Careers in Aerospace
Within Your Lifetime

A Career in Aerospace: It is rocket science ... and much more!
When today’s aerospace professionals were students, they may have dreamed about becoming astronauts, designing the next great airplane, colonizing Mars, or managing a spacecraft from mission control.

We have come a long way since that windy day at Kitty Hawk, when the Wright Brothers flew for the first time. A century ago, the technology to develop successful powered aircraft barely existed. Now, aircraft fly many times faster than the speed of sound, and spacecraft travel to other planets within our solar system, and beyond!

Today’s aerospace professionals design, develop, test, and supervise the manufacture of aircraft, spacecraft, satellites, and missiles. Aerospace professionals develop new technologies for use in aviation, defense systems, and space exploration, often specializing in areas such as structural design; guidance, navigation, and control; instrumentation and communication; or production methods. They use computer-aided design software, robotics, lasers, and advanced electronics.

But they’re not all rocket scientists!
Some aerospace professionals use their knowledge to study how the wind will affect a new building in a large urban area, to design an energy-conserving skyscraper, or to do the research materials and fluid flow for an artificial heart. Aerospace technology has expanded to include the design and development of new earthbound vehicles, such as performance automobiles, hydrofoil ships, deep-diving vessels for oceanographic research, and high-speed rail systems.

The future of aerospace is exciting and challenging. In their lifetimes, aspiring aerospace professionals are likely to see space colonization, space-based solar power stations, an active search for extraterrestrial life, and the ability to travel to any point on Earth in a matter of hours. The past few decades have seen the aerospace industry and its supporting sciences and technologies expand beyond the Earth’s thin atmosphere, to embrace manned and unmanned travel through space to the Moon and the planets. Recent discoveries of the presence of water on other planets and moons will make future space travel more possible than ever before. As an aerospace professional, you could be a major factor in this development.
My name is Heather Paul, and my career began while I was pursuing my undergraduate degrees at Auburn University. I worked as a cooperative education student at the NASA Johnson Space Center (JSC), working in areas such as life sciences, propulsion, and space suit and tool design. I continued my education and work experience while attending the University of Texas at Austin and combined my research on fibrous insulation materials for the advanced space suit with my work as a graduate cooperative education student at JSC. After I obtained my Master of Science degree in mechanical engineering, I returned to JSC to work as a NASA engineer.

My previous work experience as a cooperative education student enabled me to become a project engineer managing a team to create and build tools to construct and maintain the International Space Station. After a few years in that position, I returned to work on space suit design. Currently, I work with the team of engineers designing the next-generation space suit that astronauts will wear on the moon!

I lead the team that designs the equipment to keep an astronaut alive by circulating oxygen for breathing and space suit pressurization, and controlling carbon dioxide and humidity levels. When I’m not designing, building, and testing space suit hardware, I coordinate our team’s education and public outreach efforts, to ensure that we’re telling the world about the incredible work that NASA is doing! When I’ve finished my work day at NASA, I go to the gym and teach classes like hip hop dance and weight lifting, and I train people one-on-one to help them stay fit and healthy! I also love learning about other cultures and places so I try to travel as much as possible, and in addition to Spanish, I have studied Russian and Italian. I hope to one day become an astronaut, but in the meantime, every day I strive to be the best NASA engineer that I can be!
A degree in aerospace engineering is your launch pad to a career in aerospace. With this degree, you will meet qualifications for many different positions. The exposure you receive in school will help determine the career path you wish to follow.

As an aerospace engineering student, your classes will introduce propulsion, thermodynamics, fluid dynamics, aerodynamics, structures, flight and space mechanics, and so on. As you continue, you might develop a strong emphasis on a particular area of your studies, such as structures or thermodynamics. From these classes, you will discover the areas that interest you the most, or the areas you feel most comfortable with, and that will lead you to a professional career. Upon graduation, it will be time to enter the workforce through a job you will enjoy and look forward to every day.

This booklet can help you make your preflight plan for your aerospace education and career success. Although this booklet can only provide a representation of available jobs, you will gain insight into a career in aerospace:

- Common disciplines within the field of aerospace engineering. Although this is only a representation of available jobs, you will gain insight into basic operations.
- Aerospace engineering and other degrees that are applicable to the various jobs and field specialties of aerospace professionals.
- A list of courses usually required in a four-year college engineering curriculum, along with high school and college-entry requirements.
- Guidance for finding the college with the engineering program that is right for you.
- Information about student membership in AIAA.
- Check out the Ask Polaris Web site, designed by aerospace experts to help you make important decisions about college. Parents can also get insights into what to look for in a college program and all-important information about financing your education. Go to www.askpolaris.org for more information.

No matter which degree or field specialty you plan to pursue, a career in aerospace is waiting for you.
I grew up in Montreal, Quebec, and attended college at McGill University. I moved to the United States, where I continued my education to earn Bachelor’s and Master’s degrees. My graduate work focused on airframe motion and aerodynamics, where I had the opportunity to perform analysis on the F-15 and F/A-18.

Now I work for Gulfstream Aerospace Corporation in Savannah, Georgia, in the Loads and Dynamics Group. As a loads and dynamics engineer, my responsibility is to make sure that the airframe is designed to withstand loads encountered during operation like maneuvers, turbulence, landings, and taxiing.

Some of the more interesting projects I’ve worked on are ones where I had to figure out why something happened the way it did. These are the ones where I have learned the most. I also had the chance to work with other people in a team and learn from their experiences. An advantage of working at Gulfstream is that I get exposed to working with topics outside of my area of expertise, such as aerodynamics and propulsion. Some of the projects I’ve worked on involved re-creating landing transients using simulation software to analyze the structural impact on the aircraft from taxiing on different runways.

As a professional member of AIAA, I have served on the Honors & Awards Committee of the Savannah Section and have served as a judge at the AIAA Region II Student Design Competition. I also participate in section events, where I have the chance to meet other professionals and learn more about the aerospace industry.
The aerospace profession offers many different and interesting kinds of jobs. Many of the people working in the aerospace industry are engineers. Engineers design aircraft, spacecraft, and unmanned vehicles as solutions to complex problems for a variety of missions. These missions may include defense, global transportation of people or goods, or international endeavors like the exploration of space or harnessing our airspace. There also are commercial applications like race car, golf ball, or speed boat design.

Engineers usually work as part of a team. They design methods to build, test, and operate aircraft or spacecraft. Scientists research unknown areas of aerospace. Business people market new products to meet the needs of their customers. Engineers or business people manage engineering development projects. Technicians, logisticians, and mechanics manufacture, build, and maintain the aircraft or spacecraft.

Some typical careers in the aerospace profession are described below. To get ready for a career in aerospace, students take classes in these areas based on what they want to do when they graduate from college.

**Design**

Design is the process of taking a creative idea or a need and turning it into the blueprint for a new or improved product, such as a landing gear for an aircraft. Design engineers have to consider the structure, arrangement, and function of the object, whether it is an individual part or just one piece of a larger object. In the aerospace industry, designs have to conform to the rules of aerodynamics or astrodynamics; they have to be able to work under certain stresses and conditions. For example, an engineer designing a new spacecraft would have to study the possible effects of radiation in the space environment. The design also has to consider other engineers involved, such as the structural or production engineers who will eventually build the object. Further, the design also has to meet the needs of the people who will ultimately buy and use the product. To create their designs, engineers use computer-aided design/computer-aided manufacturing (CAD/CAM) tools.

**Systems Engineering**

Systems engineers are methodical and organized, and they are involved in all phases of engineering projects. They must be aware of many ways to address complex problems, potential ways to

For researchers in the field of earth science, the International Space Station provides an excellent viewing platform as it crosses the same area of the planet **every three days** and covers more than 90% of the populated **Earth**.
solve them, and the risks associated with each. Systems engineers analyze the mission; develop requirements for hardware, software, operations, and testing; and break down the mission and system requirements into subsystem and component requirements. As these elements are developed and integrated, systems engineers ensure that the original requirements are being met.

**Test and Evaluation**

In a flight test, a new or modified aircraft or space vehicle goes through specific maneuvers and flight conditions to see how well it meets the design demands. Propulsion, aerodynamics, acoustics, thermal conditions, structures, stability and control, performance, and vehicle systems—the test monitors and records information about all of these factors. Often, test engineers need to design special facilities to conduct the testing, like wind tunnels or test chambers, or complex software models. They ensure that the results mirror the real world. Qualified and experienced pilots usually fly the aircraft, but test engineers design the test plan and conduct the test program. The test results are carefully noted, and the test engineer uses theories, concepts, and equations to analyze the data and prepare flight reports.

**Aerospace Science**

Sometimes it DOES take a “Rocket Scientist”! Aerospace scientists extend the knowledge of the basic sciences to the fundamental principles that are behind every aerospace product and activity. Specialty areas include air breathing and rocket propulsion, aeroacoustics, astronautics, aerodynamics, lasers, life sciences in space, propellants and combustion, fluid dynamics, material science, and atmospheric and space environments. The scientist works to “know what hasn’t been known before” so the engineer can “build what hasn’t been built before.” Many aerospace scientists work in government or industry laboratories; many others teach and do research at the undergraduate, graduate, and post-graduate level. Often they will have studied physics, chemistry, or biology before specializing in aerospace. Others will be skilled engineers who have found their calling in expanding the frontiers of knowledge.

**Aerodynamics, Structures, and Controls**

There are many specialty areas in engineering where experts in narrow areas are needed. Some examples are structural engineering, aerodynamics and computational fluid dynamics, wind tunnel testing, stability and control, trajectory analysis and guidance law development, and human factors. In all these areas, engineers use math and basic engineering knowledge to develop their designs, build physical or virtual prototypes for evaluation, and then look at data from research to assess their suitability. An example specialty area is computational fluid dynamics (CFD). In this field, high-speed computers solve mathematical equations that will show how a fluid, like air, will flow around an object, like an airplane. The computers produce a model of what will happen in certain flight conditions. This saves time and money, and is a much lower risk than building the airplane and then having a pilot try to fly it.

**Field Service**

Training, maintenance, and service support is almost always required after a product is developed and delivered to the customer. Manufacturers want to make sure the customer gets the most from their product. Field service representatives work with the manufacturers and the design engineers to fix any problems that might develop after the product has been built. Field service duties require technical know-how, expertise with the product, and the ability to work well with people.
The American Institute of Aeronautics and Astronautics (AIAA) is the world’s largest society of professionals in the aerospace industry. Membership in AIAA provides opportunities to meet and talk with a number of engineers and other distinguished people in the industry, including astronauts, pilots, and business leaders. As a student member, you can meet other students like you who are interested in astronautics and aeronautics.

Student membership costs only $20 a year. Membership includes a subscription to Aerospace America, AIAA’s monthly member magazine with special articles about news in the aerospace industry, as well as access to the online Student Journal, which reports news about research and projects other students in aerospace fields are working on.

The AIAA Foundation also provides scholarships for student members who are in college, as well as opportunities for students to attend conferences and to present their research work and projects.

Your college, university, or high school might have an AIAA Student Branch, which organizes meetings and activities specifically for students who, like you, are interested in aerospace. If your school does not have a Student Branch, you and your friends can start one, or you can attend the meetings of your local professional AIAA section.

Information about student opportunities within AIAA is included in this booklet and is available on the AIAA Web site at www.aiaa.org, “Students and Educators.”
Tiffany M. Finch

I am a native of Raleigh, NC and I completed a BS in Mechanical Engineering from Florida A&M University, an MS in Materials Engineering from Purdue University, and an MBA from the Indiana University Kelley School of Business.

Growing up in Raleigh, I was able to participate in wonderful and challenging math science programs. Through my participation in programs such as the Imhotep Academy and the North Carolina Math and Science Education Network Pre-College Program (NC-MSEN PCP) at NC State University, I was able to explore math and science. I discovered that I enjoyed solving problems and learning how things work through hands-on experimentation. So, my love of math and science, combined with my innate curiosity, led me to want to study engineering.

Engineering has opened up numerous opportunities for me to have a variety of amazing experiences. I was able to work as an Intern at NASA Marshall Space Flight Center and as a mini-grant researcher at NASA Langley Research Center. However, I have to admit that my favorite experience was as a Test Engineer as part of the Pratt & Whitney Systems Engineering—Validation group. As a Test Engineer, I was involved in the build, test, teardown, and inspection of advanced technology aircraft engines. I’ll never forget the time that I spent on the flight lines working on engines while they were actually installed on the jets. That was pretty amazing!

Working on such technologically advanced products as next generation aircraft engines can pose a slew of challenges. It takes years of experience to really grasp the inner workings of these machines.

Tiffany M. Finch
Mechanical Engineer

HOMETOWN: Raleigh, North Carolina

DEGREES: BS in Mechanical Engineering, MS in Materials Engineering, and an MBA

SCHOOL ATTENDED: Florida A&M University, Purdue University, and Indiana University Kelley School of Business

WORK EXPERIENCE: Intern at NASA Marshall Space Flight Center, Test Engineer as part of Pratt & Whitney Systems Engineering-Validation group

SPECIAL CHALLENGE: It always helps to know that there is a community of fellow engineers that is willing to help tackle any issues I may face.
You don’t need to wait until you are almost done with high school to begin to think about a college degree and a career. As early as middle school, you can explore ideas about what you would like to do and begin thinking about colleges and universities you might like to attend.

Consult your teachers and counselors for resources. Find engineers and scientists in your community and talk with them about their jobs. Write to college and university registrars for catalogs to see what they offer or in many cases, check their Web sites. If possible, try to do this before you select your high school electives; some colleges will reject applicants who have not completed all required courses.

Entrance tests are often required. These may include the standardized College Entrance Examination Board (ACT) exams, the Scholastic Aptitude Test (SAT), or achievement tests.

You must have a good scholastic average to qualify for admission. This does not mean that you must be a “straight A” student, but neither can you expect to receive much consideration when you have Cs and Ds to show for your high school work.

At a minimum, most colleges require completion of high school courses in the following subjects:

**English:** 4 years

**Mathematics (Algebra, Geometry, Trigonometry):** 3 years

**Sciences (Physics, Chemistry, and/or Biology):** 2 years

**History (including Social Studies):** 3 years

Some engineering colleges may allow advanced placement into algebra and trigonometry, but most start the first term with calculus. If you feel that you are not as strong in math as you should be or want to be, or if you have not had the opportunity in high school to take trigonometry or advanced algebra, it might be wise to consider colleges where the study of calculus is deferred for a semester or two. If you are sure you want to pursue a career in aerospace, we suggest you take as many math and science courses, especially physics, as you can.

The AIAA Foundation has provided scholarships to over 500 college students at 130 universities, sponsored more than 150 student conferences and design competitions, and reached 10,000 pre-college students through over 260 classroom grants to K-12 teachers
The following curriculum is for a typical four-year aerospace engineering major. Terminology varies among schools; some designate the curriculum as Aeronautics and Astronautics, some as Aeronautical Engineering, some as Aerospace Sciences, etc.

The aerospace engineering program is the result of extensive consultation among university administrators and faculty, key people in the aerospace industry, and ABET, which is the agency that accredits engineering curricula at colleges and universities in the United States. Remember that the following is “typical.” You might not follow it exactly. It is presented to show the flexibility that exists in course structure.

The first two years are almost always devoted to the basic physical and engineering sciences, mathematics, and nontechnical subjects. The content of these first years is likely to be as follows:

**First Year**
- English
- Analytic Geometry and Calculus
- Chemistry (or Physics)
- Computers

**Second Year**
- Humanities and Social Sciences
- Calculus and Differential Equations
- Physics (or Chemistry)
- Engineering Mechanics
- Statics and Dynamics
- Thermodynamics

During the junior and senior years, you can choose a program devoted primarily to a field of study—for example, design, or research and development—as well as an aero or astro option. Such alternative curricula might be the following:

**Third Year**
- Aero/Astro Design Program
- Applied Aerodynamics/Astrodynamics
- Elementary Structural Analysis
- Materials and Metallurgy Aero/Astro Research Program
- Analytical Mechanics
- Electromagnetic Fields
- Advanced Calculus and Analysis Common to Both Programs
- Fluid Mechanics
- Heat Transfer
- Electrical Circuits
- Aeronautical/Astronautical Laboratories
- Nontechnical Courses

It is safe to say that no two curricula in aerospace engineering offer the same subject matter during the fourth year. There is a good reason for this: The advanced courses are built around the interests and abilities of the faculty members in the department. Because these vary widely from institution to institution, we provide here a list of possible technical electives for the fourth year of study:

**Fourth Year**
- Aero Design Program
- Flight Vehicle Design
- Structural Analysis Astro Design Program
- Spacecraft Design
- Spacecraft Dynamics and Control
- Space Structures Aero Research Program
- Engineering Mechanics
- Vehicle Systems
- Flight Mechanics
- Trajectory Dynamics Astro Research Program
- Orbital Mechanics
- Spacecraft System
- Telecommunications
- Spacecraft Power Common to All Programs
- Gas Dynamics
- Electronics
- Modern Physics
- Aerospace Propulsion Systems
- Boundary Layer Theory
- Advanced Mathematical Problems

**Communications Check**

English is a requirement for admission to engineering colleges and will continue to be important throughout your college years and during your career as a professional. You will need the ability to convey information and to express ideas and opinions clearly and concisely. Instructors and other engineers and scientists will rely on your written and oral reports as a clear indicator of efficient and original work.

Apply yourself continuously to your English and writing courses, and consider taking technical writing courses in college or through a continuing education program. Your diligence could pay off in many unforeseen ways with a scholarship, a college degree, a good position, and steady promotion.
As an aerodynamicist, I began working for The Boeing Company in our research and development company, Phantom Works, in Advanced Weapons and Missile Systems. I have supported exciting, fast-paced weapons programs such as Joint Direct Attack Munition, HyFly Hypersonic Missile, Area Dominance Munition Technology Development (Dominator), & Persistent Munition Technology Demonstrator (PMTD). I also have participated in Boeing’s Engineering Skills Rotation Program working on the F/A-18 E/F, T-45, and F-15 aircraft programs.

Currently, I’m back in AWMS as an aerodynamicist. My main responsibilities in this role are to perform Wind Tunnel Tests on AWMS programs. In these duties, for my programs, I have to approve each model and model change that is tested. I am also responsible for taking the wind tunnel test results and creating the aerodynamic database of that particular vehicle. Being in the wind tunnel is a lot of fun, but it presents many challenging opportunities for all the engineers involved.
I always envisioned myself as a people person, wanting a career working with people— that’s probably why I was less than enthused when my high school guidance counselor suggested I study engineering in college!!! I really enjoyed math and science and excelled in those classes, so the suggestion made sense, but I just had a hard time getting past that engineer stereotype in my head. Then I learned about Biomedical Engineering, and how this type of engineering looks at the human body as a mechanical and electrical system. *That caught my attention—biology, physiology, people!* It was a bit later in my college years that I learned biomedical engineers work in the human space program. They solve the problems the human body encounters while in the microgravity environment of space. *I was hooked!* 

I began my aerospace career with Wyle as a Biomedical Flight Controller in Mission Control. 

During the Space Shuttle Program I worked closely with the NASA Flight Surgeons and other engineers to plan and execute the crew health component of space shuttle missions during the pre-, in-, and post-flight phases. 

During the NASA/MIR Program, I spent extended periods of time in Russia as the lead Biomedical Engineer and was part of the initial group of NASA representatives providing mission support from Mission Control Center Moscow (MCC-M). I felt like a pioneer living and working in Russia, helping lay the ground work for how multiple countries can send humans into space and take care of them. 

During the early phases of the International Space Station (ISS) Program, I worked closely with the International Partners to help define their individual space medicine roles and responsibilities with respect to ISS and facilitated their integration into a collaborative ISS space medicine effort. In 2000, I was instrumental in the creation of Wyle Laboratories GmbH in Germany to provide space medicine support services to the European Space Agency (ESA), specifically assisting ESA with defining and implementing their medical program for the ISS. 

Currently, I am one of the Houston-based Managing Directors for Wyle Laboratories GmbH in Germany that continues to provide space medicine support services to the European Space Agency (ESA). I provide liaison and space medicine consultancy services on technical issues to help bridge the ESA and NASA medical organizations. Similarly, I am the liaison between Wyle GmbH and Wyle in Houston for financial and business operations. 

I am also currently the project manager for Wyle’s contract with a commercial company, Virgin Galactic, to provide medical consultancy services.
How do I know what type of engineering is right for me?

The Junior Engineers Technical Society (JETS) has an engineering aptitude test called the NEAS+ (National Engineering Aptitude Search+). The test will help you determine which type of engineer you might prefer to be, and it will guide you to the selection of a university program that will best fit your interests and aptitude. Go to the JETS Web site, www.jets.org, for information on career selection tools and descriptions of the different types of engineering.

Which college is right for me?

As you consider which type of engineering degree to pursue, you need to factor in other important issues, such as programs offered, cost, and distance from home.

Get started by looking at only colleges that offer ABET-accredited engineering programs. ABET is the recognized accreditor for college and university programs in applied science, computing, engineering, and technology. A federation of 28 professional and technical societies represents these fields. AIAA is the recognized society for evaluating aeronautical, aerospace, and similarly named programs and currently evaluates over 70 programs around the United States.

Why is accreditation important?

ABET accreditation determines whether an engineering program meets quality standards for courses, faculty, and facilities. Accredited programs will adequately prepare you to enter the workforce. Graduation from an ABET-accredited program is often a minimum requirement for some jobs, graduate schools, and state boards of professional licensure.

Where can I find an accredited college that has programs I am interested in?

The ABET Web site, www.abet.org, is a valuable resource. On the ABET site, you can find an accredited engineering program by specifying a discipline (for example, “aerospace”), a region of the United States (for example, “Mid-Atlantic”), and/or a U.S. state. A list of colleges that meet your criteria is displayed, along with links to their Web sites and contact information.

Note that ABET does not rank university programs; rather, it ensures that each program has been evaluated by aerospace professionals and other faculty and that it meets the requirements for accreditation.
How do I choose the college that has the right program for me?

Do your homework! Visit the Web sites of the accredited colleges you found on ABET.org, or request their catalogs. Is the school doing things that you are interested in? Some schools are heavily into research. Some are known for their internships and opportunities in the local community. Some have excellent master’s and doctorate programs. These are things that only you will know are right for you.

Engineering students and faculty members also are an excellent resource. The AIAA Web site, www.aiaa.org, provides access to both. Go to “Students & Educators” and click on “Student Branches.” There you will find a list of chartered AIAA student branches at U.S. and international colleges and universities, along with contact information for faculty advisors and student branch chairs and, in some cases, URLs to the branch’s home page. You can directly contact the advisor or chair of a student branch for information and recommendations. You also can network with other engineering students by attending a branch meeting at a college near you.

Is there any help to pay for my education?

AIAA’s student membership program offers several forms of financial assistance. The AIAA Foundation offers thirty $2000 scholarships to college sophomores, juniors, and seniors. In addition, Design Competitions award prizes for individuals and teams of undergraduate and graduate students. Graduate awards provide financial rewards and professional recognition. Student paper competitions are another way to gain financial and recognition benefits.

Consult the financial aid advisors at your high school or at the colleges you are considering. They can provide information and applications for other sources of financial assistance, such as scholarships, grants, and loans.

Still have questions about aerospace engineering?

Go to “Students & Educators” on the AIAA Web site and click on “Ask An Engineer.” A list of frequently asked questions — and their answers — is provided. If you have other questions that are not covered, click on “Ask Us” to submit your specific questions. We will have one of our AIAA members answer your questions directly via e-mail so you can make an informed decision about your future.

How else can AIAA help with your future?

E-mail us at studentprograms@aiaa.org. We are happy to answer your questions and help you as you earn your degree and become a practicing engineer. As you advance, you will find many opportunities within AIAA to make the successful transition to the professional world.

For more information about preparing for a college, visit www.askpolaris.org.

Factoid Sources:


Smithsonian National Air and Space Museum, Steven F. Udvar-Hazy Center, on the Web at www.nasa.si.edu/museum/udvarhazy/.
Two of the hardworking students benefiting from the Foundation’s scholarship and awards program are Brian and Brent Pomeroy, brothers from Mechanicsburg, Pennsylvania. Brian is a 2006 graduate of Penn State University’s Aerospace Engineering program, now pursuing a Ph.D. in Aerospace Engineering at Purdue University, and his younger brother Brent graduated from Clarkson University and is now at the University of Illinois at Urbana-Champaign working to complete his Masters.

Brian is a past recipient of the Foundation’s Dr. James Rankin Digital Avionics Scholarship, and is the 2009 recipient of the Foundation’s Orville and Wilbur Wright Graduate Award. Not lagging behind his older brother, Brent is a 2009 recipient of the Rankin scholarship. The boys’ parents, Walt and Lin Pomeroy, stated that while the scholarship money was helpful in subsidizing the boys’ education, the awards had a larger impact: “giving them the confidence to continue working towards their personal goals, and making them feel that their work is valued and appreciated by others, especially as AIAA has allowed both Pomeroy brothers to work on projects directly related to their future careers, and present their work in professional settings.”

Beyond scholarship eligibility, membership in AIAA helps future engineers prepare for their careers by exposing them to leadership roles and meaningful work experiences on aerospace programs. Brent’s involvement with AIAA allowed him to recently serve on the volunteer staff of the Smithsonian Institute’s “Be a Pilot Day” at the National Air and Space Museum’s Steven F. Udvar-Hazy Center, helping educate children and adults alike about the importance of aerospace and the wonders of flight, a fitting experience as his parents credit his frequent visits to the National Air and Space Museum for igniting Brent’s passion for aerospace. When not inspiring future engineers, Brent has served as an intern in G.E.’s Wind Energy division in Albany, New York, working on solutions to America’s dependence on fossil fuels.

**Brian Pomeroy**
**AIAA Foundation Scholarship Recipient**

**HOMETOWN:** Mechanicsburg, Pennsylvania

**DEGREES:** B.S., Aerospace Engineering, pursuing a Ph.D. in Aerospace Engineering

**SCHOOL ATTENDED:** Undergrad: Aerospace Engineering at Penn State University, Graduated December 2006, Graduate Work: Aeronautical and Astronautical Engineering, Purdue University, Masters December 2009, currently working on my Ph.D.

**WORK EXPERIENCE:** Secretary of the AIAA Student Branch, principal organizer of the Region I (MA) Student Conference in 2006, eSPRIT sounding rocket, Penn State

**SPECIAL CHALLENGE:** I worked on two sounding rockets at Penn State with NASA Wallops Flight Facility. The greatest challenge here was to learn everything that went into the design before I learned it in class. The project forced me to learn how to manage my time, learn new topics, design and build what was needed to successfully complete the mission, and finally post process the results.

**Brent Pomeroy**
**AIAA Foundation Scholarship Recipient**

**HOMETOWN:** Mechanicsburg, Pennsylvania

**DEGREES:** B.S., Aeronautical Engineering; working on Masters

**SCHOOL ATTENDED:** Clarkson University, New York; working on Masters at University of Illinois at Urbana-Champaign

**WORK EXPERIENCE:** Intern in G.E.’s Wind Energy division in Albany, New York; NASA Langley, summer of 2010.

**SPECIAL CHALLENGE:** Being part of the AIAA Design Build Fly team, where I served as Chief Design Engineer my senior year. It required a great design in limited time while coordinating a large team.
Growing up, I was fascinated by things that flew. Both birds and airplanes always made me wonder how they work. I built plastic models and flew “U-Control” model airplanes as a kid. I read books and magazines about the latest airplanes, and they told stories about an aircraft designer named Kelly Johnson. When I got a chance to meet him when I was in high school, I could tell that he loved his job. That’s what inspired me to be an aeronautical engineer.

My career started with Lockheed Martin in 1981, when I was a sophomore in college. I started working there to earn money to go to college. In my career at Lockheed Martin, I have worked on a wide variety of aircraft, including the JSF X-35. I work in Palmdale, California—home of the famed “Skunk Works”—where I develop real-time, man-in-the-loop and hardware-in-the-loop simulations.

These simulators are used to train test pilots and to test a new airplane’s systems and software. In other words, I create the world’s best video games!

Apart from the great people I get to work with, the travel, and watching airplanes fly (specifically the X-35 doing a vertical takeoff), I get to fly the simulators I create. I have several hundred hours flying real planes and several thousand hours in high-performance aircraft simulators. I have also worked as a consultant on several aircraft simulation computer games and movie special effects.
Wow, you're a mechanical engineer? What made you want to do that? Every time I tell someone what I do, I see a surprised look on his or her face. Still, how did I get here? My love for math and science was the starting point. I always did well at math and science, and I enjoyed learning those subjects. While in high school, I participated in several engineering clubs, camps, and programs to experience a broad range of potential specialties. Out of the different engineering disciplines I chose mechanical because it spanned a broad range of scientific principles, including thermodynamics, physics, materials, and design. In my senior year of high school I received both a scholarship to college and an internship with Pratt & Whitney Rocketdyne. The internship at such a high-technology company was the best thing that could have happened to a high school student who was interested in an engineering career. It gave me hands-on access to state-of-the-art technologies and equipment, and more importantly, the ability to learn from experienced engineers. I ended up working several internship positions at Pratt & Whitney while I was pursuing my mechanical engineering degree. Upon graduating, I was hired full time at Pratt & Whitney and I now work as an RL10 test engineer.

I truly love what I do. I work with a machine that is used to power vehicles into space. The RL10 engine is the highest performing, most reliable upper stage rocket engine in service in the world. Testing rocket engines is one of the coolest jobs to have!

One of my greatest rewards is the ability to give back to the community. Twice a month, I speak with third- through eighth-grade students about a new engine called CECE (Common Extensible Cryogenic Engine). CECE is a deep throttling engine derived from the RL10. Pratt & Whitney Rocketdyne is designing and testing this engine to demonstrate enabling technologies for future missions in support of NASA’s Vision for Space Exploration. Check out the Web site at www.takingupspace.net.
Since Boeing introduced America’s first jet commercial transport airplane in 1954, only ten new airplane families have been developed: the 707, DC-8, 727, DC-9, 737, 757, 767, DC-10, 777, and 747. As an aerodynamics engineer at Boeing, it is inspiring to work each day to bring the eleventh model—the 787—in such an amazing lineage. Day to day, the most exciting part of my job is the anticipation of the first flight of the 787.

Aerodynamicists like me have many interesting and important tasks when designing a new airplane. Generally, we design the shape of the airplane so it can move through the air smoothly and efficiently at the highest possible speed. We ensure that the airplane can take off from today’s airport runways and can be landed safely.

We have several methods for predicting how our design will perform, but the primary one is wind tunnel testing. By building a scale model and testing it in a wind tunnel, we are able to simulate how a real airplane will behave during flight. Sometimes these models are very large, but typically they would fit in your average living room. No two wind tunnels are the same, so we travel all over the world to test different parts of the airplane. I have traveled to London and California and spent months working at wind tunnel facilities in Seattle. We also use wind tunnels in Japan, Germany, and Tennessee.

In addition to wind tunnels, we use some of the world’s fastest computers to simulate how air will move as an airplane flies through it. These computers are like virtual wind tunnels and can predict how the airplane performance is affected by the smallest design changes.
I work on an array of hardware systems for the U.S. Air Force and the U.S. Navy. Before working for Raytheon, I spent 21 years working for NASA as part of America’s Space Shuttle team at Marshall Space Flight Center (MSFC) in Huntsville, Alabama.

As a young engineer at NASA, I got to work on some fun things, travel around the United States, and meet some really fun people like astronauts, members of Congress, presidents of companies, and wonderful students from schools around our nation. I got to work on space propulsion elements and live in Los Angeles, California; Cocoa Beach, Florida; Denver, Colorado; and even our nation’s capital, Washington, D.C. I also received increasing levels of responsibility. The last six years of my career, as a senior executive, I was appointed director of the Safety and Mission Assurance Office at the MSFC, which offered me the opportunity to support shuttle launch activities and countdown activities at Kennedy Space Center in Florida.

I also have been selected for many executive leadership programs. I am a very energetic, motivational, and inspirational speaker, which offers me the chance to speak all over the country about how to be successful in life. I always say: “Expect the best and the best will come, envision yourself in the future and work toward that goal every day. Live your life to reflect what you want to be. Find mentors and coaches to help you soar and reach your greatest potential!”

AMANDA GOODSON
ENGINEER

HOMETOWN: Decatur, Alabama
DEGREES: B.S., Electrical Engineering; M.S., Management; Doctor of Ministry
SCHOOLS ATTENDED: Tuskegee University, Tuskegee, Alabama; Florida Institute of Technology, Melbourne, Florida; United Theological Seminary
NO. YEARS WORKING: 23 years
SPECIAL CHALLENGE: As a teenager, I felt I had limits. Now, I see my strengths as opportunities to create extraordinary results, instead of focusing on what I cannot do.
I have always known I wanted to be involved with spacecraft missions to other planets. Ever since a young age, images of our solar system's planets, especially those images taken “close up,” have fascinated and amazed me. Those bright points of light we see in the sky are worlds unto themselves, with unknown histories; and simultaneously the Earth’s history is intimately linked to theirs. That, I think, is most compelling, namely the juxtaposition of the unknown with the familiar.

I majored in physics as an undergraduate, and then I attended graduate school at the University of Colorado at Boulder in the Aerospace Engineering department. My Ph.D. thesis research focused on planetary sciences. I was fortunate enough to do my graduate research with a scientist who was a part of the Galileo imaging science team. My current work involves designing missions to explore the planets and continuing research on the moons of Jupiter, the planet Mars, and Earth’s Moon.
“You mean you really are a rocket scientist?” That is a question I never tire of answering. “Yes, I really am!” I usually reply, with a gentle cockiness in my tone. Score one for girls in math and science!

I was inspired by my 10th grade math teacher to pursue a career in computer technology. Today, I write software for complex and state-of-the-art defense systems.

When I first started working at Raytheon, I had no idea what a fascinating career I was getting into. But 20 years later, I am intrigued with the seemingly endless possibilities and the future that lies ahead. I develop systems that are used by our country’s Air Force, Army, and Navy servicemen and women. These systems have sophisticated sensors that can detect things autonomously from several miles away. The algorithms that I implement allow rockets to fly preplanned or dynamically calculated trajectories. Computer communication with other systems halfway around the world (or sometimes even in outer space) is possible via space satellites or the global information grid.

Not only do I love working as an aerospace engineer, but I also share my love of math and science with school-age kids in my community. Three years ago, after hearing Dr. Sally Ride, the first American female in space, speak to a group of women engineers, I was inspired to create the Southern Arizona Math Science and Technology Funfest. The MSTFF brings together hundreds of scientists and engineers from many different companies and affiliations across Tucson to share their love for math and science with the community’s children. In a hands-on and interactive setting, more than 7200 kids and teachers are able to experience math and science in very engaging ways. So far, I have found very few kids that don’t get hooked when they are exposed to the “cool” aspects of math and science that are around us everywhere.

SHARON O’NEAL
AEROSPACE ENGINEER

HOMETOWN: Tucson, Arizona
DEGREES: B.S., Computer Science; M.S., Computer Engineering
SCHOOLS ATTENDED: California State University Northridge; University of Southern California, Los Angeles, California
CURRENT JOB: Senior Engineering Fellow, Raytheon Missile Systems, Tucson, Arizona
NO. YEARS WORKING: 23 years
SPECIAL CHALLENGE: Back in the early 1980s, I was one of very few females in the engineering program at my university. But, boy, did I show them that girls have what it takes to be great engineers, too. I graduated magna cum laude!
I am a certified airplane nut. I have always been in love with planes and spacecraft. The fusion of science and the art of flight simply fascinates me.

I think my inspiration to become an engineer and professor came from my parents. My dad, as a career Marine, always entertained my desire to watch and learn about high-performance aircraft. My mom, as an artist, stressed the importance of creativity, reading, and careful thought. They created an environment that coincided with NASA’s early days, during the Mercury, Gemini, and Apollo rocket programs. I watched everything shown on TV, including Neil Armstrong’s first steps on the Moon. As a result, I have been in love with aircraft and spacecraft for much of my life.

By age 12, I was a kid on a mission. I wanted to become an aeronautical engineer. Things started to get really fun in college. I had a chance to learn, to do, and to discover even more. Interestingly, my career made a shift while I was in graduate school. My advisor gave me an unexpected assignment—teaching. I was scared to death, but it worked out and I discovered an interest in teaching.

As a professor, I teach, do research, and communicate. I spend a lot of time working in wind tunnels and on various projects (aircraft design, rotors, wind energy, and laser systems). Communications—writing and talking—is a prime tool in all my endeavors.

Working with students is very rewarding, and it is now my first love. Seeing students graduate and going on in life to enjoy the science of flight is exciting. It’s kind of like watching lots of “first flights” every year. Also, as a member of AIAA, I serve as the faculty advisor of the Student Section at Wichita State University and as chair of the National Student Activities Committee.

Along with my passion for airplanes is an even greater interest in high-tech secret aircraft, like the Blackbird and Stealth Fighter. For many years I have been collecting bits of information that is in the public domain on classified U.S. aircraft programs. I occasionally present information on this hobby as an AIAA Distinguished Lecturer.
AIAA MISSION AND VISION

AIAA’s vision is to be the shaping, dynamic force in the aerospace profession—the forum for innovation, technical excellence, and global leadership.

AIAA’s mission is to address the professional needs and interests of the past, current, and future aerospace workforce and to advance the state of aerospace science, engineering, technology, operations, and policy to benefit our global society.