

Aerospace Engineering
Gant, Hook, Windes
Lesson: 4-7-2020

Learning Target:

Learn about the abilities and technological design as they identify individual aircraft components, regardless of design or manufacturer.

Let's Get Started:

Watch Video: [Parts of an Airplane](#)

Bell Work:

In 1 minute, write down every part of a plane that you can think of.

Figure 1 shows a plane with its major parts listed. Many external plane parts are constructed of metal materials, although some composites can be made of materials such as carbon fiber and different fiberglass resins, which are becoming more popular as technology improves.

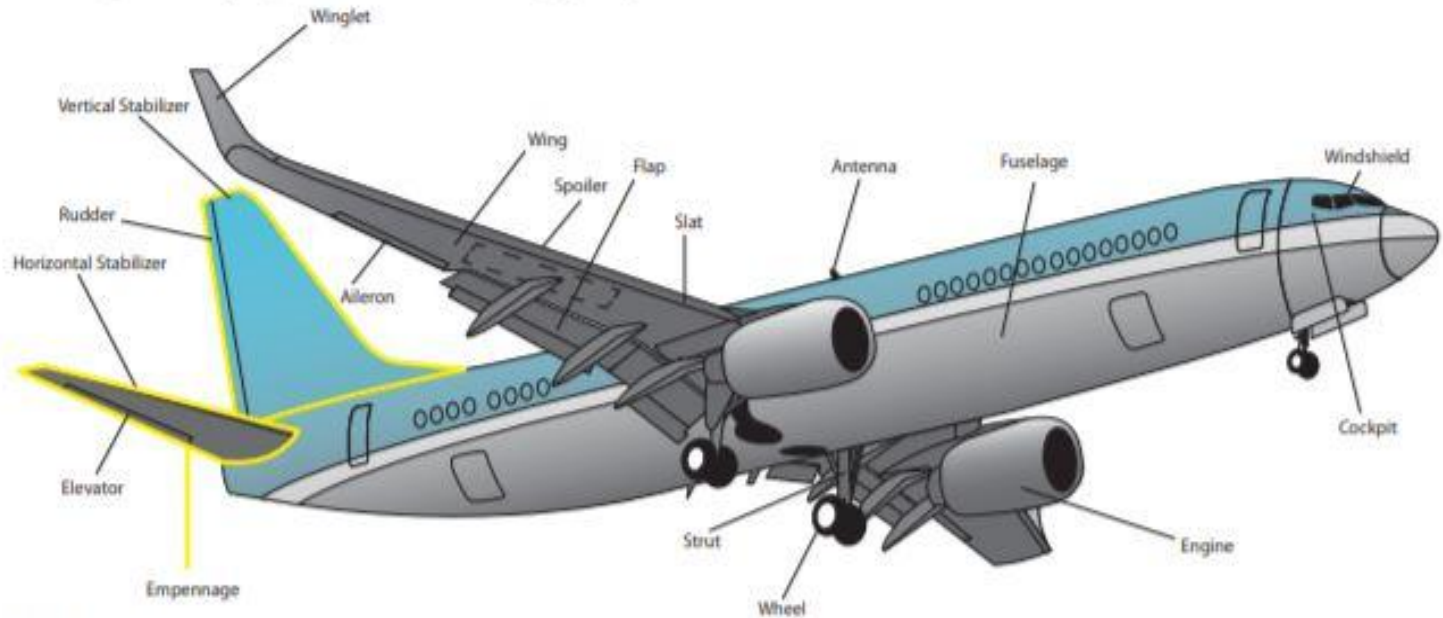


Fig. 1 Airplane Diagram

Aileron

The ailerons are located on the rear of the wing, generally one on each side. These work opposite to each other, which means that when one is raised, the other is lowered. Their job is to increase the lift on one wing while reducing the lift on the other. By doing this, they roll the aircraft sideways, causing the aircraft to turn.

Antenna

There are several radio antennas located on a plane, their size and position depends on the type of work each one performs and the frequencies being transmitted or received. The GPS antenna is usually mounted to the top of a plane. This is because the GPS satellites are in Space, and always above the aircraft. Generally, longer antennas are used for radio communication and navigation, while shorter antennas are used for higher frequency data like the GPS signals and the transponder, which provides air traffic control with information about the plane's position and altitude.

Cockpit

The cockpit, is where the pilots sit. It contains the flight controls that move the plane, as well as the buttons and switches used to operate all the different systems.

Elevator

The elevator helps “elevate” the plane. It is located on the tail of the plane and directs the nose of the plane either up or down in order to make the plane climb and descend.

Empennage

The empennage is the entire tail section of the plane, including both the horizontal and vertical stabilizers, the rudder and the elevator. As a complete unit, it works like the feather on an arrow, helping guide the plane to its destination.

Engine

A plane has at least one, but could have as many as eight engines. There are many different makes and models on planes today, but all of them perform the same basic function of taking air and accelerating it and pushing out behind the aircraft. Jet powered planes do this by compressing the air using turbines. Propeller-powered planes use a propeller mounted to the engine. The propeller works like a big screw, pulling the aircraft forward while pushing the air behind it.

Flap

Flaps are a “high lift / high drag” device. They improve the lifting ability of the wing at slower speeds by changing the curvature of the wing, but when they extend completely, they create more drag. This means an plane can descend faster, without gaining airspeed. Flaps come in 4 main types: plain, split, slotted and fowler.

Fuselage

The fuselage is the portion of the plane used to literally join, or fuse, the rest of the parts together. It is commonly thought of as the body of the plane and holds the passengers and cargo safely inside.

Horizontal Stabilizer

The horizontal stabilizer is an upside-down wing, which is designed to provide a downward force on the tail. Planes are traditionally nose-heavy and this downward force is needed to compensate for that, keeping the nose level with the rest of the plane. Some planes can control the angle of the stabilizer and the level of downward force while in flight, while others are fixed in place.

Rudder

The rudder is attached to the vertical stabilizer, located on the tail of the plane. It works just like a rudder on a boat, helping to steer the nose of the plane left and right. Unlike a boat it is not the primary method of steering. Its main purpose is to counteract certain types of drag, or friction, ensuring that the plane's tail follows the nose, instead of being out to the side.

Slat

A slat is a “high lift” device usually found on jet-powered planes. Slats are just like the flaps except they are mounted on the front edge of the wing. They also assist in changing the curvature of the wing, to improve lifting ability at slower speeds.

Spoiler

The spoiler’s job is to disrupt, or “spoil”, the flow of air that passes over the top surface of the wing. They are usually found on larger planes, and they can have two types installed. The in-flight spoilers are small and designed to reduce the lifting capability of the wing enough to allow the plane to descend quicker without gaining speed. The flaps can also perform this duty, the spoiler is intended to be used temporarily, while the flaps are typically used for longer durations such as during the approach and landing.

Struts

The struts are part of the undercarriage, more commonly known as the landing gear. There are two main types - straight leg and trailing link - but their function is the same: to absorb the impact of the landing as the aircraft touches the ground. Each strut contains a shock absorber (a collection of springs), hydraulic oil and gasses which work together to reduce the impact felt by the passengers.

Vertical Stabilizer

The vertical stabilizer is designed to stabilize the left-right motion of the aircraft. While most aircraft use a single stabilizer, some models, such as the Lockheed C-69 Constellation, use multiple, smaller stabilizers.

Wheel

The wheels are another part of the landing gear. While most planes have a minimum of three wheels, larger planes require many more to support the weight. Typically aircraft wheels are filled with nitrogen instead of air. This is because the pressure of nitrogen gas changes very little with changes in altitude or temperature, which is something aircraft constantly experience.

Windshield

The windshield on smaller planes are usually made from polycarbonate, a type of plastic, while pressurized airplanes use a sandwich of plastic and glass layers, called a laminate, up to 20mm thick. This is necessary to absorb the impact of birds, insects and other debris that may collide with the windshield as the airplane flies at close to the speed of sound.

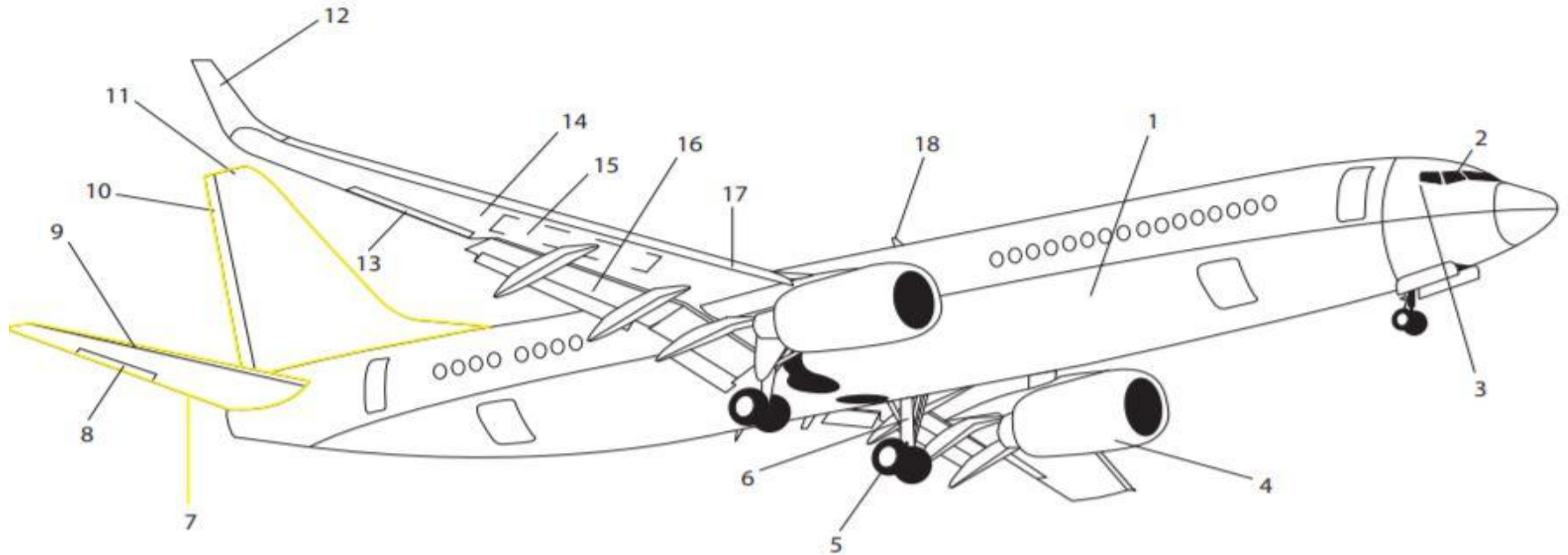
Wing

The wing provides the majority of the lift an airplane requires for flight. Its shape is specifically designed for the plane to which it is attached. On most planes, the interior of the wing is also used to store the fuel required to power the engines.

Winglet

Some aircraft wings have an additional component called a winglet, which is located at the end of each wing. Its purpose is to reduce the drag (or air resistance) the wing produces as it pushes through the air. This not only allows the airplane to fly faster, but also means it burns less fuel, allowing it to fly longer distances without refuelling.

Label the parts of the plane:



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____

Word Bank	
Aileron	Rudder
Antenna	Slat
Cockpit	Spoiler
Elevator	Strut
Empennage	Vertical Stabilizer
Engine	Wheel
Flap	Windshield
Fuselage	Wing
Horizontal Stabilizer	Winglet