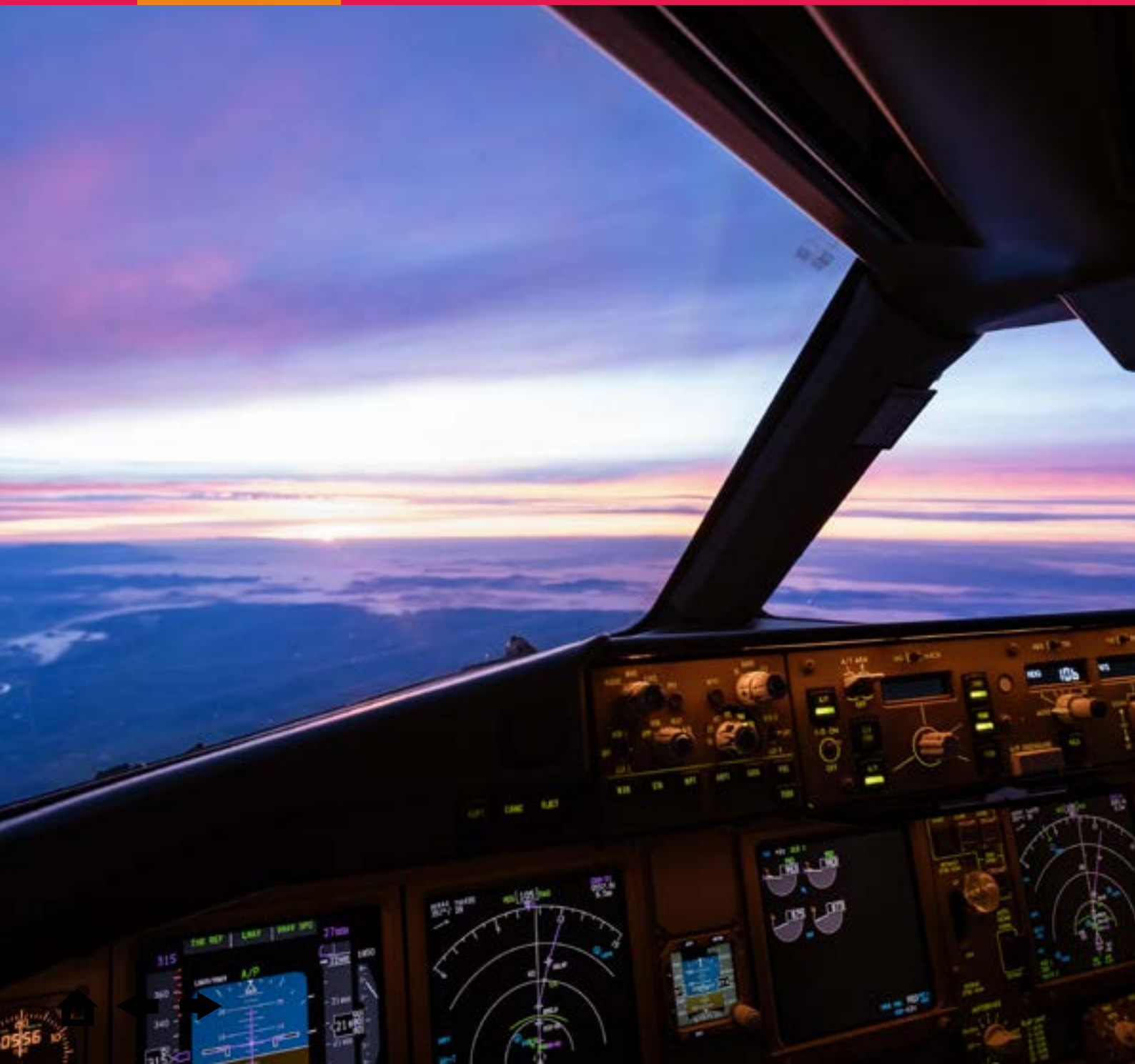
SECTION

4

THE AVIATION INDUSTRY



Aviation Industry

The Aviation Profession and Operations

INTRODUCTION

The aviation industry refers not just to occupations directly involved with the aircraft but also to all the professions that make it possible for air travel to remain pleasant, safe, and secure. The essence of this section is to expose you to the various professions in the aviation industry you yearn to become someday and how they all work together to ensure smooth and safe operations of air travel. We shall look at the roles of each, the learning pathways through which you may qualify to work in the various fields of aviation as well as how all these professionals work together to ensure the manufacturing and smooth running of aeroplanes by the airlines for passenger safety and carriage of cargo.

At the end of this section, you will be able to:

Describe the various career paths in the aviation industry.

Key Ideas:

- **Career** is **progress and actions you have taken throughout your working life.**
- **Learning pathways** are the courses, programs, and experiences that students complete as they progress toward graduation to attain a skill or venture into a career.
- **Profession** is a type of occupation that requires specialised training, education, and often certification or license.
- **Coordination** is organising people or groups so that they work together to achieve a goal.

INTRODUCTION TO AVIATION CAREERS, THEIR ROLES AND LEARNING PATHWAYS

The following are the careers in Aviation, their roles and the career pathways that may lead one to such careers.

Pilot

Pilots are responsible for flying and navigating helicopters, aeroplanes, and other kinds of aircraft. They may transport passengers and cargo, dust crops, operate sightseeing tours and assist in rescue and fire-fighting operations**.** Their job is challenging, as they must fly in varying weather conditions into many unfamiliar airports. They must have good concentration and the ability to make sound decisions under pressure. Pilots may fly for an airline, where they oversee "large" aircraft carrying several people. Other commercial pilots fly missions like banner towing [this is where aircraft are used for advertising or displaying information whilst the plane is in flight], real estate surveying and power line inspections. Then there are the private pilots who fly for recreation or personal transport. Test pilots fly new/prototype aircraft to test their performance. Theirs is an interesting endeavour as they push the plane to the limits of its design strength and performance capabilities.

Roles

1. Create a flight plan, considering aircraft performance, altitude, and weather conditions.
2. Check the aircraft before every flight (engines, radars, navigation systems, etc.).
3. Ensure cargo weight does not exceed aircraft limits.
4. Communicate with air traffic control to ensure safe take-off and landing.
5. Ensure the aircraft has adequate fuel supplies.
6. Monitor cockpit instruments like altimeters and speed indicators and report any malfunctions.
7. Check the aeroplane's position, weather conditions and air traffic regularly during the flight and determine change of path when needed.
8. Work closely with flight attendants to ensure all passengers follow safety rules while on board.
9. Fill out reports about the flight and the status of the aircraft after landing.
10. Test pilots work hand-in-hand with flight test engineers to investigate the performance characteristics of new/retrofitted aircraft.

Requirements

Airline pilots often require a college degree in aeronautical engineering or a related discipline. Following this, they must obtain a pilot's license by undertaking flight

instruction at a certificated flying school. The training consists of hours of ground school instruction where students learn the principles of flight, aerial navigation, weather factors, and flight regulations; and flying lessons, usually conducted in dual-controlled aircraft. The first step is usually to earn a private pilot's license after taking written and flight examinations and passing a third-class medical examination. The private pilot can then undertake advanced instruction, learn to fly on instruments (fly blind) and earn a commercial pilot's license upon acquiring additional hours of flight experience. With further study and experience, the pilot eventually earns the air transport rating to qualify as an airline pilot. Some universities offer flight training with credit toward a degree. Learners who follow this path graduate with a pilot's license plus a degree. Another route is obtaining pilot training in the armed forces. This entails no expense to the learner other than a service obligation for years after training. Ex-military pilots are usually in high demand in the civil space.

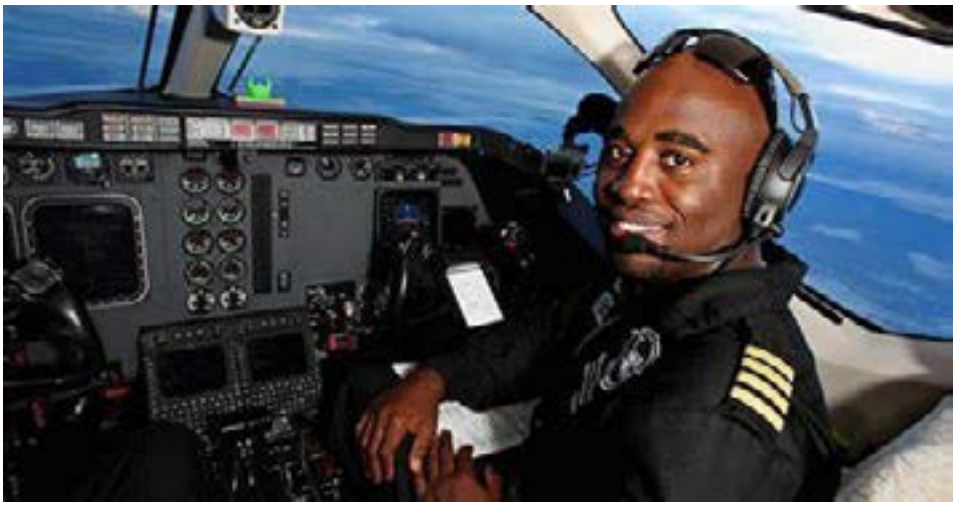


Figure 4.1: A pilot.

Aerospace Engineer

Aerospace engineers are people who have knowledge of the design of both aircraft and spacecraft—they combine the expertise of aeronautical and astronautical engineers. They study the science that underlies the behaviour of vehicles within and outside of the Earth's atmosphere and develop innovative technologies that aim to improve the efficiency, safety and security of air and space travel. Aerospace engineers are also involved in the design of high-speed ballistics including rockets and missiles that often find application in defence systems.

Roles

1. Develop leading-edge technologies and integrate them into aerospace vehicle systems used for transportation, communications, exploration, and defence applications.
2. Involved in the design and manufacturing of aircraft, spacecraft, propulsion systems, satellites, and missiles.

3. Supervise the assembly of airframes and the installation of engines, instruments, and other equipment.
4. Measure and improve the performance of aircraft, components, and systems.
5. Collate information, interpret data and publish the results of specific projects in technical report form.
6. Communicate technical and regulatory advice to clients, teams, suppliers, and other professionals within the aerospace industry.

Requirements

An entry-level job in aerospace engineering usually requires a bachelor's degree, which is usually obtained at a four-year higher education institution with classes in aerodynamics, flight dynamics and control, aircraft structures, and propulsion. Some positions require a master's degree or to facilitate progression in the organisation. For learners who would like to be involved with the research and development of modern technologies and systems, a doctorate degree may also be required.

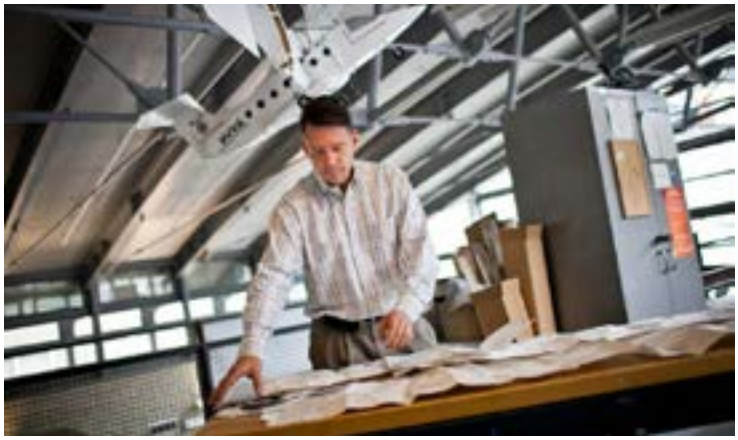


Figure 4.2: An aerospace engineer at work

Aircraft Maintenance Engineer

An aircraft maintenance engineer performs functions like those of automobile technicians (fitter), except they work on aircraft and aircraft parts. Due to the level of safety required of air transport, the role of the maintenance engineer cannot be over-emphasised. They work using manuals developed by aerospace engineers to troubleshoot and repair/replace aircraft parts. Aircraft maintenance engineers specialise in one of two areas: the aircraft structure and propulsion system or the electrical/electronic systems.

Roles

1. Perform preventive maintenance, inspections, adjustments, servicing, and repairs on airborne equipment.
2. Research, evaluate, and recommend improvements to manufacturing processes, equipment, and procedures.

3. Troubleshoot aircraft systems, components, and assemblies.
4. Maintain aircraft logs, records, and records management.
5. Manage the maintenance and repair budget.

Requirements

While a high school diploma is not required to become an apprentice aircraft mechanic, employers give preference to applicants who are high school or vocational school graduates. Relevant subjects to pursue while in high school include Mathematics, Physics, Computer Science, chemistry, English, and Aerospace education courses. These subjects help the maintenance engineer understand the physical principles involved in the operation of the aircraft and its systems. It is also necessary that the aircraft maintenance engineer acquire relevant formal qualifications and complete a technical training program, which will include written and practical exams to obtain a license as an avionics or airframe and power plant technician. The aircraft maintenance engineer is expected to continue their education, even after hiring, to keep abreast of the continuing technical advancements in aircraft and associated systems.

Figure 3: Aircraft maintenance engineer

Air Cargo Handler

The air cargo handler works for an airline or air freight company. They are responsible for ensuring that passenger luggage is loaded onto the right aircraft and in an efficient, safe and secure manner. They also handle the unloading of baggage. Most of their work is done outdoors in all kinds of weather, and they are usually required to wear a uniform.

Roles

1. Direct ground crew in the loading, unloading, and securing of aircraft cargo or baggage.
2. Determine the quantity and orientation of cargo, compute the aircraft centre of gravity, and sign the load plan or manifest.

3. Load and unload aircraft, perform preflight and post-flight aircraft checks, and compute weight and balance.
4. Calculate load weights for different aircraft compartments, using charts and computers.
5. Operate a variety of equipment, including trucks, forklifts, conveyors, and baggage tugs.
6. Accompany aircraft as a member of the flight crew to monitor and handle cargo in flight.

Requirements

Air cargo handler positions are typically entry-level jobs that require little or no prior training; training is usually done on the job. They must be high school graduates. Usually, though, the airlines like to see some post-secondary education in either an academic or vocational field. A qualification in cargo management or training in shipping offers the learner an advantage.

Figure 4: Cargo handlers at work. Bing images

Air Traffic Controller

The air traffic controller plays a leading role in flight safety. They direct air traffic so it flows smoothly and efficiently. They monitor aircraft movements and provide directions/instructions to pilots and other crew members. Air traffic controllers may be responsible for monitoring the airspace close to airports, for flights en route, and for controlling ground traffic at the airport.

Roles

1. Inform pilots of any runway closures, harsh weather, or other critical information.
2. Direct pilots through the entire take-off and landing process.
3. Alert the airport response team whenever there is an aircraft emergency.

4. Give departing flight control to other traffic control centres and receive control of any arriving flight.
5. Assist in searches for missing aircraft.
6. Compile and analyse data and reports to develop more effective flight plans and prevent delays.
7. Additional roles include organising searches for missing aeroplanes, controlling airport lighting, and monitoring all communications in and out of the flight control tower.

Requirements

A four-year college degree in an aviation-related discipline is usually required for this position. Candidates study airspace, weather, how to read charts, flight regulations, clearances, and other similar topics. Beyond this, air traffic controllers are required to be certified after taking a knowledge test and practical exam. Skills needed for this role include good communication, attention to detail, and strong concentration.

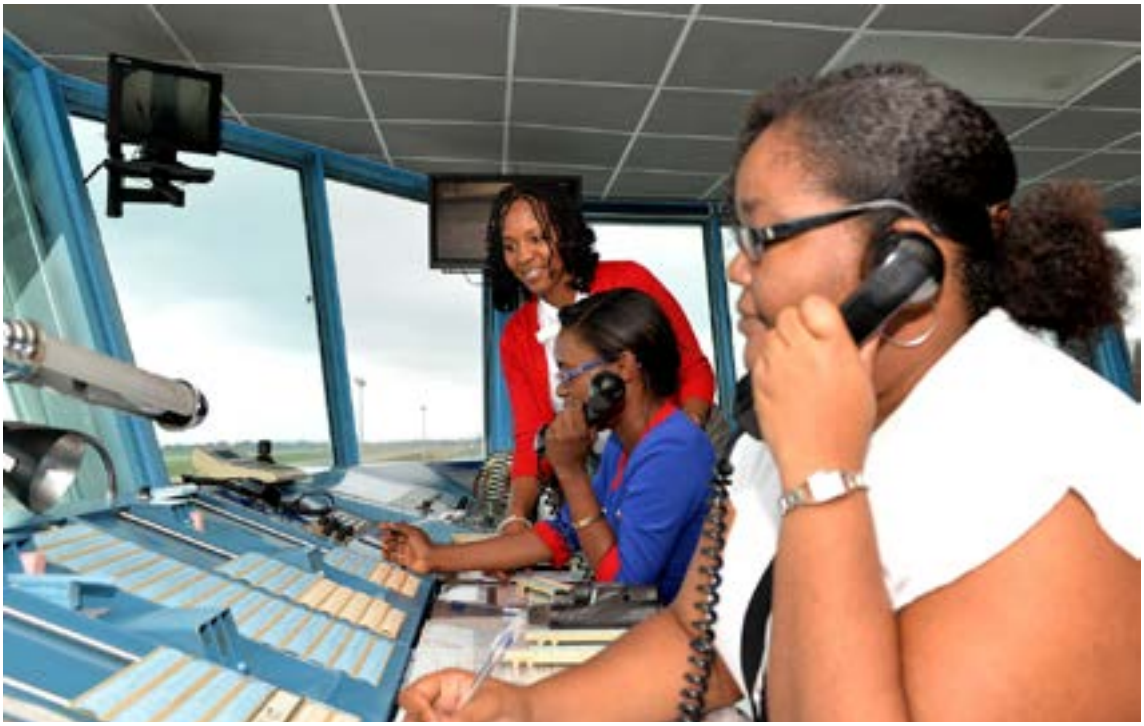


Figure 5: Air traffic controllers

Flight Dispatcher

A flight dispatcher is an important player in an airline's operation. They coordinate all airline flights, consult with the pilots and ground staff, and ensure that all essential services required for safe flight are provided. Together with the pilot, they are responsible for signing off the aircraft for flight and keeping all personnel concerned about the flight's status informed.

Roles

1. Monitor aircraft arrivals and departures and amend turnaround schedules if there are delays.
2. Consult with the ground crew and ensure that tasks, such as cleaning, refuelling, and loading, are completed on time.
3. Calculating how much fuel is required for the weight of the aircraft and distance of the journey.
4. Prepare flight paperwork for the crew, such as printing of flight plans, passenger lists and weather reports.
5. Check that all passengers and luggage are loaded and decide, along with the pilot, when to close the departure gate.
6. Authorise, together with the pilot, dispatch of the aircraft, and complete all reports and logs according to company regulations.

Requirements

To become a flight dispatcher, a high school diploma or equivalent is required. A college degree with a major in air transportation or meteorology is advantageous. Experience is equally important. The flight dispatcher must be familiar with navigation facilities over airline routes and at airports as well as with the take-off, cruising, and landing characteristics of all aircraft operated by the airline.

Figure 6. Flight Dispatcher

Passenger Service Agent

Passenger service agents act as customer service representatives for airline passengers in the airport. They act as ground hosts and are highly visible and helpful to the public, assisting passengers to pass through the airport from the ticket counter to boarding. They are mostly found at ticket counters, gates and baggage areas of the airline they serve. They answer questions and offer a wide range of information concerning the airline, flights, and other airport-related topics. They also tend to passengers requiring special assistance.

Roles

1. Providing information to passengers about flight times, gate changes, delays, and other pertinent information.
2. Processing boarding passes, checking identification documents, and directing passengers to security checkpoints.
3. Coordinating with other ground staff to arrange transportation and hotel accommodation for passengers who need assistance.
4. Assisting with wheelchair boarding procedures and helping passengers with disabilities board or disembark from aircraft.
5. Handling customer complaints, helping resolve disputes, and referring problem cases to supervisors for further attention.
6. Greeting passengers at airports and providing information about flight schedules, delays, or cancellations.
7. Performing safety checks of aircraft before boarding begins to ensure that emergency exits are not blocked and that life vests are available if needed.

Requirements

To become a passenger service agent for an airline, a high school diploma is required. High school classes in reading and reasoning skills enable one to be successful in this position. An associate degree in subjects like communication or hospitality might give one an advantage in the hiring process. Learning a foreign language might be advantageous as well, as passenger service agents work with people from around the world. It is also necessary to develop customer service skills, through internships, part-time work, or other entry-level positions in other institutions.

Figure 7: Airline passenger service agent

Airport Security Personnel

Airport security personnel are involved with security procedures at the airport. They are found throughout the airport and are responsible for identifying and neutralising security risks at the airport. An airport security manager devises security strategy,

monitors security and safety procedures and coordinates with other security personnel to ensure the security of travellers and staff at the airport.

Roles

1. Screen passengers and luggage.
2. Ask security questions of passengers.
3. Direct passengers through security equipment.
4. Report suspicious activity to appropriate authorities.
5. Ensure a safe and respectful environment.
6. Comply with safety measures.
7. Work with passengers to ensure that their needs, as well as security regulations, are met.

Requirements

Airport security personnel usually require a high school diploma or its equivalent. Previous airport security experience and having taken courses on criminal justice, law enforcement or security improves employability and earning potential. After joining an airline security role, most employees receive field training and gain knowledge of the protocols and processes involved in airport security while engaging with them on the job. Airport security personnel undergo strict background checks and receive designation-specific training before starting work officially.

Figure 8: Airport security personnel

Airport Manager

The airport manager runs the airport. They perform classic managerial duties, such as coordinating different teams, delegating work, hiring employees, writing reports, and devising business strategies. They supervise other staff, ensuring that the airport complies with all regulations. The airport manager also helps to implement new

strategies and secure contracts with airlines, retailers, security companies and others involved in day-to-day airport operations.

Figure 9. Airport manager visits an airport.

Roles

1. Manage personnel and operational activities of the airport facility to ensure that all rules and regulations are followed.
2. Ensure that all airport staff follow aviation and security rules.
3. Provide training to airport staff in safety and emergency procedures.
4. Ensure customer complaints are handled and resolved in a precise and timely manner.
5. Manage recruitment, training, workload assignment, performance review, appraisals, and promotions for airport staff.
6. Assist in preparing an annual budget for airport operations and monitoring and managing all expenses within the approved budget.
7. Develop and implement safety policies and practices for employees.
8. Ensure airport facilities and equipment are in good working order.

Requirements

To become an airport manager, a bachelor's degree from an accredited university with major course work in business, airport or aviation management or a closely related field is usually required. It is necessary that the airport manager be knowledgeable in aviation regulations. This position may also be assumed by workers who have had experience working as airport operations agents.

Airline Flight Attendant

The flight attendant is the most visible employee to passengers on an aircraft. They tend to meet a wide variety of needs and requests, offering personalised service to passengers for the duration of the flight. They spend most of their time in the passenger cabin and are responsible for the safety and comfort of passengers. Flight attendants must remain pleasant and provide quality service to passengers.

Roles

1. Provide information, guidance, and assistance for the safety and comfort of passengers on board the aircraft.
2. Conduct safety checks before the flight.
3. Greet customers, check their tickets, and accompany them to their seats.
4. Prepare and serve drinks and food to passengers.
5. Present emergency equipment and give instructions on their use.
6. Monitor and secure the cabin regularly.
7. Provide special help to passengers with special needs (e.g., children, disabled persons, elders etc.).

Requirements

To work as a flight attendant, an applicant must hold a high school diploma or its equivalent, although many airlines prefer a college degree. Flight attendants are required to complete a training program organised by the airline. Other post-secondary institutions also offer training for flight attendants. Advanced degrees are often helpful when pursuing a management or supervisory position.

Figure 10: Flight attendants

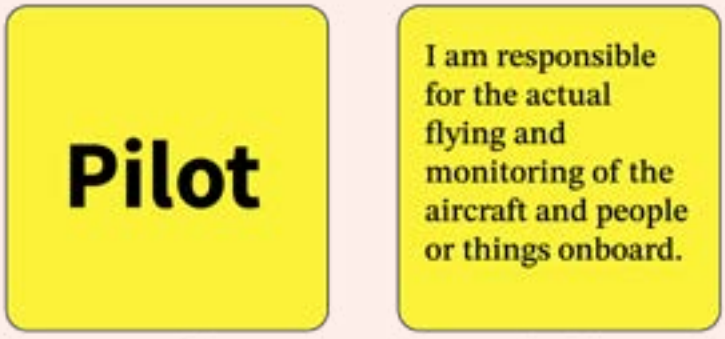
Activity 4.1: Presentation by an Aviation Personnel / Field Trip / Videos

1. A professional from aviation will make a presentation to your class on the work they do, as well as the academic and professional pathways that can lead one to these careers.
2. Go on a field trip to a nearby airport or aviation facility to learn what the personnel there do.
3. Watch the following videos:
   Aviation Jobs in Airports and Airlines
   https://www.youtube.com/watch?v=qeVx9agJtmw

Aviation jobs – catch your dream.
https://www.youtube.com/watch?v=CkGcvvqQ4Pw

In either activity, make sure you take notes as you will make presentations on them later. If you get to the aviation facility, make sure to adhere to all safety guidelines provided. Let your teacher know in advance if there are any challenges you may have while performing the tasks above. After the performing tasks above, you will be required to do the following:

a. Develop a set of flashcards with the name of an aviation career on one side and the roles performed by that career on the other. (See example below).



Front Side Back Side

b. You may use the following:
   i. Cardboard, sticky notes, or plain sheets
   ii. Marker, pencil, or pen
   iii. Poster colours
   iv. Artist brushes
   v. Eraser
   vi. Crayons.

c. Present your work to your teacher.

d. Share your work with your friends.

e. Explain to the class any profession your teacher asks you to.

After the class presentation, your teacher may ask you to paste your flashcards on the classroom walls.

Activity 4.2: Flow Chart

1. Your teacher will put you into groups.

2. In your group, develop a chart that traces the educational progression from high school through to professional institutions in the aviation industry.

3. You may use the following:
   a. Flip chart, cardboard, plain sheets.
   b. Colour markers, pencils, pen.
   c. Rulers
   d. Eraser
   e. Paper clips
   f. Push pins
   g. Scissors
   h. Knife.

4. Your group will be asked to explain the information on your flashcard to the whole class.

5. Share your work with other groups after the presentation.

COORDINATION IN AVIATION

The aviation industry and all professions in it do not work exclusively for each other. There is always coordination and cohesion between them. Our focus here will be on how they work together to ensure smooth and safe travel.

1. We begin with the aerospace engineer. They are at the root of the whole chain. They continually research new and safer technologies for the aviation industry and bring their knowledge to fruition when they design and build aircraft and aerospace systems. Like any other profession, to thrive, there must be a customer. The aerospace engineer's customers are the airlines. They may be looked at as the true employer of the aerospace engineer. The airlines provide the funds that support aerospace engineers in their research when they sign up for modern designs and products. They go on to purchase the end products of their work.
2. Aircraft maintenance engineers continue the aerospace engineer's work in the field. They inspect the aircraft and make sure it is fit for flight. They service faulty or overdue components to ensure the prolonged life of the aircraft.
3. With the aircraft in hand, the airlines need a place to operate. Airports are normally constructed and operated by the state. At the helm of affairs is the airport manager. They receive the airlines' business and allocate resources necessary for their operation at the facility.
4. Flight dispatchers liaise with airline management, airport staff and pilots to plan flight schedules.
5. Passengers book flights with their favourite airline. With the current advancement in technology, most people do this online with the help of customer service representatives at the airline. They arrive at the airport and are received by airline passenger service agents. Passenger service agents assist passengers to check in and receive their baggage. Luggage is passed on to cargo handlers who process it for loading onto the aircraft.
6. Airport security personnel process passengers as they move from the airline counters towards the boarding gates. They check to make sure that passengers are not in possession of any items that might present a security risk to other travellers. They monitor passenger behaviour and coordinate with the security services to identify and isolate potentially harmful individuals.
7. Passenger service agents interact with passengers one more time when they call out boarding schedules at the gate. Passengers make their way to the aircraft and are received by flight attendants who direct them to their seats and assist them with stowing their carry-on luggage. They ensure that all passengers are seated and safely strapped in, then secure the doors and prepare for the flight. They make presentations about safety measures on board the aircraft in the event of emergency and serve food and drinks as the flight progresses towards its destination.
8. Pilots take charge of the flight and control the aircraft from taxi to take-off, cruising, and landing at the destination airport. They maintain constant communication

with air traffic controllers for instructions to ensure the safety of theirs and other aircraft in the same airspace.

9. In all this work, they work as a team to ensure that there is smooth and safe travel for both travellers and workers in the aviation industry.

Figure 11. Coordination in aviation

Activity 4.3: Dramatisation

Perform a play portraying the interrelationship between the aviation professions for smooth and safe air travel.

Your teacher will guide you to perform a short dramatisation of how aviation professions work together to ensure safe flight. Follow along as your group discusses how to perform this.

Cast: Airport Manager, Meteorological Officer, Maintenance Technician, Flight Dispatcher, Flight Attendant, Passenger Service Agent, Air Traffic Controller

Guidelines:

First Scene: An airport manager holds a brief meeting with all personnel and takes them through the activities for the day. All personnel state their readiness for the day. The meteorological officer gives the weather for the day. The passenger service agent gives the number of booked seats. The maintenance technician shows the state and readiness of the aircraft for take-off. The flight dispatcher confirms safety on the ground. Meeting ends.

Second Scene: Flight dispatcher confirms to pilots that all passengers are seated and ready.

Third Scene: Pilots call air traffic controllers for the latest weather. Pilots ask for clearance for take-off. The air traffic controller gives clearance.

Fourth Scene: Flight attendants announce safety measures and precautions to passengers.

Fifth Scene: Aircraft Marshaller (Flight Dispatcher) directs pilots and bids them farewell.

-Play ends-

Activity 4.4: Flow Chart

Develop a flowchart showing the interrelationship between the aviation professions.

a. Your teacher will put you into groups.

b. In your group, develop a flowchart showing the interrelationship between the aviation professions.

c. You may use the following:

i. Flip chart, cardboard, plain sheets.
ii. Colour markers, pencils, pen.
iii. Rulers
iv. Eraser
v. Paper clips
vi. Push pins
vii. Scissors
viii. Knife.

d. Your group will be asked to explain the information on your flashcard to the whole class.

e. Share your work with other groups after the presentation.

Review Questions

1. You are travelling from Kumasi to Accra on a local flight like African World Airlines (AWA). Identify at least four (4) aviation professionals you are likely to encounter and give three roles each played for your smooth and safe travels.
2. Three students from your school came to you as students of aviation and aerospace engineering on certain careers they want to pursue. These include Piloting, aerospace engineering, air traffic control and aircraft maintenance engineers. Suggest to them the requirements they would need to pursue such careers.
3. Develop a flowchart as a group for a presentation that traces the educational progression from high school through to professional institutions in the aviation industry.
4. Your school decided to make an aircraft as well as manage the operations of this aircraft just like it happens at airports and employ all the professionals in the aviation industry. Develop a flowchart to be presented to the class in groups showing the interrelationship between all these aviation professionals.

Answers to Review Questions

1.

Pilot

Roles

a. Communicate with air traffic control to ensure safe take-off and landing.

b. Work closely with flight attendants to ensure all passengers follow safety rules while on board.

c. Create a flight plan, considering aircraft performance, altitude, and weather conditions.

Air Cargo Handler

Roles

a. Direct ground crew in the loading, unloading, and securing of aircraft cargo or baggage.

b. Load and unload aircraft.

c. Accompany aircraft as a member of the flight crew to monitor and handle cargo in flight.

Passenger Service Agent

Roles

a. Providing information to passengers about flight times, gate changes, delays, and other pertinent information.

b. Processing boarding passes, checking identification documents, and directing passengers to security checkpoints.

c. Handling customer complaints, helping resolve disputes, and referring problem cases to supervisors for further attention.

Air flight attendant

Roles

a. Prepare and serve drinks and food to passengers.

b. Present emergency equipment and give instructions on their use.

c. Monitor and secure the cabin regularly.

Airport Security personnel

Roles

a. Screen passengers and luggage.

b. Ask security questions of passengers.

c. Direct passengers through security equipment.

2. **Requirement of a pilot**
   a. SHS passes in (English, Mathematics, Physics, Geography, and ICT).
   b. Gain a university degree in engineering related field.
   c. Enroll at a flying training school to obtain a certificate and licensing.
   d. One can also enroll in the Ghana Air force and be trained as a pilot.

   Requirement of an Aerospace Engineer.
   a. Obtain a high school certificate passes in Mathematics, chemistry, Physics and optionally ICT.
   b. Obtain a bachelor's degree in aerospace engineering or
   c. Acquire a professional engineering license through an Aviation Training school.

   Requirements of an Air Traffic controller
   a. Prospective applicants must be fluent in English and any other native language.
   b. English is the Pass in the SHS courses like English, mathematics, physics, Geography, and ICT.
   c. Apply to institutions offering courses in Air traffic control.

   Requirements of an Aircraft Maintenance Engineer
   a. Obtain a high school certificate passes in Mathematics, chemistry, Physics, and ICT.
   b. Pass computer science or Aerospace engineering courses at the university.
   c. Complete a technical training program to acquire certification and licensing.

3. Flowchart
   a. High school Education (Select relevant subjects like Mathematics, Physics, Geography and English).
   b. Aviation colleges (Aviation Training schools) or University.
   c. Obtain certifications.
   d. Further education (optional).

4. Aerospace Engineers to Aircraft Maintenance Engineers to Airport Operations (Airport Managers) to Flight Dispatchers to Passenger Attendants to Airport Security Personnel to Pilots [As one work is about to end, the other takes over from there. They all coordinate to ensure smooth and safe travels].

EXTENDED READING

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   d. Aviation jobs - catch your dream [atc for you] (youtube.com)

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