航空科技

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僅以此片紀念自強號升空三十周年
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AERONAUTICS

HISTORY AND TECHNOLOGY

- Aeronautics which means "navigation, seamanship", i.e. "navigation of the air“. It is the science involved with the study, design, and manufacture of flight-capable machines, or the techniques of operating aircraft.

- While the term—literally meaning "sailing the air"—originally referred solely to the science of operating the aircraft, it has since been expanded to include technology, business and other aspects related to aircraft.

- One of the significant parts in aeronautics is a branch of physical science called aerodynamics, which deals with the motion of air and the way that it interacts with objects in motion, such as an aircraft.

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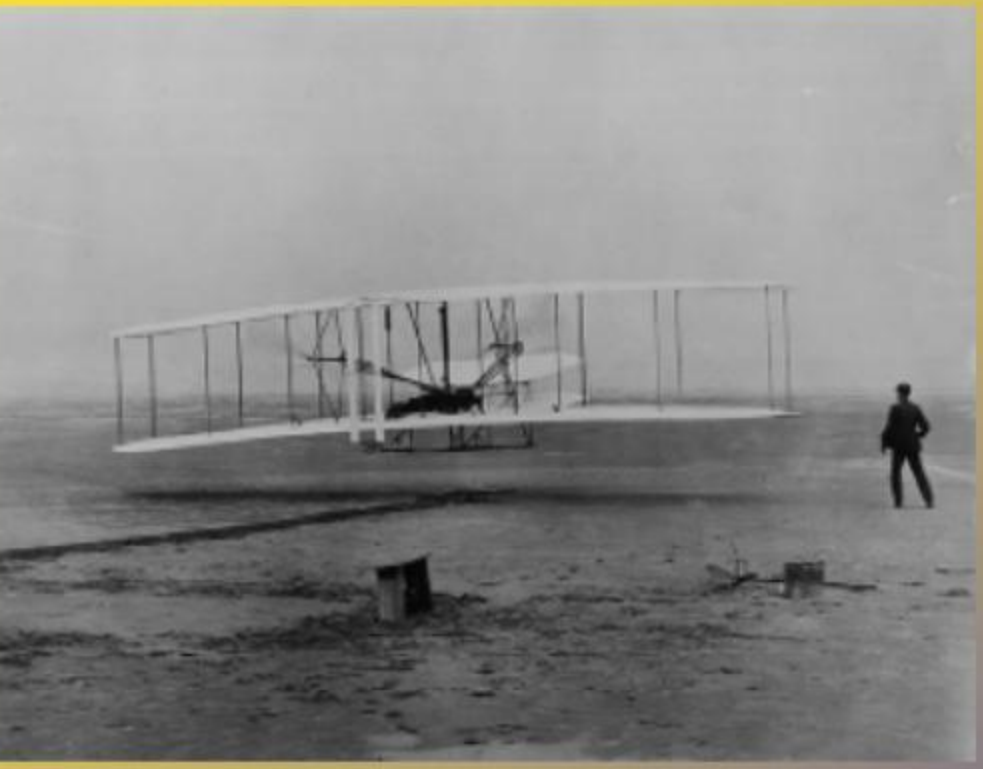
AEROPLANES

HISTORY

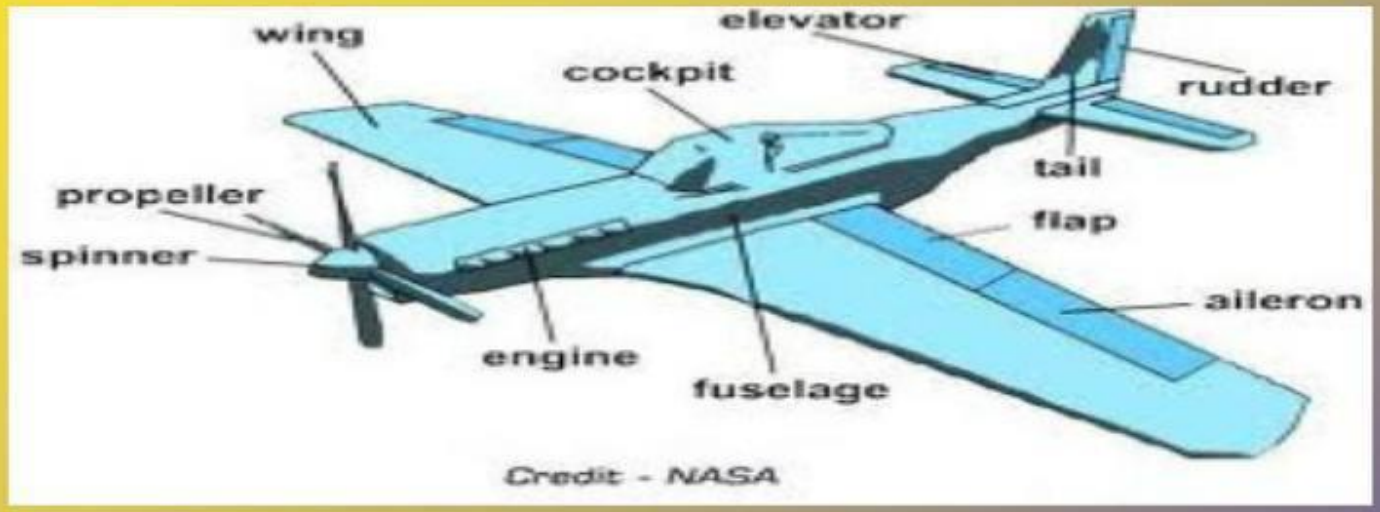


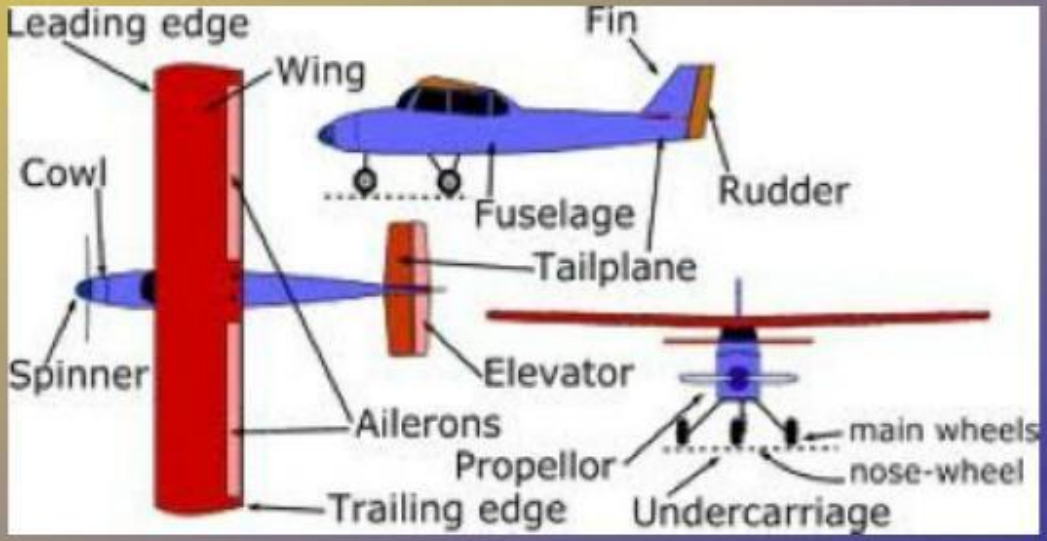
- The first manned aircraft was named as “Flyer”.
- It was made by the Wright brothers who owned cycle shops and worked as mechanics.
- The historical flight flew on December 17, 1903.
- It was a fixed wing aircraft.

AEROPLANES

- A fixed-wing aircraft, typically called an airplane, aeroplane or plane, is an aircraft capable of flight using forward motion that generates lift as the wing moves through the air. ...

Parts of the Aeroplane





TYPES OF AIRCRAFTS

- An **AEROSTAT** is a system that remains aloft primarily through the use of buoyant lighter than air gases to give a vehicle with nearly the same overall density as air.
- Aerostats include free balloons, airships, and moored balloons.
- An aerostat's main structural component is its envelope, a lightweight skin containing a lifting gas to provide buoyancy, to which other components are attached.
- One of the most recent deployments of an aerostat was seen at the opening ceremony of the nineteenth 2010 Commonwealth Games, held in Delhi, India.
- Aerostats are so named because they use "aerostatic" lift which is a buoyant force that does not require movement through the surrounding air mass.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AERODYNES

Heavier-than-air aircraft must find some way to push air or gas downwards, so that a reaction occurs (by Newton's laws of motion) to push the aircraft upwards. This dynamic movement through the air is the origin of the term aerodyne. There are two ways to produce dynamic upthrust:aerodynamic lift, and powered lift in the form of engine thrust.

Aerodynamic lift is the most common, with fixed-wing aircraft being kept in the air by the forward movement of wings, and rotorcraft by spinning wing-shaped rotors sometimes called rotary wings. A wing is a flat, horizontal surface, usually shaped in cross-section as an aerofoil.

To fly, air must flow over the wing and generate lift. A flexible wing is a wing made of fabric or thin sheet material, often stretched over a rigid frame. A kites tethered to the ground and relies on the speed of the wind over its wings, which may be flexible or rigid, fixed or rotary.

A pure rocket is not usually regarded as an aerodyne, because it does not depend on the air for its lift (and can even fly into space); however, many aerodynamic lift vehicles have been powered or assisted by rocket motors. Rocket-powered missiles which obtain aerodynamic lift at very high speed due to airflow over their bodies, are a marginal case.

COMMERCIAL AIRCRAFTS

THEY ARE USED FOR COMMERCIAL AND DAILY TRAVELLING

LUXURY AIRCRAFTS

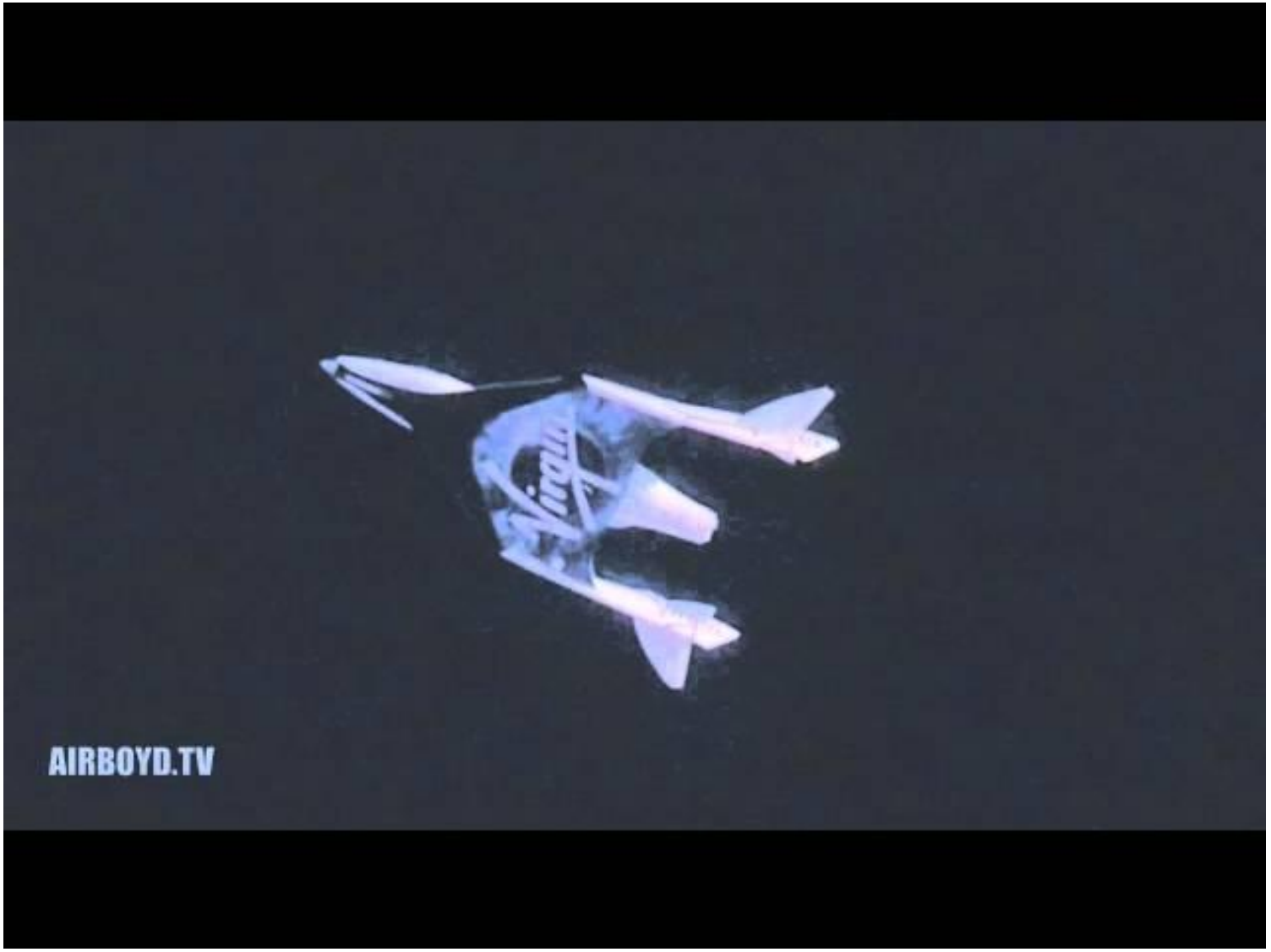
• NOWADAYS IN MOST OF THE AIRLINERS GIVE PREFERENCE TO LUXURY.

PRIVATE JETS

- THEY ARE OWNED BY RICH PEOPLE FOR THEIR PERSONAL AND FAMILY TRAVELLIN

SPACECRAFTS

- THEY ARE USED FOR TRAVELLING AND EXPLORING IN SPACE.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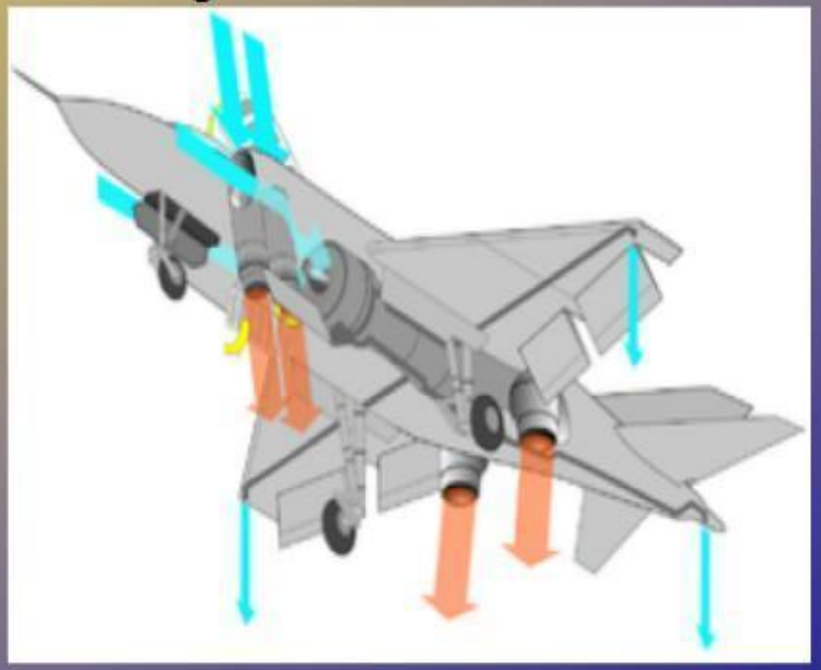
FIGHTER JETS

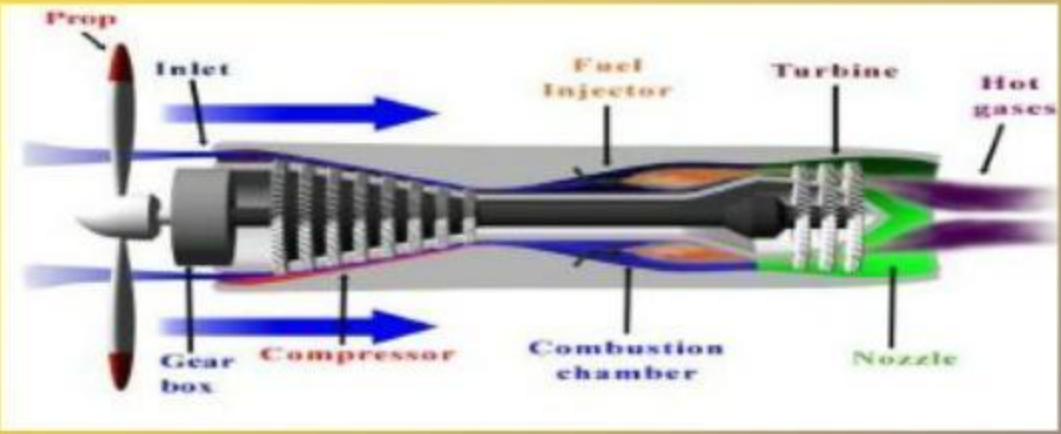
They are used for defense and national purposes by the armed forces.

VTOL AIRCRAFTS

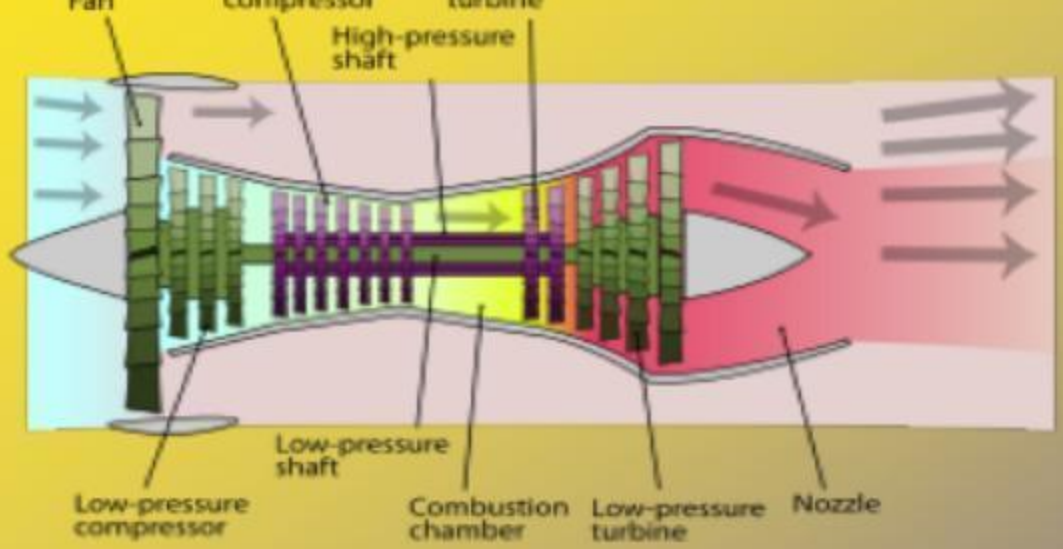
•The initialism VTOL (vertical take off and landing) is applied to aircraft that can take off and land vertically. Most are rotorcraft. Others, such as the Hawker Siddeley Harrier and F-35B, take off and land vertically using powered lift and transfer to aerodynamic lift in steady flight. Similarly,STOL stands for short take off and landing.



MAIN ENGINES



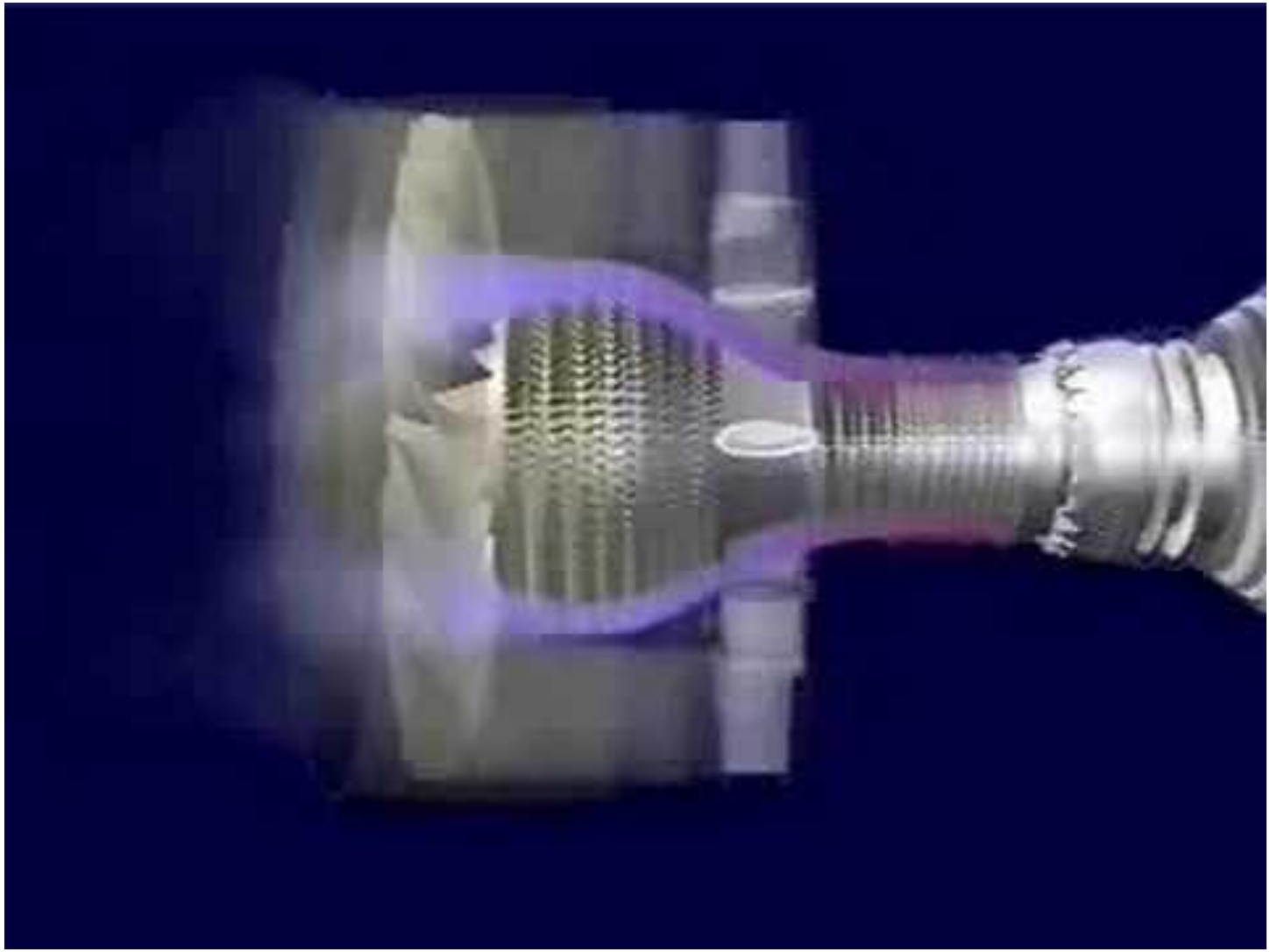
- **TURBOPROP** engines are a type of aircraft power plant that use a gas turbine to drive a propeller.
- The gas turbine is designed specifically for this application, with almost all of its output being used to drive the propeller.
- The engine's exhaust gases contain little energy compared to a jet engine and play a minor role in the propulsion of the aircraft.

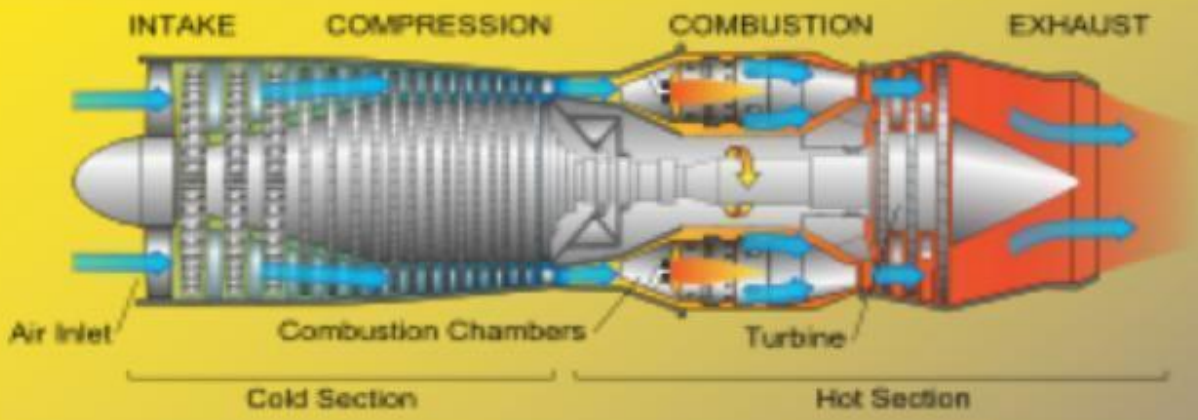


•**TURBOFAN** is a type of aircraft jet engine based around a gas turbine engine. Turbofans provide thrust using a combination of a ducted fan and a jet exhaust nozzle.

• Part of the airstream from the ducted fan passes through the core, providing oxygen to burn fuel to create power. However, the rest of the air flow bypasses the engine core and mixes with the faster stream from the core, significantly reducing exhaust noise.

• The substantially slower bypass airflow produces thrust more efficiently than the high-speed air from the core, and this reduces the specific fuel consumption.



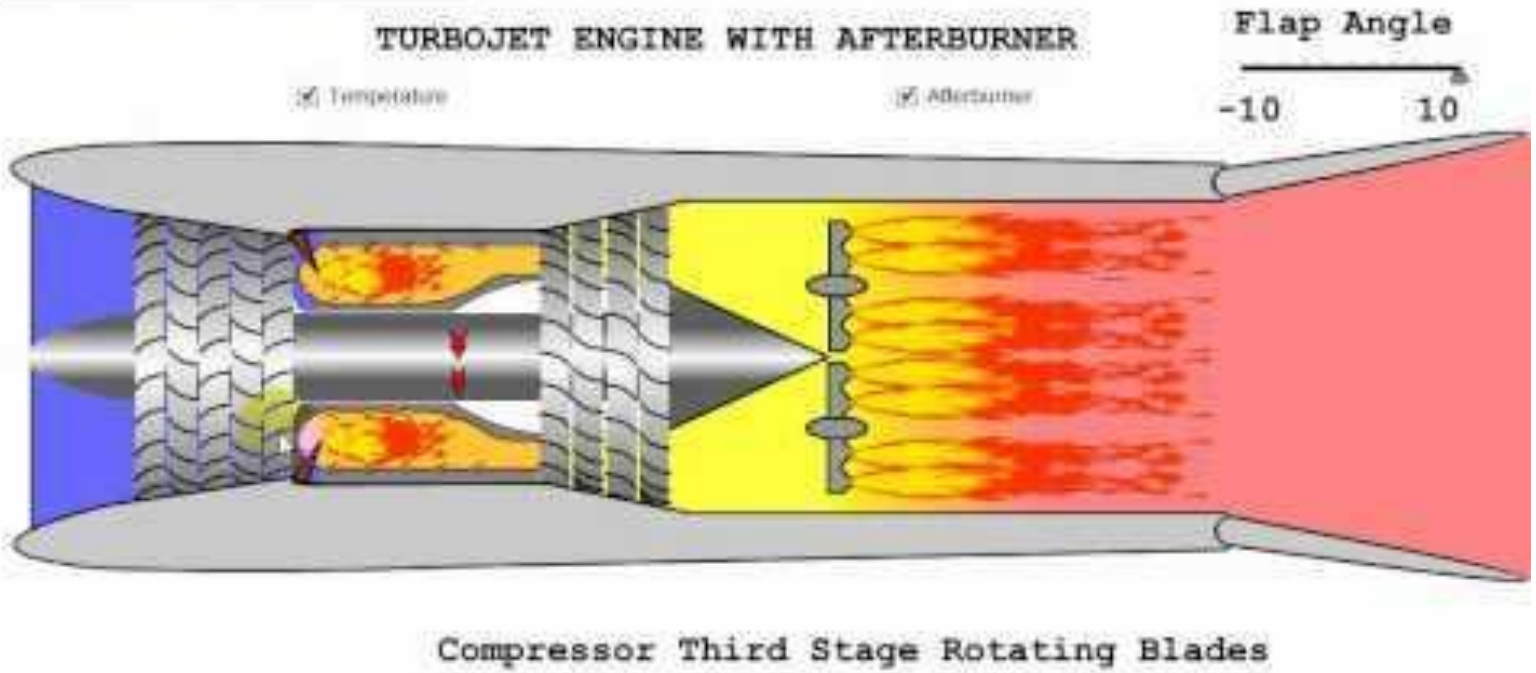


TURBOJETS consist of an air inlet, an air compressor, a combustion chamber, a gas turbine (that drives the air compressor) and a nozzle.

The air is compressed into the chamber, heated and expanded by the fuel combustion and then allowed to expand out through the turbine into the nozzle where it is accelerated to high speed to provide propulsion.

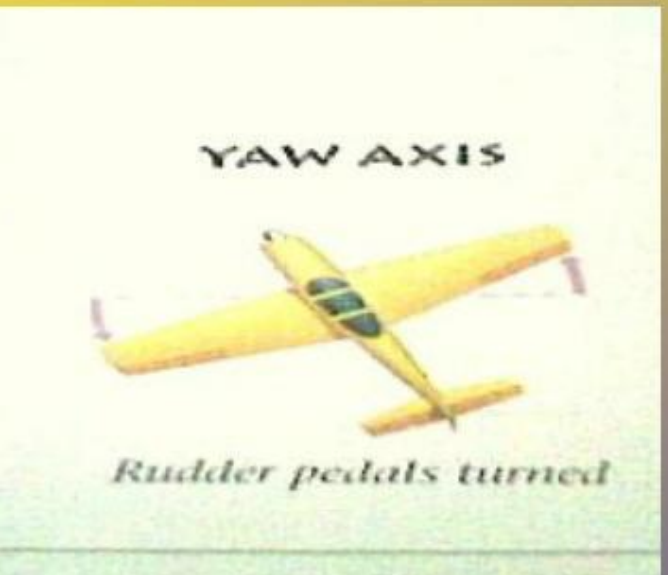
Turbojets are quite inefficient if flown below about Mach 2 and very noisy. Most modern aircraft use turbofans instead for economic reasons.

Turbojets are still very common in medium range cruise missiles due to their high exhaust speed, low frontal area and relative simplicity.



Compressor Third Stage Rotating Blades

Actions of the Aeroplanes



- Pitching or bowing is done with the help of elevators. It is for the vertical stabilization of the plane.
- Yawing or direct turning is done with the help of rudder. It is used for changing the direction of he plane.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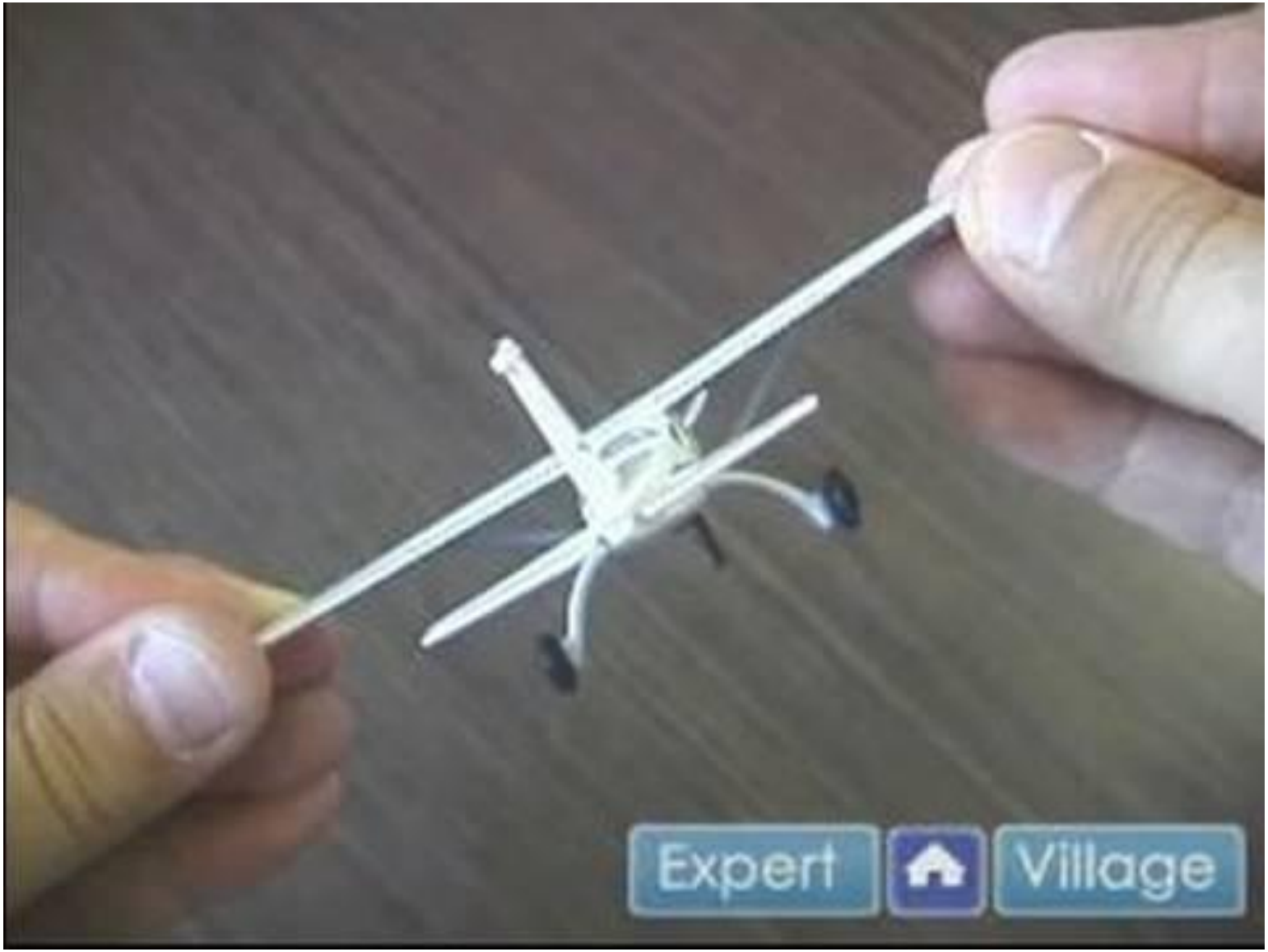
Actions of the Aeroplanes

- Turning is done when the airplane changes is direction with slight change in its horizontal angle.

- Rolling is done with the help of ailerons for rapid turning and is commonly used in combat.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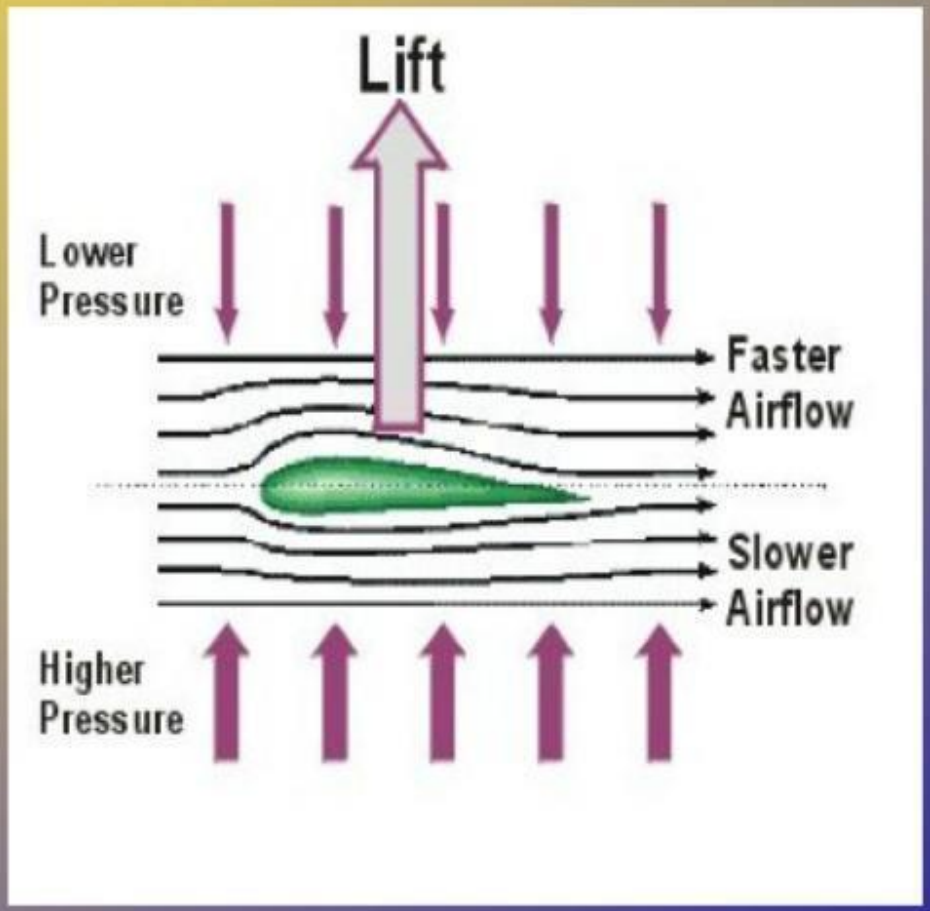
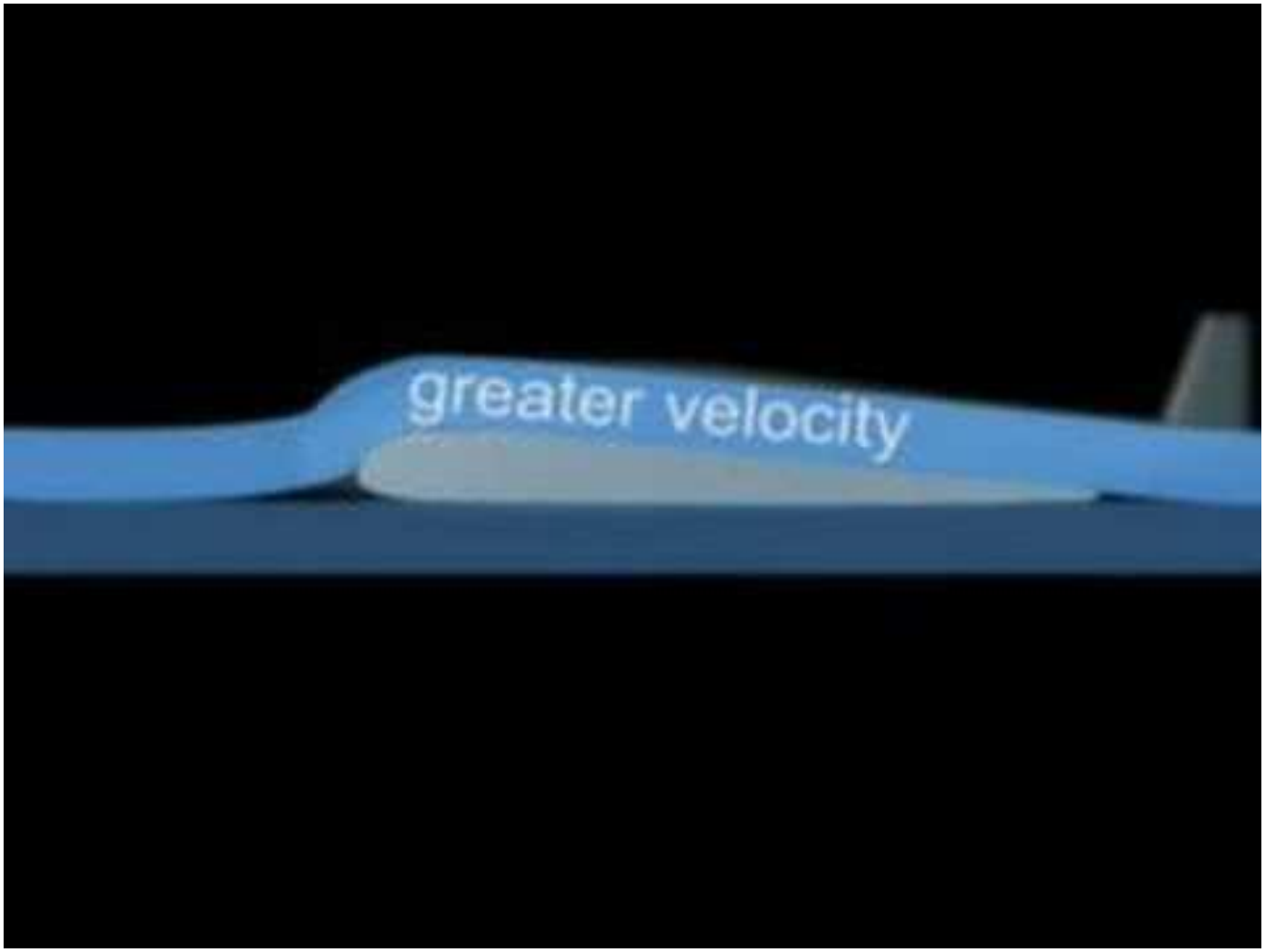
Bernoulli's principle

- All the concepts of aeronautics are only possible due to Bernoulli's principle.
- Bernoulli's principle states that for an in viscid flow, an increase in the speed of the flying object occurs simultaneously with a decrease in pressure or a decrease in the fluid's potential energy

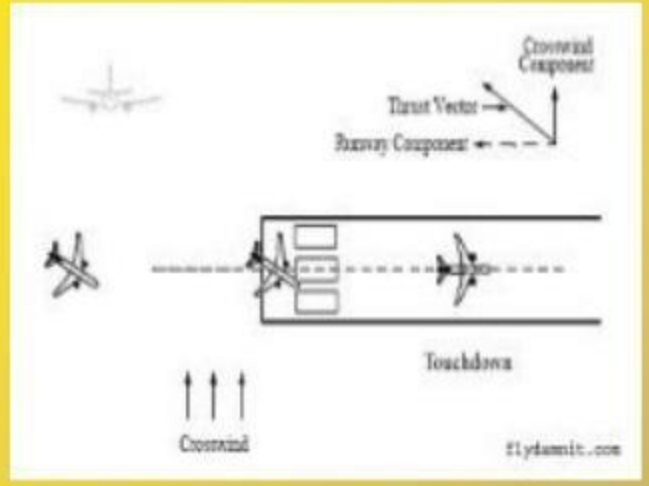



greater velocity

Take-off

- Takeoff is the phase of flight in which an aircraft goes through a transition from moving along the ground (taxiing) to flying in the air, usually starting on a runway. For balloons, helicopters and some specialized fixed-wing aircraft (VTOL aircraft such as the Harrier), no runway is needed. Takeoff is the opposite of landing.

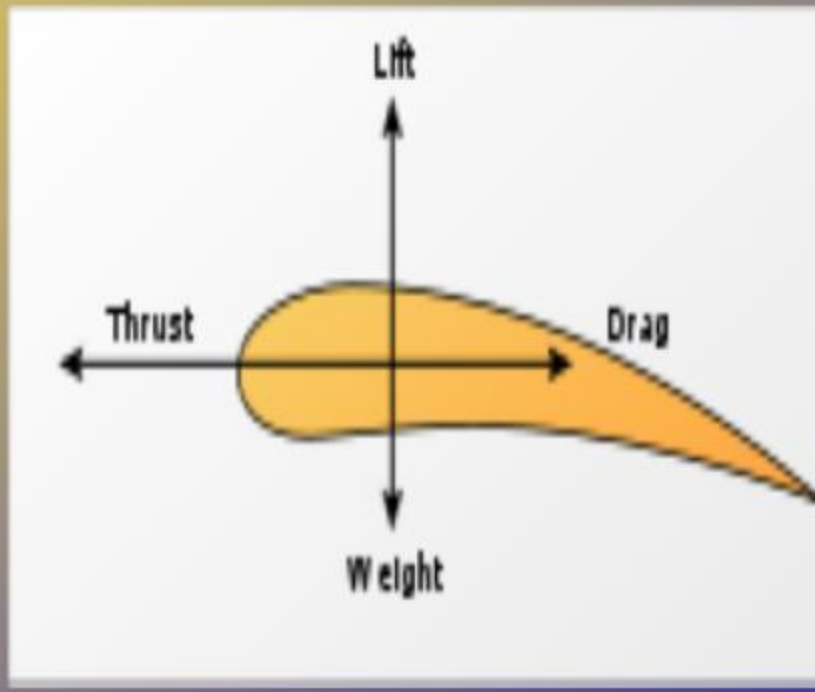
Landing



- Landing is the last part of a flight, aircraft, or spacecraft returns to the ground.
- When the flying object returns to water, the process is called alighting.
- A normal aircraft flight would include several parts of flight including taxi, takeoff, climb, cruise, descent and landing.
- This article describes the last portion of flight as the plane, or rocket touches the ground.

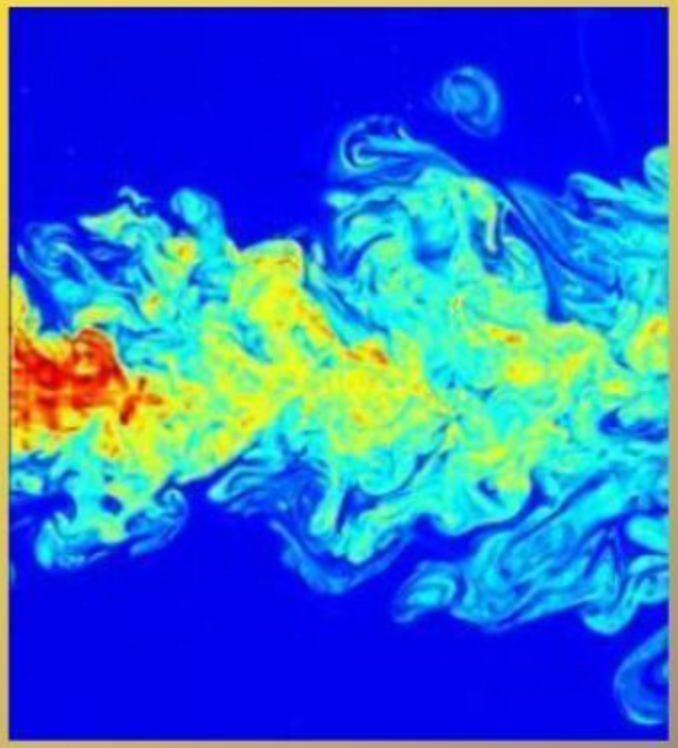
Forces on a Aircraft

- There are four forces acting on a aircraft to stabilize it.
- The lift which is caused by the upward motion and the weight is caused by the gravity.
- The thrust is powered by the engines and the drag is caused by the frictional force.
- The lift and weight balance the vertical motion whereas the thrust and drag maintains the horizontal stability.




lift
drag
weight

Turbulence



- In fluid dynamics, turbulence or turbulent flow is a fluid regime characterized by chaotic, stochastic property changes. This includes low momentum diffusion, high momentum convection, and rapid variation of pressure and velocity in space and time. Flow that is not turbulent is called laminar flow. While there is no theorem relating Reynolds number to turbulence, flows with high Reynolds numbers usually become turbulent, while those with low Reynolds numbers usually remain laminar


FLYiNG EXPERiENCE

Turbulence

- Turbulence in aircraft sometimes causes instability in itself.
- Too much of instability is caused when the streamline body or the vortex of the wings is not in a state of equilibrium.

FUTURE TECHNOLOGY

X-ION-T

It is optimized for lower-speed flight. Light and maneuverable, with a big glass canopy and no propeller in front to spoil the view, the airplane woul be a natural choice for low-altitude sightseeing.

AADX450TJ

T-tail jet exemplifies the elegant curves made possible by composite construction technology. Aerodynamically slippery, the jet would be well-suited either for private transportation or as a regional air taxi.

MONOTILT ROTOR

It is used as a spy plane which is designed in Japan and is an unmanned computerized and pre programmed aircraft.