

futurum



# Flying high with aviation!

Cranfield University

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# Flying high with aviation!

When it comes to careers in aviation, the sky is the limit!

In this brochure, you will meet five professionals from **Cranfield University** who work in the aviation industry. They want to share their passion for aviation and teach you about the huge range of careers available.

Whether you dream of flying a plane, building a helicopter, managing an airline, keeping people safe while flying or improving the sustainability of the industry, there are careers for everyone in aviation!

## Meet the team



**Rob Harrison**  
Pilot



**Sarah Warde**  
Safety and Compliance Manager



**Dr Simon Place**  
Engineer



**Professor Thomas Budd**  
Professor of Airport Decarbonisation



**Professor Anna Smallwood**  
Professor of Air Transport Management

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“  
*Aviation remains one of the most exciting career options out there for young people!*  
”  
- Rob Harrison

## Did you know ...?

- The world's first successful aeroplane flight (made by Orville and Wilbur Wright in 1903) only travelled 55 m and only lasted for 12 seconds.
- Today, the world's longest non-stop flight is over 15,000 km, from New York to Singapore.
- And the world's shortest commercial flight only is 2.7 km, between Westray and Papa Westray (islands in Orkney in the north of Scotland). The flight lasts less than a minute and a half – so there is hardly enough time to enjoy the ride!
- Commercial planes fly 9 to 12 km above the Earth's surface.
- Aircraft designs are often inspired by nature. For example, Airbus plane wingtips were inspired by shark fins.

# Pilot

Do you wish you could fly? If so, you should consider becoming a pilot.

Talk like a ... **pilot**

**Aerobatics** — ‘aeroplane acrobatics’ such as spins and rolls

**Aircraft** — any flying vehicle, including planes, helicopters, gliders and drones

**Aviation** — the flying or operating of aircraft

**Commercial plane** — a plane that carries paying passengers on regular travel routes

**Drone** — an aircraft this is controlled from the ground

**Glider** — an aircraft without an engine



## Meet Rob

Job: Pilot

**I flew a plane for the first time when I was 14 years old.** I’ve always wanted to be a pilot, and I’ve always been fascinated with the idea of flight. So, when I was 13, I joined the Royal Air Force (RAF) Air Cadets. I really enjoyed my time in the Air Cadets, and it allowed me to achieve my dream of becoming a fighter pilot.

**I flew the Jaguar aircraft as a military pilot on the front line of warzones.**

It was exciting to help with incredibly complex missions. I also flew the Tucano aircraft as a display pilot which was great because I loved flying low-level aerobatics at air shows.

**After leaving the RAF, I worked as a commercial jet pilot for ten years,** transporting passengers and goods in commercial planes. This allowed me to travel from the Arctic Circle to North

Africa and from beaches to mountains. Sometimes, I’d visit five different countries in a single day!

**Being a pilot gives me a sense of freedom.** The job is always a challenge, and there is a constant need to train and prepare. Every flight is different and there is always something to learn, so it’s never boring.

**Would you like to be a pilot?**

1. What type of pilot would you most like to be? Why?
2. What do you think you would most enjoy about being a pilot? Why?
3. What do you think you would find most challenging about being a pilot? Why?



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## Pilot opportunities

Aircraft come in lots of shapes and sizes, which means there are lots of different types of pilot you could be:

- **Commercial pilots** fly passengers around the world in large commercial planes. You could fly short-haul flights to nearby countries or long-haul flights around the world.
- **Military pilots** fly large planes and helicopters to transport soldiers and equipment to warzones or disaster areas.
- **Fighter pilots** are specialist military pilots who fly fighter jets to fight in warzones.
- **Helicopter pilots** fly helicopters. You could rescue people from remote locations and fly them to hospital in an air ambulance or take people on scenic helicopter tours.
- **Display pilots** perform aerobatics at airshows.
- **Drone pilots** fly drones. You could do filming or photography for special events, monitor wildlife, or help with search and rescue efforts.



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## What skills do pilots need?

- To be able to stay calm under pressure.
- To be observant and quick-thinking.
- To understand how weather systems affect aircraft.
- To understand the technology of their aircraft.

# Engineer

If you like creating things and working with your hands, you could become an engineer. Engineers design, develop and test the individual pieces that make up different aircraft.

## What skills do engineers need?

- To be interested in how things work
- To enjoy creating and improving things
- To be good with numbers
- To be able to explain things

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## Engineering opportunities

There are lots of different engineering roles in the aviation industry:

- **Aeronautical engineers** design aircraft and aircraft parts. You could use a wind tunnel to study aerodynamics and find the best shape for plane wings.
- **Mechanical engineers** design moving systems. You could test the turbines in plane engines.
- **Materials engineers** create and test new materials. You could make a new type of metal that makes planes more efficient.
- **Electronics engineers** build electrical systems. You could wire up a plane's navigation system.
- **Software engineers** create computer programs. You could write the computer code that detects if passengers have something dangerous in their luggage.

Talk like an ... **engineer**

**Aerodynamics** — the study of interactions between air and solid objects moving through it

**Aeronautical** — related to building and flying aircraft

**Aerospace** — related to the technology used in Earth's atmosphere (aeronautical) and outer space (astronautical)

**GPS (Global Positioning System)** — a navigation system that uses satellites to locate itself

**Radar** — a system that uses radio waves to detect objects

**Wind tunnel** — a tunnel in which engineers can control the strength of air blowing through it, used for conducting aerodynamics experiments



**Meet Simon**

Job: Engineer

**I have always had a passion for aviation.** My father and grandfather both served in the Royal Air Force (RAF), and my secondary school was right next to the airport on the Isle of Man. I'm sure both these factors rubbed off on me.

**At school, I enjoyed sciences and languages.** I studied engineering at university and spent three years studying helicopter gearboxes! I have also worked as an engineer in the RAF, where I was responsible for ground radar and communications. And I was a software engineer at an aerospace company.

**Teaching in Cranfield's flying classroom is amazing.** I work as a member of the flight crew while teaching students during their flight. I don't know anywhere else in the world where I could teach flight control theory while flying.

**Aviation connects the world!** It has also contributed to communication technologies – engineers developed GPS and radar for applications in aviation.

**Do you want to be an engineer?**

1. What type of engineer would you most like to be? Why?
2. What do you think you would most enjoy about being an engineer? Why?
3. What do you think you would find most challenging about being an engineer? Why?

# Air transport management

There is a lot more to aviation than building and flying planes. With a career in air transport management, you could help keep planes, airlines and airports working smoothly and safely.



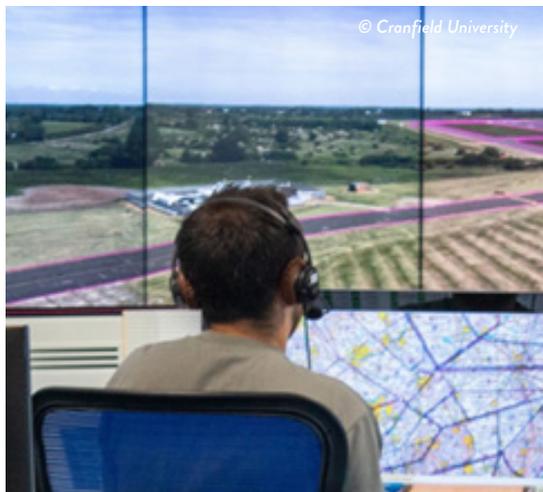
## Talk like an ... **air transport manager**

**Airline** — a company that provides commercial flights for passengers

**Departures board** — the large screen showing the list of flights from an airport

**Fleet** — all the aircraft owned by an airline

**Operations** — all the things that must be done to keep an airport or airline running smoothly



## What skills do air transport managers need?

- To lead and inspire others
- To work well in a team
- To communicate effectively
- To be organised

## Air transport management opportunities

Roles in air transport management include:

- **Being in charge** of an airline or airport and making sure its operations run smoothly.
- **Looking after** an airline's fleet of aircraft and making sure everything is well maintained.
- **Managing and looking after** the people who work in your team.

## Meet Anna

Job: Professor of Air Transport Management



***Aircraft are incredible feats of engineering... I feel a sense of wonder every time I stop to think about this.***



**When I was at school, I loved reading** because books allowed me to travel in my mind. Books have the power to transport you to other societies and cultures.

**I was inspired to pursue a career in aviation when I went to an airport for the first time.** I grew up in a small village in Yorkshire and went on a plane for the first time when I was a teenager. I remember looking up at the large departures board and realising that there was a big world out there, waiting to be explored!

**I initially wanted a business career in the aviation industry.** I spent many years working for Thomson Airways and TUI Airlines. In those jobs, I managed the aircraft fleets and the airline operations. The biggest highlight was when we first introduced the Boeing

787 Dreamliner into service. It took a lot of work to prepare the airport and airport staff to be ready to deal with this new type of aircraft. The first time the Dreamliner took off with holidaymakers on board was a very special day!

**Aircraft are incredible feats of engineering and technology** that allow us to connect across countries and continents. I feel a sense of wonder every time I stop to think about this.

### Do you want to work in air transport management?

1. What career in air transport management would you prefer? Why?
2. What do you think you would most enjoy about working in air transport management? Why?
3. What do you think you would find most challenging about working in air transport management? Why?

# Aviation safety

Safety is a top priority in the aviation industry, which is why flying is one of the safest ways to travel. With a career in aviation safety, you would work to make sure every aspect of flying is as risk-free as possible.

## Aviation safety opportunities

Every part of the aviation industry includes roles to improve safety:

- **Safety managers** identify potential hazards before they become a problem. You could train colleagues so everyone knows about safety guidelines or study human factors to understand why people make mistakes.
- **Safety analysts** monitor flight data to check nothing is going wrong.
- **Safety inspectors** check that planes aren't damaged.
- **Airport security officers** check that passengers don't bring dangerous things in their luggage.
- **Cabin crew** teach passengers what to do in an emergency before a flight takes off.
- **Aviation regulators** make the laws that keep aviation safe.
- **Compliance managers** make sure airports and airlines follow the laws made by aviation regulators.
- After an accident, **crash investigators** investigate why it happened so that the aviation industry can learn from any mistakes and prevent future accidents.

## What skills do safety officers need?

- To be good at problem-solving and decision-making
- To be able to follow procedures
- To be organised

Talk like a ... **safety officer**

**Compliance** — following the rules

**Human factors** — the study of the interactions between humans and their environment, with the aim of reducing risk

**Regulator** — someone who makes laws



### Meet Sarah

Job: Safety and Compliance Manager

**I have a family background in the Royal Air Force (RAF),** so I have always loved planes, especially fast jets!

**My career began in the finance industry.** I worked in the finance department for TUI Airlines, and as part of this job I worked with the TUI aviation safety team. My colleagues saw that I had good analytical skills, so they invited me to join the safety team as an aviation safety analyst – it shows that being good at maths is very useful.

**I had to learn a lot about aviation safety** when I became a safety analyst. Since then, I have switched from analysing the safety of airlines to managing the safety of airports.

**I love my job because there is no typical day at work** – every day is different. The diversity of maintaining safe operations for an airport is both challenging and very satisfying. A key skill is being able to turn challenges into opportunities, such as encouraging people to safely adapt to changes in the aviation industry.

### Do you want to work in aviation safety?

1. What career in aviation safety would you prefer? Why?
2. What do you think you would most enjoy about working in aviation safety? Why?
3. What do you think you would find most challenging about working in aviation safety? Why?

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# Aviation sustainability

Do you think flying is bad for the environment? If so, the aviation industry needs you! The aviation industry is well known for contributing to climate change. It is working hard to reduce its environmental impacts, but it will only become more sustainable if more people have jobs in aviation sustainability.

Talk like a ... **sustainability expert**

**Aerodynamic** — having a shape that reduces air resistance

**Carbon offsetting** — compensating for carbon dioxide emissions by paying for services that reduce carbon dioxide in the atmosphere, for example planting trees to 'offset' the emissions caused by going on holiday by plane

**Sustainability** — taking actions to protect the planet and reduce negative environmental impacts

**Zero-emissions fuels** — fuels that do not produce carbon dioxide



## Meet Thomas

Job: Professor of Airport Decarbonisation

I didn't always want a career in aviation, but my older sister inspired me when she got a job in air transport management. She is passionate about aviation and her enthusiasm was infectious. I'm glad I listened to her!

At school, I was fascinated by the environment and climate change. I liked geography because I enjoyed learning about Earth's natural processes and how human activity is affecting this balance. When I became interested in carbon offsetting, it set me on the path to working in aviation sustainability.

As a Professor of Airport Decarbonisation, I work with university researchers and industry partners to conduct research into

aviation sustainability. Currently, we are investigating whether hydrogen could be used as a zero-emissions aviation fuel.

Climate change is the defining challenge facing society, and aviation has a crucial role to play in this. My job allows me to be part of the solution.

### Do you want to work in aviation sustainability?

1. What career in aviation sustainability would you prefer? Why?
2. What do you think you would most enjoy about working in aviation sustainability? Why?
3. What do you think you would find most challenging about working in aviation sustainability? Why?

## What skills do sustainability experts need?

- To be able to analyse information and data from a range of sources
- To be able to explain complicated things in a way everyone can understand

“

*Climate change is the defining challenge facing society. My job allows me to be part of the solution.* ”

## Aviation sustainability opportunities

How could you help aviation become more sustainable?

- Airport **carbon strategy managers** monitor carbon dioxide emissions and think of ways to reduce them.
- Airline **sustainability managers** think of ways to reduce carbon dioxide emissions and noise pollution from planes.
- **Scientists** create new zero-emissions fuels that don't release carbon dioxide.
- **Engineers** design aircraft that are more energy efficient. You could make planes that use zero-emissions fuels or that are more aerodynamic.
- **Policymakers** create government guidelines to make aviation more sustainable. Once zero-emissions planes have been invented, you could figure out how this new technology can become part of the aviation industry.

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## Other careers in aviation

Rob, Simon, Anna, Sarah and Thomas have introduced you to some of the many different roles in flying planes, engineering, air transport management, aviation safety and aviation sustainability. However, there are lots more careers in aviation – it takes a big team to keep the industry running smoothly!



- **Check-in agents** collect passengers' luggage when they arrive at the airport.
- **Boarding gate agents** check passengers' tickets and passports before they get on a plane.
- **Baggage handlers** load luggage onto planes.
- **Air traffic controllers** schedule when planes can take off and land.
- **Technicians** maintain aircraft and other airport machinery.
- **Ground crew** refuel planes and transport passengers from the airport terminal to the plane.
- **Advertisers and marketers** encourage people to book flights.
- **Travel agents** help people book flights.
- **Immigration officers** check the passports of anyone entering or leaving the country.
- **Psychologists** study people's experiences of airports and flights to improve systems and processes.
- **Architects** design airport buildings.



## Did you know ...?

- As well as being the world's first pilots, the Wright brothers were also some of the first aeronautical engineers. They designed and built their plane from scratch, and they even built their own wind tunnel to test it.
- Commercial plane travel is one of the safest forms of transport – it is 100 times safer than travelling by car!
- If the global aviation industry was a country, its carbon dioxide emissions would be the same as those of Japan!

### What is your favourite subject at school? How could it help you in a career in aviation?

**Maths** – you could be an **aeronautical engineer** or a **mechanical engineer** because you will be able to analyse data when you test new plane parts.

**Science** – you could be a **scientist** who creates new environmentally-friendly aviation fuels.

**English** – you could work in **advertising** or **marketing** because you will be good at communicating and persuading people to book plane tickets and fly to different destinations.

**Foreign languages** – you could be a **pilot** or **cabin crew** and fly to foreign countries, or you could work in **customer services** at an airport because you will be able to communicate with foreign travellers.

**Geography** – you could be a **sustainability manager** in charge of making planes and airports more sustainable because you will understand how aviation impacts the environment.

**History** – you could work in **aviation safety** because, to make planes safer in the future, we need to understand any problems they had in the past.

**Computer science** – you could be a **software engineer** who creates the computer programs that control planes.

**Art, design and technology** – you could be an **aeronautical engineer** who designs new planes or an **architect** who designs new airport buildings.

**Sports** – if you like being physically active, you could work as **ground crew** at an airport, such as a **baggage handler**.

**Music** – you could work in **advertising** and record the music for airline adverts.

**Drama** – you could be an **air transport manager** because you will be good at communicating and have the confidence to lead and inspire others.



# Aviation

## Activity sheet



### Can you remember...?

1. When was the first aeroplane flight?
2. What is the difference between a plane and a glider?
3. What animal inspired the wingtips of Airbus planes?
4. What gas is being tested as a zero-emissions aviation fuel?
5. What type of engineer could create an app so that people can book plane tickets on their phone?

## Activities

### 1. Paper plane engineering

How far can you throw a piece of paper? In this engineering and design experiment, you can see how aerodynamics influences how something flies through the air.

#### You will need:

- 5 identical pieces of paper
- Tape measure/metre stick
- 5 small objects (e.g., coins)

#### Instructions

1. Keep one piece of paper as a flat sheet.
2. Scrunch one piece of paper into a ball.
3. Fold the other three pieces of paper into different paper aeroplane designs. Be creative!
4. Stand behind a marked line and throw each piece of paper as far as you can.
5. Ask a friend or family member to note where each piece of paper lands (not where it stops moving, because it might keep moving along the ground after it has landed). They could put a small object on the ground – make sure you know which object marks which piece of paper.
6. Use a tape measure or metre stick to measure how far each piece of paper travelled before landing.
7. Repeat steps 4 to 6 twice more, so you have three flying distances for each piece of paper.
8. Calculate the average distance that each piece of paper flew (see below).

#### Questions

- Which piece of paper flew the furthest? Why do you think this was?
- What happened when you tried to throw the flat piece of paper? Why do you think this was?
- How did the ball of paper compare to the flat piece of paper? Why do you think this was?
- How did the ball of paper compare to the paper planes? Why do you think this was?
- How did your three paper planes compare to each other? Why do you think this was?
- What aspects of your planes' designs do you think helped them to fly, and what aspects do you think hindered them?

#### How to calculate an average

For each piece of paper:

1. Add up the distance it travelled on each flight.
2. Then divide this number by the number of flights.

For example, if one of your paper planes travelled 4.8 m, 3.1 m and 5.3 m, the average flight distance would be 4.4 m:

1.  $4.8 + 3.1 + 5.3 = 13.2$

2.  $13.2 \div 3 = 4.4$

▶ Watch an animation about careers in aviation at: [futurumcareers.com/flying-high-with-careers-in-aviation](https://www.futurumcareers.com/flying-high-with-careers-in-aviation)

## So, are you interested in a career in aviation?

1. Of the many careers in aviation, which most interests you? Why?
2. How do you think aviation 'connects the world'?
3. What is your favourite subject? And what are your hobbies and interests? How could they help you in a career in aviation?
4. What did you learn during your visit to Cranfield?
5. What was your favourite part of your visit to Cranfield? Why?
6. If you haven't been to Cranfield, what would you be most excited about seeing? Why?
7. What questions do you want to ask Rob, Simon, Anna, Sarah and Thomas to learn more about their jobs?

## 2. Airports of the future

How would you design a sustainable airport? Draw a picture of a future airport and show how you would make sure it is environmentally friendly. Think about:

- What type of planes fly from your airport? For example, do they produce carbon dioxide when they fly, or do they use zero-emissions fuel? If they are a new type of plane, what do they look like?
- Where will the airport's electricity come from? For example, will it come from solar panels, a fossil fuel power station or wind turbines?
- What happens to waste from the airport? For example, does it go to landfill, get recycled or get composted? Does waste water go into the sewers or is it used for another purpose, like watering a garden?

Be creative!



*Singapore's Changi Airport is regularly voted the 'world's best airport' - could you design an airport like this?*

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