups, and supporting business aviation that underpins the geographically-dispersed operations of local key employers.

11. Linking Smith Reynolds Airport development strategies to area universities and firms developing in the IQ is natural – Smith Reynolds Airport is historically linked to the industries that defined Winston-Salem's past, *its future should be linked to the industries that are defining its future.*

## SECTION 3

## FINDINGS

Over the past several months Aerotropolis Business Concepts has worked with the Winston-Salem Chamber in developing strategies to leverage the Smith Reynolds Airport for increased economic development benefit. Consultations with airport administration and resident corporate officials have informed scenarios for planned and prospective market-articulated enhancements. Analysis of bespoke aviation industry cluster datasets on 20,000+ firms identified and characterized external/internal economic development prospects. Market signals garnered from 45 key informant interviews defined aviation-derived value propositions for Winston-Salem's existing industrial portfolio and its emergent knowledge economy. Findings developed through this process follow.

1. **The aerotropolis model is relevant to Smith Reynolds Airport.** The aerotropolis model is applicable to and informs the role of Smith Reynolds Airport in Winston-Salem's economic development. The aerotropolis model is about fostering aviation-oriented business users that maximize the economic impact of the airport on the local community and its broader region. Such clusters, as we noted initially, have been shown to generate quality jobs, higher incomes, more tax revenues and overall greater community prosperity. A mini-aerotropolis centered on and around Smith Reynolds airport can capitalize on existing Winston-Salem assets and function to unlock the city's full economic potential by not only attracting new businesses and industries but also strengthening existing businesses and industries.

2. **All economic development stakeholders in Winston-Salem need to better understand the aerotropolis model.** Smith Reynolds Airport could be a major asset in recruiting investors to area properties, including Whitaker Park. To illustrate: biomeds (especially extremely expensive, highly perishable protein-based biologics) frequently need to be quickly shipped to distant sites by air on demand. Business jet aircraft are often used for product-control purposes. Winston-Salem's Chamber, in partnership with Wake Forrest University, the Innovation Quarter and Smith

Reynolds Airport should explore becoming a center for innovation, productivity and distribution for the high-value biomedical sector.

3. **Air Commerce already makes a significant contribution to Winston-Salem's economy**. Winston-Salem's economic history and the current economic utility of the Smith Reynolds Airport indicates that Air Commerce is continuing to yield significant economic outcomes through 1) the establishment and attraction of firms directly engaged in Aviation Industry Cluster activities, and 2) firms that capitalize on business aviation as competitive advantage. The experience of several Winston-Salem firms growing by shifting their business models to serve the aviation industry demonstrates that Winston-Salem can also capture greater Aviation Commerce economic benefits by 3) supporting currently non-Aviation firms in learning about opportunities to become Aviation Industry suppliers.

4. **Proactive efforts are needed to secure economic benefits accruing to communities served by Peer airports.** Peer airports demonstrate economic spillover benefits to host communities, but those benefits do not accrue through passive osmosis; they require deliberate efforts designed to enable local workforce economic participation and to achieve community-identified preferred development outcomes. Some needed changes are exclusively in the domain of the airport management; others will require the coordinated attention of key stakeholders in business, government, and education sectors. Better connections—physical, mental, organizational—have to be established to better integrate aviation into the mindshare and strategies for economic growth and community development. Illustrative of this is the under-appreciated, under-developed market value of airport-adjacent locations such as Brookwood Business Park (formerly Aviation Business Park). Despite initially high expectations this park has only recently obtained its first commercial tenant and is invisible to all but the most informed person; interviewees were generally unaware of its existence or status.

5. **Winston-Salem is late to recognizing and acting on the economic potential of enhanced Air Commerce around Smith Reynolds Airport**. Nationally, and to a

lesser extent regionally, comparable airports have implemented development strategies designed to capitalize on some aspects—air cargo, corporate aviation, aircraft maintenance—of the opportunities available to Winston-Salem. Given the uniquity of the combination of assets available to a Winston-Salem Air Commerce strategy these comparables can be more illuminating than competitive.

6. **Smith Reynolds Airport is insufficiently integrated into economic development strategies.** Smith Reynolds Airport's demonstrated economic value shows a potential to serve as a primary conduit for Winston-Salem and Forsyth County to benefit from Aviation Industry growth in the Piedmont Triad region. The need for a stronger awareness of this economic development opportunity results in part from the muting of that potential by the external constraints imposed on current and future use of Smith Reynolds Airport. The resulting underestimation of the airport's economic role has led to its marginalization as factor in Winston-Salem's economic development opportunities. The silo-ed nature of existing planning efforts prevents important synergies that could deliver cross-cutting benefits.

7. **Smith Reynolds Airport can provide focus to Whitaker Park Development.** The Whitaker Parker opportunities initiated a reassessment of the airport; but for Whitaker Park, Smith Reynolds Airport would not be the focus of this visioning effort but perhaps the reverse should be true. Strategically-located airports do not happen anymore while industrial parks, even extraordinarily large ones, are more achievable assets. The airport's ability to provide national level service minutes away should be central to defining the market and presenting the Whitaker Park space to prospective tenants.

8. **Proximity is the airport's competitive advantage.** Current corporate and institutional use demonstrates the airport's distinct proximity value proposition which can be enhanced through a program of market-prioritized cosmetic and operational enhancements. The location of the airport is unparalleled in terms of convenience—this is a major competitive advantage that is under-recognized and under-utilized.

Smith Reynolds Airport is rated as a national airport which supports high-value adding services. There are few, if any, national airports so close to an urban center.

9. **Aviation can be a major asset for Winston-Salem's thriving medical sector**. With its world-class medical facilities, attractive downtown and relatively nearby leisure assets, Winston-Salem has an opportunity to become a United States center for affluent medical tourism. Procedures ranging from organ transplants to plastic surgery to wellness spa therapies could be provided to wealthy patients who could fly in for treatments on private jets

10. **Aviation assets are important to missions of area universities.** The relationship between Smith Reynolds Airport and the diverse and growing interests of area universities and research institutions is an undocumented success story that needs to be made explicit. Important relationships between universities and a vital range of human and capital assets are facilitated by the airport. Many donors, collaborators, speakers, sports teams, patients, prospective investors and students connect with area schools and research centers through Smith Reynolds Airport. Defining this contribution in economic and intangible terms will help define value-adding roles for the airport in supporting sectors that will define Winston-Salem's future.

11. **Smith Reynolds Airport is important to Innovation in Winston-Salem.** Many of the separate elements that Winston-Salem needs to be more successful in the Knowledge Economy are in place: vibrant research universities; an active arts scene; and an excellent quality of life. From its existing business aviation role in delivering investors, collaborators and resources to the area's universities, research centers and companies to its potential as a site for an aviation incubator and entrepreneurial prototyping/maker space, the airport can be a location where innovation happens. A comprehensive aerotropolis vision includes an innovation triangle with vertices at Smith Reynolds Airport, Winston-Salem State University and Wake Forest University, a triangle whose area encompasses the think-and-do centers in the Innovation Quarter, the N.C. School of the Arts and a revitalized Whitaker Park production zone.

12. **Winston-Salem can be important to innovation in aviation.** The United States aviation industry is undergoing “creative destruction” spawning opportunities for a new generation of innovative entrepreneurs. While the direction of these changes is impossible to forecast with precision, those communities with flexible aviation infrastructure and entrepreneurial resources are positioned to benefit. Winston-Salem has significant recent experience and success in capitalizing on such industry volatility as demonstrated in the creation and growth of the Innovation Quarter. That experience has application to designing and executing an Air Commerce economic development strategy that is prepared for uncertainty and responsive to emergent market opportunities in the aviation sector.

13. **Smith Reynolds Airport needs to become a better portal.** As the first and often last impression for visitors of all types, the visual impact of Smith Reynolds Airport and its immediate surroundings is off-putting, at best. Currently, Akron Drive and Liberty Street are negative barriers between existing and potential growth poles. Serious environmental issues on tracts immediately adjacent to the airport, lack of ready-use spaces, and access problems will require concerted efforts and investment to remediate. The success of revitalizing Whitaker Park is not divorced from the concurrent need to address the aesthetics of the airport and the physical space connecting it to Whitaker Park.

14. **Planned renovations could revitalize awareness and appreciation of the airport**. Smith Reynolds Airport, after a perceived period of senescence, has a program of current and planned improvements that could revitalize the facility for expanded business aviation activity and significantly grow its economic contributions. Current users appreciate the economic and strategic value of the airport but other stakeholders and the general public do not recognize the significance of this asset; the general perception is one of empty buildings and limited activity. Proactive outreach efforts inclusive of the broader Winston-Salem community are needed.

15. **Physical and location constraints limit airport development.** Expansion of the airport is constrained; many of the immediately adjacent properties are either committed to established residential and public-purpose use or are occupied by deteriorating, environmentally-compromised industrial facilities. Apparent conflicts exist between the airport's Master Plan options for using existing and potentially available land to expand operations and services and plans for expanded residential development in areas immediately adjacent to the airport. It is vital that planning efforts of the airport and other economic and community development stakeholders be optimized.

16. **Smith Reynolds Airport is not cost competitive.** From a totally utilitarian perspective, pilots think Smith Reynolds Airport provides all the infrastructure and services of a major airport without the hassles and traffic of larger facilities. However non-competitive fuel prices, double property taxes and perceived lack of appropriate hangar space are significant barriers to expanded use across different categories of potential users. Fuel prices are a particularly sensitive issue that is a make-or-break factor in decisions to land or keep a plane at an airport.

17. **Growing the aviation workforce needs to start early.** The demand for skilled aviation industry workers in the region is growing. Workforce development and jobs creation are inextricably tied and needs to engage all levels of education with a focus on local youth. The Forsyth Technical Community College aviation training center is a good and necessary start but efforts need to reach back to middle/high schools, especially those in central and east Winston-Salem to generate interest in aviation-related careers. Aviation can be an excellent focus for STEM efforts at many levels.

18. **Winston-Salem's aviation cluster is narrow and shallow.** Despite a distinguished aviation heritage, Winston-Salem's aviation cluster is relatively anemic. Compared to a set of peer regions the area has relatively few firms actively engaged in aviation and is especially deficient in cluster density, lacking breadth in the variety of aviation businesses. The United States Aviation Industry is growing but the thinness of the

Piedmont Triad and Winston-Salem Aviation Industry Cluster suggests that the region may not benefit from national growth without a commitment to proactive Air Commerce economic development. Similarly while the continued growth of North Carolina and Piedmont Triad-based aviation industry (such Honda Aircraft) is certain to create new supplier opportunities, but the low density of the Piedmont Triad Aviation Industry Cluster suggests those opportunities will not automatically accrue to existing firms nor attract new industry locations within the region. The growth of the aviation industry that does occur in the Piedmont Triad region will not necessarily spill over into the Winston-Salem area. The relative scarcity of Aviation Industry Cluster firms in the city and Forsyth County shows the area is already under-participating in the Piedmont Triad's Air Commerce economy.

19. **Characteristics of the region's aviation cluster point to opportunities to attract firms.** Firm population assessments indicate the region offers competitive advantages at either end of the Aviation Industry Cluster firm size distribution. Targets of opportunity likely exist in the attraction and development of mid-range firms for which the region's mix of cost advantages, workforce availability, infrastructure proximity, and quality of life appeal to growth-oriented executive teams.

20. **Identified gaps in the Triad's Aviation Cluster are ready targets of opportunity.** The presence of Air Commerce firms in the Aviation Cluster Sectors of peer airports that are underrepresented in those same sectors in the Piedmont Triad region and in Winston-Salem represent validated and credible "targets of opportunity" for a Smith Reynolds Airport-centered Air Commerce economic development strategy. The characteristics of firms in those candidate sectors—as described in this study's Virtual Portfolio—delineate the resource requirements, location factors and potential economic impact for a successfully implemented Air Commerce plan.

21. **Whitaker Park facilities could meet the requirements of identified Air Commerce targets**. Comparing the facility requirements of representative aviation firms in the Virtual Portfolio to the inventory of available industrial facilities in the

proximity of Smith Reynolds Airports - including the Whitaker Park complex - suggests such properties could be an asset to a Smith Reynolds-centered Air Commerce economic development strategy. Current information on the status and suitability of those properties to the requirements of the aviation firms described in the Virtual Portfolio is insufficiently precise to communicate a compelling competitive advantage to Air Commerce prospects.

22. **Universities' and Colleges' experience in attracting talent would inform Winston-Salem's Air Commerce strategy.** Winston-Salem's universities and colleges understand the value of the region's assets that they use to attract talented students, researchers and faculty to the area and the value Smith Reynolds Airport affords in facilitating travel to their campuses. Those values will also appeal to the next generation of innovative businesses. The universities and colleges could be valuable in guiding Winston-Salem's Air Commerce strategy.

23. **Business Aviation is bigger than corporate jets**. Smith Reynolds has the potential to become a major player in business aviation's future that includes not just corporate aircraft but also air taxis, air ambulances, small jet charter services, drones and other autonomously-operated aircraft. Such smaller aircraft are often either not welcomed or receive second-class citizen status at many larger commercial airports due to air and ground capacity constraints posed by their commercial air service. Were Smith Reynolds to offer unmatched, first-class services to these smaller business aircraft, it could capture market share and become a critical component of the broader Piedmont Triad Aerotropolis. Encouraging the use of business aviation through Smith Reynolds Airport potentially has a greater economic impact than successful industrial development due to the larger, more diverse population of growth firms that can utilize that asset. Winston-Salem has a large generation of younger, smaller firms that will mature into the revenue parameter of business aviation feasibility. Simultaneously the cost parameters of business aviation feasibility are decreasing as aviation costs decline and innovative models for shared business aircraft access expand the market of prospective customers.

24. **Business aviation at Smith Reynolds Airport could be its contribution to a regional Air Commerce strategy.** Smith Reynolds can perform an important role in the broader Piedmont Triad Aerotropolis by utilizing its business aviation specialization and assets to complement commercial aviation at PTI, thus providing the Piedmont Triad Aerotropolis with dual growth engines. Most aerotropolis development in the United States and around the world has been built upon commercial aviation. Yet, business aviation is growing and becoming an expanding means of moving higher-value people products in small numbers or quantities. And, business aviation provides speed, agility, and connectivity to many distant locations far better than commercial aviation. There are more than 5,000 general aviation airports operating in the United States that serve small aircraft and enable efficient connectivity to almost all United States locations, many of which do not have a commercial airport within 150 miles. Recruitment needs to target firms that appreciate the value proposition of business aviation and cutting edge innovative firms in new and existing sectors, such as drones, robotics, medical tourism, maker spaces/incubators.

25. **Specialized aviation industry knowledge is needed to guide the integration of aviation into the Winston-Salem economic development mindset.** The Air Commerce industry is similar to other focused economic categories – Life Sciences, Automotive, Sports – in that effective economic development interaction with industry participants and leadership requires specialized knowledge. Aviation industry opportunities are being driven by a complex mix of regulations, financing, markets and innovation. Successfully implementing an Air Commerce strategy, whether at the state, region or local level, will depend on economic development personnel with specialized knowledge generally lacking in North Carolina.

## SECTION 4

## RECOMMENDATIONS

### 4.0 OVERVIEW

The potential for growth in Air Commerce in Winston-Salem and the region can be significant. Recommendations for developing the Air Commerce sector and enhancing its strategic and economic contribution to Winston-Salem, Forsyth County and the Piedmont Triad region were derived from rigorous analysis of the Piedmont Region's and Winston-Salem's assets arrayed against the new aero-economy and aero-industry principles as applied to smaller airports. These market-centered, big-picture comparisons were informed and enriched with observations and suggestions provided by local and regional leaders from relevant sectors and stakeholder groups.

The overarching premise binding these recommendations is that success will only be possible to the extent that Smith Reynolds Airport becomes more proactively connected—in all senses of the word—to other elements in its broader community. These recommendations provide a blueprint for actions that can be taken discretely or collaboratively by the Smith Reynolds Airport Authority, local and regional governmental organizations, educational institutions, businesses, and community organizations to assist, support and attract the type of commercial and industrial development that is benefitted by proximity to competitive Air Commerce.

There are three non-exclusive strategies for developing Air Commerce in the region: (1) recruiting firms to complement and expand the area's existing aviation cluster; (2) increase awareness and use of business aviation by the many aviation-enabled firms – established and emerging – from Winston-Salem's burgeoning entrepreneurial community; and (3) making aviation a focus of entrepreneurial efforts to make Winston-Salem once again a locus of Air Commerce innovation. Central to realization of these strategies is an increased awareness of their potential to support energized Air Commerce initiatives and human capital in the form of a skilled workforce. Smith Reynolds Airport in its current configuration does not support scaled implementation of any of these strategies; changes to its appearance, operations and relations with

stakeholders will be required. Chief among its challenges is the need to increase awareness among the various stakeholder groups as a preamble to the creative, collaborative relationships that will be essential to realization of the more expansive vision of Winston-Salem. Smith Reynold airport can be an active participant in a vibrant regional aerotropolis that connects businesses, institutions and citizens to opportunities, wherever they exist.

The opportunities for Air Commerce in Winston-Salem have been challenged and validated and impediments identified. Recommendations for realizing a vibrant Air Commerce presence in Winston-Salem follow.

## 4.1 STRATEGIES FOR CONNECTIONS

Physical proximity does not always engender awareness: Smith Reynolds Airport has for too long been far out of mind when it comes to appreciating what a unique resource it is and the vital role it can have in supporting the economies of speed and just-in-time delivery of people, products and resources to and from distant markets. The aviation assets in Winston-Salem are best characterized as passively engaged in economic development; a more proactive effort involving all parties—airport management, economic developers, local government, workforce developers and businesses and entrepreneurs—is required to fully exploit the contribution aviation can make to Winston-Salem's future.

1. ***Operationalize Air Commerce in Economic Development:*** Smith Reynolds Airport has a surprisingly low mindshare among stakeholders at key institutions in general but more importantly among economic development leaders in Winston-Salem. Proactive, coherent and intergovernmental collaboration has to become the objective of strategic relationships and operations needed to elevate the perceived and realized value of the airport. The Chamber should lead in the organization of a Winston-Salem Air Commerce Strategy Implementation task force, supported by staff with specialized aviation industry expertise.

2. ***Harmonize constraining land use plans***: Elected officials and planners of areas surrounding Smith Reynolds Airport and between the airport and Whitaker Park need to coordinate decisions about land uses near these properties for the benefit of the broader community. Encroachment of residential and non-compatible land uses threatens the huge collective impact these two assets have for Winston-Salem and the broader Piedmont Triad aerotropolis. Expanded activity at Smith Reynolds Airport is already constrained physically by existing and planned residential development and politically by the potential of aggravating conflicts over noise with residential and business neighbors. At a minimum city, county

and airport land use plans need to be harmonized and integrated into a common long-term strategic vision for developing commercial and residential properties in the area surrounding Smith Reynolds Airport and between the airport and Whitaker Park. New zoning should encourage the location of airport-oriented businesses and industries in the vicinity of Smith Reynolds Airport.

3. ***Expedite infrastructure to leverage aerotropolis benefits:*** Multimodal air logistics hubs require air, highway and rail transportation modes with advanced telecommunications, sophisticated materials handling systems and state-of-the-art support services. Efforts to retain high-potential entrepreneurial firms being created at area universities and the Innovation Quarter and to recruit new firms to Whitaker Park will be strongly enhanced by facilitating the physical connectivity between these growth centers and Smith Reynolds Airport: road and bridge improvements need to be expedited; direct rail access established; and robust redundant high-speed Internet access deployed throughout the innovation triangle encompassing these elements. In the short-term, unobstructed multi-lane transportation between Whitaker Park and Smith Reynolds Airport that is augmented by inter-modal rail facilities needs to become a priority. Improved access to NC 52 is needed to facilitate linkage between Smith Reynolds Airport and aviation cluster and spine developments emanating from Piedmont Triad International Airport.

4. ***Assert Winston-Salem leadership in NC's aviation industry:*** The absence of a coherent, active effort on the part of the state to promote aviation places the onus on communities to develop strong marketing efforts that leverage their aviation assets. Economic developers in Winston-Salem and the broader region need to collaborate in creating strategies to operationalize this opportunity through targeted recruitment strategies, trade shows, promotional literature etc. that proudly displays Winston-Salem as part of an emerging aerotropolis that fully supports Air

Commerce and global sectors that support and utilize it. Winston-Salem cannot continue to defer to people who are not going to do this; it should assert a leadership role in developing aviation industry locally, regionally and in North Carolina.

## 4.2 MARKET OPPORTUNTIES

Air Commerce already makes a significant contribution to Winston-Salem's economy. The city's economic history and the current economic utility of the Smith Reynolds Airport demonstrates how Air Commerce yields significant economic outcomes through the presence of firms directly engaged in Aviation Industry Cluster activities and firms that capitalize on business aviation as competitive advantage for growth. But while the United States Aviation Industry is growing the relative thinness of the Piedmont Triad and Winston-Salem Aviation Industry suggests that the region may not benefit from national growth without a commitment to proactive Air Commerce economic development. A pervasive under-estimation of the airport's economic role has led to its marginalization as factor in Winston-Salem's economic development opportunities. Recommended actions to effect growth of this sector and to enhance its contribution to economic development in Winston-Salem and the Triad more broadly are organized into categories below that speak to growing the aviation cluster, expanding its reach by recruiting aviation-enabled firms and developing Winston-Salem as a center for aviation entrepreneurism and innovation.

### 4.2.1 Aviation Industry Cluster Development

The Aviation Industry cluster in Winston-Salem and the Piedmont Triad region is relatively anemic and undiversified, having limited span across the different sectors comprising the cluster and limited numbers of firms in the sectors that are present. Opportunities to expand and enrich the local Aviation Industry Cluster have been identified (see Section 2). Fortunately the presence of Air Commerce firms in the Aviation Cluster Sectors of Peer airports that are under-represented in those same sectors in the Piedmont Triad region and in Winston-Salem represent validated and credible "targets of opportunity" for a Smith Reynolds Airport-centered Air Commerce economic development strategy. The characteristics of firms in the Target Sectors described in this study's Virtual Portfolio delineate the resource requirements, location factors and potential economic impact for a successfully implemented Air Commerce plan.

5. ***Conduct site visits to Air Commerce-comparable airports:*** Winston-Salem is late to recognizing and acting on the economic potential of enhanced Air Commerce around Smith Reynolds. Nationally, and to a lesser extent regionally, comparable airports have implemented development strategies designed to capitalize on some aspects – air cargo, corporate aviation, aircraft maintenance – of the opportunities available to Winston-Salem. Given the uniquity of the combination of assets available to a Winston-Salem Air Commerce strategy these comparables may be more illuminating than competitive. The Chamber should organize site visits to regional airports implementing comparable Air Commerce to gain insights into the facility and management issues that might be addressed at Smith Reynolds Airport.

6. ***Conduct an Industrial Facility Assessment of Smith Reynolds Airport Vicinity***: Comparing the facility requirements of firms in the Virtual Portfolio to the inventory of available industrial facilities in the proximity of Smith Reynolds Airport - including the Whitaker Park complex - suggests such properties could be an asset to a Smith Reynolds-centered Air Commerce economic development strategy. Current information on the status and suitability of those properties to the requirements of the aviation firms described in the Virtual Portfolio is insufficiently precise to communicate a compelling competitive advantage to Air Commerce prospects. A detailed Industrial Facility Assessment of the airside, landside and proximate industrial properties must be performed to authoritatively determine their availability and suitability to targeted Air Commerce sector prospects.

7. ***Conduct a Surface Transportation Assessment of Smith Reynolds access routes:*** Efficient surface transportation of freight, cargo, equipment and people is vital to expanding Smith Reynolds Airport's role in Air Commerce. While the airport is located at the nexus of several rail and roadway surface transportation routes the status of those modes and

access have not been recently determined. Considerable attention is being paid to surface transportation issues in conjunction with to the Whitaker Park project. An updated surface transportation assessment of routes accessing Smith Reynolds Airport needs to be performed to identify and remedy impediments to facilitated business transport between Whitaker Park and the airport.

8. ***Implement Aviation Industry supplier programs***: The continued growth of North Carolina and Piedmont Triad-based aviation industry is certain to create new supplier opportunities. But the low density of the Piedmont Triad Aviation Industry Cluster suggests those opportunities will not automatically accrue to existing firms nor attract new industry locations within the region. In turn scarcity of local suppliers and service providers undermines regional operational efficiencies further weakening the region's Aviation Industry Cluster. The Winston-Salem economy retains a base of smaller manufacturers and suppliers that could shift from their traditional markets to serve an expanding aviation market. The Chamber should develop and execute a program of education and promotion to encourage aviation buyer/supplier network development.

9. ***Convene Air Commerce Prospect executive focus groups:*** The Chamber should convene focus groups of founders of representative firms of Aviation Portfolio Target Sectors to visit Winston-Salem to engage with the community, tour its aviation and entrepreneurial resources and experience its high quality of life. Based on focus group feedback, a program of proactive Air Commerce prospect identification and development to test and adjust the strategy should be developed.

10. ***Create an Air Commerce "Closing Fund":*** Winston-Salem ***e***conomic developers have access to established economic development incentives programs at both the state and local level. The State of North Carolina offers incentives through the Job Development Investment Grant and One

North Carolina Fund programs. Forsyth County and the City of Winston-Salem have defined programs of local incentive support based on net new capital investment and job creation. The OneNC program which requires a local match provides a model of an Air Commerce strategy focused incentive program. The Chamber should collaborate with Forsyth County and Winston-Salem to adapt the OneNC model in the creation of a "closing fund" for proactive targeting of Air Commerce prospects.

### 4.2.2 Developing and Recruiting Aviation-Enabled Firms

Contemporary hallmarks of competitiveness emanate from speed and facility of connections to people, places and products, but this is not a new phenomenon. Business aviation was central to the founding of Smith Reynolds Airport and to its subsequent development as a major commercial aviation hub. While the airport lost its status as a commercial flight center it retained critical FAA certification and infrastructure needed to allow it to serve all classes of airplanes and the businesses and individuals that value independent, fast air connections. Unparalleled proximity to local businesses, medical centers, the innovation hub and the broader PTI-based logistics resources elevates business aviation as the best opportunity for Smith Reynolds Airport to distinguish and leverage its contribution to the regional economy. Creation of attractive, cost-competitive business aviation facilities can empower existing businesses and institutions to connect with distant markets and operating centers, encourage the influx of necessary management and financial resources to support the region's entrepreneurs and the targeted recruitment of firms whose business models most benefit from business aviation. A primary challenge to expansion of this market opportunity is the need to educate a broader share of the region's business community to its proximity and value proposition.

11. ***Expand business aviation through prioritized development of appropriate facilities:*** Resource and space limitations at Smith Reynolds Airport necessarily results in the need to impose strategic considerations

in planning future development. If the goal is to support expanded use of the airport for business aviation then the priority for additional hangar space has to be on commercial hangars to accommodate corporate jets over general aviation hangars that service less value-adding General Aviation.

12. ***Incent the location of desired business aviation providers:*** Attract air charter, fractional ownership and other innovative providers of business aviation capabilities to expand options and mediate cost barriers to draw prospective users from among Winston-Salem's growth companies.

13. ***Develop integrated strategy to grow demand for business aviation:*** Winston-Salem has the diverse set of educational, aviation and economic development resources to brand the city as the place where "competitive advantage is in the air". Business aviation executive education targeting executives and professionals in key Winston-Salem business sectors, MBA students at area universities and entrepreneurs emerging from the IQ can be introduced to the advantages business aviation offers. This recommendation is developed more fully in the following Education recommendations (see 4.4).

### 4.2.3 Aviation Entrepreneurism and Innovation

Winston-Salem has successfully positioned itself as an innovation-focused entrepreneurial community. Notable accomplishments include the burgeoning bio-medical sector, the creation of the Innovation Quarter, the nationally-recognized arts programs at the North Carolina School of the Arts and the broader community. The region's engineering strengths are bolstered by competitive programs at North Carolina A and T State University, new programs at Wake Forest University and expanded programs at Wake Technical Community College. Linking aviation development strategies that support flexibility, responsiveness and innovation that area universities

and firms developing in the Innovation Quarter can capitalize on to realize the airport's potential as an economic development asset. The question is whether the airport and adjacent properties can become a destination for new development rather than an adjunct, and in some instances, an impediment to other plans, such as Whitaker Park. Towards this expansive vision it is recommended to:

14. ***Position the airport as a launch pad for new ventures****:* Entrepreneurial companies engaged in aviation-related or enabled developments, such as drone manufacturers, can benefit from being located at Smith Reynolds Airport, where a number of relatively unrefined and/or vacant buildings could provide the room and obscurity needed in prototyping facilities. Harkening back to the Wright brother's trip to Kitty Hawk and Boeing's "skunkworks" as locations where major aviation innovations were prototyped in secrecy, the notion of reconfiguring the original Piedmont Aviation hanger as an aviation innovation launch pad is appealing.

15. ***Reanimate Brookwood Business Park as an Innovation Destination****:* In general the market value of airport-adjacent locations is unappreciated and under-developed, as illustrated by the Brookwood Business Park. Created in the early 2000s as the Aviation Business Park, it was originally conceived as a location for both aviation and other emerging innovation economy ventures. While the realization of this vision has been slow, the market is beginning to validate that premise. The park's first speculative building was recently acquired by an Innovation Quarter life science spin-off. The park should be re-branded as an aviation-inclusive Innovation Destination with additional speculative space as a landing pad for entrepreneurial startups and recruited companies' beachhead operations. This would tangibly signal a commitment to Air Commerce economic improvements in the surrounding community.

16. ***Create an Aviation Innovation Seed Fund****:* Start-ups in all fields share a need for seed capital and opportunities to present their proposition to

potential investors. The airport, in collaboration with IQ, the Chamber and other stakeholders, could make support for aviation innovation tangible by creating a pool of seed capital, spotlighting aviation at existing venture forums or sponsoring an aviation-focused venture fair (possibly in collaboration with the Triad Partnership) to elevate the area's entrepreneurial profile.

## 4.3 SMITH REYNOLDS AIRPORT

Smith Reynolds Airport is a rare strategic commodity – a Class I national airport with excess landing capacity that is open to all types of aircraft located a mere 3 miles from the downtown of a major urban center. It is further distinguished by its ability to self-sustain operations and most recently by a significant investment in an aviation workforce training center, runway infrastructure improvements and planned enhancements to the terminal building. The Airport Master Plan lays out strategies for further improvements that would be necessary for expanded Air Commerce but not sufficient. The ability to attract and retain general and business aviation is significantly hampered on multiple levels: hangar space is inadequate and aging; fuel costs are considered exorbitant in comparison with nearby airports; and double taxation by the city and county further reduces the appeal of the airport. These "inside-the-gate" problems are matched by external aesthetics that are uninviting and do nothing to attract positive interest or communicate the airport's relationship to a community that is focused on innovation and the future. These issues need to be addressed in the short term so the airport can maintain its current level of success while a longer-term strategy to take a more active role in expanding Air Commerce will require proactive engagement with other stakeholders recognized in the Master Plan. Recommended action steps for transitioning Smith Reynolds Airport to be a more competitive and active asset for growing Air Commerce include the following:

17. ***Implement an Up-dated Smith Reynolds Airport Master Plan:*** Today's most successful businesses are innovative, flexible and rapidly responsive; so too must be infrastructure and facility planning and design at both Smith Reynolds Airport and Whitaker Park. Master planning including and surrounding these areas these plans need to be endorsed and supported by all stakeholders with infrastructure that supports new speed-focused business practices including modern supply-chain management that fuses multimodal transportation, advanced telecommunications, sophisticated materials handling systems and state-of-the-art business support services to offer unmatched speed and agility to tenants at the airport, Whitaker Park and their

combined service area. Facilities at both locations should provide a flexible framework to accommodate a wide variety of tenants, uses, facilities and layouts that can be modified when new technologies, industries and infrastructure emerge. (For example, the emergence of drone-based delivery systems can be anticipated and should be incorporated into plans for facilities at the airport.) The Airport Master Plan needs to be updated to comprehend and support the needs of a more demanding market to enable the airport to add more value to potential development at Whitaker Park and more broadly in Winston-Salem.

18. ***Prioritize competitive pricing, telecommunications and services***: Strong efforts must continue to attract additional business and general aviation and air cargo service to Smith Reynolds Airport. To the extent possible, costs of maintaining and operating aircraft at Smith Reynolds Airport needs to be competitive with those in the region, specifically as relates to double property taxes and fuel costs. In the today's new speed-driven economy businesses demand access to state-of-the-art telecommunications services to support redundant, real-time tracking and communication. The airport, Whitaker Park and locations in between have to offer these services.

19. ***Improve aesthetics for priority purposes****:* Planning for Smith Reynolds Airport and potential strategic linkages with Whitaker Park and other elements of the Winston-Salem Innovation Triangle should give high priority to aesthetics and environmental sustainability. Smith Reynolds Airport supports not only routine general aviation operations but also leisure and business travelers. High quality design standards should be maintained at and surrounding the airport terminal, landscaping and site improvements. Entranceways and signage should be aesthetically pleasing. Smith Reynolds Airport forms the first and often enduring impression of Winston-Salem for visitors to the region's businesses, universities and Innovation Quarter so a pleasing approach is extremely important.

## 4.4 EDUCATION – HUMAN CAPITAL

Growth of the aviation cluster in Winston-Salem and more broadly in the Piedmont Triad Region will be constrained by a shortage of skilled aviation workers. Aviation Week reports that majority of workers in the industry are more than 45 years old and less than 5 percent of aviation workers are 22-25 years old. This graying workforce is creating serious growth challenges to aerospace companies nationwide. Winston-Salem already has a baseline of skilled aviation workers, an artifact from the Piedmont Airlines days who continue in the industry, albeit many travel to work at Piedmont Triad and Charlotte Douglas International airports; reflecting broader trends, many are aging out of the workforce. It is clear that aviation companies will be attracted to communities that demonstrate a commitment to developing younger workers with skills appropriate to this sector; Forsyth Technical Community College's inside-the-fence aviation training center is an excellent start. Opportunities exist to engage area educational institutions at multiple levels to catalyze awareness and interest in aviation careers and to inculcate an appreciation for the value proposition of business aviation among the region's corporate and institutional management. Beyond direct application to aviation, training programs can also be leveraged to increase interest and availability in other career paths important to Winston-Salem's future. Recommendations include:

20. ***Engage existing employers in aviation training design****:* The development of the Forsyth Technical Community College aviation campus at Smith Reynolds Airport will be a powerful asset in workforce development for the region's aviation industry. Matching training to area employers' workforce needs is critical to the growth of Winston-Salem's aviation economy. Considerable relevant knowledge resides in the area's existing aviation companies that should be engaged in optimizing the curriculum developed for the aviation training center.

21. ***Think beyond aviation****:* Knowledge sets and technical skills developed in aviation-related programs have value in other advanced manufacturing

settings; for example, non-destructive testing has relevance in biomedical contexts. The aviation workforce should be expanded through development of expedited programs for workers transitioning from fields and sectors who possess compatible experience; conversely, support for expanded aviation training can be in other sectors that could benefit from the availability of workers with aviation sector skill sets.

22. ***Educate growth company management on aviation strategies***: Area business schools can contribute to the growth of the aviation sector in Winston-Salem and the region through creation of executive education on the value proposition of business aviation. Sophisticated corporate and institutional managers who are primed to the use of aviation-enabled competitiveness will find a ready solution in business aviation services based at Smith Reynolds Airport. The Chamber should convene area business schools leaders to conceptualize an Executive Education Business Aviation program serving management of growth-positioned Winston-Salem companies.

23. ***Grow the next aviation generation***: Workforce development and jobs creation are inextricably tied and needs to engage all levels of education, with a focus on local youth The Smith Reynolds Aviation Training Center is a good and necessary start but efforts need to reach back to middle/high schools, especially those in central and east Winston-Salem, to generate interest in aviation-related careers. Previous efforts to encourage interest in aviation among youth included summer camps that operated at the airport and junior civil air patrols. Opportunities exist to re-energize youth outreach and increase awareness and interest in aviation careers while simultaneously enriching STEM education through partnerships between Smith Reynolds Airport, the Aviation Training Center and the Winston-Salem/Forsyth County Public Schools. An example of such a partnership could be creation of an Aviation Early College Program that prepares advanced high school students for aerospace and engineering fields. Students could earn credit towards

Federal Aviation Administration and industry certification/licenses and also graduate high school with credit for up to two semesters completed at Forsyth Technical Community College.

## 4.5 PUBLIC RELATIONS/AWARENESS

A major problem confronting leaders in Winston-Salem and airport management is the need to increase awareness of the role Air Commerce has in supporting and diversifying growth in the city and the broader Piedmont Triad region. Extensive interviews spanning different constituencies in the region document the lack of connection that characterizes the airport today – paradoxically proximate yet remote, disconnected administratively, culturally, visually and aesthetically, financially, logistically, and strategically. This disconnection is profound, extending to both internal and external stakeholder groups in ways tangible and intangible. Concerted and creative outreach and engagement efforts targeting local audiences must be undertaken to leverage the full potential of Winston-Salem's aviation assets. Beyond the need to increase awareness locally there is also an opportunity to enhance local and regional marketing and economic development with a stronger aviation message. Recommendations for external engagement follow:

24. ***Transform Smith Reynolds Airport into an enticing portal***: Visuals are impactful; the many investors visiting companies in the IQ, high-value donors, patients and research partners visiting Wake Forest Baptist Hospital, alumni, parents, prospective students and faculty visiting area universities and visiting executives who might consider relocating to Winston-Salem access the region through Smith Reynolds Airport have to be underwhelmed by the appearance of the terminal and its surroundings. What a missed opportunity to use the terminal space to make a great first and last impression about the many attractive aspects of Winston-Salem, to visually introduce visitors to Winston-Salem as a great place to "work, live, learn, play". The prospects of presenting a terminal refurbished by Signature with visual displays featuring the best aspects of life in Winston-Salem could be an exciting catalyst for increasing awareness and support for the airport. Airport management should engage with terminal tenants, local artists, economic development stakeholders and the Chamber to re-imagine and re-brand Smith Reynolds Airport as an enticing front door to the city. .

25. ***Connect with the Public***: Future growth and improvements at Smith Reynolds Airport will depend on the support of the citizens of Winston-Salem and the elected officials who represent them. That support is dependent on recognition by the public of the benefits from the airport. It borders on existential that airport leaders work diligently to communicate the various contributions the airport makes to the community and to develop and maintain positive relations with the public. Air shows that were the most obvious and successful public engagement vehicle had to be suspended to accommodate infrastructure improvements; these shows need to be reinstated and reimagined to present the relevance of aviation to Winston-Salem's future. Airport leadership and management should host regular public engagement events; air shows are absolutely necessary but insufficient events that need to be augmented with other efforts.

*END*

**APPENDIX 1**

**SUMMARIES OF INDIVIDUAL INTERVIEWS**

To keeping with best practices for research that involved direct interaction with individuals and to encourage candid responses all interviewees were assured that no direct attribution would be made to them in this report. The following interview summaries reflect actual responses offered by interviewees who are identified in this report only by code. Interviewees are further identified by their categorization as being primarily members of the Airport Commission or the Government, Education, Aviation or Business sector as a means of giving some context to their comments. All information captured in these summaries reflects the opinions of the interviewees; it has not been fact checked for accuracy or completeness

***Interviewee: 092101***

*Category:* Business

- Native to east Winston-Salem
- Developments at Smith Reynolds Airport needs to include surrounding community
- Job creation/training for local residents is important
- Jump start businesses, entrepreneurship support is needed
- Airport currently is isolated from surrounding community
- Visually not appealing to local community, art and other beautification is needed
- Engage students at local school to inspire interests, e.g., FFA to address food desert situation

***Interviewee: 0921012***

*Occupation:* Business Aviation/Airport User

- In area since 1994
- Glad to hear Chamber is doing this project
- Owner of two 6-seater planes; company rents a plane and has commercial pilot on staff to connect up to 20 offices across the United States, 700 employees.

Finds general aviation a tremendous asset, moving people just-in-time and saving money.

- His firm inverts the Global Transpark concept - build electronic job shop team, travel from central node to action centers, possible because of technology
- Signature as FBO – "fair", monopoly on maintenance limits competitive pricing
- Flight school "Good"
- Hangar space - on waiting list for five years to get space. Need to expand hangar space
- Airport staff lacks ambition, internal drive to do more than they are doing.

***Interviewee 092103***

*Occupation:* Airport Commission (12 years)

- Smith Reynolds Airport is self-sustaining, a rarity among airports.
- The Airport Commission/Smith Reynolds Airport is committed to being an active asset to Winston-Salem
- Winston-Salem city government does not value the airport, as demonstrated by the issue of storm water fees
- Smith Reynolds Airport has been a major asset to RJ Reynolds for more than 50 years.
- A number of positive changes are underway impacting future – transitions at North State, aviation school, Signature moving to the terminal.
- Firms located near airport such as BE enterprises, and Piedmont Aviation do not require airport location but proximity to new training school can be important to them and other similar companies that could be recruited to the site.
- Airshow was Smith Reynolds Airport's primary outreach effort. It was well attended but inactive for 2 years due to construction. It caused some discord with neighbors who complained about noise.

***Interviewee: 092104***

*Occupation:* Business

(Interviewed three company officials in collective discussion)

- Generic advertising to recruit aviation companies will not work, have to recognize and promote assets.
- Have to be clear whether the goal is to use the airport to support other goals and developments or to grow the aviation sector
- Aviation sector growth will depend on availability of qualified work force with basic skills (to inspect, measure, read a manual). An apprenticeship program would help address this impediment.
- Efforts to build awareness and interest in aviation careers needs to start in middle school
- Key employee with this company offered to teach course in non-destructive testing at Guilford Community and Technical College's aviation school but they were not interested. There is opportunity for Forsyth Technical Community College to work with local aviation sector firms build better training programs. These firms would welcome that relationship.
- Workforce problems are a real threat to growth in the sector locally, too many workers "poached" by Piedmont Triad International.

***Interviewee: 092201***

*Occupation:* Business

- Dearth of mid- and small-sized local banks and purchase of banks by out-of-state corporations limits options for local discretion on loans needed to finance growth and spec work on facilities.
- This business represents 15,000 sq. ft. of warehouse/5,000 sq. ft. office that could be filled tomorrow but banks will not finance spec work
- This business represents 54,000 sq. ft. across from the airport suitable for light manufacturing but airport proximity is not necessarily an asset to filling it.
- Liberty Street is a negative barrier between two growth poles.

***Interviewee: 092202***

*Occupation:* Airport User

- Took flight training at Smith Reynolds Airport in 2006, has plane at Piedmont Triad International but would love to be at Smith Reynolds Airport but there is no available hangar space
  - Smith Reynolds Airport is on the wrong side of Hwy. 52; it is disconnected and a hard place to start a business
  - No Winston-Salem leadership involved in making the airport an asset. Smith Reynolds Airport has no visibility, no big mindshare; it is only seen as source of complaints
  - The airport suffers from a general lack of professional appearance, coherent layout. The parking lot is only paved every 20 years
  - Signature is an unfriendly service provider
  - North State Aviation is a good asset but it is invisible
  - Smith Reynolds Airport's' use associated with Wake Forest University cuts across areas – athletics, parents, alumni. The point of entry is Signature but where there is no obvious signage for Wake Forest University and Signature not on "Visit WFU" brochures
  - A negative image is biggest issue
  - Civil Air Patrol operates out of Smith Reynolds Airport. It has 1.5 planes (a plane splits time between locations), 80-100 members, approximately 36 cadets (most home schooled) and 46 senior members. It is an excellent entry point for growing interest in aviation.

***Interviewee: 092203***

*Occupation:* Education

- In Winston-Salem for 10 years
- City's focus is on developing Whitaker Park so the best angle on Smith Reynolds Airport needs to be "Do no harm".
- 2 barriers – getting over the railroad tracks and Hwy. 52.
- Forsyth Technical Community College's aviation training center will take up valuable real estate that will be permanently removed from the mix so it is critical that best value be derived from this center.

- Growth potential for Winston-Salem is enormous. There is good support from city and county and a great workforce
- There is a strong need to educate public and increase awareness of role airport can plan in economic growth
- The airport and Whitaker Park need to be presented as a package to draw attention of companies.
- Multimodal aspect of airport-adjacent area is underdeveloped. There is no connection between the immediately available rail road lines and highway connections need to be better
- Drones and other leading edge technology developments that could take advantage of airport facilities should be a focus.

***Interviewee:*** **092204**

*Occupation:* Government

- Economic Development in the city context is focused on small business loans and inclusion; recruiting outsourced to Bob Leak
- Focus of the city is mostly on large projects – Whitaker Park and a 17 acre business park – business stock is aging and developed sites are limited. Some view the airport like a low yielding bond in that there is no competition for the space it takes; Smith Reynolds Airport could be considered a land bank.
- The airport is at the trailing edge of the old economy, how to move it to the leading edge?
- Workforce is a big issue - elements responsible for different levels of education function in silos. Need to cut across barriers to jointly identify inputs needed to insure success: K-12, the community college, area universities and economic developers need to collaborate to address deficiencies and opportunities.
- The city is patriarchal – the definition and vision of success is centralized. There is no community discussion of what success means. The fundamental question is whether economic development serves people or place.

***Interviewee:*** **092501**

*Occupation:* Business

- The process underway in Winston-Salem and the IQ is to incubate a culture of entrepreneurism.
- Investment capital is available, what is lacking in the area is management talent. The approach being taken is to try to nurture and grow the local management capacity
- The highest per-capita in history reflected at time when trucking, banking and tobacco ruled the Winston-Salem economy. They are gone and the shift to the arts, healthcare and light manufacturing favor a different paradigm focused on flexibility, responsiveness and innovation.
- There is some concern that promoting Whitaker Park to the wrong market will confuse investors focused on the IQ and the medical school. Whitaker Park is suited for industrial and less capital-intensive start-ups. Have to be careful not to cannibalize what is developing at the IQ
- There is a lack of vision on what is required to go forward. There needs to be a focus on all aspects of development that addresses "work-live-learn-play" simultaneously
- A hallmark of success in economic development around the airport and Whitaker Park will be the creation of figurative and literal economic on-ramps for minority communities.

***Interviewee:*** **092502**

*Occupation:* Business Aviation/Airport User BBT

- In Winston-Salem since 1995
- Frequent corporate user of Smith Reynolds Airport so they are familiar with its issues. Overall the airport offers everything a corporate pilot needs.
- Hangar space is an issue and allocation is a problem. High-end corporate users should get priority for limited space which could be expanded 15x to meet nascent demand.
- Signature has a monopoly on hangar space and charges inflated prices for jet fuel but they have no competition and there is no evidence that the airport is

working to remedy that situation. There is every reason they should be actively pursuing options because they do not benefit from Signature's inflated prices, receiving a flat 10 cents per gallon on fuel sales. More hangars with more planes would generate increased property taxes and fuel sales.

- Fuel prices are a real problem and for many pilots deflects landings to Piedmont Triad International Airport over Smith Reynolds, even when their ultimate destination is in Winston-Salem. More fuel farms and self-serve options are suggested solutions.
- A good recruiting target would be another airplane service center.

***Interviewee*: 092503**

*Occupation:* Airport Commission

- Smith Reynolds Airport is a "hidden gem".
- Smith Reynolds Airport capacity to maintain, much less grow is significantly hampered by storm water fees and double taxation issues. De-annexation is a serious consideration after the city recently reneged on an agreement to subsidize the operating budget of the airport.
- The County Commission does provide subsidy to the airport and established a $1 million loan fund to match an allotment from the Federal Aviation Administration for work on the airport's runway infrastructure.
- Whitaker Park development can give the airport a "new life". Private groups are interested in developing it as a private park and this should be considered.
- To increase charter and business aviation traffic Smith Reynolds Airport needs to be more hospitable.
- The achievable vision is to strip the terminal to its bone and revamp it to look forward while reflecting its important role in aviation history, have Signature move its operations to the terminal, add a restaurant, have North State relaunch operations and supply a growing aviation sector with graduates of the on-site training facility and an on-site aviation incubator.

- The County is short of developable land; the airport and surrounding assets need to be optimized. Residential areas surrounding the airport limit its capacity to optimize its contribution to the economy.
- Workforce availability issues limit upside development across the county.
- The value of the airport to multiple interests of Wake Forest University needs to be made more explicit. There does not appear to be a centralized understanding of this at the institution – the airport serves the needs of athletics teams, parents and alumni flying in for events, visiting officials, transport of perishable medical product, health tourists, etc.

***Interviewee*: 092504**

***Occupation:*** Business Aviation/Airport User

- Workforce has been an ongoing challenge to the aviation sector in Winston-Salem, going back years to an Aviation Forum Group study for the chamber that is finally being addressed with development of the Forsyth Technical Community College Aviation Training Center. This is an important development.
- Curriculum at the training center is being developed with input from local aviation sector companies and an economic development group in Greensboro.
- Smith Reynolds Airport is presumed to be an asset but it is rarely engaged in planning efforts. There is a strong need to educate critical sectors on its value proposition.
- The master plan for the airport would not be classified as focused on economic development. There are a lot of empty buildings and under-utilized space on the airport grounds.
- The airport location does provide proximity but its operations do not currently support immediacy.
- Short-term success for the airport would have the aviation training center graduating a well-trained workforce for existing companies.
- Long-term success would involve attracting aviation OEMs and MRO facilities to provide supply chain for the broader region's aviation sector that does not necessarily have to be located at Smith Reynolds Airport

***Interviewee:*** **092601**

*Occupation:* Education

- Former plane owner and pilot
- Visitors and investors to his facility are frequent users of Smith Reynolds Airport.
- Fuel prices are often cited as a deterrent to landing at Smith Reynolds Airport, deferring to Piedmont Triad International
- The airport is not a good introduction to Winston-Salem, does not support the image the city and the universities have been cultivating.
- A smaller independent air carrier providing daily service to Charlotte would be a welcome addition to the broader community.
- There is a general lack of acknowledgement at Smith Reynolds Airport that the university is one of its primary customers. The growing reputation of Wake Forest University offers an excellent opportunity to use the space at the terminal to brand the airport as being linked to the university.

***Interviewee:*** **100201**

*Occupation:* Business

- Grandfather started company in 1938. He was a pilot and on the airport Commission
- Family deeply engaged in community service, including interests in workforce development
- Affordability is major impediment to more use of the airport by more people
- Wake Forest University is in many ways the elephant in the economic neighborhood. It sets the bar, with strong development focus. Many graduates are now choosing to stay in Winston-Salem while many visiting parents and alumni are frequent visitors who buy property and join the country club.
- Whitaker Park will dominate the picture for the next 2 years.

***Interviewee:*** **100301**

*Occupation:* Airport Commission

- Pilot and airport user

- Image of Smith Reynolds Airport is changing as memory of commercial service there declines; future of the airport is general aviation
- The airport still suffers from some viewing it as a rich boys' private club.
- De-annexation is a real possibility, property tax and run-off squabble could poison the deal for prospective Whitaker Park tenants.
- Smith Reynolds Airport cannot be competitive with double taxation, adding 50-55 percent premium to costs
- Dilapidation is an issue. Signature is moving to the terminal to be state-of-the-art FBO. They will make terminal a fitting portal
- Greenbrier WV provides a model for how Smith Reynolds Airport could be gallery for displaying Winston-Salem's cultural heritage
- Blue-sky vision had a parking lot issue improved with addition of an escalator from lower level
- There is no hangar issue – there is not room for a larger hangar and the waiting list for existing space is not relevant. They often have to go several names deep into the list to find a taker when space becomes available.
- Fuel cost is an issue. A possible model is Rocky Mountain Metro near Denver which lowers costs on weekends to self-serve levels. Self-serve at Smith Reynolds Airport is good.
- The Akron Corridor will be done within 2 years, providing expedited transit to Whitaker Park.
- Winston-Salem Business has contracted to do a digital marketing plan for the airport
- An aviation incubator could be a good addition to the airport

***Interviewee:*** **100302**

*Occupation:* Government

- Smith Reynolds Airport is perceived by the many in the community as a visually unattractive, noisy nuisance
- Any economic development surrounding Smith Reynolds Airport that does not also improve east Winston-Salem cannot be considered a success.

- The area surround the airport is plagued by lack of leadership and employable skills. Need to look to business people on Liberty Street for assistance.
- The Forsyth Technical Community College aviation training program needs to engage local students, work with VOC-Ed and engage local schools to increase awareness of opportunities.

***Interviewee:*** **100303**

*Occupation:* Business

- List of names to contact
- Healthcare Tourism

***Interviewee:*** **100304**

*Occupation:* Business

- Three buildings (former Piedmont Advantage, Landmark Aviation and an elementary school) directly across from the airport are located on contaminated brown field properties that require years of extensive and expensive remediation. This limits options for development of potentially prime real estate.
- There is a serious lack of services available in the surrounding community. The absence of a financial institution results in heavy usage of the one remaining ATM in a location that does not provide any security.
- Statistics on poverty released at the recent State of the Region meeting were appalling, 24 percent poverty, and 33 school schools with 100 percent TANIFF. There is no leadership in the central and east Winston-Salem area, the Community Development Corporation is gone, and there is a perception of too much risk to launch anything new there.
- The first meeting of the Chamber's Smith Reynolds Airport Task Committee did not address the poverty issues and the needs of the surrounding community as being part of considerations surrounding airport development.

***Interviewee:*** **100401**

*Occupation:* Business Aviation/Airport User

- Smith Reynolds Airport is a great facility for corporate air

- NBAA has a calculator to estimate time and savings for use of corporate aviation.
- Benefits outweigh costs in contrasts to public perceptions
- Challenge to increased use is inadequacy of shorter runway#422 in heavy winds when instrument approach is required. Making it longer would remove constraints on expanding the use of the airport and impart weather resiliency.
- Historic value of the building is great but it needs to be revamped to attract corporate and business aviation.
- Of all smaller airports visited Smith Reynolds Airport has good operations although multiple FBOs would be improvement. Fuel cost is a very big consideration
- Best outlets to promote Smith Reynolds Airport among pilots and plane owners is internet ads, word of mouth NBAA publications, Air and Space Technology, Winston-Salem Magazine

***Interviewee:*** **100501**

*Occupation*: Business Aviation/Airport User

- PTI only accepts certain types of operations, takes more of a rifle approach to development - OEMS, suppliers for Honda Jet; Smith Reynolds Airport has more flexibility, can use a shotgun approach. It and Winston-Salem in general can be more aggressive in considering options.
- Drone companies, options for Amazon delivery
- Need larger corporate hangar to expand existing base
- Aesthetics are important – the drive into the airport is bad
- Locating jobs at airport has to be a priority.
- Focus on what is working in broader area, i.e., healthcare. LabCorp in Burlington maintains 10 planes

***Interviewee:*** **100502**

*Occupation*: Government

- Poverty is a driving concern that cuts across silos. An action plan has been delivered; Winston-Salem is a philanthropically inclined community. There is a need to align and focus groups on actions
- Airport Business Park began with grant in 1999 to clean up blighted area, put firearms training there, one spec building sold at less than a year on the market, plans to build another spec building. Sign for park is coming, potential to expand but connecting parcel is not available.
- Area around the airport will be difficult to revitalize. Efforts already funded by the by RUCA (Revitalizing Urban Commercial Aviation) on Liberty Street are struggling/
- Awareness of airport is slight, airshow is only connection with public, and Smith Reynolds Airport has a marketing challenge.
- Important to focus on impactful, feasible efforts

***Interviewee:*** **100503**

*Occupation*: Business

- The airport and its management are not ambitious, tries to maintain a "no controversy, no conflict" strategy.
- The city has historically shown no outreach or discussion regarding the airport.
- The perception is that airport commissions at other airports are highly politicized; the same is not true at Smith Reynolds Airport.
- An example of the lack of overt influence the city has on the airport involved a billboard placed by a private company at the airport entrance. The billboard generated $250 income annually for the airport but the airport commission objected strongly to its presence on the basis that it degraded the visual appeal of the airport. Over the objections of a city commissioner who also owned the billboard company that erected the sign the billboard was removed.

***Interviewee:*** **100601**

*Occupation*: Government

- There is opportunity to enlarge the airport's footprint, extend the runway because at far end is parcel including county school bus lot, Forsyth Technical Community College satellite buildings, and small neighborhood.
- Question is whether the airport can be ends rather than means, a destination for development rather than an adjunct to other plans, such as Whitaker Park.
- No market evidence that airport adjacent space is in demand, witness lack of interest in the Aviation Business Park.
- Forsyth Technical Community College aviation training center may increase the value of this location and of the business park
- Success would include Smith Reynolds Airport supporting job creation with training center thereby adding to the tax base but needs to be done in way that fulfills public policy goals and mollifies the surrounding community
- Smith Reynolds Airport has been a silo focused on maintaining fuel sales, taxes, parking – who is responsible for developing a broader vision?
- Tax base growth has to be a priority - losing tax base from Whitaker Park; most developments in the area are public sector – e.g. firing range, transportation facility, training center, fire department, etc.
- Need to change perspective and include Smith Reynolds Airport as an active player in economic development.

***Interviewee:*** **100602**

*Occupation*: Education

- In Winston-Salem since 2004
- Strong culture around aviation; original plan for training center 2021-23 but priorities changed and excitement around it moved it forward. Construction to begin summer 2018, through late 2019, first class spring 2019.
- Overall bond was for $65 million, Aviation got $16 million as most visible element of package with most momentum behind it. Vote 2:1 in favor
- 1200-1500 Forsyth County residents already work at Honda Jet and HAECO. Demand for skills is real.

- Focus of the curriculum on air frames/power and avionics. Already offer core skills in manufacturing, math engineering, welding robotics, CTC. MRO industry requires certification so starting there. Looking beyond FAA certification for base requirements. Opportunity to double space at airport and have general purpose classrooms with computers ¼ mile away.
- Discussions taking place with school system about dual academy, magnet program. To funnel students into aviation programs. Andrews High School in Guilford County has dual enrollment program with Guilford Community Technical College.
- Highest salaries for recent May Forsyth Technical Community College graduates was not in medical fields as before but as painters that were hired by Honda Jet.
- Common theme to many of their considerations is that Smith Reynolds Airport is a tremendously underutilized resource

***Interviewee:*** **100603**

*Occupation*: Business Aviation/Airport User North State (joined Piedmont Air in '73, in

- MRO business is growing, workforce is largest issue. Aviation training center is "first vertical thing the airport has done in a long while
- Employment at this aviation company has ebbed and flowed with the economy but is on the upswing, with expectations of increasing employment at Smith Reynolds Airport to 250 again in immediate future; at recent introductory meeting 52 former employees attended who want to work there again.
- Profitable time for growing airline industry, large purchases of planes by major airlines will have the coming up for major servicing in 2018, timing good to focus on expanding workforce.
- Smith Reynolds Airport is well positioned with good location in mid-Atlantic, weather and work ethic favorable, excellent culture and heritage in aviation, no air traffic control issues; it has everything the big airports have without the traffic problems.
- Start growing awareness/interest down at middle school level, Civil Air Patrol academy

***Interviewee:*** **100604**

*Occupation*: Government

- Smith Reynolds Airport positives as portal: small, personal, experienced professional efficiency of handlers; great infrastructure, tower, runways
- Smith Reynolds Airport negatives as a portal: current setup is highly dysfunctional – if raining have to get in car and drive 50 yards away to the plane, car rental only occupant in terminal, takes up spaces in parking lot leaving visitors to hike up from lower lot, really old hangars, terminal is nasty, lights yellow, very bad first impression. Overall beneath community standards, - left "looking for Mr. Haney"
- Airport tax penalty demonstrated by planes leaving airport at end of December so as not to be on the tax rolls, pointing to level of price sensitivity that suggests the airport may have the wrong type of customer.
- The Airport Authority wants to suffocate it and control for personal use of private jets, not connected to business communities
- Multimodal opportunities have not been not realized – the railroad is not connected to airport, Akron bridge designated a historic property, limiting remediation of chokepoint, bridge over the railroad cannot be raised without interfering with air landings so need to move location of bridge.
- Building blocks of a great meal in different rooms but left wondering why you cannot enjoy it – no connections between elements. Instead of making airport an add-on to Akron Drive-Whitaker Park reverse it and make airport the linchpin, design with the airport at the center of ideas for development. Smith Reynolds is a rare strategic commodity **- more business parks can be built but not another airport, maximize its potential.**
- Winston-Salem has totally squandered their land allocation opportunities near the airport, placing facilities that do not generate tax base or jobs for community residents in prime strategic locations – e.g., fire stations, firing ranges, and transportation maintenance facilities. This is part of a broader pattern – consider coliseum given to Wake Forest University and that is now surrounded by non-

profits, taking up space better used by restaurants and hotels that could generate revenue but are now off the table.

- Comparable airports - Charlie Brown near Atlanta, Kennesaw and Rome GA all facilitate express delivery carriers; Boca Raton and Augusta GA used as recruiting tool; Greenville SC that places building on sides of runways, not at ends.

***Interviewee:*** **100605**

*Occupation*: Business

- Smith Reynolds Airport is part of the business supply chain in the entrepreneurial ecosystem, providing easy access to key resources such as venture capital and personnel
- Embarrassment factor – the airport looks bad, it does not speak of innovation, arts, health, sectors that up and coming in Winston-Salem, leaving a bad first impression of airport and by extension the city
- Uses for adjacent locations could be used to project Winston-Salem into the future – robotics, maker spaces, aviation incubator, drones, etc.
- Biggest challenge to increasing public interest is prevailing indifference borne of perception that Smith Reynolds Airport is a rich person's playground and the off-putting general poverty that characterizes the surrounding area.
- Whitaker Park will bring enormous manufacturing space on line when what are needed are smaller spaces. Ten thousand sq. feet next-stage, light industrial, flex, and prototyping space located near the airport would fill a gap – the "What's Next" space

***Interviewee:*** **100606**

*Occupation*: Education

- Pilot and former plane owner
- The airport could be a magnet for entrepreneurs who also fly so look to recruit those who have an aviation background. It is also useful for just-in-time

transportation of perishable products and for delivering inbound resources and investors.

- The local economy is possibly at inflexion point where old giant firms have passed and emerging potential giants have not yet matured to point where general aviation is a major factor in their operations. Should be possible to predict characteristics of firms for whom corporate aviation is practical for their operations.
- Fractional ownership, Uber-jets other options for lowering the cost of business aviation should be explored

***Interviewee:*** **100901**

*Occupation*: Business

- In Winston-Salem for 24 years, active in community service
- This business makes regular use of Smith Reynolds Airport, flying personnel and physicians/customers in for plant tours regularly – 90 visits a year, with each visit involving double take-offs/landings, Have 4 corporate jets based at a location in the mid-West; used to keep one at Smith Reynolds Airport
- As a frequent user, Smith Reynolds Airport is very easy and convenient to use, always a positive experience with the exception of limited parking at Signature.
- Aviation repair opportunities are under-developed, consider recruiting an MRO operation
- The expectation is that Smith Reynolds Airport could partner with Piedmont Triad International Airport in the creation of larger expanded training center, jobs for maintenance, OEM recruiting - all would fit that picture.
- This business was an early user of business aviation, reflecting the facts that it is a privately-held company that was started by someone who was also a pilot. Aviation has always been part of their operating strategy.

***Interviewee:*** **101101**

*Occupation*: Business

- Innovation and entrepreneurism are transforming downtown Winston-Salem, with strong interest and a growing community of people engaged in starting new technology and biomedical firms.
- Rapid air delivery and connectivity are central to the business model of many of these firms.
- Attention and energy focused on Whitaker Park may come at the expense of interest and efforts on IQ, leaving the potential of the portion of the IQ towards Winston-Salem State University undeveloped.
- The area has ready “maker space” at the Center for Design Innovation and a potential 200,000 square feet in the old Bailey Power Plant.
- There is a model and data to support the opportunity to more explicitly link Smith Reynolds Airport and area universities – A study on general aviation at the Raleigh Durham airport found that Duke University was the most frequent user of aviation services.
- Linking development strategies to developing the IQ is natural – Smith Reynolds Airport is historically linked to the industries that defined Winston-Salem’s past, its future should be linked to the industries that are defining its future.

***Interviewee:*** **101201**

*Occupation*: Business

- Moved from international location 15 years ago, attracted by diversity of resources specific to their sector in North Carolina, strong support for start-up businesses in the United States and Winston-Salem’s central location on the East Coast.
- Strategic partners and customers flying into Smith Reynolds Airport several times a year and find it an “ideal” facility, offering convenient, efficient, flexible and secure service.
- Larger airports such as Charlotte are more attractive to firms of similar size because of affordability compared to private aviation, relative nearness, and the availability of multiple options for changing flight plans on short notice. There is a scale issue in determining attractiveness of business aviation.

- Peer executives are aware of Smith Reynolds Airport but largely fly from Charlotte, in part because that is the default. Similarly, despite a convenient bus service between Winston-Salem and Charlotte airport most people drive. What may be needed to unlock established patterns and increase usage in either case is better marketing to promote advantages. Merging the two ideas into an UberAir concept has appeal.
- Business models that can utilize information technology as a key design element in their operations have more flexibility in location and finding talented workforce, especially executive level employees. Companies such as this one use technology to reduce their need for frequent air travel, making location more dependent on proximity to markets and quality of life considerations.
- Quality of life is a significant factor in attracting and retaining small innovative firms. Cultural diversity and the richness of offerings in the arts, outdoor activities, education, access to the coast and mountains contribute to its appeal.
- Winston-Salem is of a size that allows one to be as active or anonymous as one chooses. For some businesses or stages of corporate development being able to fly beneath the radar can be an important location decision.
- Smith Reynolds  is used several times a year for customers and strategic partners
- Description of options for enhancing Reynolds/Whitaker Park/Innovation Quarter functional connectivity to realize development synergies.
- Assessment of Smith Reynolds Airport and its environs capabilities and constraints to economic development revealed by Peer airport attributes.
- Analysis of compatibility of Smith Reynolds Airport's Master Plan and applicable Forsyth/Winston-Salem Land Use Plans to Aero-Economic Development.
- Future aero-industry growth sectors identified through the study's market interrogations will be characterized and differentiated where they might present opportunities for the Winston-Salem economy.
- Virtual Portfolio Construction: Regional cluster information will be combined with the market-defined priorities to construct a "Virtual Portfolio" of representative

existing regional firms and external development prospects to describe strategy resource requirements and potential economic impacts.

- Recommendations regarding the potential and appropriate role of economic incentives for the implementation of the Aero-Economic Development Strategy.

***Interviewee:*** **113001**

*Occupation*: Business

- Frequent business aviation user of airport; keeps 3 planes there
- The airport is a good but "tired" asset, remarkably well-positioned, 5 minutes from downtown.
- The region's innovation ecosystem is strong -- the airport could make a bigger contribution to that system.
- Teamwork characterizes the success in developing IQ; there are strong visionary leaders in the community who are moving Winston-Salem forward.
- Airport should convey links to innovation and entrepreneurism; the current layout and image do not do a good job of presenting Winston-Salem as a forward-looking community.
- The airport needs to become better linked with the areas' higher educational institutions.
- Smith Reynolds Airport should be renamed to better convey a focus on the future. *Winston-Salem Innovation and Technology Airport* fits the airport's call letters.
- The airport is functionally and geographically positioned to serve air cargo needs of just-in-time manufacturers with markets in an 800-mile radius to reach most of the major east coast markets.
- London City Airport is a good model of a small, centrally-located airport that elected to strategically position itself to serve only high-end business aviation. Smith Reynolds might research a similar strategy for recruiting service that provides point-to-point business class service to popular destinations.
- Smith Reynolds Airport could become integral to supporting development of innovative technologies that are establishing a foothold in Winston Salem, such

as autonomous drones and robotics. There is enormous opportunity in creating a workforce trained to manage, monitor and surveil these systems. These skills could be part of training at the aviation training center.

- Folks in the aviation innovation space – the 5-10 aviation companies with in-house R and D teams – need to learn about the depth of aviation talent in the Winston-Salem area. The combination of the IQ, local talent and the proximity of Smith Reynolds could present a compelling argument for locating aviation system and sub-system development and testing operations in Winston-Salem.

## APPENDIX 2

## PIEDMONT TRIAD REGION AVIATION INDUSTRY CLUSTER FIRMS

| Company Name | SIC | Description | City | County | Empl. | Facility (s.f.) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|---|---|
| **AEC** | 559908 | Aircraft Equipment Parts & Supplies | Advance | Davie | 2 | 1 - 1,499 | $484,000 | Single Loc |
| **Aero Accessories** | 372802 | Aircraft Equipment Parts & Supls-Mfrs | Gibsonville | Guilford | 50 | 100,000+ | $14,723,000 | Single Loc |
| **Aerospace Products Intl** | 381201 | Aerospace Industries (Mfrs) | Winston-Salem | Forsyth | 180 | 100,000+ | $9,184,000 | Branch |
| **Aerospace Studies Air Force** | 381201 | Aerospace Industries (Mfrs) | Greensboro | Guilford | 5 | 20,000 - 39,999 | $547,000 | Branch |
| **Aerosphere Aviation Services** | 874201 | Business Management Consultants | Greensboro | Guilford | 10 | 10,000 - 19,999 | $1,225,000 | Single Loc |
| **Aeroteams** | 829917 | Aircraft Schools | Greensboro | Guilford | 9 | 5,000 - 9,999 | N/A | Single Loc |
| **Air Harbor Airport** | 458106 | Airports | Greensboro | Guilford | 4 | 1,500 - 2,499 | $505,000 | Single Loc |
| **Aladdin Travel & Mtg Planners** | 472402 | Travel Agencies & Bureaus | Greensboro | Guilford | 4 | 2,500 - 4,999 | $396,000 | Single Loc |
| **Allegiant Air** | 451201 | Airline Companies | Greensboro | Guilford | 13 | 40,000 - 99,999 | $8,112,000 | Branch |
| **American Airlines** | 451201 | Airline Companies | Winston-Salem | Forsyth | 1 | 1,500 - 2,499 | $441,000 | Single Loc |
| **American Airlines Inc** | 451201 | Airline Companies | Winston-Salem | Forsyth | 25 | 40,000 - 99,999 | $11,010,000 | Branch |
| **Ark Aviation Inc** | 559908 | Aircraft Equipment Parts & Supplies | Greensboro | Guilford | 3 | 1 - 1,499 | $983,000 | Single Loc |
| **Asheboro Regional AIRPORT-Hbi** | 458106 | Airports | Asheboro | Randolph | 6 | 10,000 - 19,999 | $482,000 | Single Loc |
| **Atlantic Aero Inc** | 458104 | Aircraft Servicing & Maintenance | Greensboro | Guilford | 23 | 40,000 - 99,999 | $2,904,000 | Single Loc |
| **B/E Aerospace Inc** | 381201 | Aerospace Industries (Mfrs) | Rural Hall | Forsyth | 180 | 100,000+ | $9,184,000 | Single Loc |
| **B/E Aerospace Inc** | 381201 | Aerospace Industries (Mfrs) | Winston-Salem | Forsyth | 180 | 100,000+ | $9,184,000 | Single Loc |
| **B/E Aerospace Inc** | 381201 | Aerospace Industries (Mfrs) | High Point | Guilford | 13 | 40,000 - 99,999 | $1,422,000 | Single Loc |
| **Beta Systems** | 372804 | Aircraft Ground Support & Svc Equip-Mfrs | Reidsville | Rockingham | 140 | 100,000+ | $40,795,000 | Single Loc |
| **Bridgestone Aircraft Tire USA** | 301101 | Tire-Manufacturers | Mayodan | Rockingham | 100 | 100,000+ | N/A | Subsidiary |
| **Causey Airport-2A5** | 458106 | Airports | Liberty | Guilford | 20 | 20,000 - 39,999 | $2,525,000 | Single Loc |
| **Cessna Aircraft Co** | 458104 | Aircraft Servicing & Maintenance | Greensboro | Guilford | 120 | 100,000+ | $15,150,000 | Branch |
| **Dakotaaviation Services LLC** | 458111 | Airline Support Services | Greensboro | Guilford | 23 | 100,000+ | $2,904,000 | Single Loc |
| **Davis Feed** | 599929 | Pet Supplies & Foods-Retail | Randleman | Randolph | 15 | 10,000 - 19,999 | $1,687,000 | Single Loc |
| **Delta Air Lines Inc** | 451201 | Airline Companies | Greensboro | Guilford | 20 | 40,000 - 99,999 | $12,480,000 | Branch |
| **Delta Air Lines Inc** | 451202 | Air Cargo Service | Greensboro | Guilford | 9 | 20,000 - 39,999 | $5,616,000 | Branch |
| **Direct Jet Charter LLC** | 735939 | Aircraft Charter Rental & Leasing Svc | Greensboro | Guilford | 6 | 2,500 - 4,999 | $1,422,000 | Single Loc |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Embry-Riddle Aeronautical Univ** | 829917 | Aircraft Schools | Greensboro | Guilford | 3 | 1,500 - 2,499 | $0 | Branch |
| **Energy Efficient Insulation Co** | 329601 | Fiber Glass Fabricators (Mfrs) | Clemmons | Forsyth | 6 | 2,500 - 4,999 | $1,396,000 | Single Loc |
| **Envoy Air Inc** | 451201 | Airline Companies | Greensboro | Guilford | 25 | 100,000+ | $15,599,000 | Branch |
| **Extreme Aviation Inc** | 458104 | Aircraft Servicing & Maintenance | Advance | Davie | 3 | 2,500 - 4,999 | $196,000 | Single Loc |
| **Flying Leaf Aviation** | 458104 | Aircraft Servicing & Maintenance | Asheboro | Randolph | 4 | 2,500 - 4,999 | $322,000 | Single Loc |
| **Franklin Aerospace Inc** | 381201 | Aerospace Industries (Mfrs) | Thomasville | Davidson | 180 | 100,000+ | $28,192,000 | Single Loc |
| **General Dynamics Corp** | 381201 | Aerospace Industries (Mfrs) | Mc Leansville | Guilford | 64 | 100,000+ | $6,997,000 | Branch |
| **GPS Designs** | 874201 | Business Management Consultants | Winston-Salem | Davidson | 3 | 2,500 - 4,999 | $157,000 | Single Loc |
| **Greer Aerospace** | 381201 | Aerospace Industries (Mfrs) | Advance | Davie | 5 | 5,000 - 9,999 | $850,000 | Single Loc |
| **Guilford Technical Comm College** | 829917 | Aircraft Schools | Greensboro | Guilford | 4 | 2,500 - 4,999 | $0 | Single Loc |
| **Guilford Technical Community** | 822101 | Schools-Universities & Colleges Academic | Greensboro | Guilford | 14 | 20,000 - 39,999 | $0 | Single Loc |
| **HAECO Americas** | 458104 | Aircraft Servicing & Maintenance | Greensboro | Guilford | 1500 | 100,000+ | $0 | Headquarter |
| **HAECO Americas Airframe Svc** | 458104 | Aircraft Servicing & Maintenance | Greensboro | Guilford | 50 | 100,000+ | $0 | Subsidiary |
| **HAECO Americas Line Svc** | 458104 | Aircraft Servicing & Maintenance | Greensboro | Guilford | 50 | 100,000+ | $0 | Subsidiary |
| **HAECO Americas Special Svc** | 458104 | Aircraft Servicing & Maintenance | Greensboro | Guilford | 50 | 40,000 - 99,999 | $0 | Subsidiary |
| **High Point Trinity Air Svc** | 735939 | Aircraft Charter Rental & Leasing Svc | Trinity | Randolph | 2 | 1,500 - 2,499 | $172,000 | Single Loc |
| **Honda Aircraft Co** | 372101 | Aircraft-Manufacturers | Greensboro | Guilford | 5 | 5,000 - 9,999 | $3,055,000 | Branch |
| **Honda Aircraft Co LLC** | 372101 | Aircraft-Manufacturers | Greensboro | Guilford | 28 | 40,000 - 99,999 | N/A | Subsidiary |
| **KLX Aerospace Solutions** | 381201 | Aerospace Industries (Mfrs) | Greensboro | Guilford | 7 | 10,000 - 19,999 | $766,000 | Branch |
| **Koury Aviation** | 735939 | Aircraft Charter Rental & Leasing Svc | Greensboro | Guilford | 6 | 5,000 - 9,999 | $1,422,000 | Single Loc |
| **Landmark Aviation** | 458104 | Aircraft Servicing & Maintenance | Greensboro | Guilford | 150 | 100,000+ | $18,937,000 | Branch |
| **Landmark Aviation** | 458104 | Aircraft Servicing & Maintenance | Winston-Salem | Forsyth | 4 | 1,500 - 2,499 | $517,000 | Branch |
| **Lockheed Martin Corp** | 381201 | Aerospace Industries (Mfrs) | Greensboro | Guilford | 41 | 100,000+ | $4,483,000 | Branch |
| **Miller Air PARK-Nc30** | 458106 | Airports | Winston-Salem | Forsyth | 1 | 1,500 - 2,499 | $130,000 | Single Loc |
| **Nexga Aircraft Inc** | 559905 | Aircraft-Dealers | Greensboro | Guilford | 5 | 10,000 - 19,999 | $1,638,000 | Single Loc |
| **North State Aviation** | 874201 | Business Management Consultants | Winston-Salem | Forsyth | 2 | 2,500 - 4,999 | $227,000 | Single Loc |
| **Omnavia Interiors** | 738902 | Interior Decorators Design & Consultants | Winston-Salem | Forsyth | 1 | 1,500 - 2,499 | $94,000 | Single Loc |
| **Piedmont Flight Training** | 829917 | Aircraft Schools | Winston-Salem | Forsyth | 9 | 5,000 - 9,999 | $0 | Single Loc |
| **Piedmont Hawthorne** | 559905 | Aircraft-Dealers | Greensboro | Guilford | 5 | 10,000 - 19,999 | $1,638,000 | Single Loc |

| Aviation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Piedmont Propulsion Systs LLC** | 769994 | Propellers-Repairing | Winston-Salem | Forsyth | 45 | 5,000 - 9,999 | $3,581,000 | Branch |
| **Piedmont Triad Intl Airport-GS** | 458106 | Airports | Greensboro | Guilford | 125 | 100,000+ | $15,781,000 | Single Loc |
| **Precision Design Concepts LLC** | 559908 | Aircraft Equipment Parts & Supplies | Eden | Rockingham | 3 | 1 - 1,499 | $692,000 | Single Loc |
| **Quantem Aviation Svc** | 874201 | Business Management Consultants | Greensboro | Guilford | 3 | 1,500 - 2,499 | $368,000 | Single Loc |
| **RCR Air** | 451201 | Airline Companies | Lexington | Davidson | 15 | 10,000 - 19,999 | $4,614,000 | Single Loc |
| **Rockingham Cnty NC Shiloh-SIF** | 458106 | Airports | Stoneville | Rockingham | 3 | 2,500 - 4,999 | $187,000 | Single Loc |
| **Rockwell Collins Inc** | 372801 | Aircraft Components-Manufacturers | Winston-Salem | Forsyth | 800 | 100,000+ | $193,315,000 | Branch |
| **Rockwell Collins Inc** | 372801 | Aircraft Components-Manufacturers | Winston-Salem | Forsyth | 600 | 100,000+ | $144,987,000 | Branch |
| **Rockwell Collins Inc** | 372801 | Aircraft Components-Manufacturers | Winston-Salem | Forsyth | 175 | 100,000+ | $42,288,000 | Branch |
| **Rockwell Collins Inc** | 372801 | Aircraft Components-Manufacturers | Winston – Salem | Forsyth | 36 | 40,000 - 99,999 | $8,700,000 | Branch |
| **Rockwell Collins Inc** | 372801 | Aircraft Components-Manufacturers | Winston-Salem | Forsyth | 36 | 40,000 - 99,999 | $8,700,000 | Branch |
| **Sabeti Wain Aerospace** | 381201 | Aerospace Industries (Mfrs) | Mocksville | Davie | 180 | 100,000+ | $30,576,000 | Single Loc |
| **Sky Airparts Intl** | 559908 | Aircraft Equipment Parts & Supplies | Greensboro | Guilford | 3 | 2,500 - 4,999 | $983,000 | Single Loc |
| **Smith Reynolds Airport-INT** | 458106 | Airports | Winston – Salem | Forsyth | 10 | 40,000 - 99,999 | $1,292,000 | Single Loc |
| **Sugar Valley Airport** | 458106 | Airports | Mocksville | Davie | 4 | 1,500 - 2,499 | $261,000 | Single Loc |
| **Superior Aero Svc LLC** | 458104 | Aircraft Servicing & Maintenance | Lexington | Davidson | 4 | 2,500 - 4,999 | $373,000 | Single Loc |
| **Swan Creek AIRPORT-78a** | 458106 | Airports | Jonesville | Yadkin | 2 | 2,500 - 4,999 | $113,000 | Single Loc |
| **T H Davis Aviation Ctr** | 829917 | Aircraft Schools | Greensboro | Guilford | 20 | 40,000 - 99,999 | $0 | Single Loc |
| **Travel Center Of Lexington** | 472402 | Travel Agencies & Bureaus | Lexington | Davidson | 3 | 1 - 1,499 | $277,000 | Single Loc |
| **Travel Consultants** | 472402 | Travel Agencies & Bureaus | Eden | Rockingham | 5 | 2,500 - 4,999 | $477,000 | Single Loc |
| **Triad Aviation Academy** | 829917 | Aircraft Schools | Greensboro | Guilford | 4 | 1,500 - 2,499 | $0 | Single Loc |
| **Triumph Actuation Systs-Clemmons** | 381201 | Aerospace Industries (Mfrs) | Clemmons | Forsyth | 55 | 100,000+ | $0 | Subsidiary |
| **Tru Atlantic Mfg LLC** | 372803 | Aircraft Machine Work (Mfrs) | Kernersville | Forsyth | 3 | 1,500 - 2,499 | $725,000 | Branch |
| **Twin Lakes Airport** | 458106 | Airports | Advance | Davie | 2 | 2,500 - 4,999 | $131,000 | Single Loc |
| **United Airlines** | 451201 | Airline Companies | Greensboro | Guilford | 55 | 100,000+ | $34,318,000 | Branch |
| **United Airlines** | 451201 | Airline Companies | High Point | Guilford | 15 | 10,000 - 19,999 | $9,360,000 | Branch |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Volare Carburetors** | 559908 | Aircraft Equipment Parts & Supplies | Gibsonville | Guilford | 15 | 2,500 - 4,999 | $4,913,000 | Single Loc |
| **Welborn Farm Airport** | 458106 | Airports | Boonville | Yadkin | 1 | 1,500 - 2,499 | $57,000 | Single Loc |
| **Whiteheart Farm Airport** | 735939 | Aircraft Charter Rental & Leasing Svc | Lewisville | Forsyth | 1 | 1 - 1,499 | $136,000 | Single Loc |

## APPENDIX 3

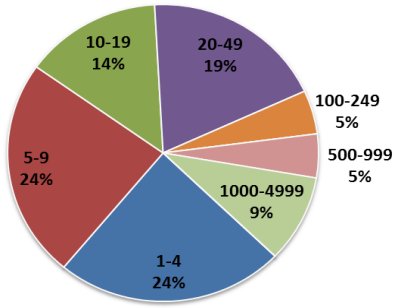
## PEER AIRPORT VIRTUAL PORTFOLIO SECTOR FIRM POPULATIONS

### Aircraft Engines & Engine Parts-Manufacturers

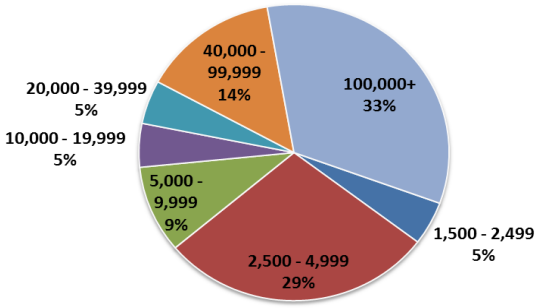
### SIC 372498

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **372498** | **Aircraft Engines & Engine Parts to Mfrs** | **172** | **17** | **0** |

**Firm Employment**
**Aircraft Manufacturers (SIC 372101)**




**Firm Facility Size (sf)**
**Aircraft Manufacturers (SIC 372101)**




| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **A D S US Sport Aircraft LLC** | Addison | TX | 3 | 2,500 - 4,999 | $1,106 | Single Loc |
| **Aero Country East Assn LLC** | Mckinney | TX | 3 | 2,500 - 4,999 | $1,512 | Single Loc |
| **Aeroworks Inc** | Denver | CO | 15 | 10,000 - 19,999 | $11,828 | Single Loc |
| **Ahlers Aerospace Inc** | Hurst | TX | 30 | 40,000 - 99,999 | $26,036 | Single Loc |
| **Air Command Intl** | Caddo Mills | TX | 3 | 2,500 - 4,999 | $1,521 | Single Loc |
| **Air Command Intl** | Caddo Mills | TX | 4 | 2,500 - 4,999 | $2,027 | Single Loc |
| **Airbus Helicopters Inc** | Grand Prairie | TX | 500 | 100,000+ | N/A | Subsidiary |
| **Benz Airborne Systems** | Fort Worth | TX | 10 | 20,000 - 39,999 | $8,679 | Single Loc |
| **Boeing Co** | Chandler | AZ | 9 | 2,500 - 4,999 | $5,424 | Single Loc |
| **Boeing Co** | Mesa | AZ | 9 | 2,500 - 4,999 | $5,424 | Single Loc |
| **Boeing Co** | Tempe | AZ | 9 | 5,000 - 9,999 | $5,424 | Single Loc |

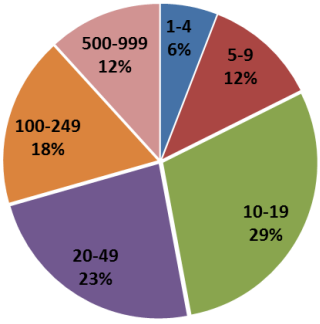
| | | | | | | |
|---|---|---|---|---|---|---|
| **Boeing Co** | Jacksonville | FL | 6 | 5,000 - 9,999 | $3,684 | Single Loc |
| **Boeing Co** | Jacksonville | FL | 27 | 40,000 - 99,999 | $16,575 | Branch |
| **Boeing Co** | Richardson | TX | 150 | 100,000+ | $75,554 | Branch |
| **Boeing Fire Protection-Mesa** | Mesa | AZ | 4000 | 100,000+ | $2,410,271 | Branch |
| **Boeing P8a Mtx** | Jacksonville | FL | 27 | 100,000+ | $16,575 | Branch |
| **Bombardier Corp** | Baltimore | MD | 7 | 40,000 - 99,999 | $2,859 | Single Loc |
| **Cross Timbers Parts Sales** | Poolville | TX | 1 | 1,500 - 2,499 | $295 | Single Loc |
| **Honeywell Aerospace** | Phoenix | AZ | 1500 | 100,000+ | $903,852 | Branch |
| **Lockheed Martin Aeronautics Co** | Fort Worth | TX | 10 | 100,000+ | $0 | Subsidiary |
| **Red Technologies Inc** | Bedford | TX | 20 | 100,000+ | $17,357 | Single Loc |

## Aircraft Engines & Engine Parts-Manufacturers

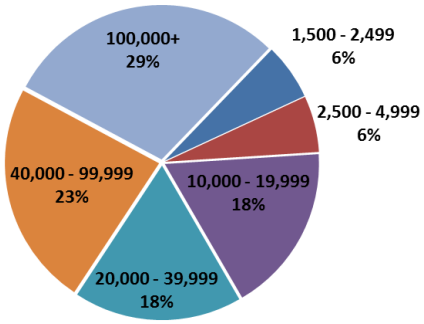
## SIC 372498

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **372498** | **Aircraft Engines & Engine Parts to Mfrs** | **172** | **17** | **0** |

**Firm Employment**
**Aircraft Engines & Engine Parts (SIC 372498)**




**Firm Facility Size (sf)**
**Aircraft Engines & Engine Parts (SIC 372498)**



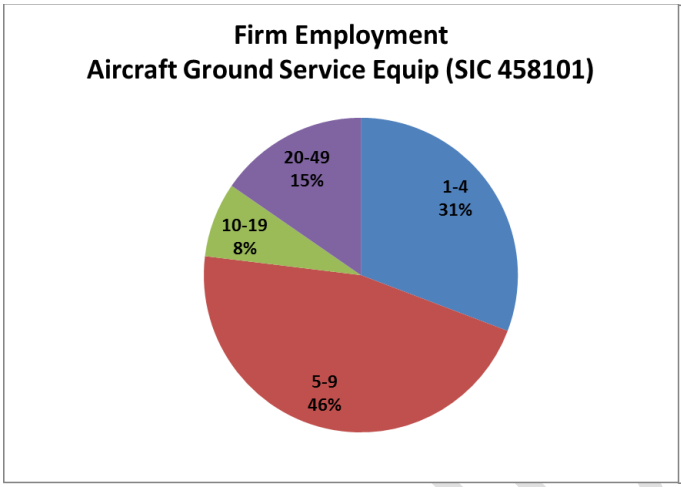

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aircraft Engine & Accessory Co** | Dallas | TX | 13 | 10,000 - 19,999 | $4,334 | Single Loc |
| **Aircraft General Supply** | Jacksonville | FL | 2 | 1,500 - 2,499 | $980 | Single Loc |
| **Barnes Aerospace** | Phoenix | AZ | 9 | 2,500 - 4,999 | $4,336 | Branch |
| **Dallas Airmotive Inc** | Dallas | TX | 12 | 20,000 - 39,999 | $4,000 | Branch |
| **Euless Aero Components Inc** | Euless | TX | 40 | 40,000 - 99,999 | $31,121 | Single Loc |
| **Frakes Aviation** | Cleburne | TX | 10 | 10,000 - 19,999 | $2,900 | Single Loc |
| **HM Dunn Aero Systems Inc** | Euless | TX | 176 | 100,000+ | N/A | Subsidiary |
| **North Texas Turbines** | Dallas | TX | 10 | 20,000 - 39,999 | $3,334 | Single Loc |
| **Pratt & Whitney** | Luke AFB | AZ | 25 | 20,000 - 39,999 | $12,044 | Branch |
| **Pratt & Whitney** | Jacksonville | FL | 15 | 40,000 - 99,999 | $7,350 | Branch |
| **Pratt & Whitney** | Fort Worth | TX | 28 | 40,000 - 99,999 | $21,785 | Branch |
| **Pratt & Whitney** | Grand Prairie | TX | 500 | 100,000+ | $389,005 | Branch |
| **Turbine Aero Inc** | Tempe | AZ | 170 | 100,000+ | $81,894 | Branch |

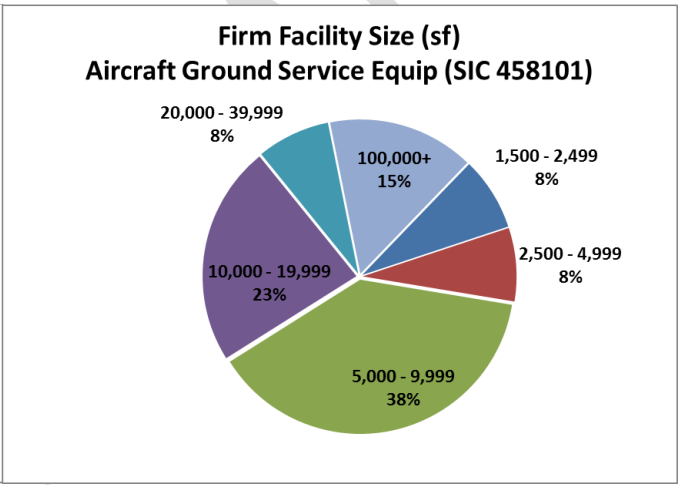
| | | | | | | |
|---|---|---|---|---|---|---|
| **Turbineaero Engines Technics** | Chandler | AZ | 32 | 40,000 - 99,999 | $15,416 | Single Loc |
| **Turbomeca USA** | Grand Prairie | TX | 216 | 100,000+ | N/A | Subsidiary |
| **Unison Industries LLC** | Jacksonville | FL | 600 | 100,000+ | N/A | Subsidiary |
| **Warnke's Machining** | Arlington | TX | 7 | 10,000 - 19,999 | $5,447 | Single Loc |

## Aircraft Ground Support & Service Equipment

## SIC 458101

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458101** | **Aircraft Ground Support & Service Equipment** | **169** | **13** | **0** |



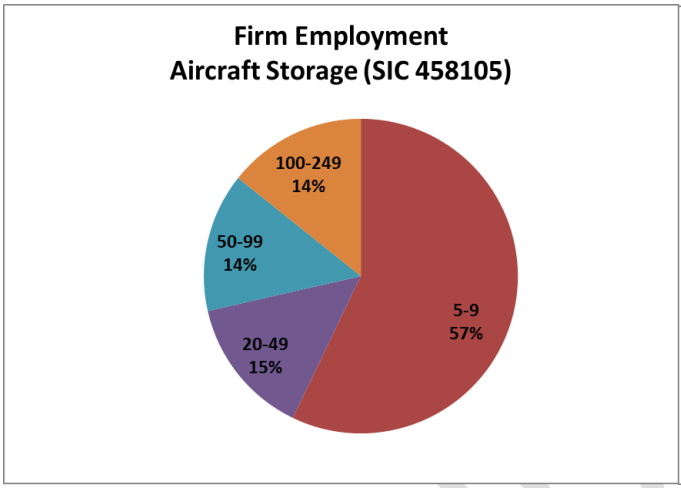



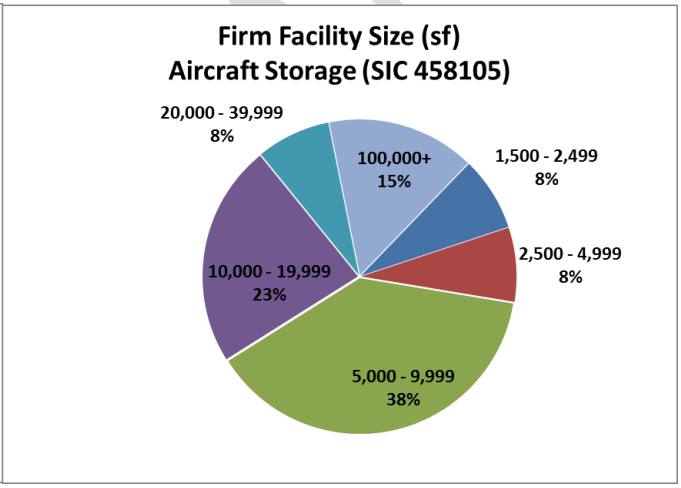

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Bam Denton Mgmt Ventures LLC** | Denton | TX | 5 | 10,000 - 19,999 | $614 | Single Loc |
| **Fbo Hanger** | Watkins | CO | 5 | 5,000 - 9,999 | $582 | Single Loc |
| **GAT Airline Ground Support** | Jacksonville | FL | 25 | 100,000+ | $3,600 | Branch |
| **Gateway Aviation Svc** | Mesa | AZ | 40 | 100,000+ | $5,390 | Single Loc |
| **Global Aviation Svc** | Phoenix | AZ | 4 | 10,000 - 19,999 | $539 | Branch |
| **Global Aviation Svc** | Dallas | TX | 5 | 20,000 - 39,999 | $887 | Branch |
| **Gold Coast Helicopters** | Glendale | AZ | 8 | 5,000 - 9,999 | $1,078 | Single Loc |
| **Parisa Travel** | Plano | TX | 1 | 5,000 - 9,999 | $152 | Single Loc |
| **Pegasus Flight Support** | Addison | TX | 9 | 10,000 - 19,999 | $1,596 | Single Loc |
| **Pegasus Flight Support** | Carrollton | TX | 1 | 5,000 - 9,999 | $123 | Single Loc |
| **Rentfrow Inc** | Phoenix | AZ | 4 | 1,500 - 2,499 | $539 | Single Loc |
| **Total Airport Svc** | Phoenix | AZ | 6 | 2,500 - 4,999 | $809 | Single Loc |
| **Western Air Crews Intl LLC** | Mesa | AZ | 10 | 5,000 - 9,999 | $1,348 | Single Loc |

## Aircraft Storage

## SIC 458105

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458105** | **Aircraft Storage** | **76** | **7** | **0** |



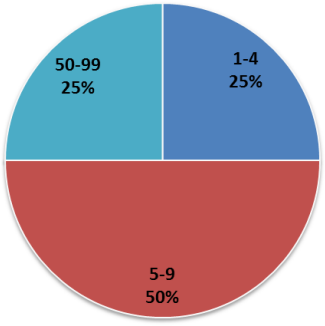

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Addison Airport-Hangar Rental** | Addison | TX | 8 | 10,000 - 19,999 | $1,419 | Single Loc |
| **Ambassador Jet Ctr** | Dallas | TX | 8 | 10,000 - 19,999 | $1,584 | Single Loc |
| **Island Aviation Inc** | Fernandina Beach | FL | 6 | 2,500 - 4,999 | $574 | Single Loc |
| **Pinal AIRPARK-Mzj** | Marana | AZ | 200 | 100,000+ | $16,149 | Single Loc |
| **Ross Aviation** | Scottsdale | AZ | 50 | 100,000+ | $6,738 | Branch |
| **Texas Jet Inc** | Fort Worth | TX | 30 | 100,000+ | $4,575 | Single Loc |
| **United Air Temp** | Jacksonville | FL | 6 | 10,000 - 19,999 | $864 | Single Loc |

## Aircraft Upholsterers

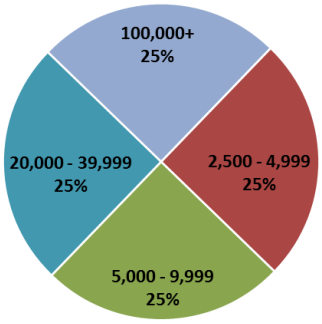
## SIC 458107

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458107** | **Aircraft Upholsters** | **33** | **4** | **0** |

**Firm Employment**
**Aircraft Upholsterers (SIC 458107)**




**Firm Facility Size (sf)**
**Aircraft Upholsterers (SIC 458107)**



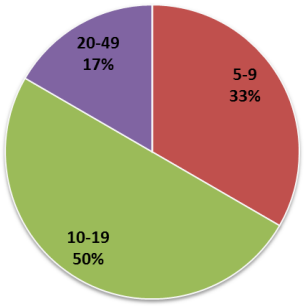

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Arizona Aircraft Interior Dsgn** | Mesa | AZ | 8 | 20,000 - 39,999 | $1,078 | Single Loc |
| **Greiner Purtec** | Fort Worth | TX | 60 | 100,000+ | $9,150 | Single Loc |
| **JBS Interiors** | Carrollton | TX | 6 | 5,000 - 9,999 | $1,064 | Single Loc |
| **Scott's Pro Upholstery** | Jacksonville | FL | 1 | 2,500 - 4,999 | $144 | Single Loc |

## Helicopter Maintenance

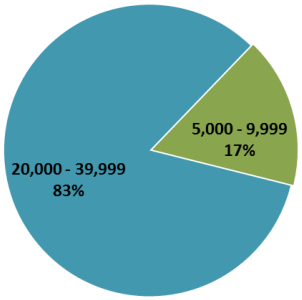
## SIC 458108

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458107** | **Helicopter Maintenance** | **32** | **6** | **0** |

**Firm Employment**
**Helicopter Maintenance (SIC 458108)**




**Firm Facility Size (sf)**
**Helicopter Maintenance (SIC 458108)**



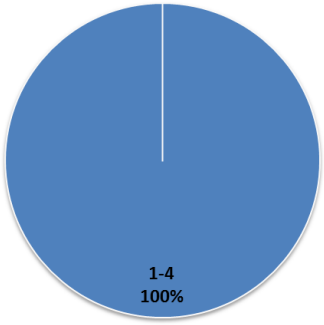

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aero Tech Svc** | Addison | TX | 10 | 20,000 - 39,999 | $1,773 | Single Loc |
| **Isc** | Fort Worth | TX | 12 | 20,000 - 39,999 | $1,830 | Single Loc |
| **Phoenix Heliparts Inc** | Mesa | AZ | 20 | 20,000 - 39,999 | $2,695 | Single Loc |
| **Tempco** | Aubrey | TX | 5 | 5,000 - 9,999 | $614 | Single Loc |
| **Uniflight LLC** | Grand Prairie | TX | 14 | 20,000 - 39,999 | N/A | Subsidiary |
| **Willie Mc Daniel Jr** | Grand Prairie | TX | 5 | 20,000 - 39,999 | $887 | Single Loc |

## Aircraft Refinishing and Painting

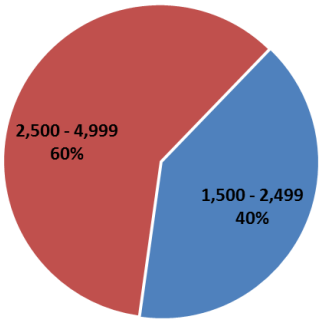
## SIC 458110

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458110** | **Aircraft Refinishing and Painting** | **39** | **4** | **0** |

**Firm Employment**
**Aircraft Refinishing & Painting (SIC 458110)**




**Firm Facility Size (sf)**
**Aircraft Refinishing & Painting (SIC 458110)**



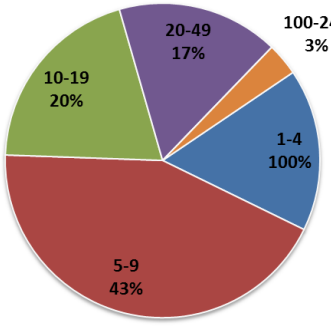

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Avchem Corp** | Greenville | SC | 4 | 2,500 - 4,999 | $566 | Single Loc |
| **Chuy's Painting** | Fort Worth | TX | 1 | 1,500 - 2,499 | $153 | Single Loc |
| **Poplawski Aircraft Pnt** | Ennis | TX | 1 | 1,500 - 2,499 | $116 | Single Loc |
| **Glo Custom Aircraft Inc** | Fort Worth | TX | 4 | 2,500 - 4,999 | $610 | Single Loc |

## Airline Support Services

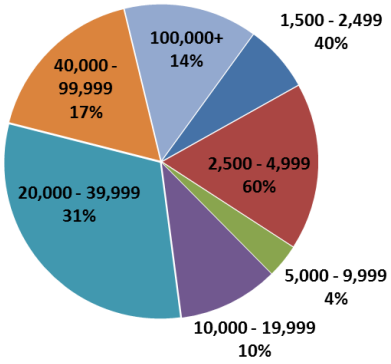
## SIC 458111

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458111** | **Airline Support Services** | **452** | **29** | **1** |

**Firm Employment**
**Airline Support Services (SIC 458111)**




**Firm Facility Size (sf)**
**Airline Support Services (SIC 458111)**




| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **367th Commercial Air Group** | Addison | TX | 22 | 100,000+ | $3,900 | Single Loc |
| **Air Cell Inc** | Broomfield | CO | 100 | 100,000+ | $4,573 | Single Loc |
| **Av Jobs Inc** | Littleton | CO | 9 | 5,000 - 9,999 | $1,382 | Single Loc |
| **Aviation Solutions** | Plano | TX | 3 | 20,000 - 39,999 | $455 | Single Loc |
| **Avjobs Inc** | Highlands Ranch | CO | 9 | 20,000 - 39,999 | $1,382 | Single Loc |
| **Bassco Services Inc** | Dallas | TX | 10 | 40,000 - 99,999 | $1,773 | Single Loc |
| **Bernal Y Mejia Enterprises USA** | Arlington | TX | 6 | 2,500 - 4,999 | $915 | Single Loc |
| **Cook Canyon Aviation** | Dallas | TX | 10 | 40,000 - 99,999 | $1,773 | Single Loc |
| **Cornerstone Air Ctr** | Fort Worth | TX | 10 | 20,000 - 39,999 | $1,525 | Single Loc |
| **Cromer Aerial** | Belton | SC | 4 | 1,500 - 2,499 | $282 | Single Loc |
| **Elite Line Svc Inc** | Carrollton | TX | 20 | 100,000+ | $0 | Subsidiary |

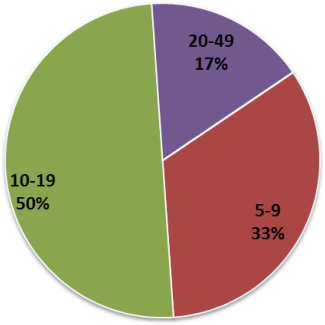
| | | | | | | |
|---|---|---|---|---|---|---|
| **Falcon Executive Aviation Inc** | Mesa | AZ | 20 | 100,000+ | $2,695 | Single Loc |
| **Fractrade** | Greenville | SC | 7 | 20,000 - 39,999 | $989 | Single Loc |
| **Gmt US Republic Aviation** | Greenwood Vlg | CO | 7 | 40,000 - 99,999 | $0 | Subsidiary |
| **Hill Air Corp** | Dallas | TX | 10 | 10,000 - 19,999 | $1,773 | Single Loc |
| **Hunt Oil Co Aviation Dept** | Dallas | TX | 10 | 20,000 - 39,999 | $1,773 | Branch |
| **Konfara Co** | Scottsdale | AZ | 22 | 40,000 - 99,999 | $2,965 | Single Loc |
| **Lemac Aviation** | Mesa | AZ | 8 | 20,000 - 39,999 | $1,078 | Single Loc |
| **Lufthansa Systems Americas** | Irving | TX | 5 | 20,000 - 39,999 | $0 | Subsidiary |
| **Pilot Shop** | Fort Worth | TX | 1 | 10,000 - 19,999 | $153 | Single Loc |
| **Rsi Visuals** | Euless | TX | 42 | 40,000 - 99,999 | $6,405 | Single Loc |
| **Safetech-Dallas** | Dallas | TX | 10 | 20,000 - 39,999 | $1,773 | Single Loc |
| **Sandpiper Aviation** | Fort Worth | TX | 6 | 10,000 - 19,999 | $915 | Single Loc |
| **Sibran Properties LLC** | Phoenix | AZ | 8 | 2,500 - 4,999 | $1,078 | Single Loc |
| **Strom Aviation Inc** | Fort Worth | TX | 6 | 20,000 - 39,999 | $736 | Single Loc |
| **Swissport Fueling Inc** | Phoenix | AZ | 7 | 2,500 - 4,999 | $944 | Branch |
| **Vas Aero** | Peoria | AZ | 8 | 2,500 - 4,999 | $1,078 | Single Loc |
| **Wheels Up Aviation Svc LLC** | Fleming Island | FL | 1 | 1,500 - 2,499 | $84 | Single Loc |
| **Wingshot Aerial Imaging Svc** | The Colony | TX | 1 | | $0 | Single Loc |
| **Worldwide Warbirds Inc** | Phoenix | AZ | 8 | 2,500 - 4,999 | $1,078 | Single Loc |

## Aircraft Hangars Rental & Sales

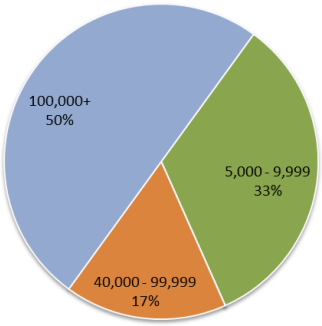
## SIC 458112

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **458112** | **Aircraft Hangars Rental & Sales** | **48** | **6** | **0** |

**Firm Employment**
**Aircraft Hangars Rentals/Sales (SIC 458112)**




**Firm Facility Size (sf)**
**Aircraft Hangars Rentals/Sales (SIC 458112)**

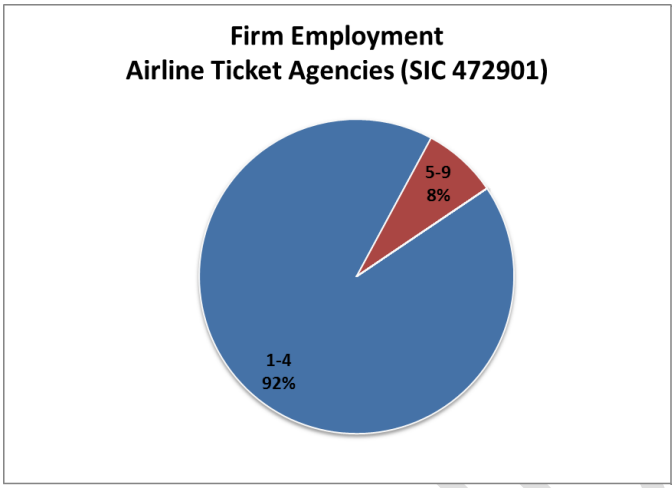


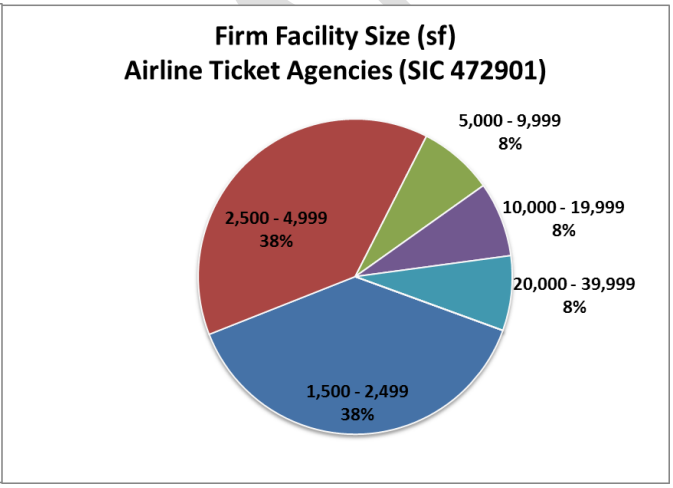

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Horizon Air Group** | Dallas | TX | 10 | 100,000+ | $1,773 | Single Loc |
| **Jet Linx** | Scottsdale | AZ | 8 | 5,000 - 9,999 | $1,078 | Single Loc |
| **Jet Linx** | Englewood | CO | 12 | 100,000+ | $1,685 | Single Loc |
| **Jet Linx** | Dallas | TX | 10 | 100,000+ | $1,773 | Single Loc |
| **Jet Linx** | Fort Worth | TX | 6 | 5,000 - 9,999 | $915 | Single Loc |
| **Richardson Aviation** | Fort Worth | TX | 41 | 40,000 - 99,999 | $6,253 | Single Loc |

## Airline Ticket Agencies

## SIC 472901

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **472901** | **Airline Ticket Agencies** | **320** | **13** | **0** |



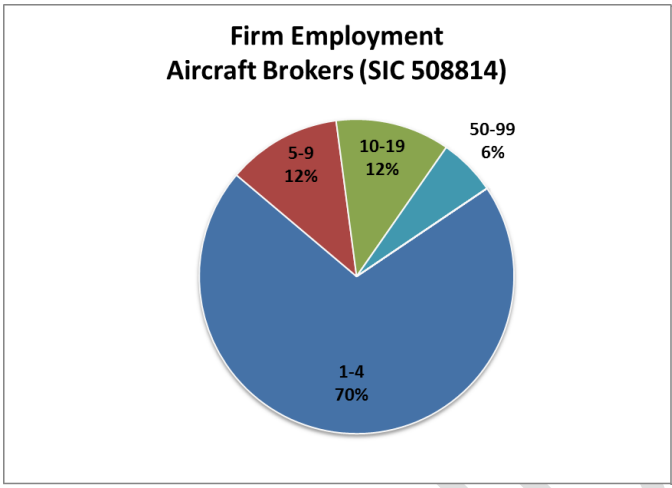



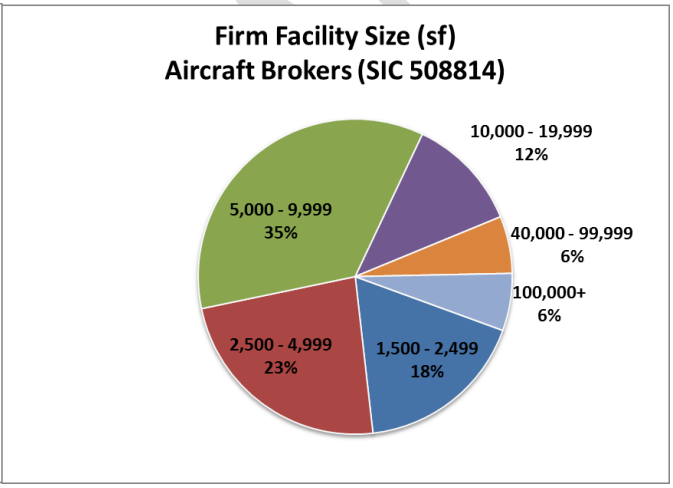

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **A & A Travel** | Plano | TX | 2 | 1,500 - 2,499 | $341 | Single Loc |
| **ASA Travel** | Arlington | TX | 3 | 1,500 - 2,499 | $292 | Single Loc |
| **Axioma Travel** | Tempe | AZ | 1 | 1,500 - 2,499 | $173 | Single Loc |
| **Bowden Travel** | Cleburne | TX | 4 | 2,500 - 4,999 | $527 | Single Loc |
| **Class Act Consulting** | Arlington | TX | 2 | 1,500 - 2,499 | $221 | Single Loc |
| **Delightful Getaways** | Littleton | CO | 3 | 1,500 - 2,499 | $481 | Single Loc |
| **Flybindu** | Irving | TX | 3 | 2,500 - 4,999 | $325 | Single Loc |
| **Infinity Global Travel** | Taneytown | MD | 3 | 2,500 - 4,999 | $382 | Single Loc |
| **Rosewood Assets Flight Dept** | Dallas | TX | 5 | 20,000 - 39,999 | $541 | Single Loc |
| **Sta Travel** | Dallas | TX | 3 | 10,000 - 19,999 | $325 | Single Loc |
| **Travel Dreams** | Greenville | TX | 1 | 2,500 - 4,999 | $132 | Single Loc |
| **Virtual Flight Surgeons** | Aurora | CO | 3 | 5,000 - 9,999 | $682 | Single Loc |
| **Visions Of Travel** | Aurora | CO | 3 | 2,500 - 4,999 | $682 | Single Loc |

## Aircraft Brokers

## SIC 508814

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **508814** | **Aircraft Brokers** | **136** | **17** | **0** |



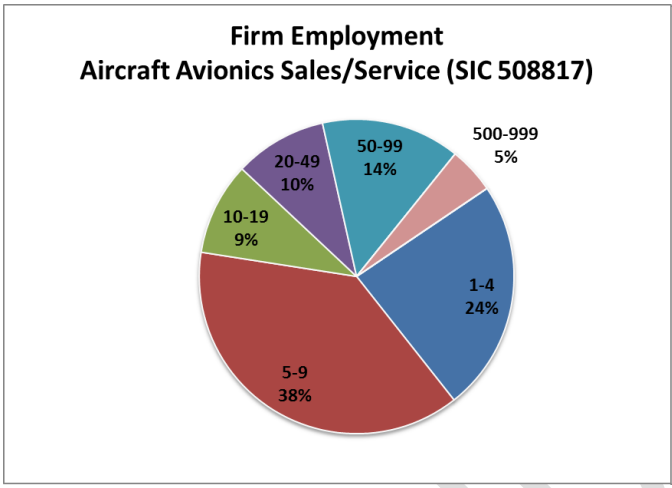

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aero Management Group** | Annapolis | MD | 10 | 40,000 - 99,999 | $16,078 | Single Loc |
| **Aero Zone** | Chandler | AZ | 15 | 5,000 - 9,999 | $24,325 | Single Loc |
| **Ameritex Aviation LLC** | Arlington | TX | 4 | 5,000 - 9,999 | $8,079 | Single Loc |
| **Auto Gyro USA** | Stevensville | MD | 4 | 2,500 - 4,999 | $5,729 | Single Loc |
| **Barron Thomas Aviation** | Scottsdale | AZ | 2 | 2,500 - 4,999 | $3,244 | Single Loc |
| **Dallas Jet Intl** | Colleyville | TX | 4 | 5,000 - 9,999 | $8,079 | Single Loc |
| **Empire Aviation** | Scottsdale | AZ | 4 | 2,500 - 4,999 | $6,487 | Single Loc |
| **Infinity Aviation Co Inc** | St Augustine | FL | 4 | 2,500 - 4,999 | $6,058 | Single Loc |
| **Jet Advisors** | Broomfield | CO | 3 | 5,000 - 9,999 | $4,670 | Single Loc |
| **Lowell Tucker Enterprises** | Scottsdale | AZ | 1 | 1,500 - 2,499 | $1,622 | Single Loc |
| **Metroplex Aviation** | Addison | TX | 1 | 1,500 - 2,499 | $2,121 | Single Loc |
| **Mile High Financial Corp** | Parker | CO | 1 | 1,500 - 2,499 | $1,622 | Single Loc |
| **MYPILOTSTORE.COM** | Scottsdale | AZ | 5 | 10,000 - 19,999 | $8,109 | Single Loc |

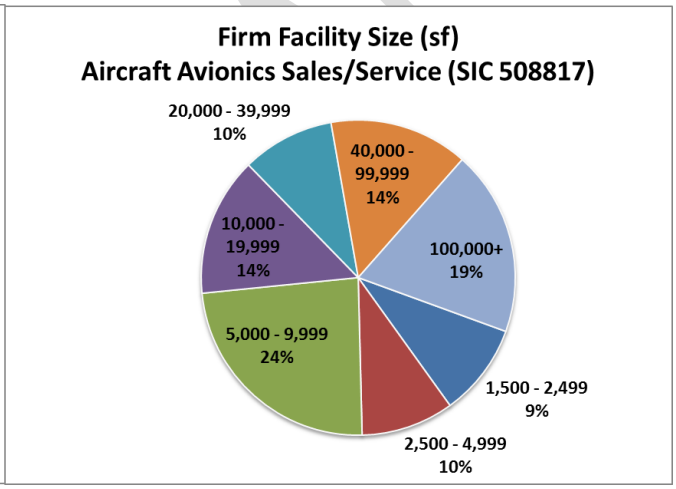
| | | | | | | |
|---|---|---|---|---|---|---|
| **Parkway Support Svc** | Middle River | MD | 6 | 5,000 - 9,999 | $9,569 | Single Loc |
| **Pinnacle Aviation** | Scottsdale | AZ | 50 | 100,000+ | $81,083 | Single Loc |
| **Vance & Engles Aircraft Broker** | Annapolis | MD | 3 | 10,000 - 19,999 | $4,824 | Single Loc |
| **Wetzel Aviation Inc** | Englewood | CO | 4 | 5,000 - 9,999 | $6,741 | Single Loc |

## Aircraft Avionics Sales & Service

## SIC 508817

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **508817** | **Aircraft Avionics Sales & Service** | **136** | **17** | **0** |




| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aft Group Inc** | Carrollton | TX | 4 | 1,500 - 2,499 | $7,769 | Single Loc |
| **Airborne Systems LLC** | Aledo | TX | 5 | 5,000 - 9,999 | $10,099 | Single Loc |
| **Alliance Aircraft Svc LLC** | Scottsdale | AZ | 5 | 5,000 - 9,999 | $8,109 | Single Loc |
| **Aviation Communication** | Phoenix | AZ | 310 | 100,000+ | $502,714 | Single Loc |
| **Cobham Avionics** | Mineral Wells | TX | 5 | 10,000 - 19,999 | $9,138 | Branch |
| **Cool City Electronics Inc** | Mineral Wells | TX | 30 | 20,000 - 39,999 | $54,827 | Single Loc |
| **Fieldtech Avionics & Instrs** | Fort Worth | TX | 50 | 100,000+ | $100,987 | Single Loc |
| **Freedom Air Avionics** | Broomfield | CO | 10 | 40,000 - 99,999 | $17,117 | Single Loc |
| **Freeflight Systems** | Irving | TX | 6 | 10,000 - 19,999 | $12,721 | Single Loc |
| **Ftw Avionics** | Fort Worth | TX | 4 | 2,500 - 4,999 | $8,079 | Single Loc |
| **Jetten.Com** | Dallas | TX | 6 | 5,000 - 9,999 | $12,529 | Single Loc |
| **L-3 Communications** | Phoenix | AZ | 5 | 5,000 - 9,999 | $8,109 | Branch |
| **LSI Inc** | Jacksonville | FL | 500 | 100,000+ | $853,870 | Single Loc |

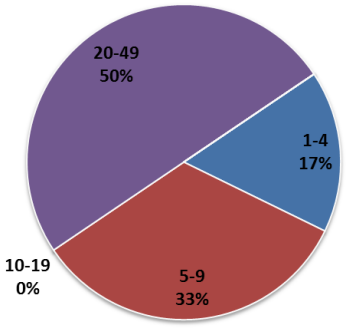
| | | | | | | |
|---|---|---|---|---|---|---|
| **Memon Aircraft Instr Svc** | Dallas | TX | 2 | 2,500 - 4,999 | $4,241 | Single Loc |
| **Million Air** | Addison | TX | 85 | 100,000+ | $180,201 | Branch |
| **Nova Avionics** | Roanoke | TX | 3 | 1,500 - 2,499 | $5,827 | Single Loc |
| **Panasonic Avionics Corp** | Coppell | TX | 31 | 40,000 - 99,999 | $65,721 | Branch |
| **Radio Masters Inc** | Dallas | TX | 5 | 5,000 - 9,999 | $10,601 | Single Loc |
| **Sims Aviation Inc** | Addison | TX | 10 | 10,000 - 19,999 | $21,201 | Single Loc |
| **Simtek Inc** | Euless | TX | 60 | 40,000 - 99,999 | $121,184 | Single Loc |
| **Southwest Aero** | Scottsdale | AZ | 2 | 1 - 1,499 | $3,244 | Single Loc |
| **World Wide Aerospace** | Roanoke | TX | 6 | 20,000 - 39,999 | $11,653 | Single Loc |

## Aircraft Engines (Whls)

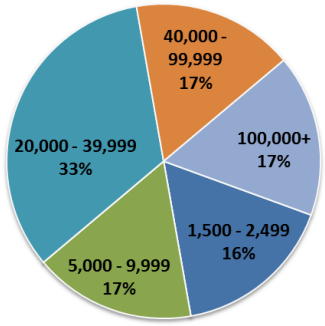
## SIC 508819

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **508819** | **Aircraft Engines (Whls)** | **49** | **6** | **0** |

**Firm Employment**
**Aircraft Engines (Whls) (SIC 508819)**




**Firm Facility Size (sf)**
**Aircraft Engines (Whls) (SIC 508819)**



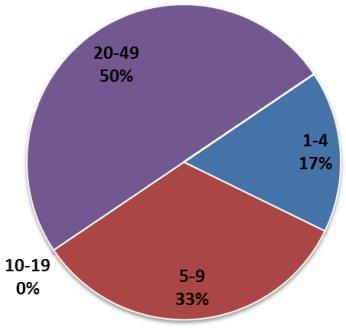

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aeromaritime America** | Mesa | AZ | 26 | 100,000+ | $42,164 | Single Loc |
| **Aircraft Engine Specialist** | Chandler | AZ | 30 | 40,000 - 99,999 | $48,650 | Single Loc |
| **Cherokee Products Inc** | Fort Worth | TX | 3 | 1,500 - 2,499 | $6,060 | Single Loc |
| **G E AVIATION Materials LP** | Grand Prairie | TX | 6 | 20,000 - 39,999 | $12,721 | Single Loc |
| **Magellan Aerospace Turbine** | Glendale | AZ | 45 | 20,000 - 39,999 | $72,975 | Single Loc |
| **Smithwest** | Tempe | AZ | 5 | 5,000 - 9,999 | $8,109 | Single Loc |

## Aviation Fuel (Whls)

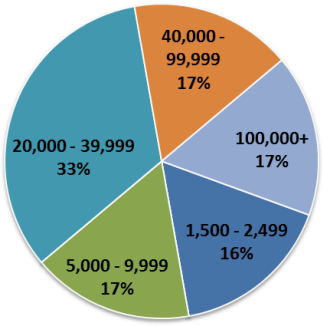
## SIC 517223

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **517223** | **Aviation Fuel (Whls)** | **121** | **6** | **0** |

**Firm Employment**
**Aircraft Engines (Whls) (SIC 508819)**




**Firm Facility Size (sf)**
**Aircraft Engines (Whls) (SIC 508819)**

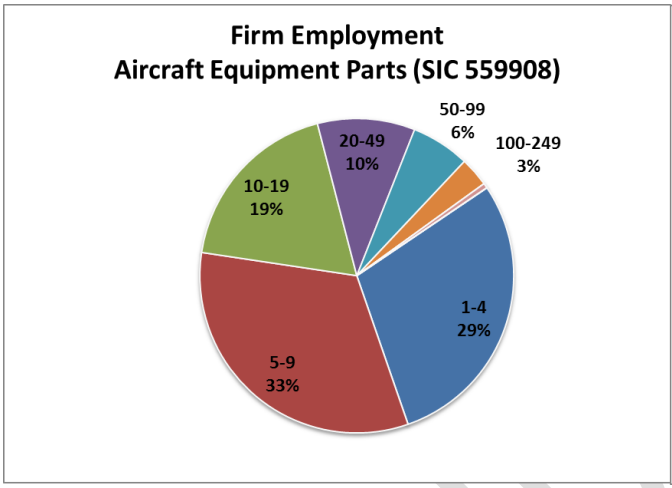


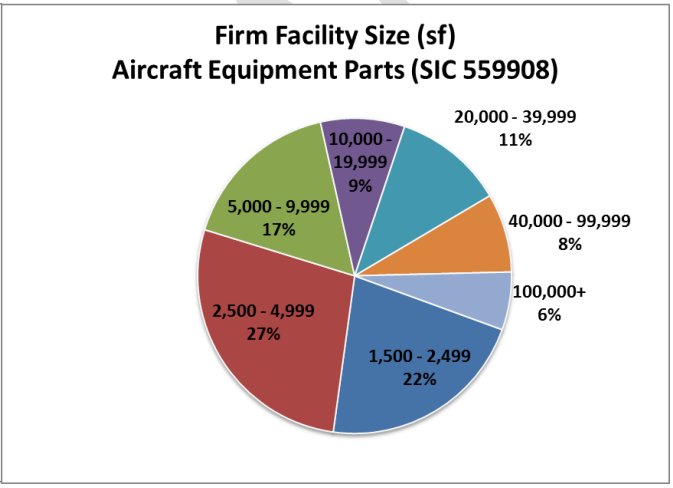

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aero Teams** | Tempe | AZ | 7 | 20,000 - 39,999 | $95,700 | Single Loc |
| **Aircraft Services Intl Group** | Denver | CO | 40 | 100,000+ | $310,384 | Branch |
| **Av Serve** | Greenville | SC | 3 | 2,500 - 4,999 | $33,393 | Single Loc |
| **Jacksonville Jet Port** | Jacksonville | FL | 25 | 40,000 - 99,999 | $3,600 | Single Loc |
| **Talon Industries Inc** | Arlington | TX | 5 | 10,000 - 19,999 | $64,813 | Single Loc |
| **TWS Aviation Fuel Systems** | Watkins | CO | 6 | 10,000 - 19,999 | $46,592 | Single Loc |

## Aircraft Equipment Parts & Supplies

## SIC 559908

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **559908** | **Aircraft Equipment Parts & Supplies** | **1,768** | **202** | **5** |




| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **A & M Aerospace** | Denver | CO | 30 | 10,000 - 19,999 | $19,407 | Single Loc |
| **A L M Technologies Inc** | Yulee | FL | 4 | 1,500 - 2,499 | $1,036 | Single Loc |
| **Accelerated Flight Training** | Scottsdale | AZ | 5 | 10,000 - 19,999 | $3,345 | Single Loc |
| **Acme Aerospace Inc** | Tempe | AZ | 95 | 40,000 - 99,999 | $63,547 | Branch |
| **Action Aircraft Parts** | Dallas | TX | 6 | 5,000 - 9,999 | $2,351 | Single Loc |
| **Action Research Corp** | Greer | SC | 2 | 1,500 - 2,499 | $0 | Subsidiary |
| **Advantage Aviation Tech** | Cleburne | TX | 5 | 2,500 - 4,999 | $1,333 | Single Loc |
| **Advantage Aviation Tech Inc** | Dallas | TX | 70 | 40,000 - 99,999 | $27,424 | Single Loc |
| **Advantage Aviation Techs** | Dallas | TX | 60 | 20,000 - 39,999 | $23,506 | Single Loc |
| **Aero Dynamix Inc** | Euless | TX | 40 | 20,000 - 39,999 | $14,136 | Single Loc |
| **Aero Glen Intl** | Grapevine | TX | 8 | 5,000 - 9,999 | $2,828 | Single Loc |
| **Aero Link Arizona** | Scottsdale | AZ | 5 | 2,500 - 4,999 | $3,345 | Single Loc |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Aero Parts & Supply** | Dallas | TX | 5 | 2,500 - 4,999 | $1,959 | Single Loc |
| **Aero Parts Mart** | Fort Worth | TX | 7 | 5,000 - 9,999 | $2,474 | Single Loc |
| **Aero Performance** | Fort Worth | TX | 5 | 5,000 - 9,999 | $1,767 | Single Loc |
| **Aero Safe Corp** | Mineral Wells | TX | 5 | 2,500 - 4,999 | $1,480 | Single Loc |
| **Aero Systems LLC** | Grapevine | TX | 4 | 1,500 - 2,499 | $1,414 | Single Loc |
| **Aero Tire & Tank LLC** | Dallas | TX | 15 | 5,000 - 9,999 | $5,877 | Single Loc |
| **Aero-Glen International LLC** | Dallas | TX | 6 | 2,500 - 4,999 | $2,351 | Single Loc |
| **Aero-Hose Corp** | Fleming Island | FL | 11 | 40,000 - 99,999 | $2,790 | Single Loc |
| **AEROPHOENIX.COM** | Phoenix | AZ | 10 | 5,000 - 9,999 | $6,690 | Single Loc |
| **Aeroturbine Inc** | Irving | TX | 6 | 20,000 - 39,999 | $2,351 | Branch |
| **Aerozona Parts & Svc** | Phoenix | AZ | 1 | 1,500 - 2,499 | $669 | Single Loc |
| **Aersale Inc** | Grapevine | TX | 3 | 1,500 - 2,499 | $1,176 | Single Loc |
| **Agusta Westland** | Mesa | AZ | 2 | 5,000 - 9,999 | $1,338 | Single Loc |
| **Air Gear Intl** | Phoenix | AZ | 10 | 2,500 - 4,999 | $6,690 | Single Loc |
| **Air Parts** | Phoenix | AZ | 7 | 2,500 - 4,999 | $4,683 | Single Loc |
| **Air Power Inc** | Arlington | TX | 50 | 40,000 - 99,999 | $17,670 | Single Loc |
| **Aircraft Battery Shop** | Anthem | AZ | 5 | 2,500 - 4,999 | $3,345 | Single Loc |
| **Aircraft Parts Store LLC** | Jacksonville | FL | 10 | 5,000 - 9,999 | $3,342 | Single Loc |
| **Airline Components Parts** | Euless | TX | 13 | 5,000 - 9,999 | $4,595 | Single Loc |
| **Allied Aerospace LTD** | Richland Hills | TX | 7 | 2,500 - 4,999 | $2,474 | Single Loc |
| **American Cooler Svc Inc** | Arlington | TX | 35 | 10,000 - 19,999 | $12,369 | Single Loc |
| **Applied Avionics** | Fort Worth | TX | 75 | 40,000 - 99,999 | $26,505 | Single Loc |
| **Applied Heat** | Chandler | AZ | 2 | 1 - 1,499 | $1,338 | Single Loc |
| **ARINC Inc** | Dallas | TX | 6 | 2,500 - 4,999 | $2,351 | Branch |
| **Arizona Aircraft Acces LLC** | Mesa | AZ | 17 | 10,000 - 19,999 | $11,372 | Single Loc |
| **Arizona Model Aircrafters** | Scottsdale | AZ | 1 | 1 - 1,499 | $669 | Single Loc |
| **ASC Industries** | Arlington | TX | 56 | 40,000 - 99,999 | $19,790 | Single Loc |
| **Associated Aircraft Supply** | Grapevine | TX | 10 | 20,000 - 39,999 | $7,068 | Single Loc |
| **Atk Corp** | Fort Worth | TX | 12 | 10,000 - 19,999 | $4,241 | Single Loc |
| **Augusta Aerospace** | Dallas | TX | 6 | 10,000 - 19,999 | $2,351 | Single Loc |
| **Av-Air Inc** | Chandler | AZ | 12 | 5,000 - 9,999 | $8,027 | Single Loc |
| **Av-Dec** | Fort Worth | TX | 45 | 20,000 - 39,999 | $15,903 | Single Loc |
| **Av-Ex Aviation Excellence** | Irving | TX | 20 | 40,000 - 99,999 | $7,836 | Single Loc |

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|---|---|---|---|---|---|---|
| **Avi Parts Intl** | Frisco | TX | 3 | 5,000 - 9,999 | $991 | Single Loc |
| **Aviall Inc** | Mesa | AZ | 8 | 2,500 - 4,999 | $5,352 | Branch |
| **Aviall Inc** | Centennial | CO | 3 | 1,500 - 2,499 | $1,803 | Branch |
| **Aviall Inc** | Dallas | TX | 6 | 2,500 - 4,999 | $2,351 | Single Loc |
| **Aviall Inc** | Dallas | TX | 6 | 2,500 - 4,999 | $2,351 | Single Loc |
| **Aviation Component Svc** | Dallas | TX | 3 | 1,500 - 2,499 | $1,176 | Single Loc |
| **Aviation Direct LLC** | Phoenix | AZ | 6 | 1,500 - 2,499 | $4,014 | Single Loc |
| **Aviation Inventory Resources** | Mansfield | TX | 15 | 5,000 - 9,999 | $5,301 | Single Loc |
| **Avionics 1st** | Dallas | TX | 6 | 2,500 - 4,999 | $2,351 | Single Loc |
| **Avipart USA Inc** | Frisco | TX | 3 | 5,000 - 9,999 | $991 | Single Loc |
| **Bauer Aviation** | Lewisville | TX | 3 | 1,500 - 2,499 | $991 | Single Loc |
| **Bennett's Aircraft Window** | Fort Worth | TX | 12 | 20,000 - 39,999 | $4,241 | Single Loc |
| **Beta Engineering Inc** | Arlington | TX | 12 | 10,000 - 19,999 | $4,241 | Single Loc |
| **Broadwing Aviation** | Fort Worth | TX | 17 | 5,000 - 9,999 | $6,008 | Single Loc |
| **Burkel, Robert** | Celina | TX | 3 | 2,500 - 4,999 | $1,122 | Single Loc |
| **Calco Aerospace** | Fort Worth | TX | 30 | 20,000 - 39,999 | $10,602 | Single Loc |
| **Century Components** | Haltom City | TX | 4 | 1,500 - 2,499 | $1,414 | Single Loc |
| **Cfdi Aero** | Denton | TX | 8 | 2,500 - 4,999 | $2,642 | Single Loc |
| **Chelton Inc** | Lewisville | TX | 3 | 2,500 - 4,999 | $991 | Single Loc |
| **Cotton Creek Capital Mgmt** | Dallas | TX | 15 | 40,000 - 99,999 | $5,877 | Branch |
| **Cotton Creek Capital Mgmt** | Fort Worth | TX | 15 | 40,000 - 99,999 | $5,301 | Branch |
| **Daedalus Components Inc** | Fort Worth | TX | 7 | 2,500 - 4,999 | $2,474 | Single Loc |
| **Dallas Aviation Inc** | Arlington | TX | 11 | 2,500 - 4,999 | $3,888 | Single Loc |
| **Dallas Avionics Inc** | Dallas | TX | 30 | 20,000 - 39,999 | $11,753 | Single Loc |
| **DAS International Jet Spares** | Englewood | CO | 5 | 20,000 - 39,999 | $3,004 | Single Loc |
| **Defense Solutions Group** | Fort Worth | TX | 12 | 10,000 - 19,999 | $4,241 | Single Loc |
| **Denco Aerospace Inc** | Grand Prairie | TX | 4 | 1,500 - 2,499 | $1,568 | Single Loc |
| **Denver Air Support Inc** | Englewood | CO | 5 | 10,000 - 19,999 | $3,004 | Single Loc |
| **Desert Fasteners** | Mesa | AZ | 1 | 1,500 - 2,499 | $669 | Single Loc |
| **DFW Instrumental Corp** | Dallas | TX | 6 | 2,500 - 4,999 | $2,351 | Single Loc |
| **Electro Enterprises Inc** | Fort Worth | TX | 12 | 5,000 - 9,999 | $4,241 | Single Loc |
| **Enparts** | Lancaster | TX | 1 | 1 - 1,499 | $392 | Single Loc |

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|---|---|---|---|---|---|---|
| **ESNA Texas** | N Richland Hills | TX | 150 | 100,000+ | $53,009 | Branch |
| **Evair Associates** | Mineral Wells | TX | 8 | 2,500 - 4,999 | $2,368 | Single Loc |
| **Executive Aircraft Products** | Scottsdale | AZ | 1 | 1 - 1,499 | $669 | Single Loc |
| **Falcon Crest Aviation Supply** | Englewood | CO | 2 | 1,500 - 2,499 | $1,202 | Single Loc |
| **Falcon Crest Aviation Supply** | Addison | TX | 3 | 1,500 - 2,499 | $1,176 | Single Loc |
| **Flite Components LLC** | Dallas | TX | 20 | 10,000 - 19,999 | $7,836 | Single Loc |
| **Flite Electronics** | Addison | TX | 5 | 1,500 - 2,499 | $1,959 | Single Loc |
| **Forced Aeromotive Tech Inc** | Englewood | CO | 5 | 20,000 - 39,999 | $3,004 | Single Loc |
| **Fox Equipment** | Carrollton | TX | 2 | 2,500 - 4,999 | $784 | Single Loc |
| **Freedom Precision Hardware** | Fort Worth | TX | 30 | 20,000 - 39,999 | $10,602 | Single Loc |
| **G & H Aerospace Inc** | Scottsdale | AZ | 8 | 2,500 - 4,999 | $5,352 | Single Loc |
| **G T Aero** | Lewisville | TX | 3 | 2,500 - 4,999 | $991 | Single Loc |
| **Generation 3 Ignition** | Englewood | CO | 5 | 10,000 - 19,999 | $3,004 | Single Loc |
| **Global Technical Svc** | Fort Worth | TX | 30 | 40,000 - 99,999 | $10,602 | Single Loc |
| **Goodrich BF** | Phoenix | AZ | 5 | 2,500 - 4,999 | $3,345 | Single Loc |
| **Gorman Aviation Inc** | Lewisville | TX | 4 | 2,500 - 4,999 | $1,321 | Single Loc |
| **Graco Supply Co** | Fort Worth | TX | 40 | 20,000 - 39,999 | $0 | Subsidiary |
| **Gulf Thrust Air** | Lewisville | TX | 2 | 1 - 1,499 | $661 | Single Loc |
| **Gulfstream Aerospace Corp** | Dallas | TX | 800 | 100,000+ | $313,413 | Branch |
| **Haire Aviation LLC** | Sanger | TX | 2 | 1,500 - 2,499 | $661 | Single Loc |
| **Hamilton Sunstrand** | Fort Worth | TX | 3 | 5,000 - 9,999 | $1,061 | Single Loc |
| **Helogistics Inc** | Grand Prairie | TX | 3 | 1 - 1,499 | $1,061 | Single Loc |
| **HRK Enterprises** | Fort Worth | TX | 9 | 2,500 - 4,999 | $3,181 | Single Loc |
| **Imex Of Jacksonville Inc** | Jacksonville | FL | 50 | 100,000+ | $16,710 | Single Loc |
| **In Tran LLC** | Gilbert | AZ | 3 | 2,500 - 4,999 | $2,007 | Single Loc |
| **Indian Aerospace** | Arlington | TX | 15 | 5,000 - 9,999 | $5,301 | Single Loc |
| **International Aviation Support** | Carrollton | TX | 10 | 20,000 - 39,999 | $3,918 | Single Loc |
| **International Governor Svc** | Broomfield | CO | 20 | 20,000 - 39,999 | $8,403 | Branch |
| **Interturbine Logistik** | Grand Prairie | TX | 25 | 40,000 - 99,999 | $8,835 | Single Loc |
| **Inventory Support Intl** | Fort Worth | TX | 4 | 2,500 - 4,999 | $1,414 | Single Loc |
| **J3 Aviation Inc** | Lewisville | TX | 2 | 2,500 - 4,999 | $661 | Single Loc |

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|---|---|---|---|---|---|---|
| **Jansens Aircraft Systs Control** | Tempe | AZ | 53 | 20,000 - 39,999 | $35,453 | Single Loc |
| **Jet Components Aircraf** | Ovilla | TX | 5 | 2,500 - 4,999 | $1,959 | Single Loc |
| **Jet Engine Support Inc** | Farmers Branch | TX | 2 | 2,500 - 4,999 | $784 | Single Loc |
| **Jet Parts Intl Inc** | Mesa | AZ | 3 | 1,500 - 2,499 | $2,007 | Single Loc |
| **Jet Set Air Motive Inc** | Euless | TX | 10 | 10,000 - 19,999 | $3,534 | Single Loc |
| **Jet Stream Aviation Products** | Mckinney | TX | 3 | 1,500 - 2,499 | $1,122 | Single Loc |
| **Jettech** | Littleton | CO | 6 | 1,500 - 2,499 | $2,236 | Single Loc |
| **Joan M Davis Inc** | Jacksonville | FL | 1 | 1 - 1,499 | $335 | Single Loc |
| **Killick Aerospace** | Addison | TX | 6 | 2,500 - 4,999 | $0 | Subsidiary |
| **Kinetic Structures Corp** | Phoenix | AZ | 3 | 1,500 - 2,499 | $2,007 | Single Loc |
| **Kitrick Widgets** | Phoenix | AZ | 5 | 5,000 - 9,999 | $3,345 | Single Loc |
| **Klg Aeromotive** | Phoenix | AZ | 2 | 1 - 1,499 | $1,338 | Single Loc |
| **KRN Aviation Svc** | Chandler | AZ | 18 | 2,500 - 4,999 | $12,041 | Single Loc |
| **Kulite Semi Conductors** | Fort Worth | TX | 12 | 20,000 - 39,999 | $4,241 | Single Loc |
| **L-3 Communications Corp** | Greenville | TX | 5 | 2,500 - 4,999 | $1,383 | Single Loc |
| **Lakeview Industries Inc** | Anthem | AZ | 5 | 1,500 - 2,499 | $3,345 | Single Loc |
| **Lance Aircraft Supply** | Dallas | TX | 5 | 1,500 - 2,499 | $1,959 | Single Loc |
| **Lightning Defense LLC** | Cleburne | TX | 1 | 1,500 - 2,499 | $267 | Single Loc |
| **Lockeed Martin** | Greenville | SC | 2 | 1,500 - 2,499 | $593 | Single Loc |
| **Lockheed Martin Aeronautics Co** | Middle River | MD | 5 | 5,000 - 9,999 | $1,602 | Branch |
| **Lone Star Aviation Corp** | Mansfield | TX | 19 | 5,000 - 9,999 | $6,715 | Single Loc |
| **Luminator Aircraft Products** | Plano | TX | 300 | 100,000+ | $112,158 | Single Loc |
| **Madison Aerospace** | Euless | TX | 12 | 5,000 - 9,999 | $4,241 | Single Loc |
| **Mayday Aviation Inc** | Arlington | TX | 6 | 5,000 - 9,999 | $2,121 | Single Loc |
| **Mayday Manufacturing Co Inc** | Denton | TX | 100 | 100,000+ | $0 | Subsidiary |
| **Mercury Trading Co** | Scottsdale | AZ | 5 | 2,500 - 4,999 | $3,345 | Single Loc |
| **Metro Parts Inc** | Fort Worth | TX | 5 | 2,500 - 4,999 | $1,767 | Single Loc |
| **Mil Tech Inc** | Benbrook | TX | 8 | 1,500 - 2,499 | $2,828 | Single Loc |
| **Millipart Fastners** | Scottsdale | AZ | 5 | 5,000 - 9,999 | $3,345 | Single Loc |

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|---|---|---|---|---|---|---|
| **Ms Electronix Inc** | St Augustine | FL | 8 | 2,500 - 4,999 | $2,144 | Single Loc |
| **National Utilities** | Haltom City | TX | 61 | 40,000 - 99,999 | $21,557 | Single Loc |
| **New Flight Corp** | Denver | CO | 5 | 1,500 - 2,499 | $3,235 | Single Loc |
| **North Texas Pilot Supply** | Roanoke | TX | 4 | 1 - 1,499 | $1,321 | Single Loc |
| **Orbital Parts** | Mansfield | TX | 4 | 1 - 1,499 | $1,414 | Single Loc |
| **Ordnance Parts & Engine Co** | Fort Worth | TX | 12 | 10,000 - 19,999 | $4,241 | Single Loc |
| **PAR Avion** | Scottsdale | AZ | 5 | 1,500 - 2,499 | $3,345 | Single Loc |
| **Pattonair** | Fort Worth | TX | 150 | 100,000+ | $0 | Headquarter |
| **Pendergrass Hydraulics** | Haltom City | TX | 3 | 1 - 1,499 | $1,061 | Single Loc |
| **Petrichor Industries** | Greer | SC | 8 | 1,500 - 2,499 | $2,370 | Single Loc |
| **Phoenix Aero Group LLC** | Phoenix | AZ | 15 | 2,500 - 4,999 | $10,034 | Single Loc |
| **Phoenix Air Repair** | Tempe | AZ | 8 | 2,500 - 4,999 | $5,352 | Single Loc |
| **Photo Etch** | Fort Worth | TX | 85 | 40,000 - 99,999 | $30,038 | Branch |
| **Pilot Shoppe** | Glendale | AZ | 5 | 2,500 - 4,999 | $3,345 | Single Loc |
| **PPG Aerospace** | Grand Prairie | TX | 40 | 40,000 - 99,999 | $14,136 | Branch |
| **Quality Honey Comb** | Arlington | TX | 45 | 20,000 - 39,999 | $15,903 | Single Loc |
| **Ranger Air Aviation** | Lewisville | TX | 7 | 2,500 - 4,999 | $2,312 | Single Loc |
| **Redbird Electronics Inc** | Dallas | TX | 6 | 2,500 - 4,999 | $2,351 | Single Loc |
| **REFA International** | Arlington | TX | 4 | 1 - 1,499 | $1,414 | Single Loc |
| **Robbins Wings** | Broomfield | CO | 1 | 1 - 1,499 | $373 | Single Loc |
| **Rotorcraft Services Group** | Fort Worth | TX | 12 | 10,000 - 19,999 | $0 | Headquarter |
| **RSG Aero Design LLC** | Fort Worth | TX | 0 | 1,500 - 2,499 | $0 | Subsidiary |
| **RSG Aviation Inc** | Fort Worth | TX | 100 | 100,000+ | $0 | Subsidiary |
| **RSG Products Inc** | Fort Worth | TX | 49 | 20,000 - 39,999 | $0 | Subsidiary |
| **Russell Associates** | Fort Worth | TX | 4 | 2,500 - 4,999 | $1,414 | Single Loc |
| **Saaco** | Dallas | TX | 3 | 1,500 - 2,499 | $1,176 | Single Loc |
| **Safran Electrical & Power** | Denton | TX | 15 | 10,000 - 19,999 | $0 | Subsidiary |
| **Salt River Aviation** | Gilbert | AZ | 5 | 5,000 - 9,999 | $3,345 | Single Loc |
| **San Tan Aviation** | Chandler | AZ | 7 | 5,000 - 9,999 | $4,683 | Single Loc |
| **Select Avionics** | Mckinney | TX | 4 | 1,500 - 2,499 | $1,496 | Single Loc |
| **Sierra Completions** | Centennial | CO | 0 | 1,500 - 2,499 | $0 | Subsidiary |
| **Sky Harbor Aviation Inc** | Gilbert | AZ | 3 | 1 - 1,499 | $2,007 | Single Loc |
| **Space Exploration** | Dallas | TX | 6 | 2,500 - 4,999 | $2,351 | Single Loc |

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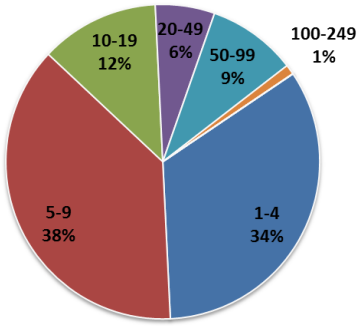
| **Technologies** | | | | | | |
| **Spectrum Aerospace Inc** | Tempe | AZ | 7 | 1,500 - 2,499 | $4,683 | Single Loc |
| **Stolo Avro Intl Inc** | Fort Worth | TX | 2 | 1,500 - 2,499 | $707 | Single Loc |
| **Stratos Aerospace** | Fort Worth | TX | 6 | 1,500 - 2,499 | $2,121 | Single Loc |
| **Sun-Foil Aircraft Sunscreens** | Phoenix | AZ | 1 | 1 - 1,499 | $669 | Single Loc |
| **Swissteknik LLC** | Tempe | AZ | 7 | 2,500 - 4,999 | $4,683 | Single Loc |
| **T K Aviation** | Grapevine | TX | 7 | 2,500 - 4,999 | $2,474 | Single Loc |
| **Team JAS** | Jacksonville | FL | 50 | 40,000 - 99,999 | $16,710 | Single Loc |
| **Texas Aero Plastics Inc** | Roanoke | TX | 4 | 1,500 - 2,499 | $1,321 | Single Loc |
| **Texas Aero Plastics Inc Local** | Roanoke | TX | 3 | 1,500 - 2,499 | $991 | Single Loc |
| **Texas Air Composites** | Fort Worth | TX | 85 | 100,000+ | $30,038 | Single Loc |
| **Texas Almet Inc** | Arlington | TX | 9 | 5,000 - 9,999 | $3,181 | Single Loc |
| **Tiger Enterprises & Trading** | Fountain Inn | SC | 11 | 2,500 - 4,999 | $2,410 | Single Loc |
| **Tri Star Aircraft Spares** | Fort Worth | TX | 5 | 5,000 - 9,999 | $1,767 | Single Loc |
| **Trinity Aircraft Parts LLC** | Mckinney | TX | 2 | 1 - 1,499 | $748 | Single Loc |
| **Tulsa Aerospace Component** | Ponder | TX | 9 | 2,500 - 4,999 | $2,972 | Single Loc |
| **Turbine Engine Resources** | Dallas | TX | 15 | 20,000 - 39,999 | $5,877 | Single Loc |
| **TURBO Machinery Products** | Chandler | AZ | 215 | 100,000+ | $143,816 | Single Loc |
| **Turboanalisis Inc** | Phoenix | AZ | 12 | 5,000 - 9,999 | $8,027 | Single Loc |
| **Unicorn Aviation** | Arvada | CO | 1 | 1,500 - 2,499 | $373 | Single Loc |
| **Valentine Aviation** | Garland | TX | 2 | 1 - 1,499 | $784 | Single Loc |
| **Van Bortel Aircraft Inc** | Arlington | TX | 40 | 20,000 - 39,999 | $14,136 | Single Loc |
| **W G Henshen Co** | Scottsdale | AZ | 20 | 10,000 - 19,999 | $13,379 | Single Loc |
| **W S Wilson Corp** | Fort Worth | TX | 1 | 1,500 - 2,499 | $354 | Single Loc |
| **Warren Aircraft LLC** | Denton | TX | 3 | 1,500 - 2,499 | $991 | Single Loc |
| **Weatherford Aerospace Inc** | Weatherford | TX | 33 | 100,000+ | $0 | Subsidiary |
| **Weatherford Aerospace Inc** | Weatherford | TX | 100 | 100,000+ | $29,588 | Branch |
| **Western Aero Repair Inc** | Denver | CO | 23 | 20,000 - 39,999 | $11,239 | Single Loc |
| **Western Aero Svc** | Denver | CO | 17 | 2,500 - 4,999 | $8,307 | Single Loc |
| **Western Air Intl** | Gilbert | AZ | 10 | 5,000 - 9,999 | $6,690 | Single Loc |
| **Wieland Designs** | Fort Worth | TX | 10 | 5,000 - 9,999 | $3,534 | Single Loc |
| **Wing Over Inc** | Granbury | TX | 9 | 2,500 - 4,999 | $2,584 | Single Loc |

## Aircraft Charter Rental & Leasing

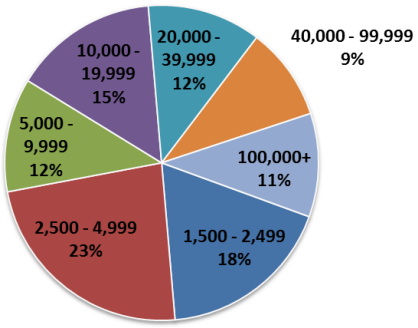
## SIC 735939

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **735939** | **Aircraft Charter Rental & Leasing** | **1,626** | **98** | **4** |

**Firm Employment**
**Aircraft Charter/Rental/Lease (SIC 735939)**




**Firm Facility Size (sf)**
**Aircraft Charter/Rental/Lease (SIC 735939)**




| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **A A Aircraft Charter** | Centennial | CO | 50 | 40,000 - 99,999 | $14,866 | Single Loc |
| **A B X Air** | Dallas | TX | 9 | 20,000 - 39,999 | $2,733 | Single Loc |
| **Adventure Pilot** | Mckinney | TX | 3 | 2,500 - 4,999 | $761 | Single Loc |
| **Air Center Helicopters Inc** | Fort Worth | TX | 40 | 40,000 - 99,999 | $12,146 | Single Loc |
| **Air Denver** | Evergreen | CO | 5 | 2,500 - 4,999 | $3,295 | Single Loc |
| **Air Denver** | Golden | CO | 4 | 2,500 - 4,999 | $458 | Single Loc |
| **Air Logix** | Dallas | TX | 9 | 10,000 - 19,999 | $2,742 | Single Loc |
| **Air Transport** | Phoenix | AZ | 1 | 1,500 - 2,499 | $243 | Single Loc |
| **Air West Inc** | Mesa | AZ | 4 | 1 - 1,499 | $969 | Single Loc |
| **Aircam National Helicopter** | Englewood | CO | 7 | 5,000 - 9,999 | $2,082 | Single Loc |
| **Airlift USA Inc** | Irving | TX | 2 | 5,000 - 9,999 | $610 | Single Loc |
| **Airwest Helicopters** | Glendale | AZ | 25 | 10,000 - 19,999 | $6,052 | Single Loc |
| **Amav Inc** | Baltimore | MD | 6 | 20,000 - 39,999 | $1,944 | Single Loc |

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|---|---|---|---|---|---|---|
| **Ameristar Jet Charter Inc** | Addison | TX | 160 | 100,000+ | $48,738 | Single Loc |
| **Anderson Aviation Inc** | Anderson | SC | 3 | 1 - 1,499 | $705 | Single Loc |
| **Aspen Flying Club** | Englewood | CO | 5 | 20,000 - 39,999 | $1,487 | Single Loc |
| **Atlantic Aviation** | Phoenix | AZ | 90 | 100,000+ | $21,787 | Branch |
| **Atlantic Aviation** | Addison | TX | 52 | 100,000+ | $15,840 | Branch |
| **Atlantic Aviation** | Plano | TX | 50 | 100,000+ | $0 | Subsidiary |
| **Aviation Services Elite** | Addison | TX | 15 | 10,000 - 19,999 | $4,570 | Single Loc |
| **Aviation Solutions Inc** | Dallas | TX | 2 | 1,500 - 2,499 | $610 | Single Loc |
| **Avjet Corp** | Englewood | CO | 7 | 20,000 - 39,999 | $2,082 | Branch |
| **Avjet Corp** | Annapolis | MD | 8 | 5,000 - 9,999 | $1,543 | Branch |
| **Boomerang Air Charter** | St Augustine | FL | 3 | 2,500 - 4,999 | $351 | Single Loc |
| **Bosiness Jet Ctr** | Dallas | TX | 9 | 20,000 - 39,999 | $2,742 | Single Loc |
| **Brett Aviation** | Baltimore | MD | 12 | 40,000 - 99,999 | $3,887 | Single Loc |
| **C2c Aircharters** | Addison | TX | 9 | 10,000 - 19,999 | $2,742 | Single Loc |
| **Caliber Jet Charter** | Scottsdale | AZ | 7 | 5,000 - 9,999 | $1,695 | Single Loc |
| **Capitol Air LLC** | Broomfield | CO | 3 | 1,500 - 2,499 | $7,054 | Single Loc |
| **Charter Department Inc** | Grapevine | TX | 6 | 2,500 - 4,999 | $1,822 | Single Loc |
| **Charter Last Minute** | Chandler | AZ | 7 | 2,500 - 4,999 | $1,695 | Single Loc |
| **CIT Aerospace** | Castle Pines | CO | 1 | 1,500 - 2,499 | $428 | Branch |
| **Corporate Airways** | Jacksonville | FL | 5 | 5,000 - 9,999 | $1,315 | Single Loc |
| **Danro Corp** | Scottsdale | AZ | 10 | 5,000 - 9,999 | $2,421 | Single Loc |
| **Dent Air LTD** | Edgewater | MD | 1 | 1,500 - 2,499 | $193 | Single Loc |
| **DFW Helitours** | Midlothian | TX | 3 | 1,500 - 2,499 | $986 | Single Loc |
| **Duke Jets LLC** | Aurora | CO | 7 | 2,500 - 4,999 | $2,082 | Single Loc |
| **Executive Air Share** | Fort Worth | TX | 6 | 20,000 - 39,999 | $1,822 | Single Loc |
| **Executive Aviation** | Glendale | AZ | 2 | 1 - 1,499 | $485 | Single Loc |
| **Executive Aviation** | Dallas | TX | 4 | 1,500 - 2,499 | $1,014 | Single Loc |
| **Executive Flight Svc** | Fort Worth | TX | 20 | 40,000 - 99,999 | $6,073 | Single Loc |
| **Executive Flight Svc Inc** | Jacksonville | FL | 4 | 1,500 - 2,499 | $1,052 | Single Loc |
| **Executive Jet Management** | Englewood | CO | 7 | 10,000 - 19,999 | $2,082 | Single Loc |
| **Executive Jet Management** | Allen | TX | 1 | 2,500 - 4,999 | $254 | Branch |
| **Executive Jet Management** | Dallas | TX | 10 | 40,000 - 99,999 | $3,047 | Branch |
| **Falcon Aviation** | Scottsdale | AZ | 7 | 2,500 - 4,999 | $1,695 | Single Loc |

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| **Five State Helicopters** | Fate | TX | 10 | 5,000 - 9,999 | $5,192 | Single Loc |
| **Flight Resource Group** | Englewood | CO | 10 | 40,000 - 99,999 | $2,974 | Single Loc |
| **Fuga** | Phoenix | AZ | 7 | 2,500 - 4,999 | $1,695 | Single Loc |
| **Gallagher Enterprises** | Englewood | CO | 3 | 10,000 - 19,999 | $892 | Single Loc |
| **Golden Beverages Inc** | Mesquite | TX | 10 | 10,000 - 19,999 | $3,047 | Single Loc |
| **Greenville Aviation** | Greenville | SC | 2 | 2,500 - 4,999 | $340 | Single Loc |
| **Group Holding Inc** | Fort Worth | TX | 7 | 5,000 - 9,999 | $2,126 | Single Loc |
| **Gta Air Inc** | Lancaster | TX | 30 | 40,000 - 99,999 | $9,139 | Single Loc |
| **Hammock Aviation Svc Inc** | Ennis | TX | 4 | 1,500 - 2,499 | $1,315 | Single Loc |
| **Helicopters Inc Of Greenville** | Greenville | SC | 1 | 2,500 - 4,999 | $170 | Single Loc |
| **Hinson Corporate Flight Svc** | Glen Burnie | MD | 4 | 1,500 - 2,499 | $772 | Single Loc |
| **Homeward Bound Enterprises LLC** | Centennial | CO | 3 | 1,500 - 2,499 | $892 | Single Loc |
| **International Group** | Paradise Valley | AZ | 3 | 1 - 1,499 | $727 | Single Loc |
| **International Jet Aviation** | Englewood | CO | 50 | 100,000+ | $14,866 | Single Loc |
| **Jet Charter Flights Phoenix** | Phoenix | AZ | 7 | 10,000 - 19,999 | $1,695 | Single Loc |
| **Key Lime Air Inc** | Englewood | CO | 50 | 100,000+ | $14,866 | Single Loc |
| **Leasing On A Jet Plane LLC** | Bedford | TX | 6 | 10,000 - 19,999 | $1,822 | Single Loc |
| **Malone Aircharter Inc** | Jacksonville | FL | 30 | 100,000+ | $7,890 | Single Loc |
| **Marklyn Aviation LLC** | Dallas | TX | 9 | 20,000 - 39,999 | $2,742 | Single Loc |
| **Marquis Jet Partners** | Littleton | CO | 3 | 1,500 - 2,499 | $1,284 | Single Loc |
| **MDC Land Flight Operations** | Englewood | CO | 7 | 2,500 - 4,999 | $2,082 | Single Loc |
| **Medstar Transport** | Fort Meade | MD | 3 | 5,000 - 9,999 | $579 | Single Loc |
| **Middle River Aviation** | Baltimore | MD | 15 | 40,000 - 99,999 | $4,859 | Single Loc |
| **Milky Way Hanger** | Chandler | AZ | 7 | 2,500 - 4,999 | $1,695 | Single Loc |
| **Mountain Aviation Inc** | Broomfield | CO | 75 | 100,000+ | $176,348 | Single Loc |
| **North Dallas Aviation** | Addison | TX | 5 | 5,000 - 9,999 | $1,524 | Single Loc |
| **Ovation Jet Charter** | Centennial | CO | 7 | 2,500 - 4,999 | $2,082 | Single Loc |
| **Pinnacle Air Charter** | Scottsdale | AZ | 12 | 20,000 - 39,999 | $2,905 | Single Loc |
| **Plane Smart Aviation LLC** | Addison | TX | 4 | 2,500 - 4,999 | $1,219 | Single Loc |
| **Platinum Air Charters** | Southlake | TX | 7 | 10,000 - 19,999 | $2,126 | Single Loc |
| **Premier Charter Network Inc** | Castle Rock | CO | 2 | 1,500 - 2,499 | $856 | Single Loc |

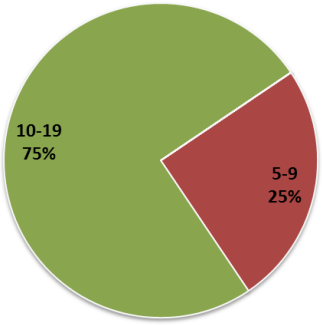
| | | | | | | |
|---|---|---|---|---|---|---|
| **Premier Charter Network Inc** | Englewood | CO | 7 | 2,500 - 4,999 | $2,082 | Single Loc |
| **Private Departures LLC** | Jacksonville | FL | 4 | 1,500 - 2,499 | $1,052 | Single Loc |
| **Private Jet Charter Flights** | Dallas | TX | 9 | 2,500 - 4,999 | $2,742 | Single Loc |
| **Resort Air Svc** | Dallas | TX | 9 | 10,000 - 19,999 | $2,742 | Single Loc |
| **Rockwall Flight Ctr** | Rockwall | TX | 2 | 1,500 - 2,499 | $1,039 | Single Loc |
| **RVR Aviation** | Arlington | TX | 20 | 20,000 - 39,999 | $6,073 | Single Loc |
| **Safford Aviation Svc Inc** | Coolidge | AZ | 4 | 1,500 - 2,499 | $749 | Single Loc |
| **Sawyer Charter Svc** | Scottsdale | AZ | 10 | 40,000 - 99,999 | $2,421 | Single Loc |
| **Sky Helicopters** | Garland | TX | 12 | 10,000 - 19,999 | $3,656 | Single Loc |
| **Spinnaker Air LLC** | Phoenix | AZ | 7 | 2,500 - 4,999 | $1,695 | Single Loc |
| **Spinnaker Air LLC** | Tempe | AZ | 7 | 20,000 - 39,999 | $1,695 | Single Loc |
| **Swift Air LLC** | Phoenix | AZ | 50 | 100,000+ | $12,104 | Single Loc |
| **Trinity Aero Capital Inc** | Fort Worth | TX | 6 | 5,000 - 9,999 | $1,822 | Single Loc |
| **Trinity Jet Management** | Dallas | TX | 9 | 20,000 - 39,999 | $2,742 | Single Loc |
| **Und Aerospace Flight Training** | Mesa | AZ | 75 | 100,000+ | $18,156 | Single Loc |
| **Venture Aviation Group LLC** | Greenville | SC | 10 | 10,000 - 19,999 | $1,696 | Single Loc |
| **Vertical Aviation LLC** | Scottsdale | AZ | 8 | 2,500 - 4,999 | $1,937 | Single Loc |
| **Village Sereno Town Homes** | Glendale | AZ | 1 | 1,500 - 2,499 | $243 | Single Loc |
| **W D Aviation Dept-Corporate** | Fort Worth | TX | 2 | 2,500 - 4,999 | $608 | Single Loc |
| **Windstar Aviation Inc** | Addison | TX | 2 | 2,500 - 4,999 | $610 | Single Loc |
| **Worldwide Jet** | Phoenix | AZ | 7 | 10,000 - 19,999 | $1,695 | Single Loc |

## Aircraft Radio Servicing

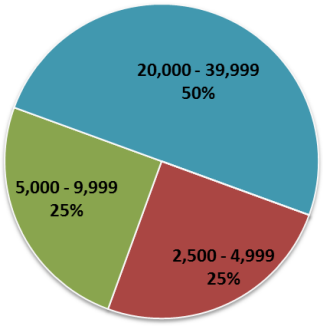
## SIC 762214

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **762214** | **Aircraft Radio Servicing** | **16** | **4** | **0** |

**Firm Employment**
**Aircraft Radio Servicing (SIC 762214)**




**Firm Facility Size (sf)**
**Aircraft Radio Servicing (SIC 762214)**

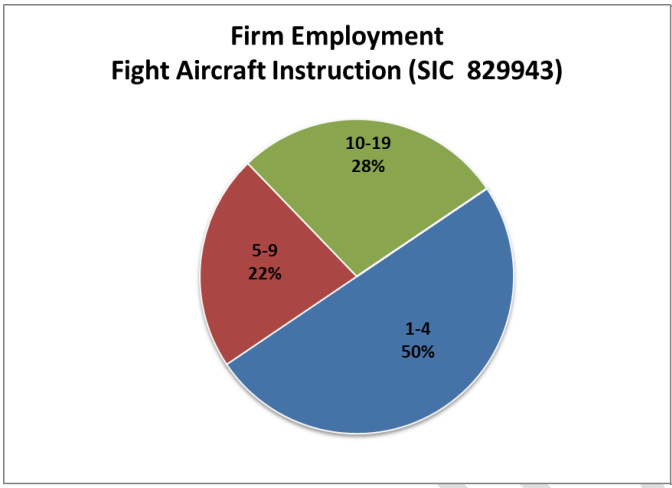


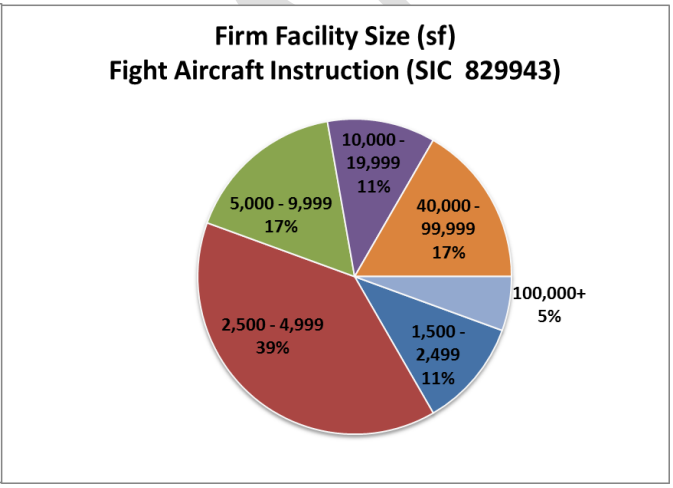

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **ACG Systems Inc** | Annapolis | MD | 19 | 20,000 - 39,999 | $2,657 | Single Loc |
| **Flight Trails Helicopters Inc** | Mesa | AZ | 15 | 20,000 - 39,999 | $1,259 | Single Loc |
| **Freedom Avionics Co** | Broomfield | CO | 5 | 5,000 - 9,999 | $326 | Single Loc |
| **TKM Inc** | Scottsdale | AZ | 11 | 2,500 - 4,999 | $923 | Single Loc |

## Fight Aircraft Instruction

## SIC 829943

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **829943** | **Fight Aircraft Instruction** | **261** | **18** | **0** |




| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Alliance Flight Training LLC** | Watkins | CO | 7 | 2,500 - 4,999 | $0 | Single Loc |
| **CAE Mining** | Littleton | CO | 12 | 40,000 - 99,999 | $0 | Single Loc |
| **CAE Oxford Aviation** | Mesa | AZ | 1 | 5,000 - 9,999 | $0 | Single Loc |
| **CAE USA Inc** | Mesa | AZ | 12 | 40,000 - 99,999 | $0 | Branch |
| **CAE USA Inc** | Mesa | AZ | 12 | 5,000 - 9,999 | $0 | Branch |
| **CAE USA Inc** | Phoenix | AZ | 12 | 10,000 - 19,999 | $0 | Branch |
| **CAE USA Inc** | Dallas | TX | 350 | 100,000+ | $0 | Branch |
| **Flight Safety Intl Inc** | Denver | CO | 5 | 2,500 - 4,999 | $0 | Single Loc |
| **Flight Training** | Denver | CO | 3 | 2,500 - 4,999 | $0 | Single Loc |
| **George Palecek** | Littleton | CO | 5 | 10,000 - 19,999 | $0 | Single Loc |
| **Learn To Fly Dallas** | Addison | TX | 4 | 2,500 - 4,999 | $0 | Single Loc |
| **Monumental Helicopters** | Fort Meade | MD | 1 | 1,500 - 2,499 | $0 | Single Loc |
| **Panam Academy** | Denver | CO | 4 | 5,000 - 9,999 | $0 | Branch |

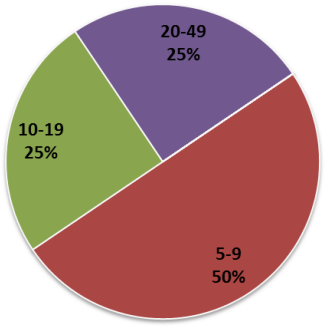
| | | | | | | |
|---|---|---|---|---|---|---|
| **Plus 5 Aviation LLC** | Phoenix | AZ | 2 | 1 - 1,499 | $0 | Single Loc |
| **Sawyer Aviation** | Scottsdale | AZ | 10 | 40,000 - 99,999 | $0 | Single Loc |
| **Scott International Procedures** | Southlake | TX | 5 | 2,500 - 4,999 | $0 | Single Loc |
| **Scottsdale Executive Flight** | Scottsdale | AZ | 2 | 2,500 - 4,999 | $0 | Single Loc |
| **Slipstream Aviation** | Dallas | TX | 4 | 1,500 - 2,499 | $0 | Single Loc |
| **Texas American Flight Academy** | Addison | TX | 4 | 2,500 - 4,999 | $0 | Single Loc |

## Aircraft Management Services

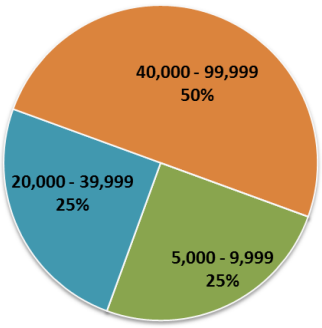
## SIC 874109

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **874109** | **Aircraft Management Services** | **48** | **4** | **0** |

**Firm Employment**
**Aircraft Management Services (SIC 874109)**




**Firm Facility Size (sf)**
**Aircraft Management Services (SIC 874109)**



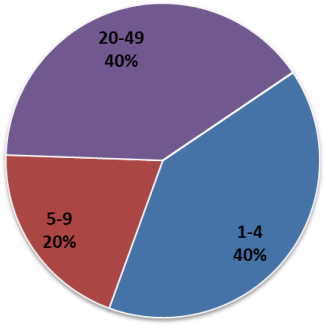

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **All-Star Aviation Svc** | Dallas | TX | 5 | 20,000 - 39,999 | $887 | Single Loc |
| **Avmax Montana Inc** | Jacksonville | FL | 6 | 5,000 - 9,999 | $879 | Single Loc |
| **Broadie's Aircraft** | Fort Worth | TX | 20 | 40,000 - 99,999 | $2,643 | Single Loc |
| **Coffman Co** | Scottsdale | AZ | 10 | 40,000 - 99,999 | $1,457 | Single Loc |

## Aerospace Support Services

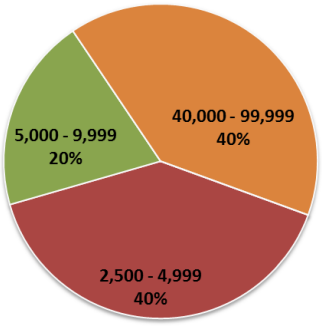
## SIC 874402

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **874402** | **Aerospace Support Services** | **61** | **5** | **0** |

**Firm Employment**
**Aerospace Support Services (SIC 874402)**




**Firm Facility Size (sf)**
**Aerospace Support Services (SIC 874402)**



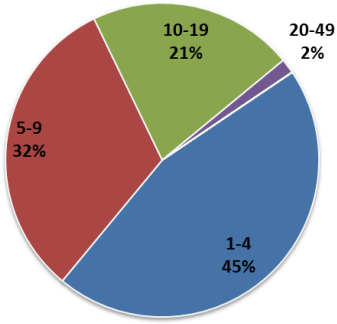

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aerospace Systems Inc** | Roanoke | TX | 8 | 5,000 - 9,999 | $741 | Single Loc |
| **Das** | Cedar Hill | TX | 45 | 40,000 - 99,999 | $5,781 | Single Loc |
| **Link Aviation** | Lewisville | TX | 1 | 2,500 - 4,999 | $93 | Single Loc |
| **Rocket Air Supply** | Arlington | TX | 20 | 40,000 - 99,999 | $1,944 | Single Loc |
| **Westar Display Technologies** | Mesa | AZ | 3 | 2,500 - 4,999 | $468 | Branch |

## Aviation Consultants

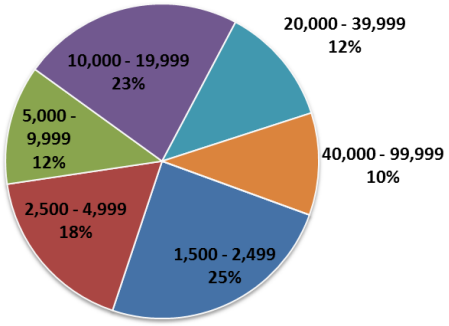
## SIC 874822

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **874822** | **Aviation Consultants** | **555** | **66** | **0** |

**Firm Employment**
**Aviation Consultants (SIC 874822)**




**Firm Facility Size (sf)**
**Aviation Consultants (SIC 874822)**




| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **Aerosolutions** | Grapevine | TX | 2 | 1 - 1,499 | $202 | Single Loc |
| **All Spares Aviation** | Anthem | AZ | 5 | 5,000 - 9,999 | $561 | Single Loc |
| **American Aviation Intl** | Columbia | MD | 10 | 40,000 - 99,999 | $1,306 | Single Loc |
| **American Valley Aviation** | Orange Park | FL | 16 | 10,000 - 19,999 | $1,219 | Single Loc |
| **Amstar Group** | Phoenix | AZ | 4 | 2,500 - 4,999 | $449 | Single Loc |
| **Armstrong Consultants** | Denver | CO | 3 | 1,500 - 2,499 | $391 | Single Loc |
| **Asiana Airlines** | Dallas | TX | 10 | 40,000 - 99,999 | $1,515 | Single Loc |
| **Atlantic Aviation Inc** | Jacksonville | FL | 5 | 10,000 - 19,999 | N/A | Subsidiary |
| **Aviation Investigations Inc** | Hurst | TX | 1 | 1 - 1,499 | $101 | Single Loc |
| **Aviation Resources Inc** | Mesa | AZ | 4 | 1,500 - 2,499 | $449 | Single Loc |
| **Bald Eagle Turbine** | Tempe | AZ | 3 | 1,500 - 2,499 | $337 | Single Loc |
| **Blue Tuna LLC** | Rockwall | TX | 5 | 2,500 - 4,999 | $492 | Single Loc |
| **Chairman Aviation LLC** | Colleyville | TX | 6 | 2,500 - 4,999 | $606 | Single Loc |

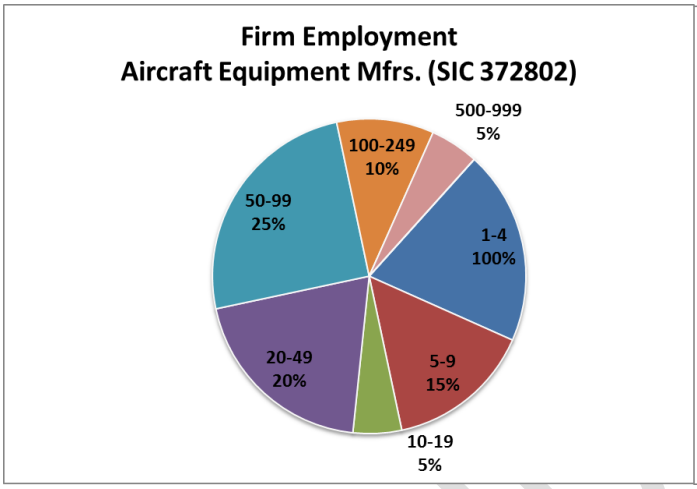
| | | | | | | |
|---|---|---|---|---|---|---|
| **Chandler Avionics** | Chandler | AZ | 6 | 2,500 - 4,999 | $673 | Single Loc |
| **Charles Taylor Aviation** | Dallas | TX | 8 | 20,000 - 39,999 | N/A | Headquarter |
| **Colt Aviation** | Southlake | TX | 5 | 2,500 - 4,999 | $505 | Single Loc |
| **Complete Aviation Fuel Systems** | Phoenix | AZ | 10 | 5,000 - 9,999 | $1,121 | Single Loc |
| **Cwie Management Resources LLC** | Scottsdale | AZ | 4 | 1,500 - 2,499 | $449 | Single Loc |
| **D & G Quality Svc Inc** | Castle Rock | CO | 3 | 1,500 - 2,499 | $399 | Single Loc |
| **Deniston Enterprises** | Middle River | MD | 4 | 1,500 - 2,499 | $392 | Single Loc |
| **Downing Aviation Assoc** | Gilbert | AZ | 4 | 1 - 1,499 | $449 | Single Loc |
| **Dynamic Ventures Inc** | Dallas | TX | 10 | 40,000 - 99,999 | $1,515 | Single Loc |
| **Emblem Aviation LLC** | Gilbert | AZ | 2 | 1,500 - 2,499 | $225 | Single Loc |
| **Epic Aviation** | Broomfield | CO | 2 | 1,500 - 2,499 | $354 | Single Loc |
| **Fbo Resource Group** | Aurora | CO | 5 | 10,000 - 19,999 | $635 | Single Loc |
| **Federal Aviation Admin** | Fort Worth | TX | 6 | 5,000 - 9,999 | $606 | Single Loc |
| **Flat Irons Aviation** | Broomfield | CO | 5 | 20,000 - 39,999 | $885 | Single Loc |
| **Flight Services & Systems** | Dallas | TX | 10 | 10,000 - 19,999 | $1,515 | Single Loc |
| **Flight Trak Inc** | Thornton | CO | 2 | 1 - 1,499 | $204 | Single Loc |
| **Flightline Solutions LLC** | Golden | CO | 3 | 2,500 - 4,999 | $355 | Single Loc |
| **Flite Instruments** | Chandler | AZ | 8 | 1,500 - 2,499 | $897 | Single Loc |
| **Green Energy Enterprises Inc** | Jacksonville | FL | 2 | 2,500 - 4,999 | N/A | Headquarter |
| **Harrison Aviation** | Arlington | TX | 20 | 40,000 - 99,999 | $2,020 | Single Loc |
| **Iamat** | Chandler | AZ | 4 | 1 - 1,499 | $449 | Single Loc |
| **Independence Aviation** | Englewood | CO | 7 | 20,000 - 39,999 | $889 | Single Loc |
| **Jerry King & Assoc** | Addison | TX | 12 | 20,000 - 39,999 | $1,818 | Single Loc |
| **Jetoptions Private Jets** | Addison | TX | 10 | 40,000 - 99,999 | $1,515 | Single Loc |
| **KRN Aviation Svc** | Chandler | AZ | 12 | 10,000 - 19,999 | $1,345 | Single Loc |
| **Leading Edge Aviation Sltns** | Grapevine | TX | 6 | 20,000 - 39,999 | $606 | Single Loc |
| **Leading Edge Strategies** | Arvada | CO | 3 | 1 - 1,499 | $355 | Single Loc |
| **Mecaer Aviation Group** | Irving | TX | 10 | 40,000 - 99,999 | $1,515 | Single Loc |
| **Mente Group** | Addison | TX | 7 | 10,000 - 19,999 | $1,061 | Single Loc |
| **Mesquite Aviation** | Mesquite | TX | 10 | 5,000 - 9,999 | $1,515 | Single Loc |
| **Metroplex Flight Svc** | Fort Worth | TX | 10 | 10,000 - 19,999 | $1,010 | Single Loc |

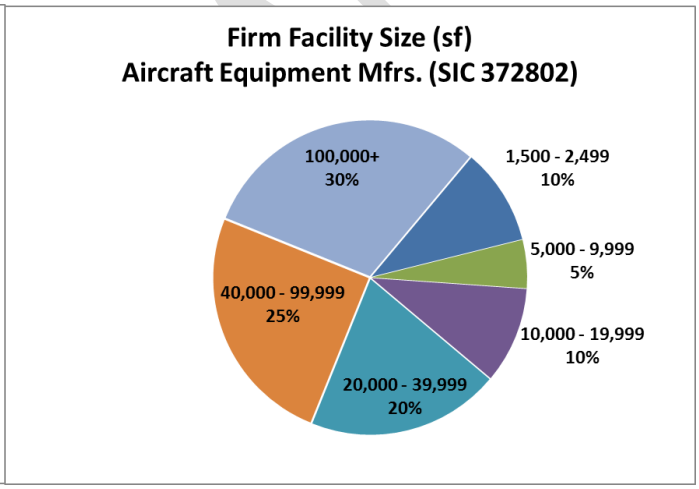
| | | | | | | |
|---|---|---|---|---|---|---|
| **MLT Development** | Dallas | TX | 2 | 10,000 - 19,999 | $303 | Single Loc |
| **Navigator Publishing** | Centennial | CO | 6 | 10,000 - 19,999 | $762 | Single Loc |
| **New Nose Co** | Glendale | AZ | 4 | 1 - 1,499 | $449 | Single Loc |
| **North Florida Aviation Inc** | Jacksonville | FL | 5 | 10,000 - 19,999 | $457 | Single Loc |
| **Quasar Aircraft Corp** | Jacksonville | FL | 5 | 10,000 - 19,999 | N/A | Subsidiary |
| **Ricondo & Assoc Inc** | Denver | CO | 3 | 10,000 - 19,999 | $391 | Single Loc |
| **Rvsm Solutions LLC** | Aurora | CO | 7 | 20,000 - 39,999 | $889 | Single Loc |
| **Service Elements** | Scottsdale | AZ | 3 | 1 - 1,499 | $337 | Single Loc |
| **Skytech Inc** | Baltimore | MD | 4 | 5,000 - 9,999 | $392 | Single Loc |
| **Special Services Corp** | Greenville | SC | 8 | 2,500 - 4,999 | $603 | Single Loc |
| **Strom Aviation** | Parker | CO | 2 | 1,500 - 2,499 | $266 | Single Loc |
| **Strom Aviation** | Coppell | TX | 4 | 2,500 - 4,999 | $606 | Single Loc |
| **Tag One** | Phoenix | AZ | 7 | 5,000 - 9,999 | $785 | Branch |
| **Tes Aviation Group** | Grand Prairie | TX | 3 | 2,500 - 4,999 | $303 | Single Loc |
| **Transpac Aviation** | Glendale | AZ | 4 | 1,500 - 2,499 | $449 | Single Loc |
| **TSD Co** | Apache Junction | AZ | 3 | 1 - 1,499 | $250 | Single Loc |
| **Turbo Resources** | Chandler | AZ | 4 | 1,500 - 2,499 | $449 | Single Loc |
| **Vector Aerospace** | Grapevine | TX | 11 | 20,000 - 39,999 | $1,111 | Single Loc |
| **Vector C S Pllc** | Glen Burnie | MD | 3 | 1,500 - 2,499 | $401 | Single Loc |
| **William E Payne & Assoc** | Elizabeth | CO | 2 | 1,500 - 2,499 | $124 | Single Loc |
| **Williams Aviation Constultants** | Gilbert | AZ | 9 | 10,000 - 19,999 | $1,009 | Single Loc |
| **Wing Aero Products** | Rowlett | TX | 14 | 5,000 - 9,999 | $2,121 | Single Loc |

## Aircraft Equipment Manufacturers

## SIC 372802

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **372802** | **Aircraft Equipment Manufacturers** | **204** | **20** | **1** |



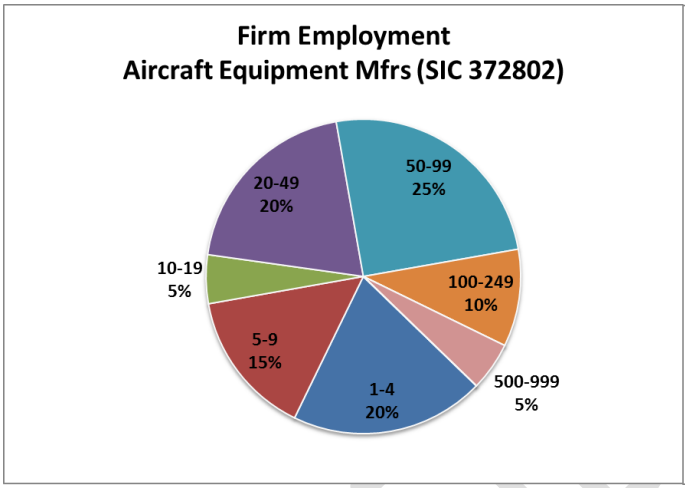

| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **ACT Supply Corp** | Southlake | TX | 4 | 5,000 - 9,999 | $2,249 | Single Loc |
| **Aero Components Inc** | Fort Worth | TX | 65 | 100,000+ | $36,538 | Single Loc |
| **Aerospace Turbine Rotables Inc** | Addison | TX | 1 | 10,000 - 19,999 | $209 | Branch |
| **Aircraft Security & Alert** | Dallas | TX | 2 | 1,500 - 2,499 | $418 | Single Loc |
| **Apache Enterprises Inc** | Grand Prairie | TX | 30 | 40,000 - 99,999 | $6,257 | Single Loc |
| **Astronautics Corp Of America** | Phoenix | AZ | 6 | 20,000 - 39,999 | $1,764 | Branch |
| **Broseh Enterprises Inc** | Arlington | TX | 50 | 100,000+ | $28,106 | Single Loc |
| **Brown Aircraft Supply** | Jacksonville | FL | 4 | 1,500 - 2,499 | $1,198 | Single Loc |
| **DFW Instrument Corp** | Addison | TX | 15 | 20,000 - 39,999 | $3,129 | Single Loc |
| **GE Aviation** | Piedmont | SC | 20 | 40,000 - 99,999 | $4,245 | Single Loc |
| **Harter Aerospace** | Tempe | AZ | 79 | 40,000 - 99,999 | $0 | Subsidiary |
| **Honeywell** | Greer | SC | 600 | 100,000+ | $127,325 | Branch |
| **International Avionics Inc** | Addison | TX | 9 | 10,000 - 19,999 | $1,877 | Single Loc |

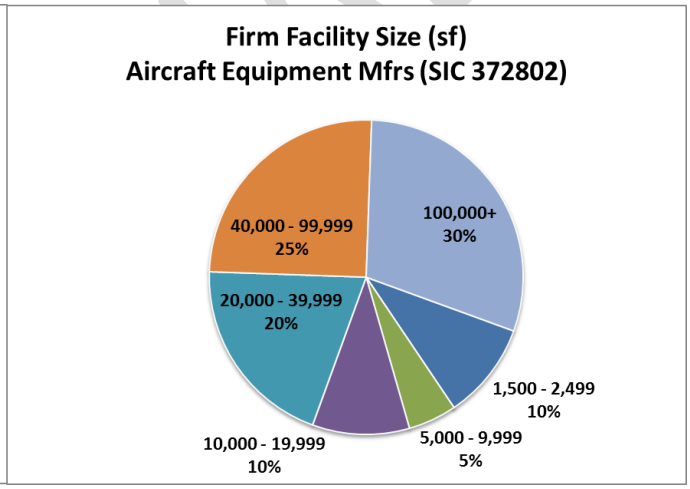
| | | | | | | |
|---|---|---|---|---|---|---|
| **Marsh Aviation Co** | Mesa | AZ | 100 | 100,000+ | $29,394 | Single Loc |
| **Nelson Engineering Co** | Phoenix | AZ | 38 | 20,000 - 39,999 | $11,170 | Single Loc |
| **Northstar Aerospace Inc** | Phoenix | AZ | 120 | 100,000+ | $35,273 | Branch |
| **Robertson Fuel Systems LLC** | Tempe | AZ | 58 | 40,000 - 99,999 | $0 | Subsidiary |
| **Sky-Tec Partners LTD** | Granbury | TX | 21 | 40,000 - 99,999 | $4,161 | Single Loc |
| **Thales Avionics Inc** | Irving | TX | 9 | 20,000 - 39,999 | $1,877 | Branch |
| **United Aviation Accessories** | Burleson | TX | 50 | 100,000+ | $7,254 | Single Loc |

## Aircraft Equipment Manufacturers

## SIC 372802

| Aviation Cluster Segment Firms | | | | |
|---|---|---|---|---|
| **SIC** | **SIC Description** | **US** | **PEER** | **WSGB** |
| **372802** | **Aircraft Equipment Manufacturers** | **204** | **20** | **1** |




| Company | Location | | Empl. | Facility (sf) | Rev. ($000) | Type |
|---|---|---|---|---|---|---|
| **ACT Supply Corp** | Southlake | TX | 4 | 5,000 - 9,999 | $2,249 | Single Loc |
| **Aero Components Inc** | Fort Worth | TX | 65 | 100,000+ | $36,538 | Single Loc |
| **Aerospace Turbine Rotables Inc** | Addison | TX | 1 | 10,000 - 19,999 | $209 | Branch |
| **Aircraft Security & Alert** | Dallas | TX | 2 | 1,500 - 2,499 | $418 | Single Loc |
| **Apache Enterprises Inc** | Grand Prairie | TX | 30 | 40,000 - 99,999 | $6,257 | Single Loc |
| **Astronautics Corp Of America** | Phoenix | AZ | 6 | 20,000 - 39,999 | $1,764 | Branch |
| **Broseh Enterprises Inc** | Arlington | TX | 50 | 100,000+ | $28,106 | Single Loc |
| **Brown Aircraft Supply** | Jacksonville | FL | 4 | 1,500 - 2,499 | $1,198 | Single Loc |
| **DFW Instrument Corp** | Addison | TX | 15 | 20,000 - 39,999 | $3,129 | Single Loc |
| **GE Aviation** | Piedmont | SC | 20 | 40,000 - 99,999 | $4,245 | Single Loc |
| **Harter Aerospace** | Tempe | AZ | 79 | 40,000 - 99,999 | N/A | Subsidiary |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Honeywell** | Greer | SC | 600 | 100,000+ | $127,325 | Branch |
| **International Avionics Inc** | Addison | TX | 9 | 10,000 - 19,999 | $1,877 | Single Loc |
| **Marsh Aviation Co** | Mesa | AZ | 100 | 100,000+ | $29,394 | Single Loc |
| **Nelson Engineering Co** | Phoenix | AZ | 38 | 20,000 - 39,999 | $11,170 | Single Loc |
| **Northstar Aerospace Inc** | Phoenix | AZ | 120 | 100,000+ | $35,273 | Branch |
| **Robertson Fuel Systems LLC** | Tempe | AZ | 58 | 40,000 - 99,999 | N/A | Subsidiary |
| **Sky-Tec Partners LTD** | Granbury | TX | 21 | 40,000 - 99,999 | $4,161 | Single Loc |
| **Thales Avionics Inc** | Irving | TX | 9 | 20,000 - 39,999 | $1,877 | Branch |
| **United Aviation Accessories** | Burleson | TX | 50 | 100,000+ | $7,254 | Single Loc |

**APPENDIX 4-**

**PEOPLE WHO CONTRIBUTED TO THE REPORT**

We would like to acknowledge and thank the following individuals who enriched this report with generous contributions of time, information, opinions and interest.

| Gayle | Anderson | Chamber of Commerce |
|---|---|---|
| **Jerry** | Anderson | Liberty Street Entrepreneur |
| **Dr. Tony** | Atala | Wake Forest Institute for Regenerative Medicine |
| **Jill** | Atherton | Chamber of Commerce |
| **Jerry** | Barker | SightLife Surgical |
| **Karen** | Barnes | Venture Café |
| **Ken** | Basch | Wake Forest University |
| **John** | Baske | BE Aerospace |
| **Vivian** | Burke | Councilwoman |
| **Robin** | Butler | Omnavia Interiors |
| **Jerry** | Cook | Hanes |
| **Charles** | Creech | North State Aviation |
| **Mark** | Davidson | Smith Reynolds Airport |
| **Monica** | Doss | New City Ventures |
| **Tom** | Ferrell | Aero 8 |
| **Don** | Flow | Flow Automotive |
| **Dr. Gary** | Green | Forsyth Technical Community College |
| **Mick** | Gunter | Piedmont Propulsion Systems |
| **Kyle** | Haney | Forsyth County Economic Development |
| **Andrew** | Hebard | Tech Corps |
| **Jim** | Hopkins | Signature |
| **Jim** | McArthur | Piedmont Triad Partnership |
| **Nancy** | Johnson | NC Biotechnology Center Triad Regional Office |
| **Ted** | Kaplan | Forsyth County Commission/Airport Commission |
| **Bob** | Leak | Winston-Salem Alliance |
| **Stan** | Mandel | WFU |
| **Tom** | McKim | Airport Commission |
| **Dave** | Morse | Civil Air Patrol |
| **David** | Mounts | Inmar |
| **Jim** | Murray | Flight Operations Manager BBT |
| **Paul** | Norby | City County Planning Director |
| **Ken** | Oakley | Piedmont Propulsion Systems |

| | | |
|---|---|---|
| **Matt** | Phillips | Professor, Wake Forest University |
| **Scott** | Piper | Airport Commission |
| **Evan** | Raleigh | City of Winston-Salem |
| **Rick** | Reed | Reed International Aerospace |
| **Houston** | Symmes | Piedmont Flight Training |
| **Judy** | Tharpe | Piedmont Advantage Credit Union |
| **Dr. Eric** | Tomlinson | Wake Forest Innovation Qtr. |
| **Luther** | Turner | RJ Reynolds |
| **Dr. Darrell** | Walker | Winston-Salem Forsyth County Schools |
| **Rob** | Welch | I.L. Long Construction Co., Inc. |
| **Everett** | Wells | Miller Hatcher Commercial Real Estate |
| **Penny** | Whiteheart | Piedmont Triad Partnership |


About Aerotropolis Business Concepts

Aerotropolis Business Concepts, LLC is headquartered in Chapel Hill, North Carolina (USA). The President and CEO is John D. Kasarda. Dr. Kasarda is considered the leading developer of the Aerotropolis concept defining the roles of aviation and airports in shaping 21st century business location, economic development and urban growth. He has conducted more than 20 airport city and aerotropolis studies for the such organizations as the International Civil Aviation Organization (ICAO) and the World Bank, as well as for airports and governments around the world including those in Brazil, China, Dubai, Egypt, India, Mexico, Panama, the Philippines, Russia, South Africa, Thailand, and the United States.