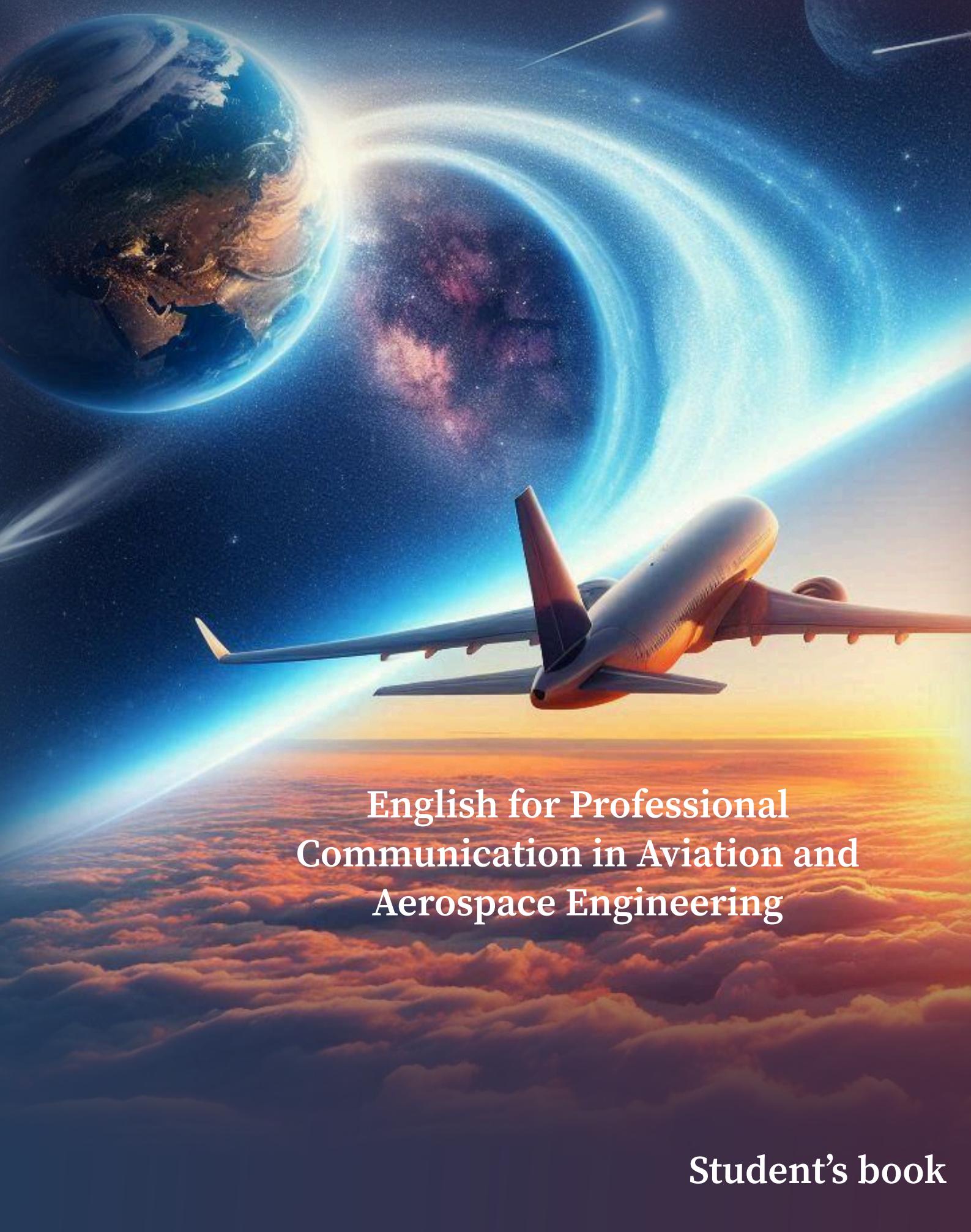




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Анурова О.М.,
Власова С.В.,
Зудилова Е.Н.



English for Professional Communication in Aviation and Aerospace Engineering

Student's book

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ
ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ “МОСКОВСКИЙ АВИАЦИОННЫЙ
ИНСТИТУТ (НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ)”

Анурова О.М., Власова С.В., Зудилова Е.Н.

English for Professional Communication in Aviation and Aerospace Engineering

**Английский язык для профессионального
общения в авиационной и аэрокосмической
отрасли**

*Рекомендовано Редакционно-издательским советом Московского
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Рецензенты:

Кафедра теории языка, англистики и прикладной лингвистики ФГБОУ ВО “Государственный университет просвещения”
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Учебное пособие направлено на развитие навыков коммуникации на английском языке в ситуациях профессионального общения, а также анализа общих процессов и явлений, связанных с техническим прогрессом в области аэрокосмических технологий, использования специальной терминологии, отбора лексики с учетом особенностей функционирования отрасли, применения фоновых знаний в области аэрокосмической науки. Пособие носит практический характер.

Пособие предназначено для студентов-будущих инженеров, обучающихся по всем направлениям подготовки базового высшего образования, а также может быть использовано для студентов авиационных вузов, обучающихся по направлениям подготовки, связанным с аэрокосмическими технологиями.

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What is an aerospace engineer?

Design is not just what it looks like and feels like. Design is how it works.

Steve Jobs

Goals

- Talk about types of jobs in the aerospace industry
- Look into an engineer's duties
- Practice Simple Tenses
- Analyze the job's offers
- Discuss one student's day

Work with a partner. Discuss the questions.

1. Read the quote. What does Steve Jobs mean? Do you agree/disagree with this statement? Why/Why not?
2. What is your favorite gadget? Give your reasons.

→ Warming up

1. What can the duties of an aerospace engineer be?

Match words and pictures

- | | |
|--------------------------------------|--|
| a To draw blueprints | e To make calculations |
| b To control environmental standards | f To build prototypes |
| c To test launch vehicles | g To conduct a research |
| d To certify products | h To maintain a jet engine and turbine |



1



2



3



4



5



6

What is an **aerospace engineer?**

An **aerospace engineer** is a specialist who invents modern airplanes and spacecraft, designs launch vehicles and helicopters, tests UAVs/UASs, certifies equipment for pilots and cosmonauts. The challenge of engineers is to use scientific discoveries to the needs of people and businesses. There are many areas of the engineer's work.

If we need to explore new galaxies or planets, a **spacecraft engineer** will provide us with highly developed missiles, modern station modules, satellites, and cutting-edge rocket engines. **Aerodynamics engineers** focus on the air and gases interaction with moving objects. To develop manufacturing processes of aerospace components at a plant, an **aerospace manufacturing engineer** must supervise the assembly control.



Vocabulary and Pronunciation

Launch vehicle, UAV, UAS, scientific discovery, to explore galaxies, module, satellite, to focus on the study, assembly control, propulsion system, to withstand loads, twisting, compression, bending, to solve problems, structural integrity, aircraft components.

Propulsion engineers specialize in designing and developing aircraft or booster engines. Do you know that aircraft structures can withstand the incredible loads of twisting, compression, bending in flight? A **structural engineer** is dealing with weight optimization and structural integrity. An **avionics engineer** provides communication and data collection, guidance systems control. Non-toxic fuels are tested by **environmental engineers**. Duties of **software engineers** include control of schedule for arriving and departing aircraft, cybersecurity, data updating.

4. Read the text and say what new facts you found.
 5. Read the text again for more detailed information and find in it the sentences about your future career.

6. Say which of the statements after the text are True or False.

- a) Propulsion engineers specialize in developing manufacturing processes of aerospace components at a plant.
- b) The duty of avionics engineers is to design and develop propulsion systems.
- c) An aerospace manufacturing engineer must supervise the assembly control.
- d) Aircraft structures can't withstand the incredible loads in flight.
- e) Structural engineers solve the problem of weight optimization.
- f) Avionics engineers are responsible for developing communication systems.

→ VOCABULARY

7. Complete the definitions (a-g) with the words in bold (1-7)

1. Maximum **load**, including passengers, is 8,000 pounds.
2. Air **compression** is important for engine work.
3. What methods are you using to interpret the **data**?
4. Are you the driver of this **vehicle**?
5. Correct **assembly** of the parts guarantees the safety.
6. She leads a research **team** of twenty scientists.
7. The plan achieved its main **purpose**.

- a) _____ facts or information used to find out things or to make decisions.
- b) _____ the intention, aim or function of something.
- c) _____ the act of pressing things together or pressing something into a smaller space.
- d) _____ the process of putting together the parts of something such as a vehicle.
- e) _____ the total amount of anything that something can carry or contain.
- f) _____ a thing that is used for transporting people or goods from one place to another, such as a car or lorry.
- g) _____ a group of people who work together at a particular job.

8. Complete the sentences with the words from exercise 7.

1. The space station serves several_____.
2. The police think that he was driving a stolen_____.
3. The aircraft took off with full_____.
4. She was a member of the design_____ working on the project.
5. The researchers analyzed the_____ on 515 flights.
6. What should be the_____ in the air inlet of a working engine?
7. The_____ of a helicopter is a difficult but very exciting task. Follow the rules and requirements.



→ SPEAKING

9. Answer the questions about the main duties of engineers using the information in the text *What is an aerospace engineer?* and speech patterns in the table below.
- 1.What are the main tasks of aerospace engineers?
 - 2.What must structural engineers do at work?
 - 3.What are the main responsibilities of propulsion engineers?
 - 4.What is the main purpose of structural engineers?
 - 5.What is the main task of spacecraft engineers?

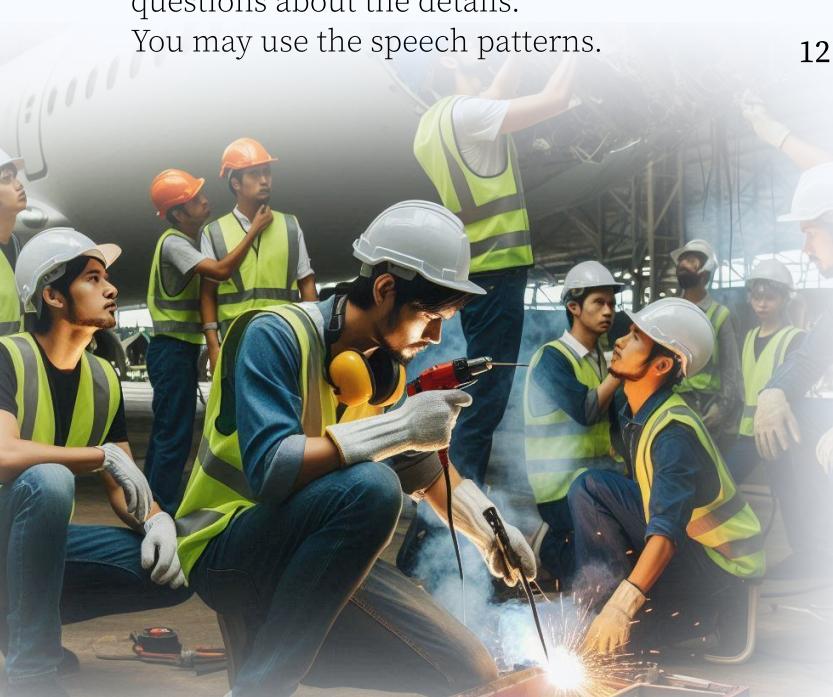
Speech patterns

- *The designer is a specialist who must +V*
- *The main task / duty of an engineer is to +V*

Example:

1. An avionics engineer is a specialist who **designs** advanced computer equipment and sophisticated programs for aircraft.
2. The main duty of a test engineer **is to meet** with the product design team and discuss the testing parameters.

10. Are you familiar with the responsibilities and tasks of control systems engineers, certification specialists, life support experts?
 ✓ Share your ideas with the group.
 ✓ Choose one of the specialties and search the Internet for more information about the responsibilities of such an engineer.
 Listen to your groupmates answers and ask questions about the details.
 You may use the speech patterns.

**Speech patterns**

- 1.What else can she/he do at work?
- 2.Is it a difficult task?
- 3.Is it teamwork?
- 4.What data does she/he need? ...do they need?
- 5.What should she/he focus on?

11. What can the spheres of aerospace industry be?

Match words and pictures

- a Aircraft design
- b Navigation and facilities
- c Engine and turbine design
- d Avionics
- e Drones
- f Rocketry



12. What is your future professional sphere / career interests? Use speech patterns in the table below.

Speech patterns
Predicting the future.

- I'm going to work as / with / at / on ...
 I guess ...
 I think...
 I believe...
 Probably I will...*

→Warming up

- Try to recall your school experience or the experience of the first year in the university. How did you manage to deal with different subjects?

Speech patterns

- I was interested in + Noun/V+ing...*
- I was keen on + Noun/V+ing ...*
- I was crazy about + Noun/V+ing ...*
- I was fond of + Noun/V+ing ...*
- I spent a lot of time + V-ing*

Example: I was good at Physics, but I wasn't crazy about Chemistry.

- Complete the sentences with the words and word combinations in the box.

natural sciences /applied science / social sciences /humanities

- Laws of nature, concepts of energy, interactions of processes play a key role in _____. The subjects are Physics, Chemistry, Biology, Geology, and Astronomy.
- _____ study relationship between the human mind and social culture. The subjects are History, Language, Literature, Philosophy, Religion.
- _____ include Mathematics and Statistics.
- Applied (industrial) Metrology, Engineering technology, applied Physics, Nanotechnology are examples of _____.

→READING AND SPEAKING

Vocabulary and Pronunciation

Flight mechanics, to get a degree, intensive workshops, principal manufacturer, Thermodynamics and Heat transfer, CAD software system, to join a company, to accept into the project, to be capable of leading projects, satellite navigation, Ballistics of space flight, constructive approaches, technological solutions

- Read the text Engineering Programs. What subject will you study? Scan the QR-code to listen to the audio and check the pronunciation of the words in the box.



Engineering Programs

Aircraft Engineering

If you want to be a creator of airliners or unmanned aerial vehicles, discover new principles of flight mechanics and structural engineering, firstly you should get an academic degree. An advanced study of engineering disciplines will be combined with intensive workshops guided by high-profile professionals from the principal Russian aircraft manufacturers.

It is necessary to study a lot of special engineering subjects such as Aircraft design technology, Flight mechanics, Thermodynamics and Heat transfer, Materials science and Strength theory, Methods for modeling in CAD software systems and so on. After graduating from the university, you can easily join any airline company or be accepted into national air industry projects all over the world.

Spacecraft Engineering

Do you dream of space flights and solar system exploration? Moscow Aviation Institute trains experts capable of leading projects in space communications, satellite navigation systems, and manned spacecraft. MAI students have already launched 9 satellites designed and manufactured in the University laboratories. But to follow in their steps, you have to master Design of spacecraft, Satellite construction, Ballistics of space flight, Aerodynamics and Thermodynamics, Space propulsion systems, Spacecraft control systems and, of course, Methods of CAD-engineering.

Graduates of the program gain deep knowledge of theoretical disciplines and knowledge of various constructive approaches and technological solutions for modern aerospace industry.

4. Answer the questions

1. What is the primary focus of the Aircraft Engineering program at MAI?
2. What subjects are essential for students in the Aircraft Engineering program?
3. What opportunities are available for graduates of the Aircraft Engineering program?
4. What does the Spacecraft Engineering program at MAI prepare students for?
5. What practical experience do students gain in the Spacecraft Engineering program?

→ VOCABULARY**5. Choose the correct variant.**

1. An aerospace university **calendar / schedule / diagram** typically includes Statistics, Thermodynamics, Strength of Materials, Computer-Aided-Design (CAD), industrial engineering.
2. Academic disciplines **develop / decrease / descend** critical thinking, analytical abilities and problem solving skills.
3. PE (Physical Education), Philosophy, Foreign languages, History are the **seasons / subjects / plans** that educate a complete personality.

6. Complete the sentences with the words and word combinations in the box.

education / Ballistics / general engineering subjects / Linear Algebra / Fluid dynamics / aerospace engineering subjects / Physics / foundation-level subjects

1. _____ give basics for all technical disciplines and provide students with fundamental construction, manufacturing, and analytical knowledge and are also called _____ and they include _____, Thermodynamics, _____, Chemistry, Computer Science and so on.
2. _____ cover _____ for future design, manufacturing, testing, repairing of aircraft, spaceships, launch vehicles, weapons systems. Consider Aerodynamics, _____, Dynamics in Jet Engines, _____, etc. are studied.

→ SPEAKING

7. Study the examples of the subjects taken from the first-year schedule. Which subjects did you study?

History of World Art, Drawing, Introduction to Engineering Analysis, Clinical Medicine, Public Speaking, Social Science, Strength of materials, Principles of Economics, Aerospace Medical Equipment, Writing and Rhetoric.

Speech patterns

- *In my first year, I studied a variety of subjects, including....*
- *During my first year, I had the opportunity to explore several fascinating subjects, for example...*
- *In my first-year schedule, I studied subjects like...*
- *My first-year schedule included courses such as...*

8. Work in pairs. Discuss the questions.

1. Why is Mathematics important in aerospace engineering?
2. What does PE stand for in aerospace engineer education?

Use the word combinations in the box.

- ✓ to understand physical situations
- ✓ to optimize aircraft design
- ✓ to learn statistics
- ✓ to compute
- ✓ to develop strong Math skills
- ✓ to become more physically competent
- ✓ to study fitness and body movement
- ✓ to learn team work through physical activity
- ✓ to get health

9. Work in groups. Discuss the question:

“What subjects would you study to cultivate a more holistic personality? Give your reasons.”

- Business administration
- Fluid mechanics
- Religion
- Fine arts
- Management
- Nuclear physics
- Screenwriting
- Political geography

→ LISTENING

1. Scan the QR-code and listen to the record.

Choose the best title.

- My typical working day.
- Stages of my work.
- Main difficulties in my job.



2. Listen again and arrange the following sentences in the order they are being discussed in the audio recording.

1. Selecting the best option.
2. Analysis of improvements.
3. Collecting data about the loads, structure analysis.
4. Working at standard specification and various instructions.
5. Designing different options of the unit or component
6. Getting task.

3. Listen to the record again. Are the sentences True or False? Correct the false ones.

1. Every working day of an engineer is the same.
2. The functional improvements can increase the weight of the component.
3. Designers can exceed weight limits, if necessary.
4. It is important for a component to be technologically advanced, but as simple and cheap as possible.
5. Engineers must know all standards and documents by heart.
6. Engineers never deal with design documentation.

6. This approach allows us to _____ the safety and _____.

7. The work of an aircraft design engineer is a combination of _____ and strict rules.

- | | |
|---|---|
| <input type="radio"/> improve
<input type="radio"/> maintain
<input type="radio"/> available
<input type="radio"/> contain
<input type="radio"/> advanced | <input type="radio"/> optimal
<input type="radio"/> reliability
<input type="radio"/> creativity
<input type="radio"/> guideline |
|---|---|

→ SPEAKING

5. Work in pairs. Discuss the statement from the record. Do you agree or disagree with this statement? Why or why not?

"I can say that the work of an aircraft design engineer is a combination of creativity and strict rules."

Speech patterns

How to agree or disagree with the statements.

- *That's right.*
- *I completely agree with this idea.*
- *I agree with part of what you said.*
- *That's true, but...*
- *I agree because...*
- *That's not quite right.*
- *I completely disagree with that.*
- *That's an interesting perspective, however,...*

→ VOCABULARY

4. Listen to the record again and complete the sentences with the words in the box.

1. Sometimes it is necessary to _____ the existing elements.
2. I find all the _____ data about the loads acting on this component.
3. The design should be technologically _____.
4. I am looking for an _____ solution to the problem.
5. Designer should have a _____ to find the document which will _____ the answer.



→ LISTENING

- Scan the QR-code and listen to the record.
Choose the best title.

✓ Main duties of a structural engineer.

✓ Stages of a space rocket design.

✓ Main difficulties in a structural engineer job.



- Listen to the record once more. Say if these statements are True or False. Correct the false ones.

- Very few people are involved in the design of a space vehicle.
- Designers do not take part in choosing the materials of a space rocket.
- The design of a rocket component doesn't have to match the surrounding components.
- The design data package has to be approved before being sent to the production specialists.
- Engineers rely on design data to create a 3D CAD model.
- Engineers avoid coffee breaks and small talks during their working day.

- Listen to the record moreover and answer the questions.

- What helps engineers define the shapes and dimensions of necessary components?
- At what stage of the design process should an engineer choose the material?
- What is the result of a designer's job?
- What process is preceded by sending the design data package to the production and tests specialist.
- What is the final stage of the design process?



→ VOCABULARY

- Listen to the record again and match the two columns. Put the word combinations in the order they are discussed.

- | | |
|----------------|---------------------------------------|
| 1. Finish | a. the surrounding components |
| 2. Choose | b. the manufacturing process |
| 3. Analyze | c. the materials |
| 4. Find | d. the design data package |
| 5. Systematize | e. package of drawings |
| 6. Fit | f. the draft design |
| 7. Pass | g. to production and test specialists |
| 8. Approve | h. standard fasteners |
| 9. Store | i. in archive |
| 10. Sent | j. the checks |

- Listen to the record again and complete the sentences with the words in box.

- The _____ is the first stage in a space rocket development process.
- A structural engineer should consider _____ to form a physical design of a component.
- The design of any engineering product should _____ of the design specifications.
- An aerospace engineer needs to have _____ to design structural units for a space rocket vehicles.
- Calculated parameters of a product are usually defined as _____.

→ SPEAKING

- Discuss the main stages of a space rocket design mentioned by Roman. Use the linking words introducing the sequence of events: *firstly, first, secondly, thirdly, finally, then, next, lastly*.

Speech patterns

How to list points.

- *Firstly, a structural engineer should ...*
- *Secondly, she/he has to...*
- *Next...*
- *Finally...*

→ GRAMMAR

Revise the grammar rules of the Present Simple, the Past Simple and the Future Simple in Active/Passive Voice.

1. Read the text fragment about the development path of the aerospace industry. Open the brackets using the correct form of the Present Simple in Active or Passive Voice.

The aerospace industry _____ (to be) a dynamic and innovative field that _____ (to play) a crucial role in shaping our understanding of the universe and advancing technological progress. Launch vehicles _____ (to design) and _____ (to manufacture) to send satellites and modules into orbit. UAVs _____ (to develop) for various applications, such as scientific discovery and exploration of galaxies.

The industry _____ (to focus) on the study of propulsion systems, which _____ (to be) essential for powering aircraft and spacecraft. These systems _____ (to design) to withstand loads, twisting, compression, and bending. The assembly control process _____ (to be) crucial for ensuring the quality and reliability of aerospace products.

Technicians _____ (to monitor) and _____ (to adjust) the assembly process to solve problems and maintain high standards.

By working together, the industry _____ (to be able) to tackle complex challenges and make significant contributions to our understanding of the world and the universe beyond.

2. Read the text about the duties of an aircraft designer in the future. Open the brackets using the correct form of the Future Simple in Active or Passive Voice.

The Duties of an Aircraft Designer in the Future

In the future, an aircraft designer _____ (to have) a wide range of responsibilities. The engineers _____ (to join) a company and _____ (to be) capable of leading projects involving the latest aerospace technologies. The designer _____ (to select) the most advanced and optimal solutions, including satellite navigation systems and ballistics of space flight. The engineers _____ (to expect) to improve and maintain the available design options containing the surrounding components and choosing the most reliable and creative manufacturing process.

The designer's work _____ (to guide) by constructive approaches and technological solutions that improve the reliability and availability of aircraft. They _____ (to require) to follow strict guidelines to ensure the safety and efficiency of the final product.

In the future, the role of the aircraft designer _____ (to be) highly sought after, as the industry continues to demand innovative and advanced solutions to meet the challenges of modern air travel.



3. Read the text about the achievements and carrier of Daniel Tarasov. Open the brackets using the correct form of the Past Simple in Active or Passive Voice.

Aircraft Designer

Daniel Tarasov, a highly skilled Aeronautical engineer, _____ (to design) several advanced aircraft models for a leading manufacturing company. He _____ (to apply) his core skills in Aerodynamics, Structural analysis, and Systems integration to create optimal designs that _____ (to contain) the latest technologies.

Daniel's background _____ (to include) a degree in Aeronautical Engineering and over 10 years of experience in the aircraft industry. As the lead designer, he _____ (to guide) a team of skilled applicants to develop innovative solutions. His proficiency in CAD software and simulation tools _____ (to allow) him to improve the reliability and performance of each aircraft design.

Then the final designs _____ (to pass) to the manufacturing team for assembly. Rigorous testing _____ (to conduct) to ensure the aircraft _____ (to meet) all safety guidelines and performance targets. Tarasov's creativity and negotiation skills _____ (to be) critical in working with stakeholders to balance design requirements and budgets.

The company's fleet of advanced aircraft, designed by Tarasov and his team, _____(to become) available to customers worldwide. Their reliability and efficiency _____ (to set) a new standard in the industry.



→ BUSINESS ENGLISH

1. Study two job offers and answer the questions.


AIR UNIVERSITY
 A Federally Chartered Public Sector University

Faculty Requirement

Exciting Career Prospects in Academia & Applied Research at the prestigious

Institute of Avionics & Aeronautics (IAA)

Department of Mechanical & Aerospace Engineering (DMAE)

Regular Faculty Positions are available in the following fields:

- Solid Mechanics / Computational Mechanics
- Thermo-fluids
- Manufacturing Engineering
- Design Engineering
- Dynamics and Controls
- CAD / CAE / Engineering Drawing & Graphics

Eligibility:
PhD / MS in above mentioned areas from HEC recognized institution with basic degree in Mechanical Engineering.

Remuneration and Benefits
A market based highly competitive salary package will be offered along with other fringe benefits as per university rules.

How to apply:
Please apply online at <http://portals.au.edu.pk/jobs> within two weeks of this advertisement.
*Only short listed candidates will be called for interview.

- What types of aerospace engineers does Air University seek (See Job Advert 1)?
- What are the requirements to the position of a civil engineer (See Job Advert 2)

ENGINEER REQUIRED

Applications are invited from dynamic and young candidates for the position of Engineer.

- Bachelor's Degree in Civil Engineering.
- Minimum 10 years working experience at a similar position.
- Proficiency in using Ms Office and AutoCAD.
- Excellent English language, communication and interpersonal skills.

Attractive salary package and other benefits will be offered based on qualification and experience. Interested applicants must contact on given below number.

Mr. Noor Muhammad Sons
0300-3925349

2. Use the words from the box to complete the job advertisement.

aeronautical/ manufacturing/ aircraft/ skills/
candidate/ assembly

13

We are looking for a talented person for a position of an _____ manufacturing engineer. You will be responsible for designing and improving aircraft _____ systems and supervising the _____ control. A successful _____ must have a strong understanding of _____ engineering principles. You should have excellent and problem-solving _____.

3. Study the words and word combinations below. Make a list of the most important skills of an aerospace engineer. Why are they important?

Important qualities for a successful career...

- **Personal qualities:** imaginative, well-organised, creative, initiative, enthusiastic, responsible, competitive, persistent, inspirational, motivated, committed
- **Professional qualities or knowledge:** well-educated, professional, knowledgeable, able to work to tight deadlines, computer literate, able to work in a team, interpersonal skills, telephone skills, able to make decisions, able to solve problems, able to do research, negotiation skills, competent, able to cope with stress, able to take risks, self-employed, being your own

4. Complete the sentences with the words from the box.

*core skills / background / applicant /
negotiation skills / proficiency*

1. Problem solving, communication, self-management and interpersonal abilities are referred to the _____.
2. Educational _____ describes the level of education and academic achievements of an individual.
3. An _____ is a person who expresses interest in a job opportunity.
4. _____ is used to describe a person's mastery in language and other fields of knowledge.
5. The person capable to reach an agreement between two or more parties possesses _____.

→ READING AND SPEAKING

5. Use the speech patterns in the box below to tell about the most vital qualities and skills of an aerospace engineer.

Rely on the vocabulary of exercise 3.

Speech patterns

- *I believe / feel / reckon (that) ...*
- *I am certain (that) ...*
- *I have no doubt that ...*
- *I'd (probably) say ...*

Example:

1. *I feel that an aerospace engineer should have effective communication and negotiation skills.*
2. *I have no doubt that a good engineer must be able to solve problems and cope with stress.*

6. Read the fragment of a job interview.

"As an experienced aerospace engineer, I believe that the most important skills for this role are problem-solving, critical thinking, and attention to detail. Problem-solving is important to identify a problem and find a solution. Critical thinking allows us to analyze complex situations and make decisions. In addition to these core skills, I also have a strong background in Mathematics, Physics, and Engineering principles. My experience with CAD software allowed me to create detailed 3D models of aircraft components and test their performance. I am also familiar with industry standards and regulations."

7. Make a list of the skills mentioned by the candidate and add 2-3 skills required for a position of an aerospace engineer.

8. Role-play the situation.

Student A is a candidate for a position described in Job Adverb 1 p.13.

Student B is an employer.

Show off your personal qualities and professional skills to the potential employer. Use the Speech patterns below.

Make use of the vocabulary of Unit 1.

Speech patterns

Employer: What are you good at?

Candidate: People say that I am good at ...

E.: Do you have any special skills?

C.: I believe that I am able to ...

My strengths are ...

The problem for me is that ...

→ REVISION

1. Complete the sentences with the types of engineers you have learned in Unit 1.

Example:

An aerospace manufacturing engineer specializes in developing and supervising manufacturing processes of aerospace components at a plant.

1. The duty of **p_____ engineers** is to design and develop propulsion systems.
2. A **m_____ engineer** must supervise the assembly control.
3. **S_____ engineer** solves the problem of weight optimization.
4. **A_____ engineers** are responsible for developing communication systems.
5. Non-toxic fuels are tested by **e_____ engineers**.
6. **S_____ engineers** control an airport schedule, cybersecurity, data updating.
7. **P_____ engineers** specialize in designing and developing aircraft or booster engines.
8. **A_____ engineers** focus on how the air and gases interact with moving objects.
9. A **_____ engineer** provides us with highly developed missiles, modern station modules, satellites.
10. An **_____ engineer** designs modern airplanes and spacecraft, designs launch vehicles and helicopters, tests UAVs, certifies equipment for pilots and cosmonauts.

2. Match the verbs to make up word combinations that you have encountered in Unit 1. Some verbs can form more than one combination.

A	B
1 to master	a <i>propulsion systems</i>
2 to complete	b <i>the assembly control</i>
3 to develop	c <i>manufacturing processes of aerospace components</i>
4 to withstand	d <i>the incredible loads in flight</i>
5 to launch	e <i>the problem of weight optimization</i>
6 to design	f <i>in Natural sciences</i>
7 to play a key role	g <i>Design of spacecraft</i>
8 to develop	h <i>Aircraft Engineering program</i>
9 to supervise	i <i>critical thinking and analytical skills</i>
10 to solve	j <i>satellites</i>

3. Read the two employee profiles. Then complete the table below with the adjectives from the box that best describe Julia and Igor.

ambitious/ creative/ hard-working/ helpful/ practical/ punctual/ relaxed/ reliable/ sociable/ well-organized/ committed/ initiative

Julia, is in many ways, a model employee. First of all, she always spends a lot of time doing a good job. Then, she is able to get on with people well, and when she promises to do something, she does it. Secondly, she likes sharing her ideas with other colleagues and doesn't oppose to other colleagues' ones. Finally, all her colleagues in R&D department love her ideas.

Igor has made a good career. He meets all the deadlines. He is always ready to take responsibility and come up with new ideas. He is never late for his work or for meetings. His colleagues like him, because he is usually calm, and because he likes to spend time with them in the lunch break or after work.

Julia	Igor
<i>hard-working</i>	<i>ambitious</i>

4. Complete the sentences below with a proper Subject from the box.

Linear Algebra / Introduction to Engineering / Strength of materials / Engineering Drawing / Fluid mechanics / Principles of Economics

1. _____ provides a visual representation of the structure, dimensions, tolerances of a machine components.
2. _____ is a branch of continuous mechanics which deals with a relationship between motions and static conditions.
3. _____ refers to various methods of calculating the stresses and strains in structural members.
4. _____ focuses on how to solve (any) kind of engineering analytical problem in a logical and systematic way.
5. _____ stresses time-tested understandings about how the economy functions.
6. _____ is the branch of mathematics that focuses on the study of vectors and linear transformations.



Ivan



Angelina



Nikita



Viktoria

1. Study the glossary before reading the dialogue incorporating informal language and idioms while discussing practical lunch options on campus.

Glossary

- ✓ **I'm starving** - a colloquial way of saying "I am very hungry."
- ✓ **In the same boat** - an expression indicating that two or more people are in a similar situation.
- ✓ **Made of money** - a colloquial expression suggesting that someone is wealthy or has a lot of money.
- ✓ **Killer shawarma** - informal slang meaning very good or excellent shawarma.
- ✓ **Catch a deal** - a colloquial way to say find or take advantage of a good offer.
- ✓ **Buy one, get one** - a common promotional phrase for sales, often abbreviated as BOGO.
- ✓ **Always down for a good deal** - a casual way of saying someone is always interested in finding good bargains.
- ✓ **Hit up** - a colloquial expression meaning to visit or go to a place.
- ✓ **Sounds like a plan** - a casual way of agreeing with a suggestion or idea.
- ✓ **Walking skeletons** - a humorous expression implying they are very hungry.

2. Assign roles (Ivan, Angelina, Nikita) and act out the conversation. You may improvise additional lines using informal language and expressions related to food and dining.

Ivan

Hey, guys! I'm starving. Any ideas for lunch that won't break the bank?

Angelina

Totally! I'm in the same boat. Last time I ate at the cafeteria, I felt like I was throwing my money down the drain!

Nikita

Right? It's like they think we're made of money. Have you checked out that food truck by the library? They have some killer shawarma!

Ivan

No way! I didn't know about that. Are they cheap?

Angelina

Yeah, they're pretty affordable. Plus, you can get a whole meal for under three hundred rubles. It's a steal!

Nikita

Exactly! And if you go during lunch hour, you might even catch a deal. Sometimes they do "buy one, get one" specials.

Ivan

That sounds awesome! I'm always down for a good deal. But what if it's packed?

Angelina

Good point. If it's too crowded, we could always hit up that sandwich shop instead. Their subs are tasty and won't cost an arm and a leg.

Nikita

True! And they have a student discount if you show your ID. Just remember to ask!

Ivan

Sweet! So, shawarma or sandwiches? What's the verdict?

Angelina

Let's play it by ear. We can check out the food truck first and if it's too busy, we'll head to the sandwich shop.

Nikita

Sounds like a plan! Let's grab our bags and hit the road before we turn into walking skeletons!

Ivan

Haha, right? Let's go before we miss out on all the good stuff!

3. Match the idioms in the box and definitions.

- Won't break the bank
- Throwing my money down the drain
- It's a steal
- Cost an arm and a leg
- Play it by ear
- Hit the road

1. _____ - An idiom meaning something is very cheap or a great deal.
2. _____ - An idiom meaning something is very expensive.
3. _____ - An idiom meaning something is affordable or won't cost too much.
4. _____ - An idiom meaning to waste money.
5. _____ - An idiomatic expression meaning to leave or start a journey.
6. _____ - An idiom meaning to decide on something as it happens rather than planning in advance.

4. Write and act a similar dialogue.

Work in groups to write your own dialogue about planning a dinner outing with friends. You may use informal language, slang and idioms, similar to the original dialogue.

→ LISTENING

1. Before listening to Victoria's blog match informal phrases and substitutions to catch more details while listening.

Informal phrase	Substitution
a. Trust me, I've been there.	1. Please take a moment to relax.
b. Grab a cup of tea, sit back.	2. Engaging in humor and gaining significant knowledge together.
c. Teamwork makes the dream work!	3. Collaboration leads to success.
d. Find a lab partner you vibe with.	4. Choose a lab partner you get along with.
e. Seriously, a cluttered desk leads to a cluttered mind.	5. I felt quite anxious until I partnered with Alex.
f. Cracking jokes and learning tons together!	6. I assure you, I have experienced that.
g. I was so nervous until I teamed up with Alex.	7. Indeed, an untidy workspace can cause confusion.

NOTE: These substitutions maintain the original message's intent while providing a more formal tone suitable for academic or professional contexts.

2. Listen to the record and choose the best title for Victoria's blog message.

- *Navigating Your Lab Journey: A Guide for Newbies*
- *Lab Life: A Comedy of Errors*
- *Surviving Lab Work: A Guide to Avoiding Mistakes*



3. Listen to the record again and answer the questions.

1. What is the best way to approach lab work as a beginner?
2. How important is organization in the lab?
3. Is it okay to ask questions during lab sessions?
4. How can I manage stress during long lab sessions?

→ SPEAKING

Embracing Mistakes as Learning Opportunities

Share a story about a significant mistake made during an experiment and the lessons learned from it. Discussing how mistakes can foster resilience, and also how adaptability can inspire others to view errors as valuable learning opportunities rather than setbacks.

Speech patterns

- *I'd like to share a significant mistake...*
- *During my last project...*
- *From this mistake, I learned that ...*
- *This incident taught me resilience...*
- *Mistakes are not failures...*
- *By sharing our experiences, we can help each other...*



2

New aerospace technologies

The best way to predict the future is to invent it

Alan Kay

Goals

- Talk about new technologies in the aerospace industry
- Look into robot application in an aircraft assembly
- Practice Continuous Tenses
- Study CV
- Discuss AI tools

Work with a partner. Discuss the questions.

1. Read the quote above. What does Alan Kay mean? Do you agree / disagree with this statement? Why / Why not?
2. Would you like to invent anything in the future? Give your reasons.

→ Warming up

1. Look through the list of the greatest scientific breakthroughs of all times. Which are the most impressive for you? Try to explain why.

- | | |
|-------------------|---------------------------------|
| 1. DNA | 5. Electricity |
| 2. The Internet | 6. Artificial Intelligence (AI) |
| 3. Semiconductors | 7. Archimedes' screw |
| 4. Antibiotics | 8. Quantum computer |

2. Study the most important discoveries from the Internet. Make your own list.

- The wheel.
- The nail.
- The compass.
- The printing press.
- The internal combustion engine.
- The telephone.
- The light bulb.
- Penicillin.

3. Do you know these famous scientists? Speak about their inventions.

Newton / Darwin / Tsialkovsky / Popov / Einstein / Zhukovsky

Speech patterns

- *It was Einstein who developed the theory of relativity.*
- *Zhukovsky is famous in the field of mechanics.*
- *Newton is known for his laws of physics.*

→ READING AND SPEAKING

4. Scan the text and share your ideas about aerospace trends and innovation.

Vocabulary and Pronunciation

Breakthrough technology, innovative compounds, artificial intelligence (AI), high-temperature alloys, 3D printing, digital transformation, electric propulsion systems, environmentally friendly fuels, space tourism, visual data, augmented reality (AR), virtual reality (VR), bioengineering



New aerospace technologies

Modern aerospace engineers are using cutting-edge technologies to build safe future airspace.

Such inventions as space bioengineering, digital air traffic management, 3D printed turbine blades for aircraft engines, artificial intelligence (AI), advanced systems for UAV, real-time visual data, vacuum infusion technology are examples of the breakthrough technologies. Let's have a look at some of them.

New composite materials have been used to create the unique MC-21 "black" wing. New 3D printing of ceramics provides next-generation spacecraft with high resistance to heat and mechanical stability. Innovative compounds and alloys such as graphite, titanium, fiberglass are being chosen for complex aviation structures.

Digital assistants and collaborative robots help human operators in aerospace manufacturing. Augmented reality (AR) and virtual reality (VR) support engineers with exoskeleton robots and provide digital transformation.

Production of lightweight parts for launch vehicles is already being controlled by AI. The autonomy of the aircraft systems can be increased by AI, which manages the information exchange of navigation sensors in flight.

To replace plastic 3D printers on board the International Space Station (ISS), the first metal additive manufacturing printer will soon be tested in an orbiting laboratory for future Moon and Mars missions.

Science fiction turns into reality with the help of aerospace engineers. Dreams are coming true with environmentally friendly fuels, space tourism and air robotic taxis, high-temperature alloys and super composites, bio-ink implants, supersonic passenger aircraft, electric propulsion systems, self-healing materials.

5. Read the text and say what new facts you found in it.
6. Study the text for more detailed information and find the sentences about up-to-date innovations.
7. Use the text and mark the statements as True, False or Not Stated.
 1. Vacuum infusion technology and 3D printed turbine blades for aircraft engines are being used for unmanned aerial vehicles (UAV).
 2. Augmented reality (AR) and virtual reality (VR) help engineers with exoskeleton robots.
 3. Innovative compounds and alloys such as aluminum, steel, lithium are being chosen for complex aviation structures.
 4. AI controls production of lightweight parts for launch vehicles and increases the autonomy of the aircraft systems.

→ VOCABULARY

8. Complete the definitions (a-g) with the words in bold (1-7).
 1. **Artificial intelligence (AI)** is an advanced technology where a computer program learns, and acts itself.
 2. Advanced materials, composites with low thermal expansion and high strength and hardness are called **innovative compounds and alloys**.
 3. **Breakthrough technologies** made significant contributions to the development of science and introduce radically new capabilities.
 4. Fiber-reinforced plastic, chopped or woven into glass with the polymer matrix, is presented as **fiberglass**.
 5. **Bio-ink implants** are being made by 3D printing to create new biological organs.
 6. **Environmentally friendly fuels** with lower greenhouse gas emissions burn cleanly and contribute to a healthier planet.
 7. **Digital air traffic management** analyzes weather reports and flight plans, to predict potential disruptions, improving flight safety and efficiency.
 - a) Developed corrosion resistance is presented in new generation of _____.
 - b) _____ is a type of a composite like polymer, epoxy, polyester resin, thermoplastic.
 - c) Additive technology uses bio-ink 3D printing to create _____ for damaged body parts.

- d) _____ is a machine-to-machine education to explore new possibilities.
- e) Automated flight planning that optimizes flight routes, reduces flight time and fuel consumption is known as _____.
- f) Bioengineering, renewable energy, quantum computing, blockchain are _____.
- g) Eco-friendly fuels, such as biodiesel and ethanol, that improve air quality are called _____.

9. Complete the sentences with the words from exercise 8.

1. Self-driving cars, cryptocurrency, virtual reality are examples of _____.
2. Sometimes rechargeable batteries for electro cars are called _____.
3. In the future _____ will function similarly to human intelligence.
4. Robotic flight control or _____ helps to collect real-time data.
5. _____ are used for 3D printing inside the body to create additive technology implants.
6. Nickel-carbon-sulfur material, cobalt-chromium-aluminum-silica admixture are _____.
7. A composite material called _____ is a non-magnetic, non-conductive compound that is considered stronger than many metals.



→ Warming up

1. Complete the chart with the words in the box.

additive space 3D printing/ woven composites/ vacuum infusion/ robotic assistance/ ion thrusters

- Ceramic matrix composites, fiber glasses compounds, polymers and _____ are being used in aerospace industry.
- The aircraft inspection includes _____ that help human personnel to find cracks, corrosion, and other vehicle defects.
- _____ is in-space manufacturing which is being applied for orbit applications.
- _____ has been patented in Russia as a technique of transforming resin into a laminate at vacuum pressure.
- Traditional spacecraft engines may be changed by _____ for improved fuel efficiency and reduced emissions.

2. Read the text, give it a title.

Divide the text into logical parts.



Vocabulary and Pronunciation

Challenging task, additive technologies, innovative composites, molding thermoforming, high-strength components, reduce the risk, bioprinting in space, airworthiness, reinforced polymers

→ VOCABULARY

- Read the text again and complete the sentences.
 - The ... are being used to reduce cost and time.
 - augmented reality*
 - additive technologies*
 - Engineers have developed special ... to produce lightweight, high-strength components.
 - electron beam melting*
 - printing with powders*
 - The cosmonauts have tested ... on ISS.
 - skin reconstruction tissues*
 - variable electromagnetic field*
 - Carbon fiber reinforced polymers have been developed to improve the ... of the aircraft.
 - reliability and airworthiness*
 - accuracy and weight*



The operation of a modern aerospace vehicle is a very challenging task that can be simplified by 3D printing and innovative composites. Up to 90 percent reductions in cost and time are being provided by additive technologies. Special 3D printing powders have been developed to produce lightweight, high-strength components. Also, 3D printing reduces the risk of investing in high-cost aerospace manufacturing. The Russian cosmonauts have successfully tested the first Russian 3D printer in zero gravity using additive bioprinting in space to produce food and medicine on long duration mission. New aerospace composite materials improve airworthiness and reliability. Spacecraft weight was reduced by approximately 20% with carbon fiber reinforced polymers. Aircraft fuel efficiency and high temperatures notwithstanding have been advanced by ceramic matrix composites.

- Name the advantages of using 3D printing and composite materials mentioned in the text.
- Choose the correct variant.
 - Aerospace 3D printing has various commercial, military and industrial exercises/ applications/ practice.
 - Space biochemistry explores/ rejects/ hires bioprinting on ISS to regenerate microorganisms in vacuum stress and radiation.
 - Ceramic matrix composites have been closed up/ imported/ advanced to improve aircraft fuel efficiency.
 - Spacecraft weight was reduced by definitely/ approximately/ closely 20% due to the use of new composites

6. Complete the chart with the words in the box.

fossil fuels / AI-powered tutoring systems / navigation / advanced aerial mobility / remotely piloted

1. _____	includes highly automated operations, _____ vehicles, electric or hybrid driven propulsion,
2. Advanced satellite technologies	cover optical technologies for satellite _____, innovative on-board processing and payload architecture.
3. Energy transformation	comes from _____ to renewables
4. Modern aerospace Engineering Education	Aerospace engineering is the third most popular field for engineering students (after programming and oil/gas industry basing on lifelong learning, _____, automated assessment.

7. Word formation. Complete the chart. Use the information from Unit 2 and fill in the columns with your examples.

Noun	Adjective	Verb	Adverb
...	environmentally
...	...	stress	...
...	ecological
power
...	...	orbit	...

→ SPEAKING

8. Work in pairs. Explore the list of new technologies from different times and eras. Which discovery can't you live without?

Introduction of iron, digital currency, implants, agriculture, computers, bronze tools, 5G Networks, animal farming, wood hammer, redshift measuring, distant learning, discovery of fire, steam engine.

9. Work in groups. Discuss the question "What scientific discoveries are we most looking forward to?"

→ Warming up

1. Which of the following do you think will happen in your lifetime?

Mark each one with a number between 1 and 5, where 1 = definitely and 5 = definitely not.

- Robots will do all our work for us.
- There will be robots that can detect human emotion.
- Robots will be used in the houses.
- Robots will be used to do more difficult and sophisticated jobs.
- People will be replaced by robots in the manufacturing industry.
- More money will be invested in robot design.

Speech patterns

Certain Prediction (high confidence – will)

- *I believe that (noun/pronoun) will ... because...*

Probable Prediction (likely – will or can)

- *Given current advances, robots can be used...*

Possible Prediction (Uncertain – may or could)

- *While automation is increasing, people may...*

Optimistic Prediction (Potential – could + future advancement)

- *With AI progress, there could be robots that ...*

Skeptical Prediction (unlikely – may not or probably won't)

- *Although robotics is advancing, robots probably won't ...*

Technical Prediction (Industry-Specific – "will" + aerospace context)

- *In aerospace, robots will be used for...*

In pairs, discuss your answers and explain your reasons.

→ LISTENING

2. Listen to the record and put the facts from the record into correct order.

1. Automation in Fuselage Production:



2. Digitalization and Data Collection:

3. Expansion and Future Plans:

4. Increased Productivity and Quality:

5. Job Transformation:

6. Robotics in Assembly Lines:



3. Listen again and fill in the gaps with the words from the record.

1. Airbus has been actively introducing robots into its assembly process to improve _____, quality, and _____.
2. Now, the Hamburg facility features 20 robots, a new logistics _____, automated positioning by laser _____, and a digital data acquisition system.
3. Additionally, 12 seven-axis robots from KUKA are used to _____ center and aft fuselage _____ with the tail.
4. Also, the assembly lines use various robots, such as the Flextrack, which _____ eight robots that drill holes in fuselage sections.
5. The automated assembly lines are _____ with digital tools, including a digital _____ of the production line.
6. The company will continue improving efficiency, quality, and safety through the strategic _____ of robotics.

4. Listen to the record again. Are the sentences True or False? Correct the false ones.

1. Airbus introduces robots into its production line in Germany.
2. The new automated wing fuselage assembly line was put into operation in Munich.
3. Airbus new assembly line includes a Flextrack component that involves 12 robots each operating on seven axes.
4. Airbus is also implementing new material- and parts logistics-related methods and technologies.
5. The Hamburg's facility uses 30 robots in its assembly line production.
6. Increasing the level of automation and robotics enables faster and efficient manufacturing.

→ VOCABULARY

5. Match the words and word combinations with the definitions.

lead time/ acquisition/ assembly line/ logistics/ ergonomics/ integration/ digital twin

1. _____ the time between starting and completing a production process; the time between placing an order and the item being delivered.

2. _____ the act of getting something, especially knowledge, a skill, etc.
3. _____ a line of workers and machines in a factory, along which a product passes, having parts made, put together or checked at each stage until the product is finished.
4. _____ the business of transporting and delivering goods
5. _____ the study of working conditions, especially the design of equipment and furniture, in order to help people work more efficiently.
6. _____ the act or process of combining two or more things so that they work together.
7. _____ using a system of receiving and sending information as a series of the numbers one and zero, showing that an electronic signal is there or is not there.

6. Fill in the gaps with the words from task 5.

1. Our normal _____ from order confirmation to dispatch is two weeks.
2. A _____ firm was hired for the deliveries.
3. There is a need for formal _____ in any design where the designer himself is not an experienced user.
4. The aim is to promote closer economic _____
5. The system is fully _____, with no analogue components.

→ SPEAKING

7. Work in small groups. Your team has been asked for its opinion on the best applications for robots.

industry: *construction, design, maintenance;*
 the home: *security, maintenance, pets;*
 business: *working with customers;*

- Choose the area where you think robots could be the most useful. Be clear about the reasons for your choice.
- Decide, in as much detail as possible, what special challenges will arise for AI in the given area.

→ Warming up

- Do you know any nanomaterials? Can you name some of them?

Speech patterns

What You Know or Remember

- I know that X is used/applied in aviation...*
- As far as I know, designers use/apply X...*
- If I'm not mistaken...*
- According to [source]...*

→ LISTENING

- Listen to the record and mark what materials are mentioned in the record ✓ and what are not ✗.



- | | |
|-----------------------------|----------------------------------|
| • boron oxides | • nanosized zirconia |
| • carbon nanotubes | • polymers, metals, and ceramics |
| • epoxy/clay nanocomposites | • silicon oxides |
| • fullerenes | • silver nanoparticles |
| • graphene | • steel |
| • magnesium alloys | • titanium-nickel alloys |

- Listen again and answer the questions choosing only one option.

- What is the key advantage of incorporating nanomaterials into traditional aerospace materials?
 - Increased weight
 - Decreased strength
 - Improved mechanical properties
 - Reduced thermal stability
- Which of the following is an example of a nanocomposite used in aviation fuel tanks?
 - Epoxy/clay nanocomposites
 - Silicon oxide nanocoatings
 - Boron oxide nanocoatings
 - Titanium-nickel alloys
- What is a key advantage of using nanocoatings on magnesium alloys in the aerospace industry?
 - Increased corrosion sensitivity
 - Reduced weight
 - Improved corrosion resistance
 - Decreased wear resistance

- How do nanomaterials promote environmental issues in the aerospace industry ?
 - By increasing fuel consumption and emissions.
 - By reducing fuel consumption and emissions
 - By having no impact on environmental issues.
 - By increasing the ecological impact of the aerospace industry.
- Which of the following is an example of a nanostructured metal, used in aerospace?
 - Epoxy/clay nanocomposites
 - Silicon oxide nanocoatings
 - Titanium-nickel alloys
 - Boron oxide nanocoatings
- What is the key advantage of using nanomaterials in aerospace components?
 - Reduced technical performance.
 - Increased ecological impact.
 - Improved technical performance and reduced ecological impact.
 - No impact on technical performance or ecological impact.
- How do nanomaterials improve the mechanical properties of aerospace materials?
 - By decreasing the strength and thermal stability.
 - By incorporating nanomaterials like carbon nanotubes into traditional aerospace materials.
 - By reducing the weight of aerospace components.
 - By promoting environmental issues.
- Listen again and say True or False.
 - Incorporating nanomaterials like carbon nano tubes into aerospace materials ensures lighter and more durable aircraft designs.
 - Nanostructured metals increase strength, elasticity, corrosion obstruction of aerospace components and considerably decrease their primary weight.
 - Nickel-titanium alloy is highly valuable in the aerospace industry due to its remarkable wear resistance.
 - Nanocoatings enhance corrosion protection of aerospace alloys.
 - Applying nanomaterials in aerospace increases fuel efficiency and lowers emissions.
 - The production and wide use of nanomaterials is vital for the further advancement in the aerospace industry.

→ VOCABULARY

5. Match the adjectives in the box and definitions.

✓ Corrosion-resistant	✓ Lighter
✓ Durable	✓ Mechanical
✓ Ecological	✓ Stronger
✓ High-performance	✓ Wear-resistant

1. _____ - describes the enhanced strength of materials due to the incorporation of nanomaterials.
 2. _____ - highlights the reduced weight of materials, which is crucial for aerospace applications.
 3. _____ - refers to the longevity and resilience of materials enhanced by nanotechnology.
 4. _____ - Pertains to the improved mechanical properties of traditional aerospace materials.
 5. _____ - signifies the superior capabilities of nanocomposites compared to conventional materials.
 6. _____ - indicates the enhanced ability of materials to withstand corrosive environments.
 7. _____ - refers to the ability of nanocoatings to protect mechanical components from wear.
 8. _____ - relates to the environmental benefits associated with the use of nanomaterials, such as reduced emissions.
6. Fill in the gaps. Match adjectives in the sentences with nouns in the box, considering the context.

• engine components	• carbon-fiber-reinforced polymers
• coatings	• materials
• titanium alloy	• cryogenic pumps
• systems in aircraft	• innovations

4. Mechanical _____, such as landing gear, benefit from advanced manufacturing techniques that produce durable and reliable components.
5. Corrosion-resistant _____ are applied to critical parts, like turbine blades, to enhance their longevity and performance in harsh environments.
6. Wear-resistant _____ are essential for ensuring the longevity of high-performance components, such as bearings in jet engines, which operate under extreme conditions.
7. Durable _____ enhance the longevity of rocket propulsion systems by maintaining low temperatures for fuel storage.
8. Ecological _____ in aerospace engineering focus on developing lightweight materials that reduce fuel consumption and minimize environmental impact.

→ SPEAKING

7. Look through the list of the key applications and challenges of nanomaterials given in the box.
- Complete the chart using the information in the box. You can add your own ideas, give your reasons.

- Additive Manufacturing Capabilities
- Advanced Sensors and Electronics
- Cost Considerations
- Enhanced Protective Coatings
- Environmental and Health Impacts
- Improved Thermal Management
- Lightweight and High-Strength Materials
- Manufacturing Challenges
- Regulatory Barriers

Key applications	Main challenges

- What are the main challenges and key applications of nanomaterials?

→ GRAMMAR

8. What can designers achieve applying new materials in the aerospace industry? Why can we encounter some difficulties in the application of nanomaterials?
Use speech patterns and ideas in the box.

Speech patterns

- *There may be different ... for example...*
- *There are a lot of ... such as...*
- *Designers can achieve enhanced/significant...*
- *We can encounter difficulties because...*

- ✓ *to create lighter and stronger components*
- ✓ *to develop protective coatings*
- ✓ *to enable the production of complex design*
- ✓ *to enhance dissipation in engines and other hot components*
- ✓ *to enhance heat transfer*
- ✓ *to enhance mechanical properties*
- ✓ *to improve fuel efficiency*
- ✓ *to improve the durability of...*
- ✓ *to monitor engine performance*
- ✓ *to understand long-term effects on human health and the environment*
- ✓ *to be technically challenging and time-consuming*
- ✓ *to require extensive testing and certification*
- ✓ *to be more expensive than traditional materials*
- ✓ *to require further exploration the potential of nanomaterials*

Revise the grammar rules of the Present Continuous, the Past Simple and the Future Simple in Active/Passive Voice.

1. Read the text fragment about aerospace technologies. Open the brackets using the correct form of the Present Simple or Present Continuous.

Aerospace companies _____ constantly _____ (to develop) innovative compounds and breakthrough technologies to push the boundaries of what's possible. At the moment, many _____ (to focus) on electric propulsion systems and environmentally friendly fuels to reduce emissions. While some _____ (to work) on artificial intelligence (AI) and augmented reality (AR) to enhance operations, others regularly _____ (to use) 3D printing to rapidly prototype new designs.

Applicants for core aerospace roles usually _____ (to have) strong backgrounds in engineering disciplines like aerodynamics and materials science. They sometimes _____ (to use) visual data and virtual reality (VR) simulations to analyze complex problems. Proficiency in problem solving, communication, and self-management _____ (to be) essential, as aerospace professionals often _____ (to collaborate) in teams and _____ (to negotiate) with suppliers.

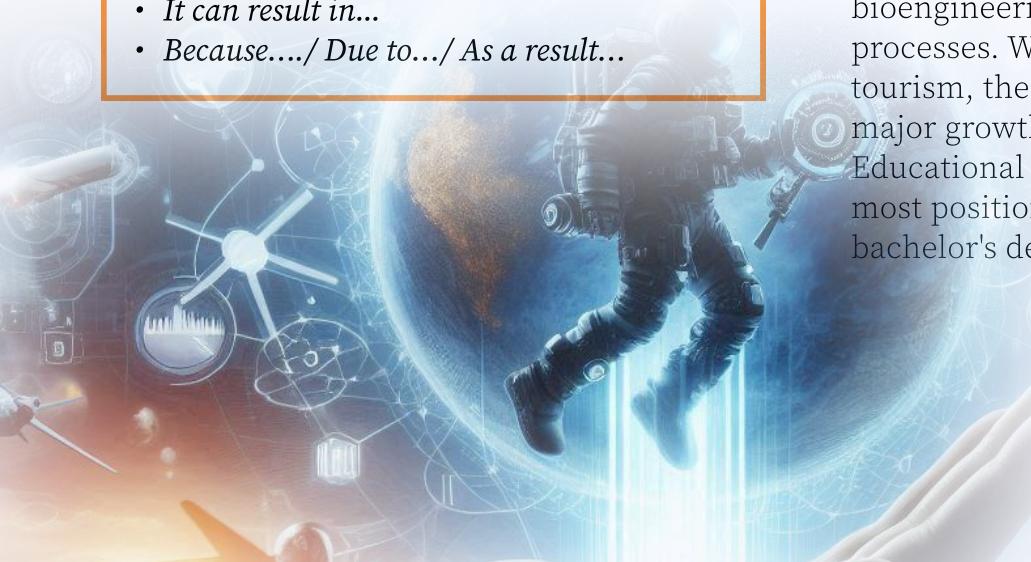
Aerospace companies _____ currently _____ (to undergo) a digital transformation, _____ (to integrate) cutting-edge technologies like bioengineering into their products and processes. When it _____ (to come) to space tourism, the industry _____ (to balance) for major growth in the coming years.

Educational requirements _____ (to vary), but most positions _____ (to require) at least a bachelor's degree in a relevant field.

Speech patterns

Phrases to talk about causes and effects

- *It can be caused by...*
- *It can be the result of...*
- *It can lead to...*
- *It can cause...*
- *It can result in...*
- *Because... / Due to... / As a result...*



2. Read the text about robots on production lines. Open the brackets using the correct form of the Past Simple or the Past Continuous.



Robots on the Airbus Production Line in Germany

Last year Airbus _____ (to put) a new assembly line into operation at their facility in Germany and _____ (to implement) new material and parts logistics-related methods and technologies to increase the level of automation and robotics. This _____ (to enable) faster and more efficient manufacturing on the production line.

While the new assembly line _____ (to construct), Airbus _____ also _____ (to train) workers on the operation of the robotic systems. When the line _____ (to become) operational, robots _____ (to work) alongside human technicians to assemble aircraft components.

Three years ago, Airbus _____ (to begin) investing heavily in robotic automation for their production facilities. At that time, the company _____ (to recognize) that increasing the use of robotics would be key to meeting growing demand for their aircraft. The robots perform various tasks such as drilling, riveting, and painting with high precision and speed.

3. Study the information on the topic of aerospace nanotechnologies. Open the brackets using the correct form of the Future Simple or Future Continuous.

Nanotechnology _____ (to continue) to revolutionize various industries in the future. Incorporating nanomaterials like carbon nanotubes into metals _____ (to increase) their strength, elasticity, and corrosion resistance while decreasing their weight. At the same time, advancements in nanotechnology _____ (to contribute) to improved fuel efficiency and lower emissions in the aerospace industry. Russian scientists _____ (to make) significant contributions to the field of nanotechnology, particularly in the areas of nanoelectronics and nanomaterials. When researchers focus on nickel-titanium alloys and nanocoatings, they _____ (to enhance) the performance of these materials significantly.

Next-generation aircraft and spacecraft _____ (to incorporate) advanced nanomaterials and nanodevices to enhance their performance and efficiency. Nanotechnology _____ also _____ (to enable) the creation of smaller, more powerful, and more energy-efficient electronic devices and sensors.

► BUSINESS ENGLISH

1. Share your ideas with the group, answer the questions.

What do you need to apply for a position of an aeronautical engineer?

How to apply for a job?

2. Put the main stages of applying for a job in the correct order.

► RESEARCH THE COMPANY

► WRITE A RESUME (CV) THAT SHOWS OFF YOUR EDUCATION, SKILLS, EXPERIENCE

► GET READY FOR A JOB INTERVIEW

► ASK FOR A REFERENCE IF REQUIRED

► WRITE A COVER LETTER TO DETAIL YOUR RESUME (CV)

► SEARCH FOR A JOB THAT FITS YOUR STRENGTHS AND SKILLS

► SEND YOUR RESUME (CV) VIA E-MAIL OR A COMPANY'S WEBSITE

3. Discuss in pairs.

1. What does CV stand for?
2. What is the main purpose of a CV?
3. What are the main sections of a typical CV?

CURRICULUM VITAE

Name: Zhukov Vladislav

Nationality: Russian

Address: ul. Kosmonavtov 30,
kv.87, Moscow, 675412 RUSSIA

Telephone: +7 9235871436

E-mail: vzhukov@mail.ru

To obtain a challenging position as an Aerospace Engineer at a reputable company where I can use my skills and knowledge to contribute to the development of innovative aerospace technologies.

2005-2002 – Master Of Science in Aerospace Engineering, Degree in Aviation Management, University of Applied Science Worms, Germany

1998-2001- Bachelor of Science in Aerospace Engineering, School of Aircraft Engineering, Department of “Flight Dynamics and Aerodynamics”, Moscow Aviation Institute (National Research University)

1994-1997 -Secondary School: School N1, Moscow Russia.

Public Joint Stock Company “Yakovlev”

2007-up to the moment

- Assisted in designing and analyzing aircraft systems
- Conducted simulations to optimize designs
- Participated in testing and evaluation of aircraft systems
- Participated in training personnel for modern highly automated aircraft

- Proficient in CAD software such as SolidWorks and CATIA
- Experience in conducting simulations using ANSYS and MATLAB
- Knowledge of aircraft and spacecraft systems
- Fluent in Russian, English and German
- Strong problem-solving skills
- Ability to work in a team

Cinema, travel, skiing, aerobics

Professional and personal references available on request.

4. Look at the Zhukov Vladislav's CV above. Put the headings from the box in the correct place.

- | | |
|--|--|
| <ul style="list-style-type: none"> ● Interests ● References ● Core skills | <ul style="list-style-type: none"> ● Education ● Work Experience ● Objectives |
|--|--|

5. Decide whether these statements are True or False.

1. Vladislav Zhukov studied in Russia
2. He has worked for two different companies.
3. He has been responsible for designing and analyzing aircraft systems.
4. He can speak more than two languages.
5. He is interested in sports.
6. He doesn't enjoy watching movies.

6. Answer the questions.

1. How many pages should a CV have?
2. What are the main sections of a CV?
3. Do you think it is a good idea to include a photo in your CV?
4. What is the purpose of writing a CV?
7. Look at the personal statement that is a brief of a person's skills, experience, achievements. It sometimes comes near top of the CV, before the main body. Then answer the questions.

A highly motivated and skilled aerospace engineer with over 5 years of experience in designing, testing, and analyzing aircraft and spacecraft systems. Proficient in using CAD software and conducting simulations to optimize designs. Possesses excellent communication and teamwork skills, with a proven track record of delivering projects on time and within budget.

1. What sort of person is this candidate?
2. What are the most relevant skills of the candidate?
3. What is he or she qualified in?
4. What has the candidate been responsible for over the last period of time.



8. Vladislav Zhukov is being interviewed by a human resource manager. Role-play this situation. Rely on the Curriculum Vitae and the Vocabulary of Unit 2. Make use of the typical questions and the speech patterns given below.

Education	HR manager What is your educational background? What is your qualification?	Vladislav Zhukov I graduated from.... I have a degree/a diploma in... I am qualified in.....
Experience	What were your responsibilities at your last job? What did you learn from your last job?	I was responsible for... I learned to....
Skills	What are you good at? Do you have any special skills?	People say I am good at... My main strengths are...
Interests	What do you do in your free time? What are your main interests?	I really enjoy I spend a lot of time...
Plans	What do you want to do in the future?.	My main aim is to... I plan to be..... I hope to have....

→ WRITING

9. Study Michael Taylor's professional profile.

1992-1997	<i>St James Secondary School</i>
1997-2002	<i>Aeronautical Engineering Imperial College</i>
2002	<i>Graduation</i>
Jun 2002-Dec 2007	<i>Graduation Engineer Airbus, London</i>
Dec 2007-Oct 2010	<i>Test Engineer Turbine Tech, Birmingham</i>
Oct 2010- Dec 2016	<i>Aeronautical Engineer Polytech Ltd, Birmingham</i>
Feb 2016 – present	<i>Aeronautical Engineer EFA System, Birmingham</i>

10. Read the text and underline the correct preposition.

Michael Taylor left ***St James Secondary School*** in 1997. He studied aeronautical engineering ***in/on/from*** 1997 to 2002. He graduated from Imperial College in 2002 with honors and was awarded a Master's degree certificate.

After graduating ***in/at/on*** June 2002, Michael took part in a graduate program ***in/for/at*** the global aircraft manufacturing giant Airbus.

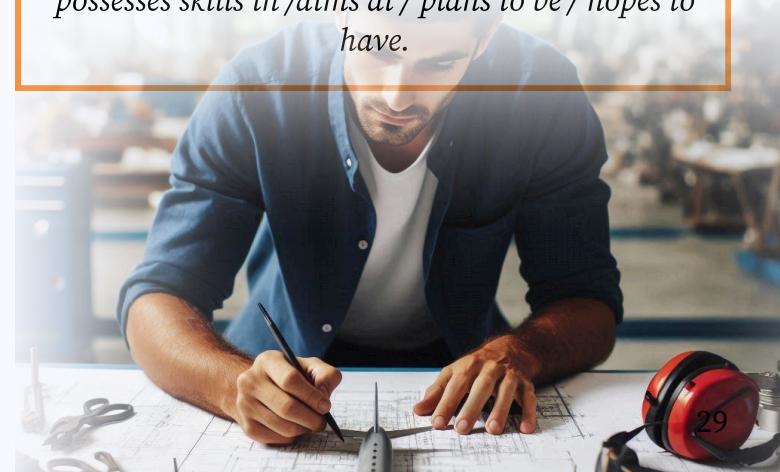
In/at/since/from December 2007 up to October 2010 Michael Taylor worked as a test engineer ***in/at/within*** the Turbine Tech in Birmingham. He was responsible for level testing of small aircraft engines.

In/Next/For October 2006 he changed the job and joined Polytech Ltd company as an advisory engineer. He provided technical support to the customers in the aeronautical R&D department.

Now he works as a part of a team ***in/at/on*** the R&D department of a reputable company. He has been dealing with design and testing new components for passenger aircraft and selling them to various multinational manufacturing companies.

11. Write Vladislav's personal professional profile story (see the CV above p.28). Use the notes from the box to write Vladislav's personal story. Mind using the Present Simple, the Past Simple, or the Present Perfect tenses.

Left school in/ studied at /graduated from/ had a degree in/ completed a MD course in/ has worked in / was (is/has been)responsible for / participated in / conducted / assisted in / has skills in / is good at / is proficient in / is fluent in / really enjoys / possesses skills in /aims at / plans to be / hopes to have.



→ REVISION

1. Match the two parts of the sentences to get logical phrases. Form as many sentences as you can.

1. Engineers are developing breakthrough technologies	a) thanks to advancements in aerospace technology
2. Innovative compounds are crucial	b) to improve flight safety and efficiency
3. The use of 3D printing allows	c) design and reduce costs significantly
4. Engineers are exploring electric propulsion systems	d) to the development of lightweight materials for aircraft
5. Space tourism is becoming a reality	e) for rapid prototyping of complex aerospace components
6. Engineers utilize visual data analytics	f) to reduce emissions in aviation
7. Bioengineering is contributing	g) for creating high-temperature alloys used in jet engines.
8. Virtual reality (VR) simulations provide	h) to minimize the carbon footprint of air travel
9. The integration of AI helps engineers optimize	i) to minimize the carbon footprint of air travel
10. Environmentally friendly fuels are being researched	j) to enhance aircraft performance

2. Match the adjectives in the box with the nouns in the sentences.

- | | |
|---------------------------|------------------------------|
| ● <i>high-performance</i> | ● <i>mechanical</i> |
| ● <i>sustainable</i> | ● <i>wear-resistant</i> |
| ● <i>durable</i> | ● <i>corrosion-resistant</i> |
| ● <i>lightweight</i> | |

- _____ materials are essential for long-lasting aerospace components.
- Researchers focus on developing _____ designs to withstand extreme flight conditions.
- Engineers are tasked with creating _____ rockets that can operate at hypersonic speeds.
- _____ materials make aircraft lighter, improving fuel efficiency and performance.

- _____ testing is crucial for ensuring the reliability of aerospace systems under stress.
- Components must be _____ to ensure longevity during repeated flights and tests.
- The push for ecological innovations includes using _____ fuels in rocket propulsion systems.

2. Complete the definitions with the words in the box.

a motivated team / teamwork skills / fluent communication / resume (CV) / objectives / proficient staff / cover letter.

- _____ can achieve great objectives.
- _____ are crucial in aerospace industry.
- _____ fosters a positive work environment.
- A _____ shows your achievements in aerospace engineering.
- Achieving _____ requires collaboration among staff.
- _____ are essential for complex aerospace tasks.
- Your _____ should highlight your relevant experience.

3. Find the proper answer in the box to the questions enlisted below. One option is extra.

- | | |
|--------------------------|---------------------------|
| ● regulatory barriers | ● maintain optimal engine |
| ● test engineers | ● temperatures |
| ● nanomaterials | ● protective coating |
| ● safety and performance | ● durability |
| | ● heat transfer |

- What is essential for enhancing the durability of aerospace components?
- What can slow down the introduction of new materials in the aerospace industry?
- What tests assess how well materials perform under various environmental conditions?
- Who conducts extensive testing to evaluate the impact of temperature fluctuations on material integrity?
- Which properties of materials are critical for optimizing engine performance?
- What standards must new materials meet in aerospace applications?
- Why is heat transfer management so vital during flight?



Ivan



Angelina



Nikita



Viktoria

1. Act out the conversation, emphasizing tone and body language to convey informality.

Chatting About AI

Ivan

Hey guys! What AI tools are you using these days?

Angelina

I just started using that chatbot for my homework. It's pretty cool!

Ivan

Classic Sam! Did you conquer anything? (laughs)

Angelina

What did you ask it exactly?

Ivan

That's a classic case of "lost in translation." You gotta be specific! (grinning)

Angelina

Right! I once asked an AI for "fun facts" about cats. It gave me a recipe for cat food!

Angelina

Nope! I just wanted to know why they knock things off tables.

Ivan

You should've asked, "Why do cats act like little tyrants?"

Angelina

So how do we make better requests?

Ivan

Start simple. Be clear about what you want. Like, "Tell me about AI tools for students."

Angelina

I tried to ask about AI art. I said, "Show me a painting of a cat in space."

Ivan

And.....?

Angelina

It gave me a picture of a cat playing chess!

Ivan

Just remember, the clearer you are, the better the answer you get.

Angelina

Right! Next time, I'll ask for "fun facts about cats" but specify no recipes!

Nikita
Oh yeah? I tried that too. But I asked it for help with my math, and it told me to "divide and conquer."

Nikita
Just my snack stash! I was too confused to do math.

Nikita
I said, "Help me with division." It thought I wanted a war strategy!

Nikita
Yikes! That's not what you wanted, huh? (laughs)

Nikita
Or "What's up with cats and gravity?"

Nikita
Got it! No more asking for "help" without details.

Nikita
Now that's a twist! Cats are smart enough to play chess? (laughs)

Nikita
And no more asking for "fun" stuff without being specific!

→ VOCABULARY

1. Match the idioms and colloquial expressions with their meanings.

Idioms and Colloquial Expressions	Meaning
a. divide and conquer	1. It's important to provide clear and detailed information.
b. what's up with	2. Avoid vague requests in the future.
c. classic case of lost in translation	3. A strategy used to break a problem into smaller parts to solve it more easily.
d. no more asking for 'help' without details	4. What is the reason for or what is happening with something.
e. that's a twist!	5. A situation where something is misunderstood due to language or context differences.
f. you gotta be specific	6. An unexpected turn of events or outcome.

→ SPEAKING

3. Reflect on your own experiences, try to share your own funny or confusing experiences with AI tools.

4. Work in groups. These creative prompts demonstrate how users can leverage AI's capabilities to explore their imagination, generate unique content, and have fun with language. They showcase the potential for collaboration between human creativity and artificial intelligence! Choose one prompt and make your own experiment, then share your result with classmates!

Creative AI Prompts

1. Story Generation
2. Inventing New Recipes
3. Character Development
4. Poetry Creation
5. Humorous Scenarios

Inventing New Recipes

Prompt: "Create a recipe for a dessert that combines chocolate, avocado, and a hint of chilli."

Outcome: An innovative and unique dessert idea that blends flavors in unexpected ways.

1. Before listening to Victoria's blog study several idioms and colloquial expressions that enhance its informal tone and humor

Glossary

- ✓ **Buzzing with excitement** - This expression conveys a sense of high energy and enthusiasm.
- ✓ **Like a kid on Christmas morning** - This simile illustrates the excitement and anticipation felt before flying the drone.
- ✓ **Try to impress** - A common phrase indicating the effort to gain approval from others.
- ✓ **Catch up** - An idiom meaning to become engrossed or involved in something, often to the point of distraction.
- ✓ **Is this how my drone career ends?** - This rhetorical question adds humor and drama to the narrative.
- ✓ **Practice makes perfect** - A well-known proverb emphasizing that consistent practice leads to improvement.
- ✓ **Riding a bike** - This expression suggests that once you learn a skill, it becomes second nature, even when applied to flying a drone.

2. Listen to Victoria's blog sharing her experience of operating a drone and try to catch the main idea. Was her experience successful?
3. Listen to the record again and give your ideas for the questions.
1. What was Victoria's initial reaction when she entered the university lab?
 2. How did Victoria describe her first attempt at flying the drone?
 3. What funny moment did Victoria experience while flying the drone?
 4. What advice did the instructor give that resonated with Victoria?
 5. How did Victoria feel by the end of her drone flying session?



→ VOCABULARY

4. Match the informal words from the blog (like "buzzing" or "whoosh") and find formal synonyms.

Informal Word	Formal Synonym
a. burst into laughter	1. ascend
b. buzzing	2. ascend rapidly
c. catch up	3. become engrossed
d. crash	4. collide
e. feel like a kid	5. excited
f. practicing	6. experience joy
g. priceless	7. invaluable
h. shoot up	8. laugh heartily
i. whoosh	9. moving quickly
j. zooming	10. rehearsing

→ SPEAKING

5. In small groups, discuss your own experiences with technology or learning new skills. Use informal language and encourage laughter by sharing funny moments.

Speech patterns

- *I thought I was tech-savvy until...*
- *Learning to code felt like trying to...*
- *I tried to fix my Wi-Fi by...*
- *Every time I learn a new app, I feel like...*
- *Trying to teach my grandma how to use...*
- *I signed up for an online course..*

3

Aerospace solutions for ecological problems



The greatest threat to our planet is the belief that someone else will save it

Robert Swan

Goals

- Talk about environmental problems
- Look into sustainable aerospace technologies
- Practice Perfect Tenses
- Study soft skills for engineers
- Discuss eco-friendly habits

Work with a partner. Discuss the questions.

1. Read the quote above. What does it mean? Do you agree / disagree with this statement? Why / Why not?
2. What role does personal responsibility play in driving systemic change?

→ Warming up

1. Match the ecological problems given in the box with the pictures.

- Discuss with a partner: what two problems are the worst for the planet?
- Study the table with the increasing scale of greenhouse gas emissions. Analyze one of the graphs and present your analysis.

Speech patterns

Typical phrases to present and analyze visual data.

Introducing the Graph

- *This graph shows the relationship between X and Y.*
- *The chart illustrates the changes in [data] over [time].*
- *According to the graph, [data source] provides information about X.*
- *This diagram represents/illustrates...*

Describing Trends and Changes

For Increases:

Verbs: rise, increase, grow, climb, soar

Adjectives: sharp, significant, substantial

Adverbs: dramatically, rapidly, steadily

For Decreases:

Verbs: fall, decline, drop, plunge

Adjectives: steep, considerable, slight

Adverbs: suddenly, gradually, moderately

For Stability:

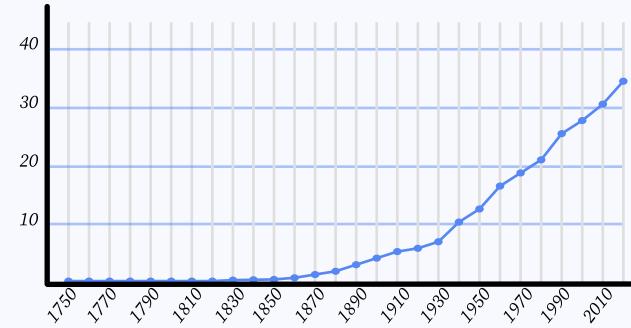
Phrases: remain stable, level off, stay constant

Anthropogenic (man-made) Contribution to the "Greenhouse Effect" expressed as % of Total (water vapor INCLUDED)

Based on concentration adjusted for heat retention characteristics	Percentage of Greenhouse Effect	Percentage of Natural	Percentage of Man-made
Water vapor	95,000%	94,999%	0,001%
Carbon Dioxide (CO ₂)	3,618%	3,502%	0,117%
Methane (CH ₄)	0,360%	0,294%	0,066%
Nitrous Oxide (N ₂ O)	0,950%	0,903%	0,047%
Misc. gases (CFC's, etc.)	0,072%	0,025%	0,047%
Total	100,00%	99,72%	0,28%

- How can a man contribute to the Greenhouse Effect enhancement? Base on the % of the Greenhouse gases in the table.

Historical carbon dioxide emissions from global fossil fuel combustion and industrial processes from 1750 to 2021 (in billion metric tons)



→ READING

3. Scan the text and give its main idea.



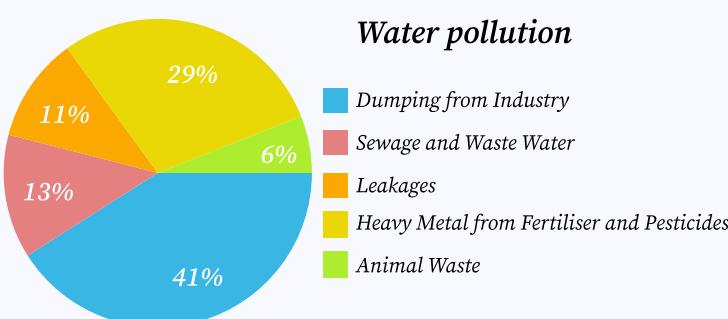
Floods

Vocabulary and Pronunciation

Environmental problems, global warming, CO₂ level monitoring, carbon emissions, airborne greenhouse gas analyzers, satellite imagery, UAV absorption systems, multi-spectral data, forest loss, shift away from fossil fuels to environmentally friendly materials, water management, global ecosystem, renewable energy

4. Read the text and name the ecological problems of our time.

Pie Chart of the water pollution causes





Save the planet via aerospace technologies

Our Earth has housed several human generations for about 4.54 billion years and the planet has been influenced by human activity that harms nature. Anthropogenic impact on ecology results in many environmental problems: global warming, carbon emissions, water pollution, extermination of animals. The time has come when we must protect the environment and save the Earth.

To monitor ecological issues the most innovative aerospace instruments are being used.

The newest airborne greenhouse gas analyzers are monitoring the CO₂ level that indicates emissions produced by fossil fuels. Aircraft mounted carbon trackers, UAV absorption systems, satellite imagery show that global ecosystem is being destroyed by air and water pollution, soil erosion, cement and petrol manufacturing, thermal radiation.

Spaceborne equipment, centralized air signal systems and meteorological radars provide CO₂ level for monitoring of ecosystems, conduct environmental assessment, 4D observations of the seas and oceans, sandstorms, fires and volcanic eruptions.

Thanks to aerial photography, it is possible to receive data on weather changes, floods, forest loss, carbon emissions, etc. Satellites regularly monitor the changes of the atmosphere, ocean surface, soil degradation, radiation temperature, water shortage.

To solve global ecological problems we need to shift away from fossil fuels to environmentally friendly materials, use renewable energy of ocean currents, sun, wind.

The latest United Nations Climate Change Conference stated to limit global warming to 1.5 °C and to triple the production capacity of renewable energy by 2030. The convention calls on countries to reduce emissions by 45% in 5 years and reach net zero by 2050.

5. Use the text and mark the sentences as True or False.

1. Our Earth has been affected by human activity that heals the nature.
2. Global warming, carbon emissions, water pollution, extermination of animals are caused by anthropogenic impact on ecology resulting in many environmental problems.
3. The most innovative aerospace instruments are used to monitor ecological issues, the CO₂ level, the changes of the atmosphere, ocean surface, soil degradation, radiation temperature, water shortage.
4. Satellite imagery, aircraft mounted carbon trackers, UAV absorption systems show the development of global ecosystem with the help of soil erosion, petrol and cement manufacturing, air and water pollution.
5. During the latest United Nations Climate Change Conference it was recommended to use spaceborne equipment with multi-spectral data, conduct 4D observations of the seas and oceans, sandstorms, fires and volcanic eruptions.

→ VOCABULARY

6. Complete the sentences (a-g) with the words in bold (1-7).

1. **Carbon emissions** are the greenhouse gases made of carbon dioxide (CO₂) and methane (CH₄) trapping heat in the atmosphere, resulting in global warming.
2. Extreme temperatures affecting marine ecosystems are monitored by **satellite imagery**.
3. **Fossil fuel** is a hydrocarbon-containing material such as coal, oil, and natural gas.
4. **Environmental assessment** studies potential effects of human activity upon nature.
5. A new generation of detectors that use imaging spectroscopy to examine the chemical composition of the atmosphere are called **infrared sensors**.
6. Global **water management** must be conducted for optimum use of Earth water resources.
7. **Aerial photography** provides photos shot from an aeroplane, helicopter, or tall structure such as a skyscraper.

- a) Russian satellite Sputnik I launched in 1957 was the first to provide seas and oceans _____.
 b) _____ is used to control drinking and industrial water quality, monitor oceans and seas temperature by spectral sensors.
 c) Spaceborne photography or _____ are images of Earth collected by imaging satellites.
 d) _____ has the power to take photos from the airborne platforms.
 e) Satellites spectral sensors monitor _____ that destroy the ozone layer and the global ecosystem.
 f) Infrared equipment fitted to satellites orbiting our planet and reacting to infrared radiation is called _____.
 g) _____ produce over 70% of global warming.

7. Complete the sentences with the words from exercise 7.

1. Meteorological satellites conduct _____ by comparing images of the same area through different time periods.
2. Non-ecological fuels increasing global temperature by 0.2C per decade are _____.
3. _____ is used to analyze the colour characteristics of plants and landscape from the sky.
4. UAV sensors provide ecological monitoring _____.
5. _____ aboard satellites use the invisible radiation spectrum to search the planet for minerals.
6. Environmental _____ controls freshwater use and protection of freshwater resources.
7. International Climate Change Organizations stated the reduction of carbon emissions that are observed via _____.

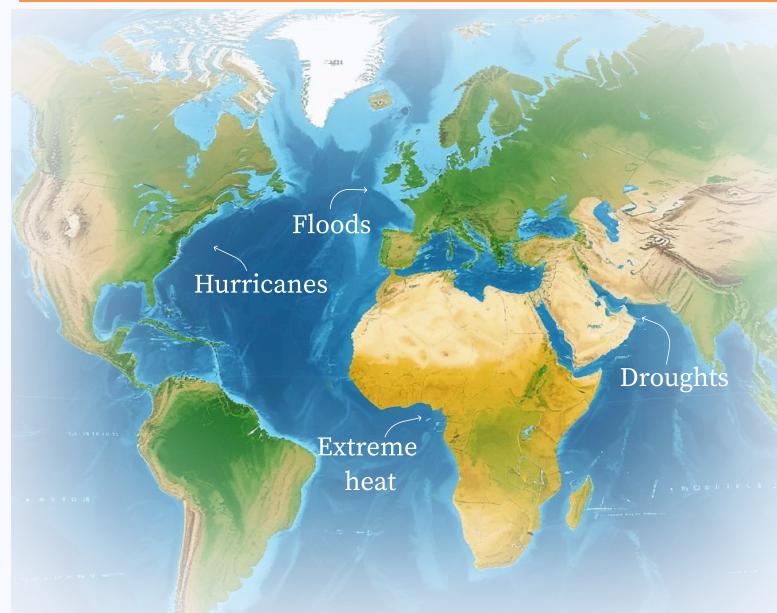


→ **SPEAKING**

- 8. Read the text for more detailed information and tell about aerospace instruments for environmental monitoring.**

Speech patterns

- *The first option is to use...*
- *Also we must...*
- *There are many instruments for environmental monitoring, for example...*
- *People use different systems such as...*
- *Engineers operate such devices as ...*



9. Study the list of international environmental organizations.

- World Meteorological Organization
- Climate Action Network
- Greenpeace
- Friends of Earth International
- United Nations Convention on Climate Change
- World Resources Institute
- International Union for Conservation of Nature
- World Wildlife Fund

Why do people unite to solve ecological problems?
Use the ideas in the box.

Examples:

- *Greenpeace was created to... / was formed to...*
- *World Wildlife Fund serves / minister to ...*

- *to reduce global emissions*
- *to avoid severe climate impacts*
- *to introduce a dialogue process*
- *to coordinate science-based climate actions*
- *to contribute to environmental problems solving*
- *to monitor climate*

→ Warming up

1. Complete the sentences with the words from the box.

planet coverage / wastewater treatment / replant trees / home energy audit / carbon footprint

- By conducting a _____ we can decrease energy consumption using light-emitting diodes, less often utilizing boilers and washing machines, considering ventilation.
- Environmental satellites and radiosondes provide global _____ for more detailed greenhouse gas monitoring, carbon capture and storage.
- Greenpeace calls for the reduction of the household chemicals for better _____.
- Airborne instruments are much more useful to provide _____ monitoring.
- To save our planet, people should recycle food and energy, _____, use less paper products.

2. Study the information and choose the main idea.



Vocabulary and Pronunciation

Ecological problem, (advanced) environmental protection, (scale of) plastic pollution, to conduct, wastewater treatment, to monitor (water nitrogen) pollution, machine learning, to collect (real time) data, high-resolution images

To better solve ecological problems, the aerospace engineers have developed more technological equipment for more advanced environmental protection.

The most innovative satellite platforms study the scale of plastic pollution and conduct the wastewater treatment. Drone vision systems help archeologists to search for underground buildings and monuments.

AI feedback transmitters monitor water nitrogen pollution, circulating of air currents, more intense marine heatwaves. The most advanced aerospace devices provide global planet coverage to help the agriculture industry and farming.



Machine learning algorithms are collecting real time data from satellites and aircraft sensors to model wild animal population dynamics. Remote high-resolution images help ecologists to observe wildlife on a global level and assist zoologists to protect tigers, elephants, whales, black albatrosses, jaguars, etc.

3. Choose a title for each paragraph of the text.

- Wildlife protection via aerospace technologies.
- Aerospace engineering enhance the environmental protection.
- Ecological problems on Earth - solutions in space.

→ VOCABULARY

4. Read the text more attentively and complete the sentences.

- More advanced ecological protection can be done by _____.
 - more technological equipment
 - less expensive devices
- The study of plastic pollution and wastewater treatment are provided by _____.
 - less noisy UAVs
 - the most innovative satellite platforms
- The most advanced aerospace devices _____.
 - provide archeological mapping
 - help the agriculture industry and farming
- Machine learning algorithms _____.
 - collect real time data from satellites and aircraft sensors
 - replant trees

5. Choose the correct variant.

1. Environmental control scheme / system / reality in aircraft is provided by air conditioning, temperature and oxygen control in the aircraft cabin, ice formation protection.
2. Development of electric aircraft, optimization of flight routes, bio-jet fuels reduce global melting / warming / boiling.
3. UAVs provide less expensive environmental surveys / audits / review over larger wild areas and produce less noise.
4. Spacecraft life support system provides atmospheric pressure, fire detection, oxygen height / levels / zone and recycles water for the crew.
6. Exploring “Save the planet” vocabulary (p.34). Complete the chart with the words in the box.

to monitor / low and zero carbon / temperature / greenhouse gas / carbon dioxide detectors / food / climate change / CO₂ emissions

1. When we throw away	<i>we waste the resources and increase all human-caused emissions.</i>
2. technologies	<i>help to reduce levels of</i>
3. Atmospheric	<i>installed on aircraft help the carbon cycle and predict future climate change.</i>
4. can be described in terms	<i>of seasonal, large-scale changes of weather and Earth's climate system.</i>

→ SPEAKING

7. Work in pairs. Choose one of the topics and prepare a small report on it
 1. Aerospace engineering can solve more environmental problems.
 2. Satellite mapping has a greater contribution to environmental impact.
 3. UAVs provide better tracking of wild animals habitat.
 4. We need to move away from planet-warming oil and natural gas.
8. Work in groups. Use the chart and answer the questions
 - What ecological problems do we have?
 - Which devices and instruments are used to monitor the situation?
 - What do these apparatus do?

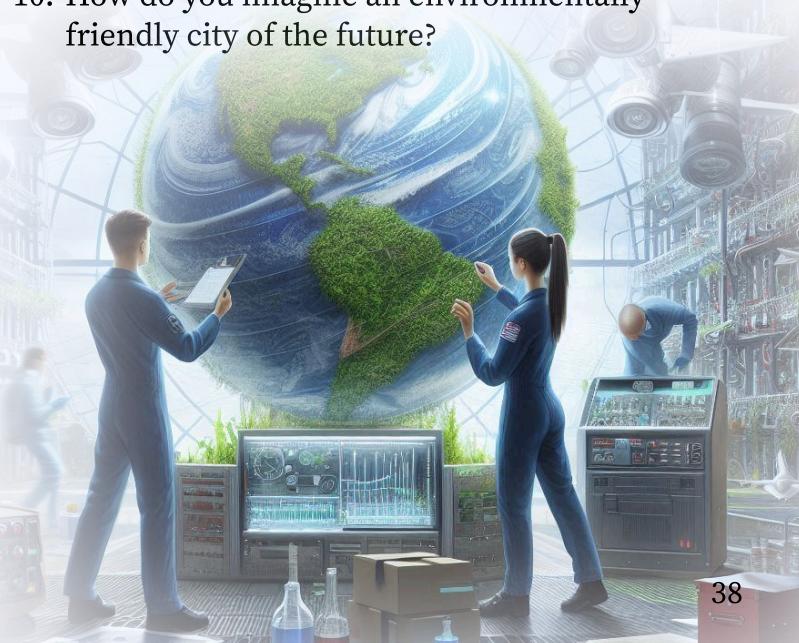
Problem	Device	Process
<i>Global warming</i>	<i>Environmental satellites and radiosondes</i>	<i>Measuring the temperature of the atmosphere, observing winds, aerosol particles, clouds</i>
<i>Carbon footprint</i>	<i>Carbon trackers, absorption and lidar systems</i>	<i>Observation of the CO₂ distribution</i>
<i>Food waste, drink water management</i>	<i>Airborne and spaceborne observation instruments</i>	<i>Water pollution tracking Land management in agriculture</i>
<i>Greenhouse gas emissions</i>	<i>High-resolution infrared detectors, greenhouse gas analyzers</i>	<i>Detection of emissions from vehicles and factories</i>
<i>Illegal storage of solid domestic or industrial waste</i>	<i>Image spectrometers, laser sensors</i>	<i>Farmland mapping, vegetation indices measuring</i>

Use the table above. Discuss environmental issues and solutions. Follow the examples.

Example:

- Environmental satellites and radiosondes measure the temperature of the atmosphere to control global warming.
- To detect greenhouse gas emissions we use greenhouse gas analyzers that detect emissions from vehicles and factories.

9. Discuss the question “How can aerospace students help to solve ecological problems?”
10. How do you imagine an environmentally friendly city of the future?



→ Warming up

- What are the environmental challenges in the aviation sector? What are the ways to overcome these difficulties?



- Listen and mark what issues are mentioned in the record ✓ and what are not ✗. Put the mentioned information from the record into correct order.

- Advanced Aircraft Design
- Advanced Propulsion Technology
- Data Technology
- Green Energy Sources
- Reusability
- Trajectory Optimization
- Urban Air Mobility

- Listen to the record again and answer the questions choosing the best option.

- What is the primary goal of projects like “Flying Air Traffic Management”?
 - To increase air traffic congestion
 - To optimize aircraft trajectories for reduced emissions
 - To enhance passenger comfort
 - To reduce flight delays
- Which alternative energy source is highlighted as crucial for reducing aviation emissions?
 - Natural gas
 - Hydrogen
 - Nuclear power
 - Coal
- How can optimizing aircraft designs contribute to environmental sustainability?
 - By increasing the weight of aircraft.
 - By improving fuel efficiency and reducing emissions.
 - By enhancing engine noise.
 - By complicating aircraft operations.



- What role does artificial intelligence play in air travel management?

- It complicates flight path prediction
- It reduces the need for digital technologies
- It simplifies flight path prediction and optimizes fleet utilization
- It has no impact on air travel management

- What is the expected outcome of developing sustainable aviation fuels (SAFs)?

- Increased reliance on fossil fuels
- Higher greenhouse gas emissions
- Reduced emissions in the aviation sector
- More waste generation

- What is one of the main challenges faced in the electrification of aviation?

- Excessive power density of batteries
- Low power density of current battery technology
- Overproduction of aviation fuel
- Lack of interest in electric aircraft

4. Listen again and say True or False

- Eco-friendly aerospace technologies focus on reducing environmental impact through innovative design and fuel efficiency.
- Reusable space and aircraft vehicles play a vital role in increasing the environmental impact of aviation waste.
- Electric vertical take-off and landing vehicles and drone deliveries are among of the least promising sustainable aviation technologies.
- Sustainable aviation fuels (SAF), are created from environmentally friendly materials.
- Aircraft manufacturers optimize aircraft designs to achieve the best fuel efficiency and reduce weight.

→ VOCABULARY

- Match the key words and words combinations in the box with definitions.

• Artificial Intelligence (AI)	• Noise Pollution
• Carbon Footprint	• Reusable Spacecraft
• Fleet Utilization	• Sustainable Aviation Fuels (SAFs)
• Greenhouse Gas Emissions	• Vertical Takeoff and Landing (VTOL)

- _____ - the total amount of greenhouse gases emitted directly or indirectly by an entity, often measured in CO₂ equivalents, significant in evaluating environmental impact.

2. _____ - unwanted or harmful sound produced by aircraft operations that can adversely affect human health and wildlife.
3. _____ - alternative fuels derived from renewable resources that can reduce greenhouse gas emissions compared to conventional fossil fuels.
4. _____ - vehicles designed for multiple flights, such as Falcon 9 and Blue Origin's New Shepard, which aim to minimize waste and reduce the environmental impact of space travel.
5. _____ - advanced computational technologies used to enhance flight path prediction and optimize fleet management, contributing to reduced carbon footprints.
6. _____ - gases that trap heat in the atmosphere, primarily CO₂, NO_x, and others, which are significant contributors to climate change.
7. _____ - aircraft capable of taking off and landing vertically, which can enhance operational flexibility and reduce the need for long runways.
8. _____ - the effective management and deployment of an airline's aircraft to maximize efficiency and minimize environmental impact.

6. Fill in the gaps using words from exercise 5.

The Future of Sustainable Aviation

_____ is revolutionizing the aviation industry by optimizing _____ and reducing _____. By analyzing data, AI can help airlines operate more efficiently, leading to lower _____. Innovative technologies like _____ and _____ are also playing a crucial role in making air travel greener. Additionally, _____ aircraft promise to minimize _____ in urban areas, enhancing the overall travel experience while promoting sustainability. Together, these advancements pave the way for a more environmentally friendly aviation sector.

7. Choose one issue that suits your future speciality. Present your point of view to the class. You can use speech patterns in the box.

1. Discussing the "Flying Air Traffic Management" Project: What economic and environmental factors should be prioritized in this optimization process?

2. **Exploring Sustainable Aviation Fuels (SAFs):** What are the benefits and challenges associated with the development of SAFs and alternative energy sources like hydrogen and solar power?
3. **Evaluating Reusable Spacecraft:** In what ways do reusable launch vehicles like Falcon 9 and Blue Origin's New Shepard minimize environmental impact?
4. **Aircraft Design Optimization:** What specific design improvements can be made to enhance fuel efficiency and reduce weight in aircraft?
5. **Digitization and AI in Aviation:** How can digitizing air travel management and utilizing artificial intelligence improve flight path prediction and fleet utilization?
6. **Overall Impact on Sustainability:** How do these eco-friendly aerospace technologies collectively contribute to a more sustainable aviation sector?

Speech patterns

Guide on structuring a monologue that discusses several aspects of a problem.

Introduction

- *The main issue we are facing is...*
- *One of the biggest problems today is...*

Body Paragraphs

- *First of all.../ Furthermore..., In addition..., Another issue is..., etc.*
- *One of the most significant impacts of X... is +noun*
- *According to a report by...*
- *In addition to the challenges faced by ...we must also consider...*
- *For instance, in regions like...*

Conclusion

- *Let me just look at the key points again.*
- *To conclude/In conclusion, I'd like to...*
- *I'll briefly summarise the main issues.*
- *To sum up (then), we...*

Some additional tips:

- Speak directly to the other characters or the audience.
- Stay focused on the main problem.

→ Warming up

1. What are the potential benefits and challenges of using UAVs in Arctic navigation?

→ LISTENING

2. Scan the QR-code and listen to the record. Choose the best title.



- Drones: The Future of Urban Delivery Systems
- Enhancing Arctic Navigation: The Role of UAVs and Satellite
- Exploring the Depths of the Arctic Ocean

3. Put the issues from the record into correct order.

1. Advanced Imaging
2. Ice Condition Assessment
3. Maritime Traffic Monitoring
4. Operational Coordination
5. Real-time Data Collection
6. Routing Decisions
7. Satellite Communication
8. Weather Monitoring

4. Listen again and say True or False.

1. Drones are deployed to assess ice conditions, weather patterns, and potential hazards along the route.
2. Satellite imagery is used to track ice movement and maritime conditions, aiding in route planning for vessels.
3. Satellite technology is crucial for providing the communication infrastructure necessary for UAV operations.
4. Satellite technology is not necessary for the operation and coordination of UAVs in maritime navigation.
5. The use of UAVs and satellites has no impact on the efficiency of Russian trade vessels delivering goods to China.
6. UAVs are primarily used for transporting goods along the Northern Sea Route (NSR) to China.
7. UAVs assist in monitoring maritime traffic, helping Russian vessels avoid collisions with other ships or icebergs.
8. UAVs provide real-time data that supports navigation through the challenging Arctic waters of the NSR.

→ VOCABULARY

5. Match the two columns to make word combinations. You may base on information in the record.

- 1)collect
- 2)ensures
- 3)identify
- 4)impact
- 5)monitor
- 6)prevent
- 7)track

- a)collisions
- b)crucial real-time data to support navigation
- c)effective communication and coordination
- d)maritime operations.
- e)movement of ice
- f)potential hazards
- g)weather patterns

6. Fill in the gaps, using the words from exercise 5.

1. Drones are equipped with sensors that _____ in challenging environments.
2. Airlines rely on meteorologists _____ and adjust flight schedules accordingly.
3. Weather conditions can _____ and aviation safety simultaneously.
4. Air traffic controllers are trained _____ in real-time to prevent mid-air collisions.
5. The Traffic Collision Avoidance System (TCAS) is designed _____ by providing pilots with timely alerts about nearby aircraft.
6. Ground crews use advanced radar systems _____ on runways and taxiways during winter operations.
7. During emergency situations, it is crucial for all team members _____ to manage the crisis efficiently.

→ SPEAKING

Debate on Future Trends

- *How will advancements in drone technology affect shipping efficiency?*
- *What are the advantages and disadvantages of using drones for real-time ice monitoring and route optimization compared to conventional navigation techniques?*
- *What are the potential geopolitical implications of increased trade via the NSR?*
- *How might climate change impact the navigability of these routes and the technologies used?*



Speech patterns

Key Tips for Effective Debating

Opening the Debate

- *Ladies and Gentlemen, welcome to this debate.*
- *The motion for debate today is...*

Presenting Arguments

- *The most important argument for... is...*
- *Firstly, I'd like to state...*

Conceding an Argument

- *It's true that... However, we must consider...*
- *While you might say that..., it's important to remember that...*

Sequencing Arguments

- *The second argument in favor of... is...*
- *To begin with,...*

Adding Supporting Arguments

- *In addition to that,...*
- *Moreover,...*

Concluding

- *To sum up,...*
- *In a nutshell, what I am trying to say is...*

Rebuttals

- *My opponent said..., however...*
- *He/She was claiming that..., but as my first speaker already told you,...*

Revise the grammar rules of the Present Perfect, the Future Perfect and the Past Simple in Active/Passive Voice

1. Read the text. Open the brackets using the correct form of the Present Perfect or the Past Simple in Active or Passive Voice.

The Role of Aerospace Technologies

Aerospace technologies _____ (to play) a significant role in addressing environmental problems, particularly in combating global warming. In the past, researchers _____ (to develop) airborne greenhouse gas analyzers that _____ (to monitor) CO₂ levels and other emissions. These analyzers _____ (to help) scientists understand the impact of carbon emissions on the global ecosystem.

Satellite imagery _____ (to utilize) to assess forest loss and changes in land use, providing critical data for environmental management. UAV absorption systems _____ (to implement) to collect multi-spectral data, which facilitated more effective water management strategies. This technology _____ (to allow) for the identification of areas requiring intervention and the tracking of changes over time. By shifting away from fossil fuels to environmentally friendly materials, the aerospace industry _____ (to aim) to reduce its carbon footprint. Sustainable Aviation Fuels (SAFs) _____ (to research) and _____ (to develop), which significantly _____ (to lower) carbon emissions compared to traditional fuels. The advancements in these technologies _____ (to demonstrate) a proactive approach to mitigating the effects of aviation on climate change. Overall, the application of aerospace technologies _____ (to contribute) to a better understanding of environmental challenges and _____ (provide) tools to combat global warming effectively.

2. Read the fragment of the text about the advancements in aerospace industry. Open the brackets using the correct word formation.

Aerospace technologies are expected to undergo significant advancements in the coming years, driven by various breakthrough technologies. By 2030, _____ (innovation) compounds will have been developed to enhance the _____ (perform) of high-temperature alloys used in aircraft engines. Artificial intelligence (AI) _____ (integration) into flight systems, allowing for improved decision-making and _____ (operate) efficiency. The adoption of 3D printing will have revolutionize the manufacturing process, enabling the production of complex components on-demand, thus _____ (reduction) waste and costs.

Digital _____ (transform) will have reshaped the aerospace industry, leading to the widespread use of electric propulsion systems powered by environmentally friendly fuels. By this time, space tourism will have become a viable _____ (industrial), with numerous companies offering commercial flights to low Earth orbit.

Visual data will have been enhanced through augmented reality (AR) and virtual reality (VR) applications, _____ (provide) immersive training experiences for pilots and engineers. Furthermore, advancements in bioengineering _____ (to contribute) to the development of sustainable materials and systems that support the health and safety of both crew and passengers in aerospace environments.

Revise the grammar rules of Comparative and Superlative degrees of adjectives and adverbs

3. Transform the adjectives and adverbs in brackets using Comparative and Superlative forms.

- Satellites monitor the changes of the soil degradation, radiation temperature, ocean surface _____ (well) than the ground-based devices.
- Laser sensors and image spectrometers can be used _____ (well) of all.
- Today, the aero tracking of dangerous industrial waste is _____ (professional) than it used to be.
- Farmland mapping via UAV is one of the _____ (good) technological innovations.
- High-resolution remote images help environmentalists monitor water pollution with nitrogen _____ (fast) and _____ (efficiently) than before.
- Starship uses one of the _____ (environmentally) friendly propellant combinations available.

4. Complete the sentences using Comparative and Superlative forms of the adjective in brackets.

- Why do environmental satellites and radiosondes measure the _____ and the _____ (high / low) temperature of the atmosphere? It is done to control global warming.

- How often do scientists use greenhouse gas analyzers that detect emissions from vehicles and factories? They do it _____ (regularly) than before to detect _____ (strong) greenhouse gas emissions.
- What are the _____ (bad) impact by global soil erosion and cement manufacturing? UAV mounted absorption systems show that global ecosystem has been destroyed _____ (fast) than in the 20th century.

→ BUSINESS ENGLISH

1. Look at the basic guidelines for CV writing. Use the words from the box to complete the guide.

achievements / applying for / relevant / employment / background / core / references

A CV is a short list of facts about you and your work history, _____, qualifications and experience. A good CV is essential when looking for work. This is especially the case when there is a large number of people _____ the same job.

Your CV should be accurate, positive, with _____ structural components. It should include personal details, _____ history, educational _____, _____ skills relevant to your position, _____ from the previous jobs, , your interests and hobbies.

2. There are core (soft) skills and qualities you need to succeed as an aerospace engineer. Match the key skills to the example of professional experience.

*Ability to work under pressure
Analytical skills
Communication skill
Creative and innovative thinking
Problem-solving skills
Team working skill
Time management skill*

1. _____	<ul style="list-style-type: none"> <i>I am good at identifying problem, analyzing answers.</i> <i>I can make effective decisions.</i>
2. _____	<ul style="list-style-type: none"> <i>I am good at data analysis.</i> <i>I am excellent at interpreting information to see the cause and the reason.</i>
3. _____	<ul style="list-style-type: none"> <i>I am good at formulating new ideas to solve problem.</i> <i>I can think ahead and find the alternative ways of getting things done.</i>
4. _____	<ul style="list-style-type: none"> <i>I am good at working cooperatively.</i> <i>I am able to cooperate with a team to achieve shared goals.</i>
5. _____	<ul style="list-style-type: none"> <i>I am able to deliver projects on time and meet all necessary deadlines.</i>
6. _____	<ul style="list-style-type: none"> <i>I can manage stress and stay calm and focused.</i>
7. _____	<ul style="list-style-type: none"> <i>I am able to cooperate with others. I am able to convince and gain support from others. I am a good listener.</i>

3. Write your ideas of professional behavior for the soft skills given below. Use the speech patterns indicated in the table above. Consult the dictionary, if necessary.

Leadership skill: I am able to be in charge of teams, projects. I am excellent at delegating tasks to the others.

Organizational skill:

Critical thinking skill:

Research skill:

4. Work in pairs. Tell each other which of the skills from exercises 2 or 3 you are developing at your university. Provide the examples that might demonstrate these skills.

Use the speech patterns and the vocabulary of the unit:

Speech patterns

- I'm responsible for*
- I'm in charge of*
- I'm able to handle*
- I'm good (excellent) at*
- I'm involved in*

Example:

As a monitor of the group I am developing both organizational, communication and leadership skills. I'm in charge of organizing and managing various events. I'm responsible for solving problems related to the educational process. I am able to convince and gain support from others.

The Difference Between Hard Skills vs. Soft Skills

Hard Skills

Hard skills refer to technical skills or abilities that can be quantified or measured.

- Examples of hard skills are:
- Software proficiency
 - Speaking a second language
 - Programming skills
 - Degree or certification
 - Machine operation



Soft Skills

Soft skills focus more on your social ability and how you relate with other people.

- Examples of soft skills are:
- Communication
 - Flexibility
 - Leadership
 - Collaboration
 - Teamwork



5. Analyze different skills, abilities and basic knowledge of a qualified aerospace engineer. Group them into two categories:

- **HARD SKILLS** (job-related knowledge and abilities relevant to an engineer's position);
 - **SOFT SKILLS** (general characteristics of personal traits).
- Proficiency in CAD software such as SolidWorks and CATIA
 - Strong decision making.
 - Knowledge of design techniques, tools, and principles involved in aircraft production
 - Critical thinking
 - Knowledge of aircraft and spacecraft systems
 - Fluency in Russian, English and German
 - Strong problem-solving skills
 - Ability to work under pressure
 - Knowledge of machine and tools used in Aerospace engineering
 - Analyzing the manufacturing technology and structure design.

6. Study some more examples of hard skills. What knowledge/ hard skills are you able to develop as a student of an aerospace university? Use the list given below or above in exercise 5, otherwise work out skills that relate to your speciality. Rely on the speech patterns in exercise 4.

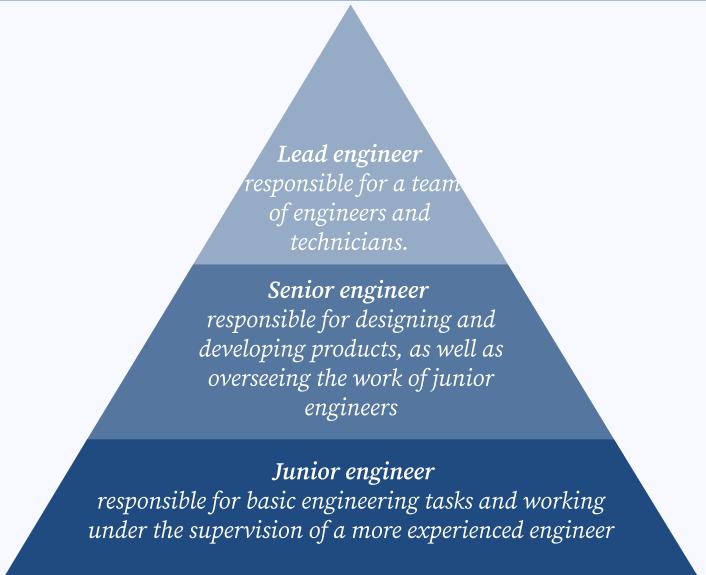
- Designing, developing, and testing a variety of power plants.
- Knowledge of applications and programming in the aerospace industry
- Proficiency in MS Office Suite, Solidworks, AutoCAD/Autodesk, MATLAB, Python.
- Knowledge of advanced aerospace engineering technologies.

→ WRITING

7. Study a list of soft skills that an engineer is recommended to have.

<i>organizational</i>	<i>self-presentation</i>
<i>coaching and mentoring</i>	<i>emotional intelligence</i>
<i>interpersonal</i>	<i>public speaking</i>
<i>managing other people's stress</i>	<i>conflict management</i>
<i>active listening</i>	<i>decision-making</i>
<i>planning and control</i>	<i>teamwork</i>
<i>creativity</i>	<i>time-management</i>
<i>goals setting</i>	<i>critical thinking</i>
<i>communication</i>	<i>problem-solving</i>
<i>team building</i>	<i>project management</i>
<i>negotiation</i>	<i>work ethic</i>
<i>leadership</i>	<i>strategic thinking</i>
<i>resilience</i>	<i>writing</i>

8. Work in a group of 2 or 4. Discuss the soft skills given in exercise 1 to make sure you know the meaning of each, then draw a pyramid of soft skills by relocating them into 3 sections (you can use one skill in two or three sections of the pyramid at the same time) according to the job hierarchy most engineering companies follow:



9. Refer to the Vladislav Zhukov's CV given in Unit 2 (p. 28). Write the section "Core skills" of your CV as if you are a university graduate and a candidate for a position of a large aerospace company. Include your soft and hard skills. Make use of the vocabulary of the Unit 3 and Unit 2.

10. Read the Recommendation Letter for Vladislav's teamwork skills, then write a recommendation letter with a focus on his leadership, communication, problem-solving or other soft skills. It is important to:

- Highlight the soft skills he possesses that are relevant to the position this skills are applying for.
- Explain the specific examples of how Vladislav demonstrated his soft skills.

Dear Hiring Manager,
I am writing this letter to recommend Vladislav Zhukov for the position of Senior Engineer at your company. Vladislav has exceptional teamwork skills, which make him a great fit for this role. During his time at our company, Vladislav was responsible for leading a team of developers and designers. He was able to create a collaborative environment where everyone was able to contribute their ideas. Vladislav also has great conflict management skills, which helped our team overcome obstacles and deliver projects on time. I highly recommend Vladislav for the Senior Engineer position. Please feel free to contact me if you have any questions.

Sincerely,
Anna Volnova

→ REVISION

1. Complete the sentences with the ecological terms, beginning with the letter given.

1. W_____ t_____ is crucial for maintaining clean environments in aerospace manufacturing facilities.
2. The c_____ f_____ of aviation is a growing concern as air travel increases worldwide.
3. Planet c_____ by satellites allows for real-time monitoring of environmental changes.
4. Carbon d_____ d_____ are essential for measuring emissions in aircraft and ground operations.
5. The aerospace industry is shifting towards l_____ and z_____ carbon technologies to reduce its impact on climate change.
6. The i_____ s_____ are utilized in satellite systems to detect temperature variations on Earth's surface.
7. S_____ i_____ provides valuable data for environmental assessments and disaster response efforts.
8. The reliance on f_____ f_____ in aviation significantly contributes to global carbon emissions.
9. An environmental a_____ is often required before launching new aerospace projects to evaluate potential impacts.
10. Efforts to reduce c_____ e_____ include the adoption of sustainable aviation fuels and improved aerodynamics.

2. Rearrange the letters in italics to form a word to complete the sentences.

1. It is vital to _____ (*fytien*) potential hazards in aviation environments.
2. The environmental _____ (*itmcap*) of aviation emissions is a growing concern.
3. We must _____ (*motorni*) weather patterns to enhance flight safety.
4. Strategies are implemented to _____ (*venpret*) collisions between aircraft.
5. Technologies are developed to _____ (*cktar*) the movement of ice in flight paths.
6. Organizations must _____ (*locelct*) data on maritime operations for better environmental management.
7. Collaboration _____ (*nesuers*) effective responses to aviation-related environmental issues.

3. Underline the correct word(s) in bold in each sentence.

Aerospace operations have a **significant/non-significant** effect on the environment, making it essential to implement effective wastewater treatment **industries/systems**. They are vital for lowering the carbon footprint **linked to/ collected** manufacturing processes. The industry is increasingly prioritizing low and zero carbon technologies to cut down on carbon emissions.

To monitor **emissions/weather** in real-time, advanced infrared sensors and carbon dioxide detectors are being used. Additionally, satellite imagery plays a key role in **evaluating/tracking** land use and environmental changes caused by aerospace activities. Conducting thorough environmental **assessments/treatments** is important for meeting regulatory requirements. While fossil **exhausts/fuels** are still widely used, there is a growing movement towards sustainable practices to lessen environmental impacts

4. Complete the advert with the words in box.

problem-solving / analytical / core, communication / fast-paced / teamworking / innovative / fresh

Join a dynamic team as an Avionics Engineer! We are seeking _____ professionals who excel in _____ and analytical thinking. Your role will involve designing, testing, and maintaining avionics systems, ensuring the highest safety and performance standards.

Key Requirements:

Problem-Solving Skills: Ability to troubleshoot complex issues efficiently.

_____ Skills: Strong capability to interpret data and make informed decisions.

Creative and Innovative Thinking: Bring _____ ideas to enhance avionics technology.

_____ Skills: Collaborate effectively with engineers and technicians.

Time Management Skills: Prioritize tasks to meet project deadlines.

_____ Skills: Clearly convey technical information to diverse teams.

Ability to Work Under Pressure: Maintain composure in _____ environments.

If you have relevant achievements in avionics or aerospace engineering, a strong educational background, and the _____ skills listed above, we want to hear from you! Apply today for a rewarding career that pushes the boundaries of aviation technology.



Ivan



Angelina



Nikita



Viktoria

1. Before reading the dialog study several idioms and colloquial expressions that enhance its informal tone and humor.

Glossary

- ✓ **Every little bit helps** - This expression emphasizes that even small contributions can make a significant difference in achieving a larger goal, in this case, being eco-friendly.
- ✓ **No-brainer** - This colloquial term refers to a decision or action that is obvious or easy to understand, suggesting that using reusable bags is a straightforward choice for sustainability.
- ✓ **Small change, big difference** - This phrase conveys the idea that minor adjustments in behavior can lead to substantial positive outcomes, particularly regarding environmental impact.
- ✓ **Keeping an eye on** - This expression means to monitor or pay attention to something. In the context of the dialogue, it refers to being mindful of energy usage.
- ✓ **A ton of energy** - This informal phrase is used to indicate a large amount of energy, suggesting that turning off lights and electronics can lead to significant energy savings.
- ✓ **All for it** - This phrase indicates strong support for an idea or proposal—in this case, biking to class.
- ✓ **Beats sitting in traffic** - This colloquial expression implies that biking is a more favorable option compared to the frustration of being stuck in traffic.
- ✓ **Talk the talk; walk the walk** - This idiom contrasts merely discussing intentions with taking action. It emphasizes the importance of following through on commitments to sustainability.
- ✓ **Make a real impact** - This expression signifies the ability to create significant change or effects through collective efforts.

2. Act out the conversation about eco-friendliness and sustainability, emphasizing tone and body language to convey informality the dialog and fill in gaps.

Angelina

Hey Alex, have you thought about how we can be more eco-friendly this semester?

Nikita

For sure! I've started bringing my own reusable bags to the grocery store. It's a no-brainer!

Angelina

That's awesome! I've also been using a refillable water bottle instead of buying bottled water. It's a small change, but it makes a big difference.

Nikita

Nice! I read somewhere that turning off lights and electronics can save a ton of energy. We should all be on board with that.

Angelina

Speaking of saving energy, have you guys tried biking to university? It's a great way to stay fit and reduce our carbon footprint!

Nikita

Right? And if we can get more people to join in, we could even organize a bike-to-university day.

Angelina

That would be great! Let's spread the word and see if we can get our classmates involved.

Angelina

Absolutely! Together, we can make a real impact. Let's keep pushing each other to be more sustainable!

3. Before listening to Victoria's blog match the idioms in the box and definitions.

- An absolute blast
- Right from the get-go
- Super chill
- Dirt under my nails
- Jump on it!
- Big team effort

Ivan

Totally! I've been trying to cut down on single-use plastics. You know, every little bit helps, right?

Ivan

Exactly! And I've been keeping an eye on my energy use at home. I switched to LED bulbs and unplug devices when I'm not using them.

Ivan

I'm all for it! Plus, it beats sitting in traffic

Ivan

Sounds like a plan! Let's not just talk the talk; we need to walk the walk too.

1. _____ Very relaxed or easygoing; a laid-back atmosphere.
2. _____ A very enjoyable and fun experience.
3. _____ A metaphor for having engaged in hard work, particularly outdoor or manual labor.
4. _____ From the very beginning; immediately.
5. _____ To take advantage of an opportunity quickly or enthusiastically.
6. _____ A collaborative endeavor where everyone contributes towards a common goal.

4. Listen to the record and choose the best title for Victoria's blog message.



- Eco-projects: A good start makes a good finish.
- Planting trees: A hard but an enjoyable activity.
- Eco- volunteering: A perfect way to be a part of the big team effort and get an unforgettable experience.

5. Listen to the record again and answer the questions.

1. What was the eco-project objective?
2. Why did Victoria enjoy the activity from the very beginning?
3. What struck Victoria most while doing eco-volunteering work?
4. What is so beneficial about volunteering? Why should one try doing volunteering according to Victoria?
5. What is a “tree buddy” project? (surf the net to find the answer)

6. Match the words in the left column with the synonyms in the right column.

Word	Synonym
a. Blast	1. Relaxed
b. Enthusiasm	2. Delight
c. Chill	3. Eagerness
d. Connection	4. Bond
e. Incredible	5. Amazing
f. Joy	6. Purposeful
g. Meaningful	7. Pleasure

7. Match the words in the left column with the antonyms in the right column.

Word	Antonyms
a. Blast	1. Dullness
b. Enthusiasm	2. Indifference
c. Chill	3. Tense
d. Connection	4. Alienation
e. Incredible	5. Unexpressive
f. Joy	6. Sad
g. Meaningful	7. Trivial

→ SPEAKING

In small groups discuss the following Eco-Friendly Initiatives:

Sustainable Transportation

- **Biking and Walking:** Anna suggests biking to class as a way to stay fit and reduce carbon emissions. This topic can lead to discussions about the benefits of cycling over driving, including health benefits and reduced traffic congestion
- **Carpooling and Public Transport:** The idea of organizing a bike-to-school day could expand into broader discussions about carpooling and using public transport as sustainable transportation options

Community Engagement

- **Organizing Eco-Friendly Initiatives:** The group expresses interest in involving classmates in sustainability efforts, highlighting the importance of community action in promoting eco-friendly practices.

This could include forming or joining environmental clubs on campus.

- **Advocacy for Sustainable Choices:** They discuss influencing peers to adopt sustainable habits, showcasing how collective efforts can amplify individual actions toward environmental conservation.

Creative Extension

Task: Write a short paragraph describing your own experience with volunteering or a similar activity, using at least three vocabulary words from the original text.

These tasks encourage deeper engagement with the text while enhancing vocabulary and comprehension skills!

Audio Scripts for the Units

Unit 1 Pronunciation Reading 1.1

Launch vehicle, UAV, scientific discovery, to explore galaxies, module, satellite, to focus on the study, assembly control, propulsion system, to withstand loads, twisting, compression, bending, to solve problems, structural integrity, aircraft components.

Unit 1 Pronunciation Reading 1.2

Flight mechanics, to get a bachelor degree, intensive workshops, principal manufacturer, Thermodynamics and heat transfer, CAD software system, join company, to accept into the project, to be capable of leading projects, satellite navigation, Ballistics of space flight, constructive approaches, technological solutions

Unit 1 Listening 1.1

Hi! My name is Alexander. I work as a design engineer at a large aviation company. Every day is different from any other – this is due to the different nature of the tasks at work.

Usually it is necessary to develop one or another aircraft unit or component; sometimes it is necessary to improve the existing ones.

Firstly, I find all the available data about the loads acting on this component; analyze its structure and manufacturing technology.

Secondly, I begin the most interesting and exciting part – the design. I can create here. But I have to follow certain principles. The design should be technologically advanced and as simple and cheap as possible. I am looking for an optimal solution to the problem. During this process, I select two or three design options, and finally I choose the optimal one. The improvements of functional properties and parameters often can lead to an increase in the weight of this part, but we shouldn't exceed these limits.

Finally, the last stage is the design documentation. All design engineers must know a large number of such documents. It is impossible to know everything by heart, but every designer should have a guideline to find the document which will contain the answer. This approach allows us to maintain the safety and reliability of aircraft at a high level.

In conclusion, I can say that the work of an aircraft design engineer is a combination of creativity and strict rules. Despite this, I find my profession very interesting.

Unit 1 Listening 1.2

My name is Roman and I am currently employed as a structural engineer in an aerospace company.

A space rocket is an incredible vehicle, which is designed by thousands of people from different parts of our country, so we need different skills and professional knowledge. Let me give you a general idea of my work.

In my department I must form a physical design of a component basing on initial configuration and preliminary strength calculations. These two are main sources of information, which allows us to define the shapes and dimensions of necessary component.

When we finish the draft design it is necessary to choose the materials and analyze the manufacturing process.

The main goal here is to use cheaper materials and minimize the labor. Then we should find standard fasteners, which meet our demands, and if there are none, we must design non-standard ones.

The result of this process is the systematized package of drawings, data sheets and instruction papers, usually supported by a CAD model.

The design of our component must fit the surrounding components and initial design specification. If all the checks are passed with the positive result, the design data package is considered approved and stored in archive.

Copies of the papers are later sent to production and test specialists.

Now these processes take half of working time. The rest is mostly coffee and small talks.

Unit 2 Pronunciation Reading 2.1

Breakthrough technology, innovative compounds, artificial intelligence (AI), high temperature alloys, 3D printing, digital transformation, electric propulsion systems, environmentally friendly fuels, space tourism, visual data, augmented reality (AR), virtual reality (VR), bioengineering.

Unit 2 Listening 2.1

Good morning guys, my name is Hans, and I'm one of the managers of Airbus, here, in Hamburg. Let me tell you about the role of robots in Airbus assembly process. Airbus has been actively introducing robots into its assembly process to improve efficiency, quality, and safety. So, Airbus has automated its fuselage production process, particularly for the A320 family. Now, the Hamburg facility features 20 robots, a new logistics concept, automated positioning by laser measurement, and a digital data acquisition system.

Also, the assembly lines use various robots, such as the Flextrack, which consists of eight robots that drill holes in fuselage sections. Additionally, 12 seven-axis robots from KUKA are used to attach center and aft fuselage sections with the tail.

As a result, the automated system is expected to increase productivity by 20% to 30% and improve quality standards. It also allows for better ergonomics and reduced lead times.

While some tasks are automated, the introduction of robots has also led to job transformation. Operators who were previously responsible for drilling now manage the robots, ensuring safer and more ergonomically comfortable working conditions.

The automated assembly lines are integrated with digital tools, including a digital twin of the production line, which collects data for analysis via multiple sensors. This improves the efficiency and quality of the manufacturing process.

Airbus plans to increase the use of robots across its assembly lines, including on final assembly lines.

The company will continue improving efficiency, quality, and safety through the strategic integration of robotics.

It seems to me, that's all! Thank you for attention!

Unit 2 Pronunciation Reading 2.1

Vocabulary and Pronunciation

<i>challenging task</i>	<i>high-strength components</i>
<i>additive technologies</i>	<i>reduce the risk</i>
<i>innovative composites</i>	<i>bioprinting in space</i>
<i>molding</i>	<i>airworthiness</i>
<i>thermoforming</i>	<i>reinforced polymers</i>

Unit 2 Listening 2.2

Nanomaterials are revolutionizing the aerospace industry by enabling the development of stronger, lighter, and more durable materials for aircraft and spacecraft. Some key applications of nanomaterials in aerospace include:

Nanocomposites

Incorporating nanomaterials like carbon nanotubes into traditional aerospace materials such as polymers, metals, and ceramics significantly improves their mechanical properties. It can provide increased strength and thermal stability. For example, epoxy/clay nanocomposites provide a high-performance, lightweight alternative to titanium oxide for aviation fuel tanks.

Nanostructured Metals

Nanostructured metals show considerably improved properties compared to their conventional counterparts. Key advantages include higher corrosion resistance, and a lower density to reduce structural weight.

Nanostructured titanium-nickel alloys exhibit extraordinary super elasticity.

Nano coatings

Nano coatings are used to increase the durability of aerospace metals. Magnesium alloys, which are much lighter than steel or aluminum but sensitive to corrosion, can be protected with Nano coatings of silicon oxides or boron oxides. Nano coatings are also applied to mechanical components to enhance wear resistance. The integration of nanomaterials into aerospace components not only make technical performance better but also promotes environmental issues by reducing fuel consumption and emissions. As research progresses, the continued development of nanotechnology promises to further expand the capabilities and reduce the ecological impact of aerospace industry.

Unit 3 Pronunciation Reading 3.1

Environmental problems, global warming, CO₂ level monitoring, carbon emissions, airborne greenhouse gas analyzers, satellite imagery, UAV absorption systems, multi-spectral data, forest loss, shift away from fossil fuels to environmentally friendly materials, water management, global ecosystem, renewable energy

Unit 3 Listening 3.1

Aerospace technologies are being developed to address various environmental challenges in the aviation sector. These innovations focus on reducing the industry's carbon footprint, noise pollution, and energy consumption:

Let's analyze some projects and ideas.

Projects like "Flying Air Traffic Management" aim to optimize aircraft trajectories to identify environmental hotspots and optimize flight paths for reduced emissions, I mean to minimize CO₂ and non-CO₂ emissions, considering both economic and environmental factors.

Also, the development of sustainable aviation fuels (SAFs) and alternative energy sources like hydrogen and solar power is crucial for reducing emissions. For example, the Solar Impulse aircraft used solar panels to generate electricity during its flight to improve efficiency, fuel range, and performance, reducing greenhouse gas emissions.

Another example is reusable spacecraft like Falcon 9 or Blue Origin's New Shepard, they can reduce waste generation and minimize the environmental impact of manufacturing and disposal. The Falcon 9's first stage is designed to land vertically after launching payloads into space. Blue Origin's New Shepard, which is designed for suborbital space tourism. The vehicle is capable of vertical takeoff and landing, allowing it to be reused for multiple flights.

Don't forget that optimizing aircraft designs for better fuel efficiency and reducing weight can significantly lower emissions. This includes improvements in engine designs, aerodynamic designs, and the use of lightweight materials. And finally, digitizing air travel management and leveraging advanced technologies like artificial intelligence can simplify flight path prediction, optimize fleet utilization, and minimize carbon footprints.

These eco-friendly aerospace technologies have the potential to improve environmental sustainability, operational efficiencies, and cost savings for airlines, contributing to a more sustainable aviation sector.

Unit 3 Listening 3.2

Vocabulary and Pronunciation

- *ecological problems*
- *(advanced) environmental protection*
- *(scale of) plastic pollution*
- *to conduct*
- *wastewater treatment*
- *to monitor (water nitrogen) pollution*
- *machine learning*
- *to collect (real time) data*
- *high-resolution images*

The use of UAVs (drones) and satellites significantly enhances the operational capabilities of Russian trade vessels navigating the Northern Sea Route to deliver goods to China or India. UAVs provide crucial real-time data that supports the navigation through the challenging Arctic waters of the Northern Sea Route. Drones can be deployed for the assessment of ice conditions, weather patterns, and potential hazards along the route. Additionally, UAVs can assist in monitoring maritime traffic, ensuring that Russian vessels avoid potential collisions with other ships or icebergs. The use of drones equipped with advanced imaging and sensing technology enables operators to make informed decisions about routing and speed adjustments, thereby enhancing safety and efficiency in cargo delivery. Satellites play a vital role in providing the necessary communication infrastructure for UAV operations. They enable real-time data transmission between drones and maritime vessels. Moreover, satellite imagery can be used to track the movement of ice and other maritime conditions, which is essential for planning the safest and most efficient routes. This capability is aiming to optimize journeys to China, as it helps in avoiding areas with heavy ice or adverse weather. The integration of UAVs and satellite technology into the operations of Russian trade vessels navigating the Northern Sea Route enhances their ability to deliver goods to China efficiently and safely. Drones provide vital surveillance and navigation support, while satellite communications ensure real-time data exchange and operational coordination.

Unit 1 Victoria's blog

Hey there, fellow enthusiasts! It's Victoria here, and today I want to share some tips on how to survive your lab work at our university. Trust me, I've been there, and I know it can be a bit daunting at first. So, grab a cup of tea, sit back, and let's dive into my five golden nuggets for lab success!

So, teamwork makes the dream work! Find a lab partner you vibe with. I remember my first lab session; I was so nervous until I teamed up with Alex. We ended up cracking jokes and learning tons together!

Please, Stay Organized! Keep your workspace tidy. Seriously, a cluttered desk leads to a cluttered mind. Use folders for your notes and label everything. I learned this the hard way when I couldn't find my experiment notes right before a big presentation!

Don't be shy about asking questions—no one expects you to know everything! Your professors and lab assistants are there to help you, even if sometimes they don't look so! I used to think asking questions would make me look clueless, but it actually showed my eagerness to learn.

Remember to take short breaks during your lab sessions. Grab a snack or take a quick stroll outside. I often found that my best ideas came to me after a little breather!

Finally, mistakes are part of the learning process, learn from it. I once mixed up two chemicals and ended up with a colorful explosion (don't worry, it was harmless!). It turned out to be a great learning experience that helped me understand chemical reactions better.

Keep these in mind, and you'll do just fine. Happy experimenting!

Unit 2 Victoria's blog

So, guys! Operating a drone in the university lab was quite the adventure! Picture this: I walk into the lab, and there they are—drones, all lined up like eager puppies ready to take off.

I was buzzing with excitement. The instructor gave us a quick rundown, but honestly, my mind was racing faster than a drone on full throttle.

When it was my turn to fly, I felt like a kid on Christmas morning. I hit the throttle and—whoosh! The drone shot up like a rocket. It felt like trying to steer a wild horse! I quickly pulled back on the controls, praying it wouldn't crash into the wall. Thankfully, it leveled out just in time.

At one point, I got so caught up in trying to impress my classmates that I accidentally sent the drone zooming straight towards the ceiling. It almost collided with a ceiling light fixture. The sound of it buzzing and my classmates gasping was priceless. I froze, thinking, "Is this how my drone career ends?" Thankfully, it just hovered there, and we all burst into laughter.

The instructor kept saying, "Practice makes perfect"! Each flight was like riding a bike—except this bike could fly and had a mind of its own. By the end of the session, I felt like a pro (well, sort of). It's true what they say: you never forget your first flight! Can't wait for round two!

Unit 3 Victoria's blog

I recently had the chance to dive into some eco-volunteering, and let me tell you, it was an absolute blast! Picture this: a sunny Saturday morning, a group of us gathered at the local park, armed with shovels and a whole lot of enthusiasm. We were there to plant trees, which honestly felt like a mini-adventure in itself.

Right from the get-go, the vibe was super chill. One of the volunteers even brought snacks—because what's better than planting trees? Planting trees with cookies!

As we got our hands dirty, I couldn't help but feel a sense of connection—not just to the earth but to everyone around me. It was like we were all part of this big team effort, working together for something bigger than ourselves.

After a few hours of hard work (and maybe a bit of sunburn), we took a break. We were all strangers at first, but by the end of the day, it felt like we'd known each other forever.

I left that day not just with dirt under my nails but also with a heart full of joy. Knowing that I had contributed to something meaningful felt incredible. If you ever get the chance to volunteer for an eco-project, jump on it! Grab some friends or even go solo—either way, you'll walk away with some great memories and maybe even a new tree buddy!

Additional information about the authors of citations for the units

Unit 1. Steven Paul Jobs

(February 24, 1955 – October 5, 2011) was an American businessman, inventor, and investor best known for co-founding the technology company Apple Inc. Jobs was also the founder of NeXT and chairman and majority shareholder of Pixar. He was a pioneer of the personal computer revolution of the 1970s and 1980s, along with his early business partner and fellow Apple co-founder Steve Wozniak.

Unit 2. Alan Curtis Kay

(born May 17, 1940) is an American computer scientist best known for his pioneering work on object-oriented programming and windowing graphical user interface (GUI) design. At Xerox PARC he led the design and development of the first modern windowed computer desktop interface. There he also led the development of the influential object-oriented programming language Smalltalk, both personally designing most of the early versions of the language and coining the term "object oriented." He has been elected a Fellow of the America Academy of Arts and Sciences, the National Academy of Engineering, and the Royal Society of Arts. He received the Turing award in 2003.

Unit 3. Robert Charles Swan

OBE, FRGS (born 28 July 1956) is the first person to walk to both poles. He is currently an advocate for the protection of Antarctica and renewable energy. Swan is also the founder of 2041, a company which is dedicated to the preservation of the Antarctic and the author with Gil Reavill of Antarctica 2041: My Quest to Save the Earth's Last Wilderness. In November 2017, Swan undertook the South Pole Energy Challenge, the first expedition of its kind: a 600-mile journey to the South Pole with his son, surviving solely using renewable energy

Unit 1

<i>Word/Phrase</i>	<i>Part of the Speech</i>	<i>Transcription</i>	<i>Definition</i>	<i>Sample Sentence</i>
1. <i>advanced</i>	<i>adjective</i>	əd'va:nst	<i>having the most modern and recently developed ideas, methods, etc.</i>	<i>Scientists are working on highly advanced technology to replace fossil fuels.</i>
2. <i>aeronautical</i>	<i>adjective</i>	,eərə'nɔ:tikl	<i>connected with the science or practice of building and flying aircraft</i>	<i>The aeronautical engineer designs aircraft.</i>
3. <i>aerospace</i>	<i>noun</i>	'eərəʊspɛs	<i>the industry of building aircraft, vehicles and equipment to be sent into space</i>	<i>Aerospace technology improves flight safety.</i>
4. <i>aircraft</i>	<i>noun</i>	'eəkra:fɪt	<i>any vehicle that can fly and carry goods or passengers</i>	<i>We operate a fleet of six aircraft.</i>
5. <i>Algebra</i>	<i>noun</i>	'ældʒɪbrə	<i>a type of mathematics in which letters and symbols are used to represent quantities</i>	<i>Algebra is used to calculate flight paths.</i>
6. <i>applicant</i>	<i>noun</i>	'æplɪkənt	<i>a person who makes a formal request for something (= applies for it), especially for a job, a place at a college or university, etc.</i>	<i>There were over 500 applicants for the job.</i>
7. <i>archive</i>	<i>noun</i>	'a:kɑrv	<i>a collection of historical documents or records of a government, a family, a place or an organization; the place where these records are stored</i>	<i>The BBC's archives are bulging with material.</i>

1 Wordlists

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
8. assembly	noun	ə'sembli	<i>the process of putting together the parts of something such as a vehicle or piece of furniture</i>	<i>Putting the bookcase together should be a simple assembly job.</i>
9. assembly line	noun+ noun	ə'sembli laɪn	<i>a line of workers and machines in a factory, along which a product passes, having parts made, put together or checked at each stage until the product is finished</i>	<i>The assembly line speeds up aircraft production.</i>
10. available	adjective	ə'veiləbl	<i>that you can get, buy or find</i>	<i>We have plenty of office space available.</i>
11. background	noun	'bækgraʊnd	<i>the details of a person's family, education, experience, etc.</i>	<i>The job would suit someone with a business background.</i>
12. Ballistics	noun	bə'listikəs	<i>the scientific study of things that are shot or fired through the air, such as bullets and missiles</i>	<i>Ballistics studies the behavior of projectiles.</i>
13. bend	verb	bend	<i>to lean, or make something lean, in a particular direction</i>	<i>He bent forward to pick up the package.</i>
14. blueprint	noun	'blu:print	<i>print of a plan for a building or a machine, with white lines on a blue background</i>	<i>The blueprint shows the aircraft's design.</i>
15. calculation	noun	,kælkju'leɪʃn	<i>the act or process of using numbers to find out an amount</i>	<i>Our guess was confirmed by calculation.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
16. candidate	noun	'kændɪdæt, 'kændɪdeɪt	<i>a person who is trying to be elected or is applying for a job</i>	<i>He is the best candidate for the job.</i>
17. certify	verb	'sɜ:tifai	<i>to state officially, especially in writing, that something is true</i>	<i>The plants must be certified to be virus free.</i>
18. component	noun	kəm'pənənt	<i>one of several parts that combine together to make a system, machine or substance</i>	<i>In the mid-1990s, Japan held more than 50% of the market for computer components.</i>
19. compression	noun	kəm'preʃn	<i>the act of pressing things together or pressing something into a smaller space</i>	<i>Compression increases engine efficiency.</i>
20. conduct	verb	kən'dʌkt	<i>to organize and/or do a particular activity</i>	<i>There are concerns about the way in which the firm conducts its activities.</i>
21. configuration	noun	kənfiɡə'reiʃn	<i>an arrangement of the parts of something or a group of things; the form or shape that this arrangement produces</i>	<i>The stars seemed to appear in a different configuration.</i>
22. contain	verb	kən'teɪn	<i>if something contains something else, it has that thing inside it or as part of it</i>	<i>Fuel tanks must contain enough fuel for the journey.</i>
23. creativity	noun	,kri:ei'trəviti	<i>the use of skill and imagination to produce something new or to produce art</i>	<i>Creativity and originality are more important for this job than technical skill.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
24. cross-disciplinary	adjective	/krɒs ˈdɪslərpiːnəri/	<i>involving different areas of knowledge or study</i>	<i>The second factor is the growth in cross-disciplinary research, especially within the life sciences.</i>
25. data	noun	/'deɪtə, 'da:tə/	<i>facts or information, especially when examined and used to find out things or to make decisions</i>	<i>We collected publicly available data over a 10-day period.</i>
26. discovery	noun	/dɪ'skʌvəri/	<i>an act or the process of finding somebody/something, or learning about something that was not known about before</i>	<i>Researchers in this field have made some important new discoveries.</i>
27. education	noun	/'edʒu'keɪʃn/	<i>a process of teaching, training and learning, especially in schools, colleges or universities, to improve knowledge and develop skills</i>	<i>The school provides an excellent all-round education.</i>
28. fastner	noun	/'fa:snə(r)/	<i>a device, such as a button or a zip, used to close a piece of clothing; a device used to close a window, bag, etc. tightly</i>	<i>A fastener secures parts of the aircraft.</i>
29. guideline	noun	/'gaɪdlain/	<i>a set of rules or instructions that are given by an official organization telling you how to do something, especially something difficult</i>	<i>The government has drawn up guidelines for schools during a pandemic.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
30. <i>humanities</i>	noun	<i>hju:’mænətɪz</i>	<i>the subjects of study that are about the way people think and behave, for example literature, language, history and philosophy</i>	<i>The college offers a wide range of courses in the arts and humanities.</i>
31. <i>improve</i>	verb	<i>ɪm’pru:v</i>	<i>to become better than before; to make something/ somebody better than before</i>	<i>Overall the situation has improved dramatically.</i>
32. <i>jet engine</i>	noun	<i>’dʒet endʒɪn</i>	<i>an engine that drives an aircraft forwards by pushing out a stream of gases behind it</i>	<i>The jet engine powers the airplane.</i>
33. <i>launch vehicle</i>	noun	<i>’lɔ:ntʃ vi:ɪkl</i>	<i>vehicle with a powerful engine that is used to take spacecraft and satellites into space</i>	<i>The launch vehicle is discarded once the satellite has left Earth's atmosphere.</i>
34. <i>load</i>	noun	<i>ləʊd</i>	<i>the amount of weight that is pressing down on something</i>	<i>Modern backpacks spread the load over a wider area.</i>
35. <i>Maintain</i>	verb	<i>meɪnteɪn</i>	<i>to make something continue at the same level, standard, etc.</i>	<i>The two countries have always maintained close relations.</i>
36. <i>manufacturing</i>	noun	<i>’mænju ’fæktsfərɪŋ</i>	<i>the business or industry of producing goods in large quantities in factories, etc.</i>	<i>The company has established its first manufacturing base in Europe.</i>
37. <i>natural science</i>	adjective + noun	<i>nætʃrəl ’saɪəns</i>	<i>the sciences that involve studying the physical world. Chemistry, biology and physics are all natural sciences.</i>	<i>He conducted research in various branches of natural science.</i>

1 Wordlists

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
38. <i>negotiation</i>	noun	<i>nɪgəʊʃi'eɪʃn</i>	<i>formal discussion between people who are trying to reach an agreement</i>	<i>They begin another round of negotiations today.</i>
39. <i>optimal</i>	adjective	<i>'ɒptɪməl</i>	<i>the best possible; producing the best possible results</i>	<i>The optimal temperature for the development of larvae is in the range 18–26 °C.</i>
40. <i>package</i>	noun	<i>'pækɪdʒ</i>	<i>a set of items or ideas that must be bought or accepted together</i>	<i>The package contains essential flight equipment.</i>
41. <i>proficiency</i>	noun	<i>prə'fɪʃnsi</i>	<i>the ability to do something well because of training and practice</i>	<i>He has a high level of oral proficiency in English.</i>
42. <i>propulsion</i>	noun	<i>prə'pʌlʃn</i>	<i>the force that drives something forward</i>	<i>The fish uses its tail fins for propulsion through the water.</i>
43. <i>prototype</i>	noun	<i>'prəʊtətaɪp</i>	<i>the first design of something from which other forms are copied or developed</i>	<i>Scientists have developed a working prototype for the machine.</i>
44. <i>purpose</i>	noun	<i>'pɜːpəs</i>	<i>the intention, aim or function of something; the thing that something is supposed to achieve</i>	<i>The purpose of the book is to provide a complete guide to the university.</i>
45. <i>reliability</i>	noun	<i>rɪ'laiə'biliti</i>	<i>the quality of being able to work or operate for long periods without breaking down or needing attention</i>	<i>The aircraft has an exceptional record of reliability.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
46. satellite	noun	'sætəlait	<i>an electronic device that is sent into space and moves around the earth or another planet. It is used for communicating by radio, television, etc. and for gathering information.</i>	<i>They could track the tagged sea turtles by satellite.</i>
47. social science	adjective + noun	,səʊʃl 'saɪəns	<i>the study of people in society</i>	<i>Social science helps understand aviation's impact on society.</i>
48. structural integrity	noun	ɪn'tegrəti	<i>the state of being whole and not divided</i>	<i>Aircraft lost its structural integrity due to explosive decompression.</i>
49. surrounding	adjective	sə'raʊndɪŋ	<i>that is near or around something</i>	<i>From the top of the hill you can see all the surrounding countryside.</i>
50. twist	verb	twist	<i>to bend or turn something into a particular shape</i>	<i>Twist the wire to form a circle.</i>
51. UAV	noun	ju: ei 'vi:	<i>an aircraft without a pilot, controlled from the ground or by a computer on board (the abbreviation for 'unmanned aerial vehicle')</i>	<i>The UAVs could be used for surveillance of possible enemy activity.</i>
52. vehicle	noun	'vi:əkl	<i>a thing that is used for transporting people or goods from one place to another, such as a car or lorry</i>	<i>Are you the driver of this vehicle?</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
53. <i>withstand</i>	verb	<i>wɪð'stænd,</i> <i>wɪθ'stænd</i>	<i>to be strong enough not to be hurt or damaged by extreme conditions, the use of force, etc.</i>	<i>The materials used have to be able to withstand high temperatures.</i>

Unit 2

1. <i>acquisition</i>	noun	,ækwɪ'zɪʃn	<i>the act of getting something, especially knowledge, a skill, etc.</i>	<i>The money will be spent on acquisitions for the university library.</i>
2. <i>adixture</i>	noun	əd'mɪkstʃə(r)	<i>something, especially a small amount of something, that is mixed with something else</i>	<i>She obtains textured effects by the admixture of sand or broken glass.</i>
3. <i>aerial</i>	adjective	'eəriəl	<i>in the air; existing above the ground</i>	<i>The banyan tree has aerial roots.</i>
4. <i>airworthiness</i>	noun	'eəwɜ:ðɪnəs	<i>the fact of an aircraft being safe to fly</i>	<i>The aircraft passed all tests and proved its airworthiness for flight.</i>
5. <i>antibiotics</i>	noun	,æntibai'ptik	<i>a substance, for example penicillin, that can destroy or prevent the growth of bacteria and cure infections</i>	<i>The doctor put her on antibiotics (= told her to take them).</i>
6. <i>application</i>	noun	,æpli'keɪʃn	<i>- a formal (often written) request for something, such as a job, permission to do something or a place at a college or university - the practical use of something, especially a theory, discovery, etc.</i>	<i>You need to complete the online application form. What are the practical applications of this work?</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
7. approximately	adverb	/ə'prɒksɪmətlɪ/	used to show that something is almost, but not completely, accurate or correct	The journey took approximately seven hours.
8. assist	verb	/ə'sɪst/	to help somebody to do something	His task is to advise and assist his colleagues.
9. assistant	noun	/ə'sɪstənt/	a person who helps or supports somebody, usually in their job	My assistant will now demonstrate the machine in action.
10. augmented reality	noun	/ɔ:g'mentɪd rɪ'æləti/	a technology that combines computer-generated images on a screen with the real object or scene that you are looking at	the potential use of augmented reality for crime-scene visualization
11. automate	verb	/'ɔ:təmeɪt/	to use machines and computers instead of people to do a job or task	We plan to automate the maintenance scheduling process.
12. beam	noun	/bi:m/	a line of light, electromagnetic waves or particles	The car's headlights were on full beam
13. bioengineering	noun	/baɪəʊ'endʒɪ'nɪərɪŋ/	the use of engineering methods to solve medical problems, for example the use of artificial arms and legs	Bioengineering can improve materials used in aircraft design.
14. blockchain	noun	/'blɒk'teɪn/	a system in which a record of payments made in cryptocurrency is maintained across several computers that are linked	Most of the new platforms are powered by blockchain technology.

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
15. budget	noun	'bʌdʒɪt	<i>the money that is available to a person or an organization and a plan of how it will be spent over a period of time</i>	<i>Many families struggle to balance the household budget.</i>
16. closely	adverb	'klaʊsli	<i>near in space or time</i>	<i>The two species are closely related.</i>
17. collaborative	adjective	kə'læbərətɪv	<i>involving, or done by, several people or groups of people working together</i>	<i>The design team took a collaborative approach to improve safety features.</i>
18. conductive	adjective	kən'dʌktɪv	<i>able to conduct electricity, heat, etc.</i>	<i>Conductive materials help manage heat for better fuel efficiency.</i>
19. confirmation	noun	,kɒnfə'meɪʃn	<i>a statement, letter, etc. that shows that something is true, correct or definite</i>	<i>I'm still waiting for confirmation of the test results.</i>
20. considerably	adverb	kən'sɪdərəblɪ	<i>much; a lot</i>	<i>Pollution levels have considerably reduced in this time.</i>
21. consumption	noun	kən'sʌmpʃn	<i>the act of using energy, food or materials; the amount used</i>	<i>Gas and oil consumption always increases in cold weather.</i>
22. contribute	adjective	kən'tribju:t	<i>to give something, especially money or goods, to help achieve or provide something</i>	<i>Would you like to contribute to our collection?</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
23. crack	noun	kræk	a line on the surface of something where it has broken but not split into separate parts	Cracks began to appear in the walls.
24. definitely	adverb	'defɪnətlɪ	a way of emphasizing that something is true and that there is no doubt about it	I definitely remember sending the letter.
25. dispatch	verb	dɪ'spætʃ	to send somebody/ something somewhere, especially for a special purpose	A courier was dispatched to collect the documents.
26. enable	verb	ɪ'neɪbl	to make it possible for somebody/ something to do something	This approach enables the company to focus on its core business.
27. encounter	verb	ɪn'kaʊntə(r)	to experience something, especially something unpleasant or difficult, while you are trying to do something else	We encountered a number of difficulties in the first week.
28. epoxy	noun	ɪ'pɒksi	a type of strong glue	The technician used epoxy to bond the aircraft components securely.
29. evaluation	noun	ɪ'velju'eʃn	the act of forming an opinion of the amount, value or quality of something after thinking about it carefully	The technique is not widely practiced and requires further evaluation.

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
30. expansion	noun	/ɪk'spænʃn/	<i>an act of increasing or making something increase in size, amount or importance</i>	<i>The expansion of higher education will continue.</i>
31. feature	noun	'fi:tʃə(r)	<i>something important, interesting or typical of a place or thing</i>	<i>I've added some new features to my website.</i>
32. fiberglass	noun	'faibəgla:s	<i>a strong light material made from glass fibres and plastic, used for making boats, etc.</i>	<i>Fiberglass is often used in aircraft components.</i>
33. fuel efficiency	noun+ noun	fju:əl ɪ'fɪnsi/	<i>an engine's ability to get energy from fuel</i>	<i>Fuel efficiency refers to how effectively a vehicle converts fuel into distance traveled.</i>
34. hire	verb	'haɪə(r)	<i>to give somebody a job</i>	<i>She was hired three years ago</i>
35. implement	verb	'impliment	<i>to make something that has been officially decided start to happen or be used</i>	<i>A new work programme for young people will be implemented.</i>
36. inspection	noun	In'spekJn	<i>the act of looking closely at something/ somebody, especially to check that everything is as it should be</i>	<i>The documents are available for inspection.</i>
37. lightweight	adjective	'laɪtweɪt	<i>made of thinner material and less heavy than usual</i>	<i>Lightweight materials improve fuel efficiency.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
38. promote	verb	prə'məʊt	<i>to help sell a product, service, etc. or make it more popular by advertising it or offering it at a special price</i>	<i>This trade fair will help businesses from Malawi to promote their products.</i>
39. rechargeable	adjective	,ri:tʃa:dʒəbl	<i>(of a battery) that can be filled again with electrical power</i>	<i>Rechargeable batteries can boost fuel efficiency in electric planes.</i>
40. reject	verb	rɪ'dʒekt	<i>to refuse to accept or consider something</i>	<i>The proposal was firmly rejected.</i>
41. reliability	noun	rɪ'laiə'biliti	<i>the quality of being able to be trusted to do what somebody wants or needs</i>	<i>The incident cast doubt on her motives and reliability.</i>
42. remotely	adverb	rɪ'məʊtli	<i>away from the place where a person usually works or worked in the past, using communications technology</i>	<i>Weekly team meetings are now held remotely.</i>
43. reputable	adjective	'repjətəbl	<i>that people consider to be honest; having a good reputation</i>	<i>We only use reputable suppliers for spare parts.</i>
44. resistance	noun	rɪ'zɪstəns	<i>the power not to be affected by something</i>	<i>The new coatings provide better resistance against corrosion.</i>
45. responsibility	noun	rɪ'sponsə'biliti	<i>a duty to deal with or take care of somebody/something, so that you may be blamed if something goes wrong</i>	<i>It's time for someone to take responsibility and get the job done.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
46. screw	noun	skru:	a thin pointed piece of metal like a nail with a raised spiral line (called a thread) along it and a line or cross cut into its head.	Now tighten all the screws.
47. sensor	noun	'sensə(r)	a device that can react to light, heat, pressure, etc. in order to make a machine, etc. do something or show something	security lights with an It is equipped with infrared sensor.
48. sophisticated	adjective	sə'fistikeitid	clever and complicated in the way that it works or is presented	The cockpit features a sophisticated navigation system.
49. supersonic	adjective	,su:pə'sɒnɪk	faster than the speed of sound	Supersonic jets require advanced designs for optimal fuel efficiency.
50. virtual reality	adjective + noun	,vɜ:tʃuəl ri'æləti	images and sounds created by a computer that seem almost real to the user, who can interact with them by using sensors	Virtual reality uses computers to create a simulated three-dimensional world.

Unit 3

1. ability	noun	ə'biliti	the fact that somebody/ something is able to do something	Students must demonstrate the ability to understand simple texts.
2. accurate	adjective	'ækjʊərət	correct and true in every detail	Accurate measurements are essential.

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
3. achievement	noun	ə'tʃi:vment	<i>a thing that somebody has done successfully, especially using their own effort and skill</i>	<i>It was a remarkable achievement for such a young player.</i>
4. advanced	adjective	əd've:nst	<i>having the most modern and recently developed ideas, methods, etc.</i>	<i>Scientists are working on highly advanced technology to replace fossil fuels.</i>
5. advancement	noun	əd've:nsmənt	<i>the process of helping something/ somebody to make progress or succeed; the progress that is made</i>	<i>The advancement of technology has improved aircraft safety significantly.</i>
6. carbon dioxide	noun	'ka:bən daɪ 'ɒksaɪd	<i>a gas breathed out by people and animals from the lungs or produced by burning</i>	<i>Trees absorb carbon dioxide and produce oxygen.</i>
7. carbon footprint	noun + noun	'ka:bən 'fʊtprint	<i>a measure of the amount of carbon dioxide that is produced by the activities of a person or company</i>	<i>Companies are measuring their carbon footprints.</i>
8. combat	verb	'kɒmbæt	<i>to stop something unpleasant or harmful from happening or from getting worse</i>	<i>Pilots train to combat turbulence.</i>
9. congestion	noun	kən'dʒeṣtʃən	<i>the state of being crowded and full of traffic</i>	<i>Airport congestion can lead to significant delays for passengers.</i>
10. consumption	noun	kən'sʌmpʃn	<i>the act of using energy, food or materials; the amount used</i>	<i>Gas and oil consumption always increases in cold weather.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
11. convention	noun	kən'venʃn	a large meeting of the members of a profession, a political party, etc.	The Chicago Convention established international standards for civil aviation.
12. convince	verb	kən'veins	to make somebody/yourself believe that something is true	She has managed to convince even the sceptics.
13. core	adjective	kɔ:(r)	most important; main or essential	We need to concentrate on our core business.
14. coverage	noun	'kʌvəridʒ	the amount of something that something provides; the extent to which something covers an area or a group of people	the service has a coverage of 90 per cent of the UK population.
15. density	noun	'densəti	the quality of being dense; the degree to which something is dense	The population density in this city is very high.
16. depletion	noun	dɪ'pli:ʃn	the reduction of something by a large amount so that there is not enough left	The greatest ozone depletion occurred near the poles.
17. deploy	verb	dɪ'plɔɪ	to use something effectively	Tanks were deployed effectively during the long campaign.
18. drone	noun	drəʊn	an aircraft without a pilot, or a small flying device, controlled from the ground and used for taking photographs, dropping bombs, delivering goods, etc.	Get ready for a future where drones are delivering our packages.

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
19. <i>efficiently</i>	adverb	<i>ɪ'fɪʃntli</i>	<i>in a good and careful way, with no waste of time, money or energy</i>	Resources must be used efficiently to avoid waste
20. <i>employment</i>	noun	<i>ɪm'plɔɪmənt</i>	<i>work, especially when it is done to earn money; the state of being employed</i>	<i>They are finding it more and more difficult to find employment.</i>
21. <i>enhance</i>	verb	<i>ɪn'hæns</i>	<i>to increase or further improve the good quality, value or status of somebody/something</i>	<i>This is an opportunity to enhance the reputation of the company.</i>
22. <i>environmental</i>	adjective	<i>ɪn'venɪrən'mentl</i>	<i>connected with the natural conditions in which people, animals and plants live; connected with the environment</i>	<i>Their main objective is to promote environmental protection.</i>
23. <i>eruption</i>	noun	<i>ɪ'rʌpfn</i>	<i>an occasion when a volcano suddenly throws out burning rocks, smoke, etc.</i>	<i>A volcanic eruption can disrupt air travel due to ash clouds.</i>
24. <i>extermination</i>	noun	<i>ɪk'stɜ:mɪ'nейfn</i>	<i>the act of killing all the members of a group of people or animals</i>	<i>The sheer scale of these mass exterminations is horrifying.</i>
25. <i>fluency</i>	noun	<i>'flu:ənsi</i>	<i>the quality of being able to speak or write a language, especially a foreign language, easily and well</i>	<i>Some young children achieve great fluency in their reading.</i>
26. <i>fossil fuel</i>	adjective + noun	<i>fɒsl fju:əl</i>	<i>fuel such as coal or oil that was formed over millions of years from parts of dead animals or plants</i>	<i>Fossil fuel reserves are rapidly being depleted.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
27. greenhouse gas	noun+ noun	,gri:nhaʊs 'gæs	<i>any of the gases that are thought to cause the greenhouse effect, especially carbon dioxide</i>	<i>Aviation contributes to greenhouse gas emissions, prompting calls for greener technologies.</i>
28. handle	verb	'hændl	<i>to deal with a situation, a person, an area of work or a strong emotion</i>	<i>He decided to handle things himself.</i>
29. high-resolution	adjective	haɪ rezə'lu:ʃn	<i>showing a lot of clear sharp detail</i>	<i>High-resolution imagery from satellites aids in air traffic management.</i>
30. illegal	adjective	I'li:gl	<i>not allowed by the law</i>	<i>These proposals are unethical and possibly illegal.</i>
31. imagery	noun	'ɪmɪdʒəri	<i>pictures, photographs, etc.</i>	<i>Aerial imagery is essential for mapping and surveying land use.</i>
32. impact	noun	'impækt	<i>the powerful effect that something has on somebody/something</i>	<i>The project's impact on the environment should be minimal.</i>
33. interpret	verb	In'tɜ:pret	<i>to explain the meaning of something</i>	<i>The data can be interpreted in many different ways.</i>
34. issue	noun	'ɪʃu:	<i>an important topic that people are discussing or arguing about</i>	<i>They are talking about issues relating to the safety of children online.</i>
35. negotiation	noun	nɪ'gəʊfi'eɪʃn	<i>formal discussion between people who are trying to reach an agreement</i>	<i>They begin another round of negotiations today.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
36. network	noun	'netwɜ:k	<i>a complicated system of roads, lines, tubes, nerves, etc. that are connected to each other and operate together</i>	<i>The new rail services will form a network connecting the capital and major cities.</i>
37. payload	noun	'perləʊd	<i>the passengers or goods on a vehicle, especially an aircraft, for which payment is received</i>	<i>The payload capacity of an aircraft determines how much cargo it can carry.</i>
38. pollution	noun	pə'lju:ʃn	<i>the process of making air, water, soil, etc. dirty; the state of being dirty</i>	<i>Aircraft emissions contribute to air pollution and climate change.</i>
39. prediction	noun	pri'dɪkʃn	<i>a statement that says what you think will happen; the act of making such a statement</i>	<i>It's difficult to make accurate predictions about the effects on the environment.</i>
40. recycling	noun	,ri:'saɪklɪŋ	<i>the process of treating things that have already been used so that they can be used again</i>	<i>Recycling of aircraft materials is becoming more common in the industry.</i>
41. reduce	verb	rɪ'dju:s	<i>to make something less or smaller in size, quantity, price, etc.; to become less or smaller in size, quantity, etc.</i>	<i>They will require car makers to reduce emissions of carbon dioxide by 30%.</i>
42. referee	noun	,refə'ri:	<i>a person who gives information about your character and ability, usually in a letter, for example when you are applying for a job</i>	<i>The principal often acts as a referee for his students.</i>

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
43. renewable	adjective	/rɪ'nju:əbl/	that is replaced naturally or controlled carefully and can therefore be used without the risk of using it all up	Renewable energy sources are being explored to power ground operations at airports.
44. reusable	adjective	/ri:'ju:zəbl/	that can be used again	Reusable rocket technology is revolutionizing space travel and satellite deployment.
45. software	noun	'sɒftweə(r)	the programs used by a computer for doing particular jobs	Click here to download the software.
46. solid	adjective	'sɒlid	hard; not in the form of a liquid or gas	The planet Jupiter may have no solid surface at all.
47. spectral	adjective	'spektrəl	connected with a spectrum	Spectral analysis reveals aircraft performance issues.
48. storage	noun	'stɔ:ridʒ	the process of keeping something in a particular place until it is needed; the space where things can be kept	There's a lot of storage space in the loft.
49. support	verb	sə'pɔ:t	to help or encourage somebody/ something by saying or showing that you agree with them/it	Efforts to reduce waste are strongly supported by environmental groups.
50. sustainability	noun	sə'steɪnə'bɪləti	the use of natural products and energy in a way that does not harm the environment	Sustainability initiatives are increasingly important for modern airlines.

Word/Phrase	Part of the Speech	Transcription	Definition	Sample Sentence
51. <i>take-off</i>	noun	'teɪk ɒf	<i>the moment at which an aircraft leaves the ground and starts to fly</i>	<i>The plane is ready for take-off.</i>
52. <i>treatment</i>	noun	'tri:tment	<i>a way of behaving towards or dealing with a person or thing</i>	<i>Certain city areas have been singled out for special treatment.</i>
53. <i>urban</i>	adjective	'ɜ:bən	<i>connected with a town or city</i>	<i>Urban air mobility solutions aim to reduce congestion on the ground.</i>
54. <i>variety</i>	noun	və'raɪəti	<i>several different sorts of the same thing</i>	<i>He resigned for a variety of reasons.</i>
55. <i>vessel</i>	noun	'vesl	<i>a ship or large boat</i>	<i>An aircraft is a vessel designed for flight through the atmosphere.</i>
56. <i>vital</i>	adjective	'vaitl	<i>necessary or essential in order for something to succeed or exist</i>	<i>Air transport is vital for global trade and tourism.</i>
57. <i>waste</i>	noun	'weɪst	<i>materials that are no longer needed and are thrown away</i>	<i>Landfills for solid wastes have started reaching their capacity.</i>

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