

Unit One

Aircraft and History

Lesson 1

History of Aviation

Pre-reading questions

1. How much do you know about the history of aviation?
2. Do you know how balloons, kites and gliders fly in the sky?
3. How much do you know about the Wright Brothers?

History of Aviation

The history of aviation has extended over more than two thousand years from the earliest attempts in kites and gliders to powered heavier-than-air, *supersonic* and *hypersonic* flight.

The first form of man-made flying objects were kites, which were used by the Chinese manned for *aerial* observation and to test winds for sailing, and unmanned as a signaling device and as a toy. It was not introduced to the West until the 13th century and played an important role in testing *aerodynamics* and flight stability in the 19th century.

During the 1500s, Leonardo da Vinci filled pages of his notebooks with sketches of proposed flying machines, but most of his ideas were *flawed* because he clung to the idea of birdlike wings.

With the efforts to analyze the *atmosphere* in the 17th and 18th century, gases such as *hydrogen* were discovered which in turn led to the invention of hydrogen balloons. Various theories in *mechanics* raised by physicists during the same period of time, notably fluid dynamics and Newton's laws of motion, led to the foundation of modern aerodynamics. In 1783, the first manned hot air balloon, crafted by Joseph and Etienne Montgolfier^①, flew for 23 minutes.

The "Father of Aerial Navigation", Sir George Cayley^② discovered the basic principles on which the modern science of *aeronautics* is founded, built what is recognized as the first successful flying model, and tested the first full-size man-carrying airplane.

The Wright brothers[®] designed and tested numerous kite and glider models from 1900 to 1902. Later, the Wrights constructed a *wind tunnel* and created a number of sophisticated devices to measure *lift* and *drag* on the 200 wing designs they tested. The Wrights finally found satisfaction with their third glider as it outperformed its *predecessors* and *rigorous* testing contributed to the field of *aeronautical* engineering. The Wrights were the first to seriously study the existing power and control problems. They discovered the solution to the control problem by developing *wing warping* for roll control, yaw control, and a *steerable* rudder. The Wrights made the first sustained, controlled, powered heavier-than-air manned flight on December 17, 1903. The age of flight had arrived.

But after their successful flying test, the airplanes were not used in civil purposes but in military. During World War I, heavier-than-air powered aircraft had become practical for *reconnaissance*, *artillery* spotting and even attacks against ground positions. This period saw major use of planes in offensive, defensive and reconnaissance capabilities. Radiotelephones were also being explored on airplanes, as communication between pilots and ground commander grew more and more important.

The years between World War I and World War II saw great advancements in aircraft technology, starting the modern era of passenger airline service. After the World War I, the research of the airplanes continued and aircraft began to transport people and cargo as designs grew larger and more reliable. Aeroplanes evolved from low-powered *biplanes* made from wood and fabric to sleek, high-powered *monoplanes* made of *aluminum*. The age of the great *rigid airships* came and went.

World War II saw a drastic increase in the pace of aircraft development and production. All countries involved in the war stepped up the development and production of aircraft and flight based weapon delivery systems, such as the first long range bomber. New technologies like radar also allowed more coordinated and controlled deployment of air defense. Not only airplanes, but also helicopters saw rapid development in the Second World War.

After World War II, commercial aviation grew rapidly, using mostly ex-military aircraft to transport people and cargo. This growth was *accelerated* by the glut of heavy and super-heavy bomber airframes like the B-29 and Lancaster that could be *converted* into commercial aircraft. The first commercial jet airliner to fly was the British de Havilland DH106 Comet[®]. Despite a technical achievement, the plane suffered a series of highly public failures, as the shape of the windows led to *cracks* due to *metal fatigue*. The fatigue was caused by cycles of *pressurization* and *depressurization* of the cabin, and eventually led to *catastrophic* failure of the plane's *fuselage*. By the time the problems were overcome, other jet airliner designs had already taken to the skies.

The last quarter of the 20th century saw a slowing of the pace of advancement. No longer was revolutionary progress made in flight speed, distance and technology. This part of the century saw the steady improvement of flight *avionics*, and a few minor milestones in flight progress.

In commercial aviation, the early 21st century saw the end of an era with the retirement of Concorde. Only commercially viable in niche markets, the planes were required to fly over the oceans if they wanted to break the sound barrier. Concorde was fuel hungry and could carry a limited amount of passengers due to its highly streamlined design.

In the beginning of the 21st century, subsonic military aviation focused on eliminating the pilot in favor of remotely operated or completely autonomous vehicles. In April 2001, the unmanned aircraft Global Hawk flew from Edwards AFB in the US to Australia non-stop and unrefuelled. This is the longest point-to-point flight ever undertaken by an unmanned aircraft, and took 23 hours and 23 minutes. In October 2003, the first totally autonomous flight across the Atlantic by a computer-controlled model aircraft occurred. (883 words)

NEW WORDS

| | | | |
|------------------|----------------------|------|---------|
| accelerate | /ək'seləreit/ | vt. | 使加速, 加快 |
| aerial | /'eəriəl/ | adj. | 空中的 |
| aerodynamics | /ˈeərə(ɒ)daɪ'næmɪks/ | n. | 空气动力学 |
| aeronautical | /ˈeərə'nɔ:tɪkl/ | adj. | 航空(学)的 |
| aeronautics | /eərə'nɔ:tɪks/ | n. | 航空学 |
| aluminum | /ə'lʊ:mɪnəm/ | n. | 铝 |
| artillery | /ɑ:'tɪləri/ | n. | 火炮; 大炮 |
| atmosphere | /'ætməsfiə/ | n. | 大气; 空气 |
| autonomous | /ɔ:'tɒnəməs/ | adj. | 自主的 |
| avionics | /eɪvɪ'ɒnɪks/ | n. | 航空电子设备 |
| barrier | /'bæriə/ | n. | 障碍 |
| biplane | /'baɪpleɪn/ | n. | 双翼飞机 |
| catastrophic | /kætə'strɒfɪk/ | adj. | 大灾难的 |
| convert | /kən'vɜ:t/ | vt. | 使转变 |
| crack | /kræk/ | n. | 裂纹; 裂缝 |
| depressurization | /di'preʃəɪ'zeɪʃən/ | n. | 释压 |
| drag | /dræg/ | n. | 阻力 |
| flawed | /flɔd/ | adj. | 有缺陷的 |
| fuselage | /'fju:zələ:ʒ/ | n. | 机身 |

| | | | |
|----------------|-------------------|-------------|----------|
| hydrogen | /ˈhaɪdrədʒən/ | <i>n.</i> | (化学元素) 氢 |
| hypersonic | /haɪpə'sɒnɪk/ | <i>adj.</i> | 特超音速的 |
| lift | /lɪft/ | <i>n.</i> | 升力 |
| mechanics | /mɪ'kæniks/ | <i>n.</i> | 力学 |
| monoplane | /'mɒnəpleɪn/ | <i>n.</i> | 单翼机 |
| predecessor | /'pri:dɪsəsə/ | <i>n.</i> | 前辈 |
| pressurization | /ˌpreʃərəɪ'zefən/ | <i>n.</i> | 压力 |
| reconnaissance | /rɪ'kɒnɪs(ə)ns/ | <i>n.</i> | 侦察 |
| rigorous | /'rɪgərəs/ | <i>adj.</i> | 精确的 |
| steerable | /'stiərəəbl/ | <i>adj.</i> | 可操纵的 |
| supersonic | /ˌsu:pə'sɒnɪk/ | <i>adj.</i> | 超音速的 |

USEFUL EXPRESSIONS

| | |
|--------------------|---------|
| metal fatigue | 金属疲劳 |
| niche market | 瞄准机会的市场 |
| rigid airship | 硬式飞船 |
| streamlined design | 流线型设计 |
| wind tunnel | 风洞 |
| wind warping | 翼扭曲 |

ABBREVIATIONS

| | | |
|-----|----------------|----------|
| AFB | Air Force Base | (美) 空军基地 |
|-----|----------------|----------|

NOTES

① Joseph-Michel Montgolfier (26 August 1740–26 June 1810) and Jacques-Étienne Montgolfier (6 January 1745–2 August 1799) were paper manufacturers from Annonay, in Ardèche, France best known as inventors of the Montgolfière-style hot air balloon, globe aérostatique. They launched the first piloted ascent, carrying Étienne. Joseph-Michel also invented the self-acting hydraulic ram (1796), Jacques-Étienne founded the first paper-making vocational school and the brothers invented a process to manufacture transparent paper.

② Sir George Cayley, 6th Baronet (27 December 1773–15 December 1857) was an English engineer, inventor, and aviator. He is one of the most important people in the history of aeronautics. Many consider him to be the first true scientific aerial investigator and the first person to understand the underlying principles and forces of flight.

③ The Wright brothers, Orville (August 19, 1871–January 30, 1948) and Wilbur (April 16, 1867–May 30, 1912), were two American brothers, inventors, and aviation pioneers who were credited with inventing and building the world’s first successful airplane and making the first controlled, powered and sustained heavier-than-air human flight, on December 17, 1903.

④ The de Havilland DH 106 Comet was the world’s first commercial jetliner. Developed and manufactured by de Havilland at its Hatfield Aerodrome in Hertfordshire, United Kingdom, the Comet 1 prototype first flew in 1949. It featured an aerodynamically clean design with four de Havilland Ghost turbojet engines embedded in the wings, a pressurised cabin, and large square windows. For the era, it offered a relatively quiet, comfortable passenger cabin and was commercially promising at its debut in 1952.

EXERCISES

Comprehension of Text

I. Answer the following questions.

1. How long has the history of aviation lasted?
2. What contributions did Chinese kites make to the Western world in aviation?
3. Did Leonardo da Vinci realize his dream of flight? Why?
4. When was hydrogen balloon invented?
5. What did the Wright Brothers contribute to the first sustained, controlled, powered heavier-than-air manned aircraft?
6. Why were there great advancements in aircraft technology between World War I and World War II?
7. What were the advancements achieved during the two World Wars?
8. What problems did the ex-military aircraft encounter after World War II?
9. Why did commercial aviation grow rapidly after World War II?
10. What happened in the aviation field in the beginning of the 21st century?

II. State the following items in your own words, and translate them into Chinese.

- | | |
|------------------|------------------|
| 1. lift and drag | 6. wind tunnel |
| 2. aerodynamics | 7. metal fatigue |

- 3. supersonic
- 4. aeronautics
- 5. fuselage

- 8. biplane
- 9. monoplane
- 10. avionics

III. Describe the following pictures in your own words.

Work in pairs and discuss the questions :

- 1. What will the commercial passenger aircraft be like in the future?
- 2. What kinds of equipment will be used by ATC to control flight in the air?
- 3. What do you think aviation development will like in the future?



Figure 1.1



Figure 1.2

Reading Aloud

IV. Read the following passage aloud repeatedly until you can retell it in a natural way according to your memory.

Feng Ru

Feng Ru, a patriotic overseas Chinese and a noted aircraft designer and flyer at the beginning of 20th century, was China's first aviator. Born on December 15, 1883, he went to the United States when he was a little boy. Funded by local overseas Chinese, he successfully designed and manufactured aircraft in 1907. Two years later, Feng Ru set up the Guangdong Air Vehicle Company and he succeeded in producing a plane. The plane Feng built first flew on 21 September 1909, less than six years after the Wright Brothers' flight. Feng Ru climbed into a self-propelled, fixed-wing plane he personally designed and prepared for a test flight in the Piedmont hills overlooking Oakland, California. Feng, a self-taught inventor, flew the plane and stayed aloft for 29 minutes before plunging to the ground. The height and distance it travelled far exceeded that of the Wright brothers' flight. (147 words)

Vocabulary Practice

V. Complete the following sentences by filling the blanks with the words or phrases given below.

| |
|---|
| <p>fuselage, avionics, depressurization, aerodynamics aeronautics, aerial, steerable, metal fatigue</p> |
|---|

1. Cabin _____ above 10000 feet may lead to unconsciousness or severe performance of degradation of the aircrew, therefore, it requires an emergency descent to a safety altitude.
2. The new trainers have a modern cockpit environment of digital displays, sophisticated navigation and advanced _____.
3. _____ is the central portion of an aircraft designed to accommodate the crew, the passengers and the cargo.
4. A _____ nosewheel or tailwheel permits the airplane to be controlled throughout all operations while on the ground.
5. The new metal structures were lighter and stronger than the old materials. With the use of these new materials came new problems like _____, cracking, and corrosion.

6. _____ is the study of forces and the resulting motion of objects through the air, which including the measurement of the forces of lift and drag.
7. If possible, conduct _____ visual inspection of unfamiliar airports before landing so as to prevent landing errors due to optical illusions.
8. _____ is the science or art involved with the study, design, and manufacturing of air flight capable machines, and the techniques of operating aircraft and rockets within the atmosphere.

Reading for More

VI. Read the following two passages and answer the questions briefly or choose the best answer from A, B, C and D.

Passage 1

International Civil Aviation Organization

International Civil Aviation Organization (ICAO) was established according to the *convention* of Chicago in 1944. It came into existence formally on April 4, 1947. There are 191 countries forming *contracting party* up until now and 33 council members of it. The site of headquarters is Montreal.

International Civil Aviation Organization is one of 15 specialized agencies of the system of the United Nations. It is the organization to deal with the international civil aviation's affairs. The aim of ICAO is to develop the principle and technology of world navigation, and to promote the planning and development of international air transportation.

The conference of ICAO is the highest authority with all contracting party joining. Every country of conference has a ticket of right to vote, and it is held once every three years. The task of conference is to review all works in technology, economy, law, technical assistance, etc. and to offer guidance to other departments of organization.

The council is a permanent establishment of the conference (including 33 countries) divided into the Secretariat and various kinds of specialized committees. Thirty-three states are members for three years, whose representatives work full-time in the headquarters of ICAO in Montreal, Quebec, Canada. Their job is to establish international standards for

recommendation to member states and the world. It is the principal executive body of ICAO. *Legislative power of allowing, judicial power of allowing and administrative power* are the three powers of council. The first two items of power are allowed by conference.

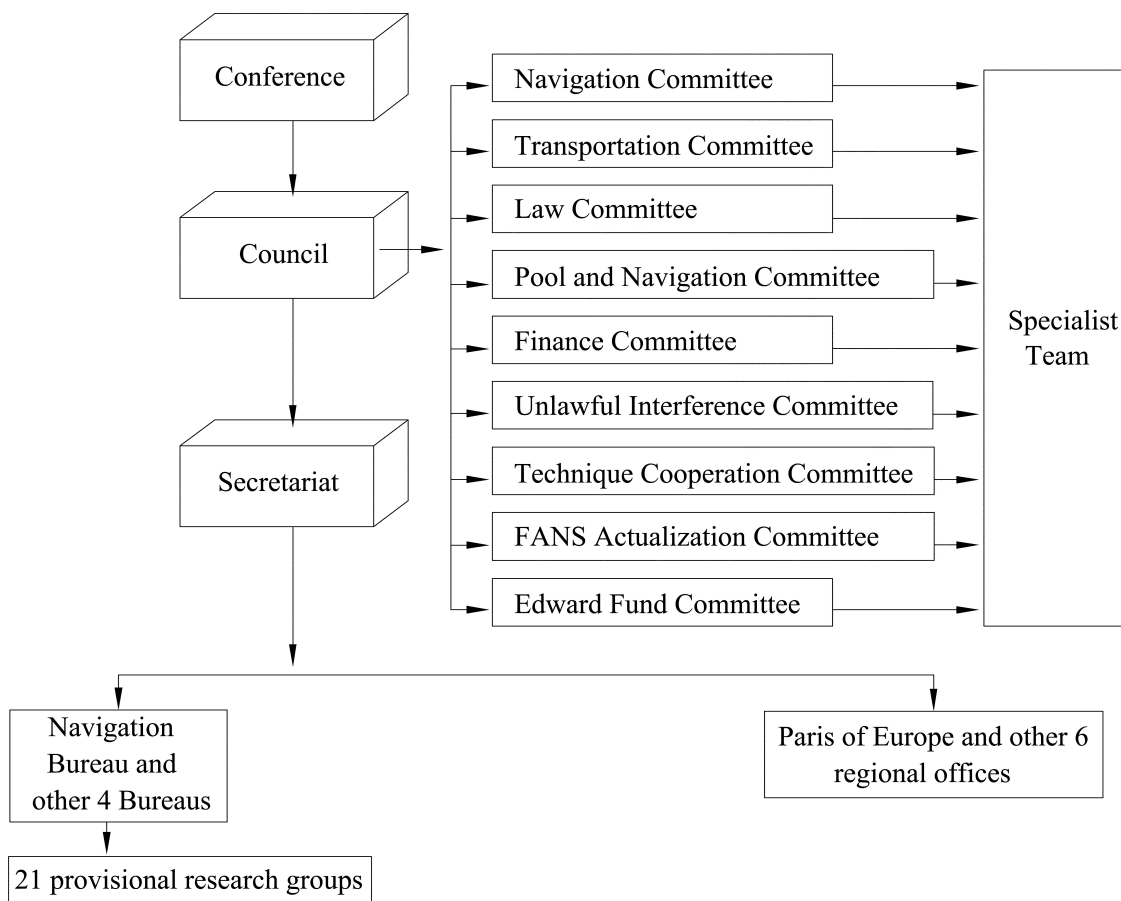


Figure 1.3

China was the earliest signatory state and sanctioning the countries of “Convention of Chicago” (wrote the *instrument of ratification* on February 20, 1946), and it was one of the first members of the council of ICAO too. China was successfully elected the Class I member of the council in October of 2004. It means that China has acquired great achievements in world civil aviation in recent years and has won much more respect from other countries than before. (327 words)

Question 1: What is the aim of ICAO?

Question 2: How much do you know about the conference of ICAO?

Question 3: Please describe China’s position and functions in ICAO.