



**Northeast Academy of Aerospace
and Advanced Technologies**

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The Northeast Academy for Aerospace & Advanced Technologies Concept Paper

The Local Imperative

Northeastern North Carolina has long suffered the effects of poverty and has lacked the opportunities for most students to encounter the 21st Century workplace that is readily accessible in more urban areas of the state. However, with the dramatic, recent growth in the aerospace industry in the Elizabeth City area, there now exists the potential to link K-12 education to the aerospace industry. This link will create meaningful pathways leading young people from high school to post-secondary degrees or industry credentials, and ultimately to a career that supports themselves, their family and community. Local leaders must provide the area's young people with the same opportunities available to others across the state.

In addition to the growing aerospace industry, all three local institutions of higher education have developed programs to support this industry. Elizabeth City State University has the only Aviation degree-granting program in the North Carolina University System. This program has grown significantly over the last five years and now offers eight different degrees in the field. Mid-Atlantic Christian University partners with Elizabeth City State to provide their missionary students pilot training. College of the Albemarle opened its new Aviation and Technical Training Center in August 2013, providing credentialing through a two-year program of study.

One frequently hears the concerns from local citizens that many, if not most, of the jobs created at the aviation park are filled by workers from outside our area. The challenge for local leaders is to develop a pathway for our students to enter this field of work. The Northeast Academy of Aerospace and Advanced Technologies will serve as a pathway for our young people to gain first-hand knowledge about advanced manufacturing and will serve as a feeder of local talent into the higher education opportunities mentioned above. Moreover, by providing a certified workforce, Northeastern North Carolina will be positioned to recruit more aerospace companies to our region.

The Northeast School of Aerospace and Advanced Technologies

Proposed Mission Statement:

To create a highly innovative regional career academy that will:

- Inspire and prepare students with the STEM-related skills, knowledge and attitudes needed for high wage/high demand careers, related to the aerospace industry, including aviation, advanced manufacturing and security.
- Demonstrate the impact of an entrepreneurial, project-based school culture on student motivation, initiative and achievement as well as faculty creativity and innovation.
- Engage business and higher education partners in creating a career-relevant education and a highly-skilled entrepreneurial workforce.
- Inspire and support surrounding school districts to redesign schools to align with regional economic and workforce development priorities.
- Re-invigorate local communities and the regional economy.

School Structure & Governance

The school will serve grades 6 – 13 with a STEM focus on the Aerospace Industry. All students will graduate job and career ready with a credential in the aerospace field or up to a two-year technical degree or two years credit towards a four-year degree.

The school will be created through a collaborative partnership of local business leaders, institutions of higher education, and elected officials. Partners will include: NC New Schools, Elizabeth City State University, College of the Albemarle, participating school districts, USCG Aviation Logistics Center, DRS Technologies, DLS Engineering Associates, TCOM, NC Division of Aviation, VECTOR CSP and North Carolina's Northeast Commission.

The governing board of the school will consist of seven members: four members will be business people, one member will represent the College of the Albemarle, one member will represent Elizabeth City State University and one member will be an elected official from a county with participating students.

Scaling the School

The school will be populated in the following manner: Year 1) 120 eighth and ninth graders; Year 2) add 120 seventh and eighth graders; Year 3) add 60 seventh graders; Year 4) add 60 sixth graders until the school is full. The school will educate approximately 450 students in grades 6-13 when fully scaled.

Teaching & Learning – The Curriculum

The National Research Council's Framework for K–12 Science Education makes student engagement the top priority. Educators increasingly recognize the challenge of ensuring that instruction not only covers the most important math and science content, but also teaches content within a meaningful context that will entice even bored or distracted students. Problem-based learning originated in medical education over 20 years ago out of concern that prospective doctors who did well on their medical exams often could not apply that knowledge when confronted with real patients in clinical settings. Extensive cognitive research since that time indicates that knowledge recall in isolation is not equal to the task of creatively and appropriately applying that knowledge to solve real problems. Employers echo that concern; knowledge without the skill to apply that knowledge in collaboration with others is largely irrelevant. It isn't what you know, but what you know how to do with what you know.

Research in STEM learning over the past two decades has a lot to say about what makes for effective, engaging STEM education. Among the key factors: it capitalizes on students' early interests and experiences, identifies and builds on what they know, and provides opportunities to engage in the practices of science and mathematics to sustain their interest. In other words, throughout their schooling, students should learn to investigate questions about the world that they come across in daily life, in much the same way that scientists and mathematicians work.

Engineering design and technology, the E and T in STEM, add an additional dimension to the value of scientific inquiry. If inquiry is the pursuit of why, then design and technology are the pursuit of how, how to apply scientific knowledge and mathematics to solve real problems and improve the world we live in. Project-based learning adds the opportunity for students to turn their knowledge and creative talents loose on problems that are important and real to students, employers and communities. Creating a meaningful context for learning provides the essential entrepreneurial culture necessary to nurture and make meaningful the 21st Century soft skills so needed to make continuous improvements in the modern workplace as well as in communities, and thus so valued by employers and citizens alike.

Unlike traditional secondary instruction, STEM education calls for schools that provide the tools and space for exploration and invention and that foster a culture of inquiry, collaboration and innovation among students and teachers. Classes at the school will be based on contextual and project-based learning with an emphasis on developing critical thinking and problem solving skills through highly engaging problems and projects. STEM courses are designed not just to develop knowledge but also the creative design, collaboration and problem-solving skills that are so highly valued by employers.

At the recent National Academy Foundation conference this summer, an employer stated, “**We hire on hard skills and fire on soft skills.**” Work in most modern organizations is team-based, including employee appraisal and incentive systems, so it is crucial for future career success that students learn to work within multi-cultural teams to collaboratively solve problems, resolve conflict and develop persuasive leadership skills, sometimes with virtual partners whom they have never met in person. Hence, the project learning culture not only improves the academic component of the students’ lives but also provides valuable life lessons that can be applied to solve tomorrow’s problems in the real world.

The curricula will be drawn from the design, manufacturing and operations functions within the aerospace industry; not to train students for narrowly defined jobs which will inevitably change, but to equip them with the transferrable entrepreneurial skills necessary to pursue the seven career changes the average person will experience by age 35. In addition, students will be provided a variety of work-based learning activities, career awareness activities, virtual experiences, mentoring, summer programs, and career preparation coaching that will enable them to discover the kind of problems on which they really want to work, and in the process connect them to the community and lay a foundation for a career in aerospace.

The school will also have a unique partnership with Elizabeth City State University’s Aviation Program and College of the Albemarle’s Aviation and Technical Training Center. Students from these schools will work directly with school faculty in course development and instruction geared towards producing tomorrow’s problem solvers. They will also be available to work with students as tutors and/or mentors.

Regional Educational Benefit

As educational budgets across the state are cut, one of the big losers will be school districts’ ability to maintain a highly trained staff. The Northeast Academy of Aerospace and Advanced Technologies will serve as a research and development resource to assist high schools and middle schools in partnering school districts in designing innovative, career-relevant curricula, instructional approaches and uses of technology. The school’s role in support of other districts in the region is to serve as a model for infusing STEM education and cutting edge technology into all areas of study.

Northeast Academy of Aerospace and Advanced Technologies Partners

Elizabeth City State University



Elizabeth City State University has agreed to house the school on its campus for the first two years of its existence. The university has also agreed to work collaboratively with the governing board of the STEM school to secure funding for a new University Aviation Facility and STEM school facility on its 15-acre site across the street from the Elizabeth City Aviation Park.

The University began its aviation program in 1986 with a grant from the Federal Aviation Administration. In the fall 2002, Aviation Science as a minor program became a major program that offered the Bachelor of Science degree in Aviation Science. At that time, there were 5 Aviation Science majors. Between 2002 and 2007 the program remained small with only 19 students majoring in Aviation Science in the fall of 2007.

Under new leadership this program has experienced dramatic growth over the last few years, matriculating 88 Aviation Science students in the fall of 2012. Today there are eight minor programs within the Aviation Science Program. They include:

- Aviation Management
- Public Administration
- Computer Science
- Electronics
- Avionics
- Space Science
- Air Traffic Control
- Flight Education

College of the Albemarle



College of The
Albemarle

Est. 1960

In August 2013, College of the Albemarle opened a new 40,000 square foot Aviation Technical Training Center in Currituck County, which is about 25 minutes from the Elizabeth City Airpark. The college is already offering courses in: Basic Aviation Sheet Metal; Advanced Aviation Sheet Metal; Aviation Electricity; Aviation Electronic; Aircraft Engine 4 & 6 Cylinder Repair; Aviation Composite; and Light Sport Aircraft (LSA). In addition, the College has been providing specialized Aviation Technical Training for DRS, LSI and the USCG.

Beginning in August 2013, the College began offering courses in its newly FAA and SACS certified Aviation Maintenance Systems Technology Program. It is a 2-year program, and students may complete this program and 6 other college General Education courses to receive an AAS (Associate of Applied Science). The college currently has an articulation agreement for its graduates with ECSU and with Embry-Riddle Aeronautical University.

USCG Aviation Logistics Center



The Aviation Logistics Center (ALC) in Elizabeth City is the hub for Coast Guard aviation support, which includes depot level maintenance, structural engineering, spare parts warehousing, and information service needs. A total teardown and inspection is completed every four years on each of the Coast Guard's 200 airframes, primarily fixed-wing HC-130 Hercules, HC-144 Ocean Sentry and Falcon Guardian aircraft, as well as Dolphin and Jayhawk helicopters.

ALC's warehouse in Elizabeth City carries an inventory of \$1.2 billion in spare parts. On an average day, ALC:

- Ships and receipts for over 700 aircraft parts
- Responds to over 100 technical/engineering questions
- Performs depot maintenance on 23 aircraft
- Works on four aircraft for "Drop-In" maintenance
- Manages 2000 contracts valued at \$750M
- Repairs 500 component parts and manufactures 100 piece parts.

DRS Technologies



DRS Technologies Coast Guard Operations

Division offers modern state of the art facilities (200,000 square feet) to perform large aircraft Maintenance, Repair and /or Overhaul (MRO). The operation caters to a global demand and fills worldwide storage for both fixed and rotary wing aircraft. Their C-130 capabilities position them as an industry Center of Excellence for Aviation Maintenance. They currently employ over 250 personnel and have the capacity to operate 8 simultaneous overhaul production lines.

Their services and products consist of but are not limited to:

- Structural Repair and manufacturing
- Aviation Program Management
- Training Solutions
- Manufacturing
- Technical document support
- On-Time Engineering
- Large aircraft maintenance
- Repair and Return services

Telephonics Corporation, Radar Systems Division



Telephonics is an aircraft radar manufacturer. Their services in Elizabeth City include component manufacture and/or repair, aircraft installation services, system integration and training. They are competing for Coast

Guard contracts to install tier radars in Coast Guard aircraft and are currently working with a variety of global customers.

DLS Engineering Associates



DLS is a government contractor providing engineering services, operations research, logistics transformation and light industrial production under contract to the USCG. Services include integrated logistics management and avionics upgrade program management, aviation subject matter expertise, logistics transformation, programmed depot maintenance support, technical writing and graphics design support and quality and risk management processes.

Vector CSP



Vector provides holistic performance improvement and modernization solutions, including integrated logistics support, systems engineering and analysis, workforce analysis and change management, training and human performance technology.

Vectors clients include Department of Homeland Defense, Department of Defense and other government agencies. Since 2002, Vector has been recognized as one of America's 5,000 fastest growing companies.

TCOM, L.P.

TCOM, L.P. operates a manufacturing, production and testing facility in Elizabeth City. Their primary business is production of line ground tethered surveillance balloons called aerostats. They range in size from 17m to 74m and are used globally by government agencies.



NextGen Air Transportation Center at NCSU



The NextGen Air Transportation (NGAT) Center at North Carolina State University is a non-profit partnership that promotes improvements to existing and anticipated air traffic control, airspace management, airport and airspace system capacity, surface traffic management, and flight safety. NGAT is currently spearheading the effort to have Englehard Airport in nearby Hyde County designated by the FAA as one of six approved testing sites for remotely piloted aircraft.

North Carolina New Schools



North Carolina New Schools works to create and transform schools that graduate students who are prepared for college, careers and life. Increasingly, the world that these young people inherit will be focused on STEM-related fields. STEM education is a natural extension of the organization's mission.

North Carolina New Schools' STEM-related efforts work:

- To establish secondary schools that immerse students in the STEM disciplines while following the same course of study required of all N.C. high schools.
- To infuse the guiding principles of many STEM fields --a spirit of inquiry, real-world project-based inquiry, design and analytical thinking -- across the curriculum at all North Carolina New Schools-affiliated schools.

NC New Schools is currently working with over 100 high schools across North Carolina.

North Carolina Science and Engineering Fair



The North Carolina Science Fair Foundation (NCSEF) is a not-for-profit organization whose purpose is to increase the awareness of, exposure to, and participation in inquiry-based science learning. NCSFF promotes science and engineering research by elementary, middle, and high school students and partners with teachers to integrate scientific research into the classroom. NCSFF organizes science and engineering fairs to showcase and celebrate student research and learning.

NCSEF regulates student research across NC to ensure safe practices are followed and provides resources for students and their adult supervisors. It is affiliated with the Intel International Science and Engineering Fair, which provides the internationally recognized rules and safety regulations for student research. The student research year culminates with each regional fair sending its best projects to compete in the state level North Carolina Science and Engineering Fair in March each year. From this fair NCSEF nominates students in grades 6-12 for science and engineering competitions at the national and international levels.

Other Partners

There are also many small business owners, such as Hyman & Robey, PC, a civil engineering firm, TowneBank, George Wood Farms, and Elizabeth City Regional Airport, who have made commitments to the school. In addition, many private citizens have agreed to support this effort.