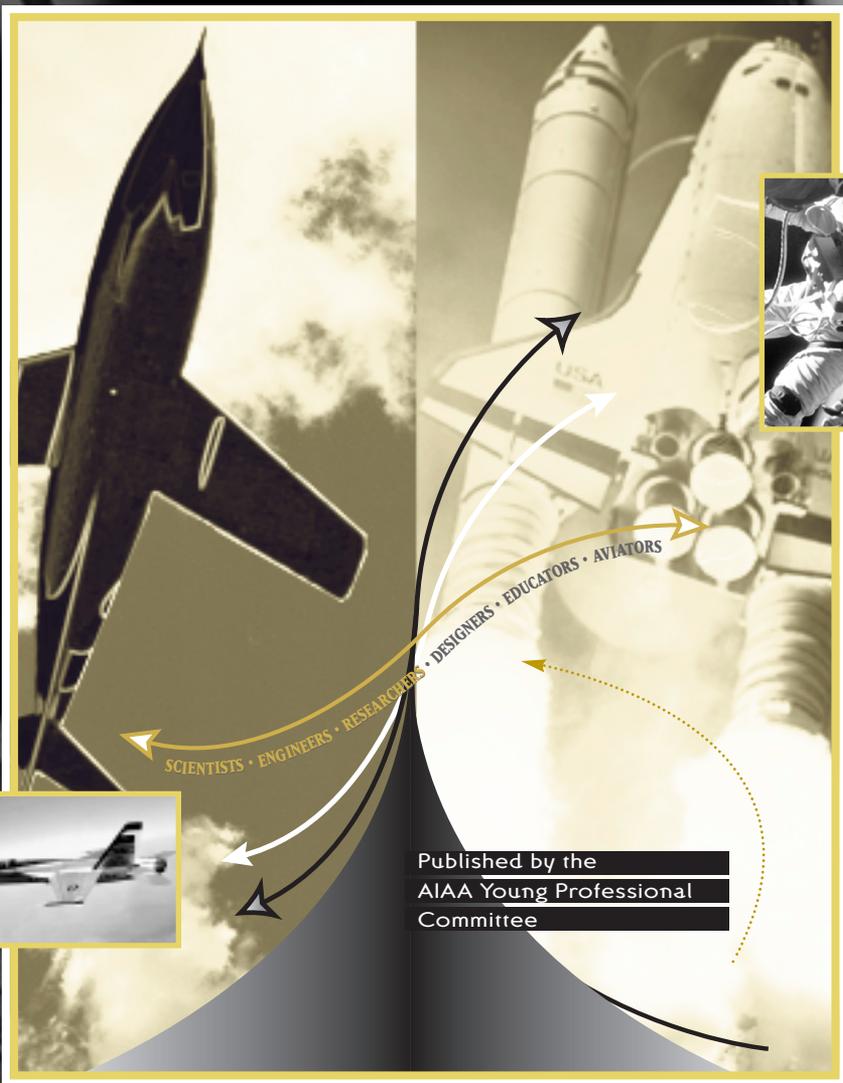


The AEROSPACE CAREER HANDBOOK



SCIENTISTS • ENGINEERS • RESEARCHERS

DESIGNERS • EDUCATORS • AVIATORS

Published by the
AIAA Young Professional
Committee

FOREWORD

Congratulations on your decision to pursue a career in aerospace—one of the most exciting and prestigious industries of our time! With the opportunity to influence and contribute to the next century of aerospace achievement, you are in the enviable position right now to file a flight plan that takes you on an expedition of triumph and accomplishment. Preparation is the key to any successful journey, and yours begins with the advice and guidance provided within this handbook. On the following pages, you'll read about the different industry sectors within aerospace and the types of jobs available to aerospace professionals, what to expect as you embark on your career, and how you can maximize your opportunities during your college years.

You are now cleared for takeoff—enjoy the journey!

A handwritten signature in black ink that reads "Alan Mulally". The signature is written in a cursive, flowing style.

Senior Vice President, The Boeing Company
President and Chief Executive Officer
Boeing Commercial Airplanes

THE AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS

For nearly 70 years, the American Institute of Aeronautics and Astronautics (AIAA) has provided scientists, engineers, researchers, designers, educators, and aviators with the resources necessary to advance aviation and space technology. AIAA members around the world have the advantage of unparalleled professional development—at



substantial savings—through a global information exchange that includes conferences, technical journals and papers, books, a member magazine, and professional development programs.

HOW TO USE THIS HANDBOOK

This Aerospace Career Handbook has been written specifically for college students who are contemplating a career in the aerospace industry. It will serve as an ongoing resource to you throughout your college life, providing information on how to prepare for—and what to expect from—a career in aerospace. Sponsored by the American Institute of Aeronautics and Astronautics, this handbook was developed by the Institute's Young Professionals Committee—AIAA members who are in the early stages of their aerospace careers. Our Young Professionals have dedicated their time and energy to this handbook so you can get a head start on your successful career in aerospace!

THE AEROSPACE INDUSTRY

Within the aerospace industry, you have the option of following one of two career paths: aeronautics (systems that operate in the Earth's atmosphere) or



astronautics (systems that operate above the earth's atmosphere). Whichever one you choose, you are assured of an exciting profession—one with a history of many proud moments, with the anticipation of more to come.

So far, humans have achieved orbit, landed on and explored the moon, and sent spacecraft on incredibly long exploratory journeys to the planets and beyond. The transformation of aviation offering flight has brought about many changes in our lives—including our conceptions of time and distance. Aircraft have seen significant growth achievements, with next-generation concepts continually being used to build commercial and military aircraft. Satellites in space have also led to triumphs: worldwide voice and television communications; precise navigation of planes and ships; weather forecasting; and detecting, monitoring, and surveillance of Earth resources. Research as well has achieved great advances in the areas of materials science and technical management. As a result, global interest and participation in aerospace have increased and continue to show evidence of growth.

YOUR CAREER IN AEROSPACE

A career in aerospace offers an exciting journey through widely varying disciplines and draws upon your educational background, communication skills, and commitment to being part of a team. As you advance your career, you will be required to demonstrate flexibility with your co-workers and within your work environment, as well as the ability for continuous learning.

You will be expected to adapt to a changing world and industry challenges with dedication and imagination.

The aerospace industry offers a virtually endless diversity of occupations, with disciplines ranging from biomedical engineering to mathematics, from human factors to optical design, from



fluid mechanics to astrophysics, and well beyond. Your career as an engineer or scientist may encompass one or more of the following:

Engineers

Analytical: Analytical engineers often specialize in a particular field or discipline. During the development of a product they provide a more detailed assessment of the design relative to customer requirements. Often coordinating with other disciplines, analytical engineers use knowledge of engineering concepts to perform assessments in increasing detail.



Design: Design Engineering is a discipline that creates and transforms ideas and concepts into a product definition that satisfies customer requirements. The role of the design engineer is the creation, synthesis, iteration, and presentation of design solutions. The design engineer coordinates with engineering specialists and integrates their inputs to produce the form, fit, and function as well as documentation to completely define the product.

Field Service: Field service engineers provide maintenance and service information to customers (usually airlines or the military) to ensure safe and efficient use of the product. If the product contains a design problem, field service engineers work with manufacturing and design engineers to resolve it.

Manufacturing: Manufacturing engineers work closely with design engineers to create components that can be manufactured quickly, easily, and economically. They plan the tooling, construction, and component assembly to meet specification requirements.



Materials and Process: Materials and process engineers study materials

and characterize the material properties. They utilize understanding of the materials and processes to effectively coordinate with engineering and manufacturing organizations. M&PE organizations are also responsible for processes and procedures for manufacturing, assembly, and integration of parts.

Software: Software engineers use a disciplined approach to design, develop, operate, maintain, and document computing systems software as well as software and hardware components to be applied to engineering,



scientific, and manufacturing requirements. Throughout the system development life cycle, software engineers use the appropriate standards, processes, procedures, and tools to support the generation of engineering applications and environments such as: laboratory simulation systems;

aircraft flight control and display systems; avionics; mechanical and electrical systems; mobile and ground-based defense systems; and space systems.

Systems: Systems engineers are responsible for interface control during development and maintenance activities, as well as for the integration and test planning that verifies the realization of system requirements. In addition, systems engineers provide expert advice and support throughout the system or subsystem life cycle, which includes: the specification and analysis of requirements; the design of hardware or software; procurement; fabrication; assembly; integration; testing; and operation.

Test: Test engineers perform a complete range of testing, from a single component to an entire vehicle—all of which are essential to the successful development of an aerospace project. Test engineers involved in a flight test might be expected to design a test and prepare necessary instrumentation, as well as collect and compile the data. Aerospace R&D labs include aerodynamics, vibrations, thermal, propulsion, or pyrotechnics.

SCIENTISTS

Scientists are vital to the discovery of new products and processes and to broadening the field of science by deriving or clarifying theories and concepts to be used by others. Other opportunities for scientists include working for high-tech research companies, commercial business, and government research centers. Many scientists also teach at a college or university while they are performing their research.



YOUR EMPLOYMENT OPTIONS

The aerospace industry gives you career options within the U.S. government, private industry, academia, and abroad. Regardless of where and in which industry segment you work, you will be constantly challenged to learn. Your enthusiasm and willingness to volunteer for new assignments will be critical to your ability to rise through the ranks and gain additional responsibilities. Aerospace professionals typically follow either a management or technical/engineering career path. As you advance within an organization, you will be given opportunities that will lead to one or the other.

WORKING FOR THE U.S. GOVERNMENT

A job with the U.S. government means that you work for the best interest of the American public. Most federal aerospace jobs are with the Department of Defense (DoD), National Aeronautics and Space Administration (NASA), and the Federal Aviation Administration (FAA).

The U.S. government has the resources to do the research and development work that is either impractical or not profitable for any single company—which gives you the unique opportunity to take part in pioneering, high-risk research on advanced technologies. Some federal aerospace jobs involve high-level oversight and review of various aircraft programs, while others

involve the testing and evaluation of competing aircraft or component designs to determine which one best meets the needs of the country. Many of these jobs involve hands-on work with the latest technology.

The DoD is the largest employer of engineers and scientists in the country. As such, it deals with a wide variety of military aircraft and space vehicles, many on the cutting edge of technology. NASA, the world's leader in spacecraft development, also does groundbreaking research in aeronautics at several centers across the country. Additionally, national laboratories offer

career opportunities. National laboratories are either government-owned and government-operated or government-owned and contractor-operated. Some national laboratories have launched partnerships and joint programs with private companies.



Typically, federal aerospace jobs offer young people the opportunity to work on interesting projects and provide exposure to a wide variety of people from various companies, other federal agencies, and military commands. Federal jobs offer excellent advancement opportunities, responsibility early in your career, good benefits, substantial leave time, flexible work options, and travel. Many federal agencies will cover the education costs of their employees. The U.S. government is also supportive of participation in

technical societies, such as AIAA, recognizing the value of development and leadership tools for their employees.



WORKING IN PRIVATE INDUSTRY

Working in private industry gives you the opportunity to participate on projects that have a strong likelihood of becoming commercial products.

While the aerospace industry is constantly changing, the type of work it requires remains relatively constant. Most private industry jobs in the



aerospace industry are found primarily within the following segments: civil aviation; general aviation; military aircraft and missiles; military and commercial launch vehicles; and space hardware such as communication satellites and the International Space Station.

Whichever segment you choose, you will be contributing to the development of key next-generation products.

In addition to these segments, private industry offers the opportunity to work for any number of subcontractors in critical roles. For example, systems engineers are essential employees at companies that provide cockpit hardware. Understanding the fundamentals of aerospace hardware is key. Subcontracting companies often have engineering organizations that contribute to each segment of the aerospace industry—from single-engine general aviation aircraft to the most advanced military fighters.

Working for private industry means you will be affected by the cyclical nature of the aerospace industry. Thus, flexibility is key to your ongoing success.

While smaller companies offer a greater chance for more responsibility early in your career, large companies generally include a balanced distribution of experience within each business unit or department. This provides a valuable resource for social relationships as well as perspective on your future career.

WORKING IN ACADEMIA

Working as a university faculty member gives you the opportunity to train the next generation of practicing aerospace engineers. In addition, faculty at research universities (defined as having active graduate programs) are heavily involved with developing new structures and materials, devices and systems, analytical and computational techniques, design concepts, and processes to improve both current and next-generation aerospace products.

Almost all university faculty positions require a doctoral degree, which typically involves four to six years of schooling beyond the bachelor's degree. Doctoral training can extend the depth of your expertise and help you to become proficient at independent research work. Some first-hand teaching experience during or upon completion of your graduate program may also be beneficial, helping you develop the communications and organizational skills needed in the classroom while providing a taste of life on "the other side" of the instructional fence. Working as a research associate or research engineer in an industry or government laboratory for a few years in between your graduate studies and your first faculty appointment also offers the opportunity to add some practical experience to your training.

As a faculty member, you will be expected to publish the results of your research in technical journals and to participate in conferences and workshops. You can also be required to seek funding for and submit research proposals on topics of particular interest to you.

The exciting combination of classroom instruction, individual mentoring, and cutting edge research makes for a unique and rewarding career path for young faculty members. Those who succeed in establishing a balance of teaching, research, and service are granted tenure and enjoy a high level of job security and intellectual freedom.

WORKING ABROAD

Working abroad can be an exciting and rewarding way to enhance your career while creating personal and professional relationships that will last a lifetime. For yourself and your organization, the new skills you acquire and contacts that you build will be valuable over your entire career.

In the U.S. DoD, the Army, Navy, and Air Force all have overseas scientific detachments to supplement domestic research, and all have programs designed for military and civilian personnel to do research abroad in both government and academic institutes. Other government organizations, such as NASA and the State Department, also offer overseas assignment opportunities. For those in academia, universities around the world have visiting professorship programs and opportunities for international sabbaticals.

Industries are also increasingly global and recognize the value of broadening assignments. Both the U.S. government and many private organizations offer overseas compensation allowances, and non-U.S. government employees can qualify for substantial U.S. tax deductions while stationed abroad.

If you are an international member looking for opportunities in the United States, the National Research Council has programs open to non-U.S. citizens to work in U.S. government organizations. In addition, private organizations can hire you if you qualify for a visa based on your unique talents and skills. Because opportunities to work abroad can vary considerably, you should research them carefully. The AIAA Web site (www.aiaa.org) provides additional tips and a list of Internet sites to get you started.



NON-TECHNICAL SKILLS

While your classroom education provides you with the technical knowledge and aptitude you will need for a career in aerospace, you should also take advantage of the opportunity during college to develop business skills and learn more about your personal and professional goals. Co-op programs and internships provide not only hands-on industry experience, they give you the chance to try out various disciplines and determine where your interests are the strongest. Additionally, you have the advantage of meeting and working with people who are already established in their professions and who can offer advice and support.

Participating in student organizations such as AIAA and other associations, clubs, and societies offers an excellent means for you to acquire and enhance non-technical but very important skills such as time management, oral and written communication, and team building. Such skills are just as critical to your professional success as your technical knowledge.

YOUR PROFESSIONAL AND PERSONAL ETHICS

The duty of professionals is to serve with authority and accountability. The Accreditation Board for Engineering and Technology is an organization that establishes the standards and requirements for all accredited engineering programs in the United States with the following principles:

Engineers uphold and advance the integrity, honor, and dignity of the engineering profession by:

- Using their knowledge and skill for the enhancement of human welfare;
- Being honest and impartial, and serving with fidelity the public, their employers, and clients;
- Striving to increase the competence and prestige of the engineering profession; and
- Supporting the professional technical societies of their disciplines.

These follow closely to the precepts of the AIAA Code of Ethics found at <http://www.aiaa.org>. Click on “About AIAA - General Information” and then “Board of Directors,” and finally click on “Code of Ethics.”

During your career, you will make personal decisions that demonstrate your dignity and respect for the organization. A strong sense of personal ethics, honesty, and integrity will provide you with the ability to resolve, or at least accommodate, any tension and/or disagreement. Ultimately, the ethics by which you work will be just as important as the job you do.

The organization you join may have principles and practices that will enable you to act wisely when confronted with multiple and potentially conflicting responsibilities. For your organization to ensure high quality and productivity, it will rely on you to align your personal ethics with its documented ethical principles and values. If you face tough decisions, speak with your supervisors or, if necessary, seek out higher levels of management. You can make a difference to your profession and your employer.

To learn more about the subject of corporate ethics, visit www.onlineethics.org/corp/index.html.

YOUR APPROACHING GRADUATION

At this juncture of important decisions, we encourage you to take advantage of the resources provided by your college’s or university’s Career Planning and Placement Department. Job-hunting workshops as well as job fairs or scheduled interview days specific to aerospace can help you build the tools necessary for a successful job search.

During your search, be persistent and cast a wide net in pursuit of opportunities. While networking is a great way of getting a job and getting ahead, your personal organization and enthusiasm will be just as important in maintaining an effective job search. Stay professional, even when there may be disappointment. One opportunity may extend from another that wasn’t just right.

Companies that hire college graduates advise that you take the time to assess and develop a desired career plan. In both oral and written communications, be articulate about the aerospace career you are seeking. And always research a company before you attend an interview — don't go unprepared. AIAA offers excellent materials to assist you as you plan your career:

Additionally, several guides, job listings, and other organizations and societies can help you search for careers in aerospace and aviation:

- Nationjob's - Aviation/Aerospace Jobs Page
(www.nationjob.com/aviation)
- SpaceCareers job reference (www.spacelinks.com)
- Federal Aviation Administration (www.faa.gov)
- American Society of Engineering Education
(www.asee.org)
- American Institute of Aeronautics and Astronautics and
its Career Planning & Placement Services
(www.aiaa.org)
- Society of Hispanic Professional Engineers
(www.shpe.org)
- National Society of Black Engineers (www.nsbe.org)
- Society of Women Engineers (www.swe.org)
- NASA Jobs (www.nasajobs.nasa.gov)
- American Society of Mechanical Engineers
(www.asme.org/jobs)
- Society of Automotive Engineers (www.sae.org)

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Professional Career Time Line – Six Phases of Professional Development and Job Hunting: Nine Steps to Success. To request a copy of either of these materials, contact AIAA at **800/639-2422** or visit the AIAA Web site at **www.aiaa.org**.

THE SKY'S THE LIMIT!

A career in aerospace offers endless opportunities to contribute to the achievement of exciting and meaningful industry advances. You'll be part of a challenging environment that allows you to demonstrate your expertise as you exercise your imagination. Finally, when you embark on your career as an aerospace professional, you'll become part of history!

This booklet has been prepared as a service of AIAA's Young Professional Committee. We encourage your future participation with AIAA as a continued and valuable relationship throughout your career.



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