



SNS COLLEGE OF TECHNOLOGY

**An Autonomous Institution
Coimbatore – 35**

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DEPARTMENT OF AEROSPACE ENGINEERING

19ASO301 BASICS OF AERONAUTICAL ENGINEERING

UNIT 3 – AIRPLANE STRUCTURES AND MATERIALS



UNIT 3 – AIRPLANE STRUCTURES AND MATERIALS



- *Components & Functions*
- *Aircraft Materials*
- *Mechanical Properties*
- *Definition – Mechanical Properties*



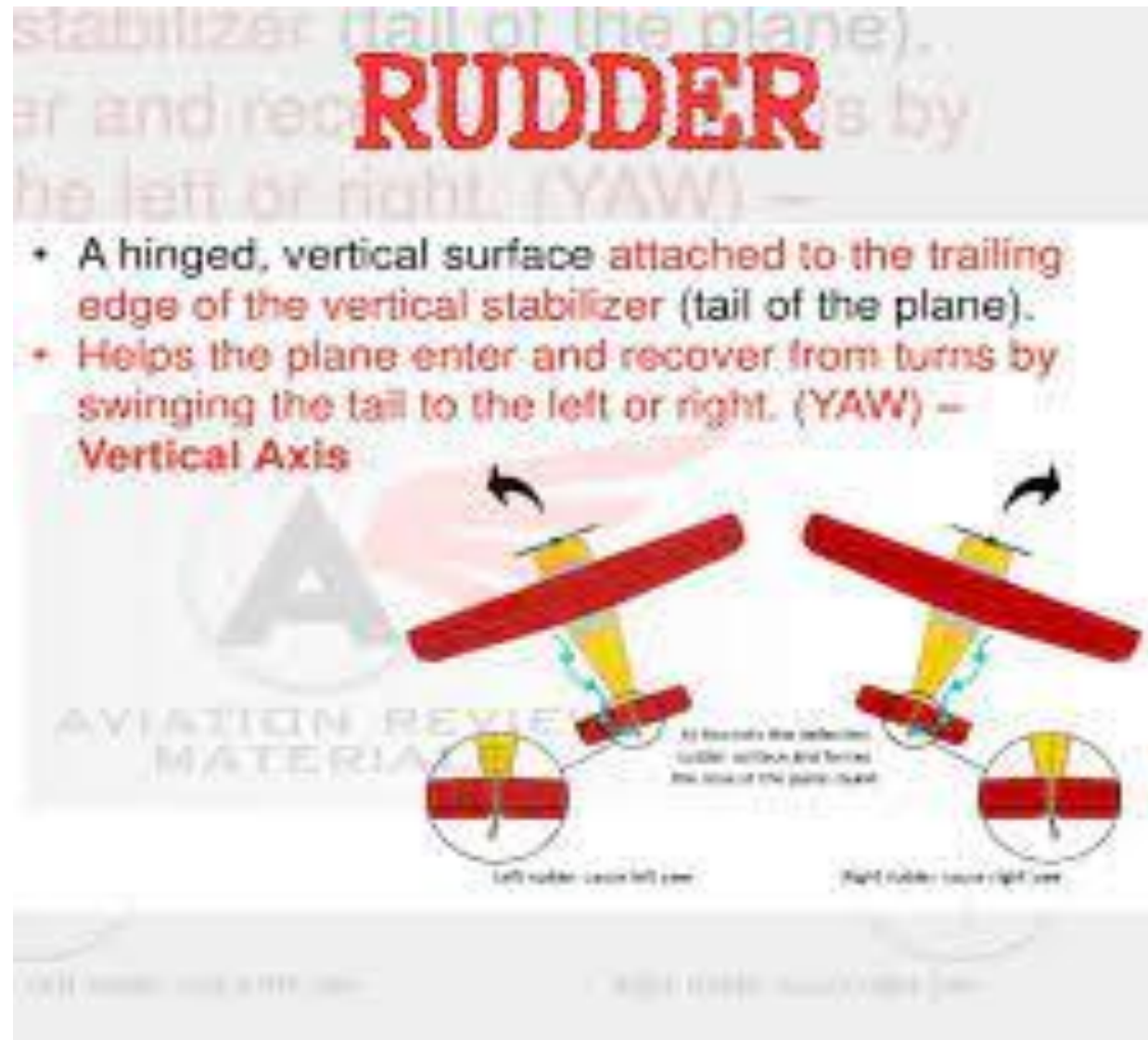
TEXT BOOK



- ***Anderson. J D, “Introduction to Flight”, McGraw-Hill, 1995***
- ***Richard S. Shevel, “fundamentals of Flight”, Prentice Hall, 2010***



Rudder



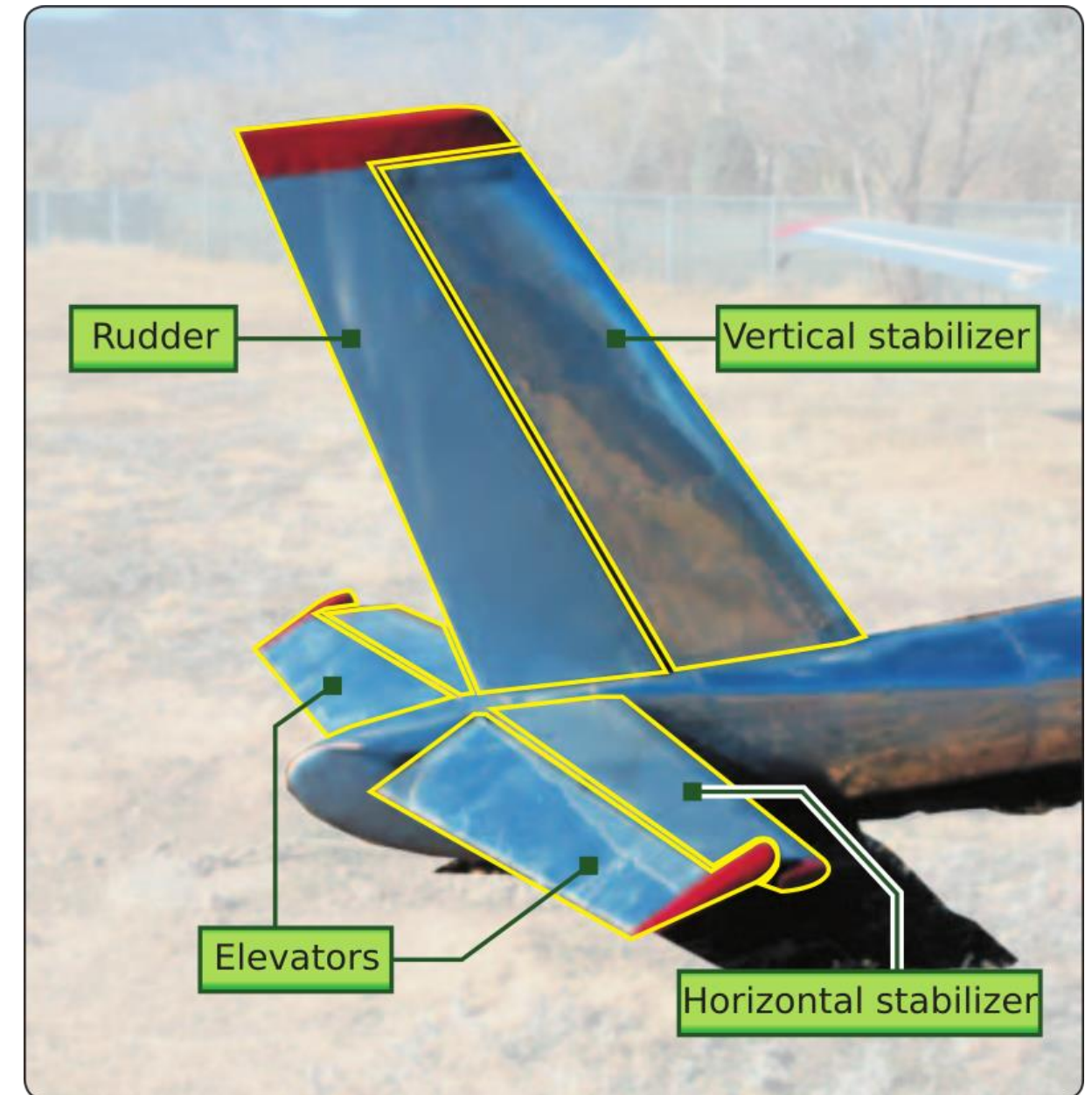
- *Located on the vertical stabilizer (Tail)*
- *Controls the aircraft's yaw*
- *Right Rudder = Right Yaw*
- *Left Rudder = Left Yaw*



Rudder



- *On the trailing edge of the vertical stabilizer is the Rudder.*
- *This controls the yaw or the left/right sliding movements of the aircraft.*
- *On a real aircraft, this is controlled by the foot pedals.*
- *When the pilot pushes the left pedal, the rudder deflects left. Pushing the right pedal causes the rudder to deflect right.*





Stabilator



A Stabilator is a fully movable horizontal stabilizer.

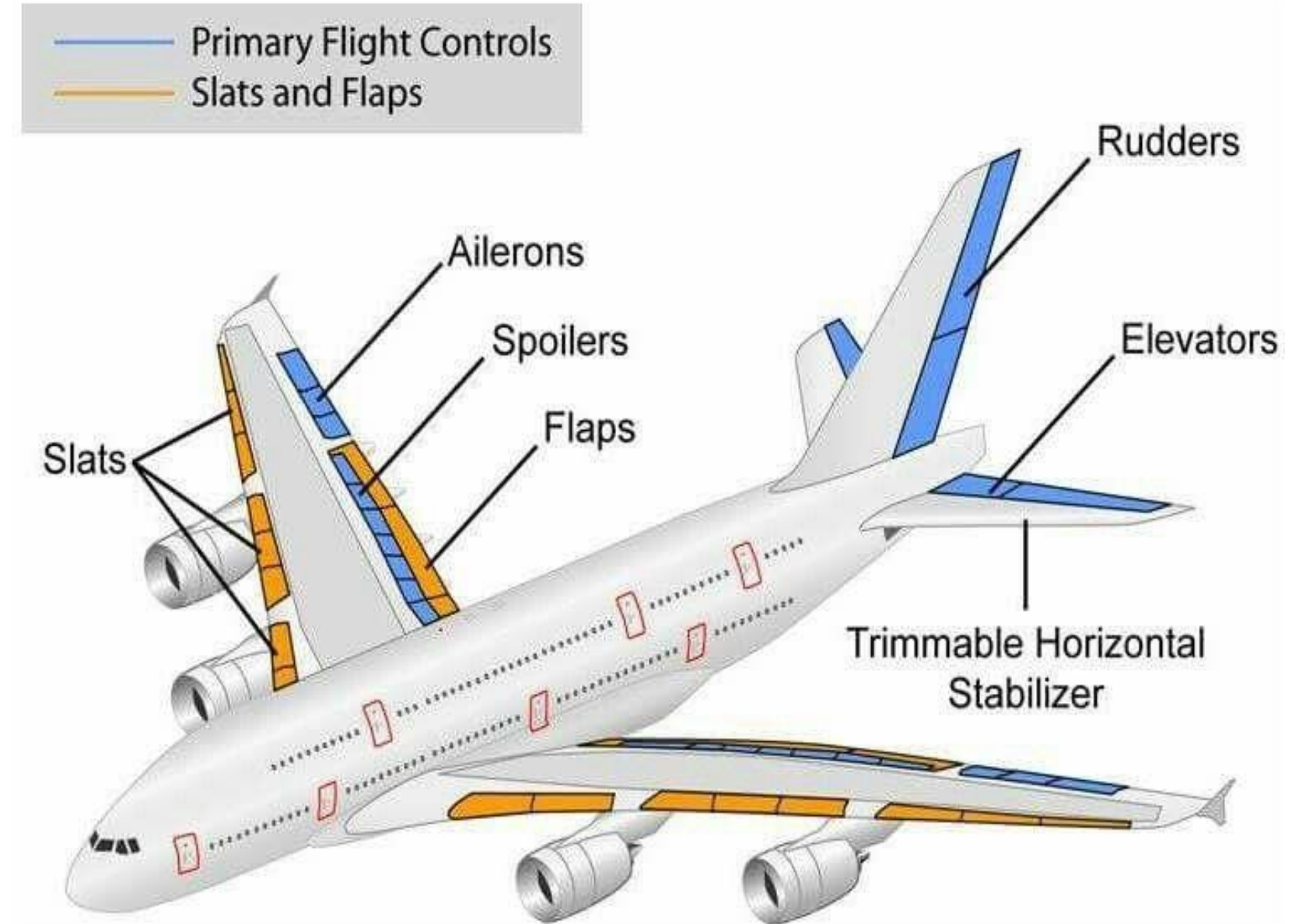
It performs the functions of horizontal stabilizer (fixed) and elevator (adjustable)



Flaps

- *Flaps are trailing – edge high – lift devices.*
- *That's a technical way of saying that they are movable surfaces on the back of the wings that help the plane make more lift.*
- *They're used to help a high-speed plane fly slowly for takeoff and landing.*

Aircraft Control Surfaces



AirCraft & Rocket Entire Details



Aileron

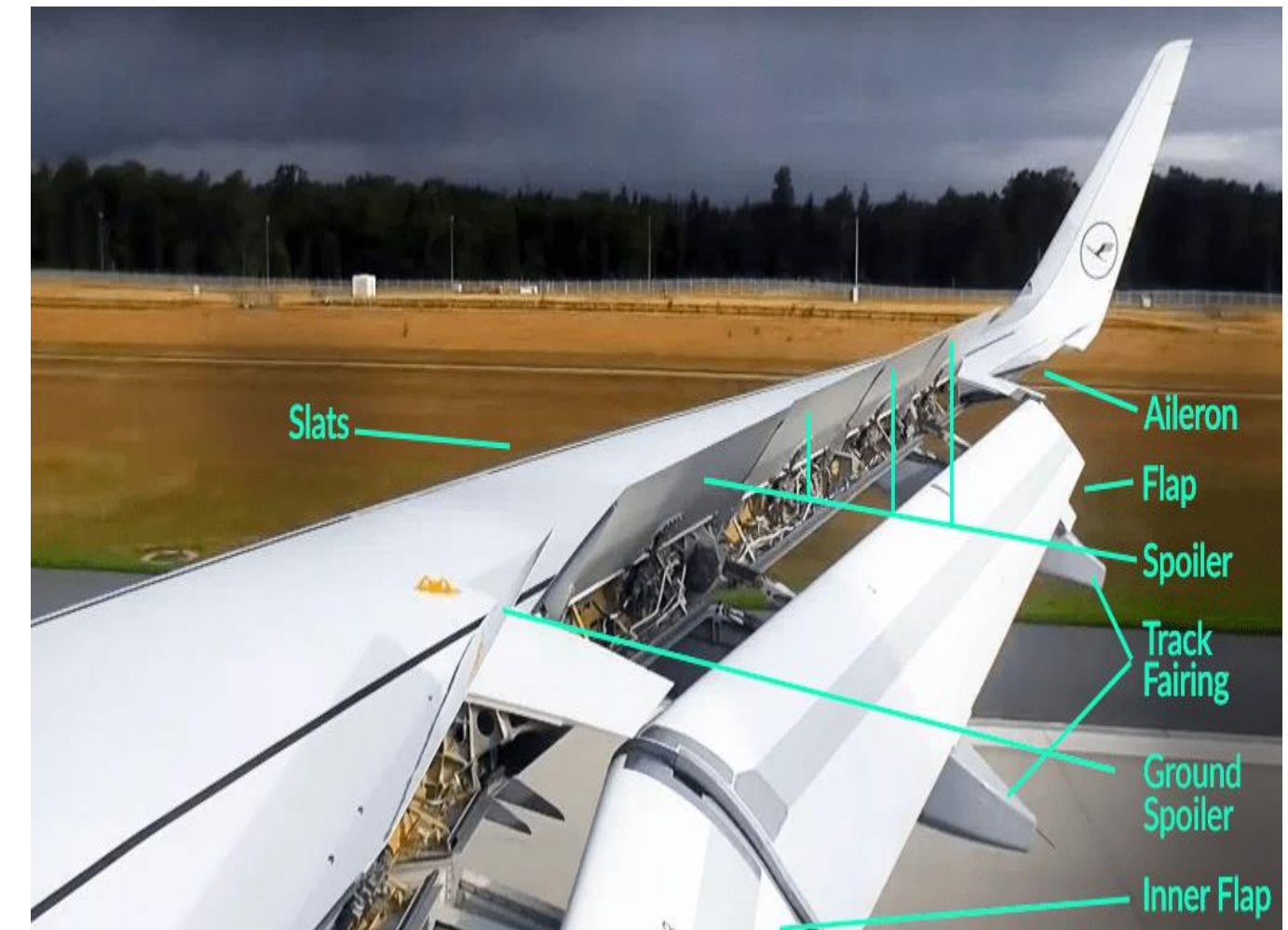
- An Aileron (French for “Little wing” or “fin”) is a hinged flight control surface usually forming part of the trailing edge of each wing of a fixed – wing aircraft.
- Ailerons are used in pairs to control the aircraft in roll (or movement around the aircraft’s longitudinal axis), which normally results in a change in flight path due to the tilting of the lift vector.
- Movement around this axis is called ‘rolling’ or ‘banking’





Spoiler

- In aeronautics, a spoiler (Sometimes called a lift spoiler or lift dumper) is a device which intentionally reduces the lift component of an airfoil in a controlled way.
- Most often, spoilers are plates on the top surface of a wing that can be extended upward into the airflow to spoil the streamline flow.
- By so doing, the spoiler creates a controlled stall over the portion of the wing behind it, greatly reducing the lift of the wing section.



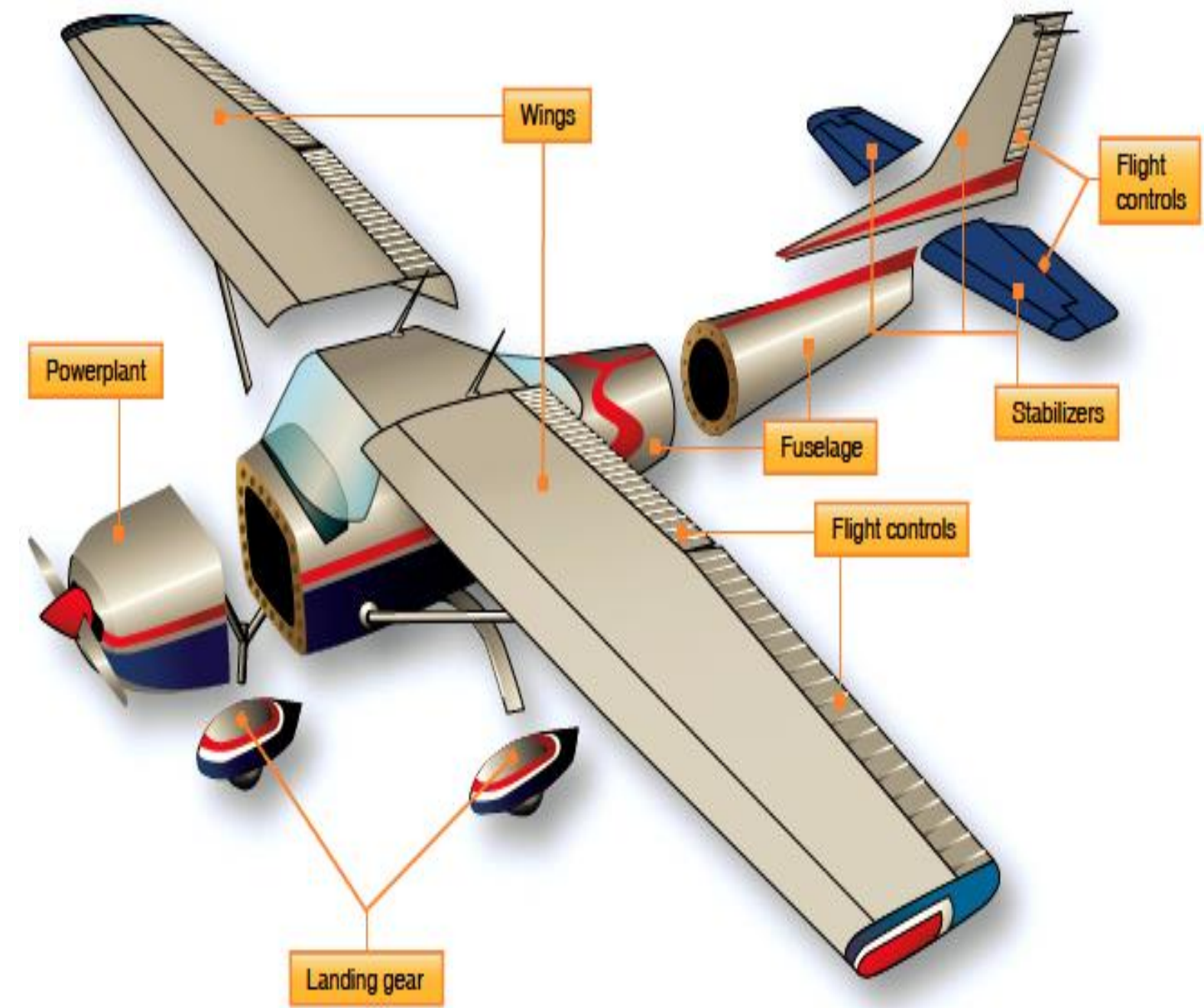


Fuselage

The main body section of an aircraft is called a fuselage.

This forms the central body of the aircraft onto which wings, control surfaces and engines are connected.

The fuselage houses the crew, passengers, cargo, an array of aircraft systems and sometimes fuel.





Cockpit

A cockpit or flight deck is the area, on the front part of an aircraft or spacecraft from which a pilot controls the aircraft.

The cockpit of an aircraft contains flight instruments on an instrumental panel and the controls that enable the pilot to fly the aircraft.





Aircraft Materials

- *The main groups of materials used in aircraft construction nowadays are steel alloys, aluminum alloys, titanium alloys, and fiber-reinforced composites.*
- *Titanium alloys are preferred in aerospace applications as they are high strength to weight ratio, highly resistant to corrosion, durability, Chemical stability and withstand high temperatures.*
- *Most widely used Titanium alloy is Ti-6Al-4V, also known as Ti64 or Grade 5 Titanium. 90% Titanium, 6% Aluminium and 4% Vanadium*