

# King Fahd University of Petroleum and Minerals

## Aerospace Engineering Department

### Vocabulary

#### **Aeronautics**

Aeronautics is the study of the science of flight.

#### **Aerodynamics**

The study of how air flows around the airplane.

#### **Air**

Air is a physical substance which has weight and is made up of molecules which are constantly moving. Moving air has a force that will lift kites and balloons up and down. Air is a mixture of different gases; oxygen, carbon dioxide and nitrogen.

#### **Airfoils**

The wings of a plane.

#### **Ailerons**

They are hinged on the wings and move downward to push the air down and make the wing tilt up.

#### **Combustor**

In the combustor the air is mixed with fuel and then ignited. This process results in high temperature, high-energy airflow. The fuel burns with the oxygen in the compressed air, producing hot expanding gases.

#### **Compressor**

The compressor is the first component in the engine core. It is made up of fans with many blades and it is attached to the shaft. The compressor squeezes the air and creates an increase in the air pressure. The squashed air is forced into the combustion chamber.

**Drag**

Resistance that slows an object down in the air. Items that are streamlined have less drag in air.

**Elevators**

are found at the rear of the plane. They can be raised or lowered to change the direction of the plane's nose. The plane will go up or down depending on the direction of that the elevators are moved.

**Fan**

The fan is the first component of the turbofan engine. The large spinning fan sucks in large quantities of air. The blades of the fan pull the air into the engine.

**Fin**

is the vertical part of the tail

**Flaps**

The flaps slide back and down to increase the surface of the wing area.

**Fuselage**

The body of the plane

**Gas Turbine**

Another term for engine.

**Gravity**

a force that pushes objects come down to the earth.

**Hypersonic**

This is the speed of flight that is used by rockets in outer space. Rockets can travel 5 to 10 times faster than the speed of sound. That means the speed is 3500 - 7500 MPH. An example of this speed is the Space Shuttle.

**Landing Gear**

The wheels of a plane.

**Laws of Motion** - Sir Isaac Newton proposed three laws of motion.

1. If an object is not moving, it will not start moving by itself. If an object is moving, it will not stop or change direction unless something pushes it.
2. Objects will move farther and faster when they are pushed harder.
3. When an object is pushed in one direction, there is always a resistance of the same size in the opposite direction.

**Lift**

A force that pushes objects upward.

**Mach 1**

760 MPH. When a plane travels faster than this speed it is breaking the sound barrier.

**Materials and Structures**

The study of what materials are to be used on the plane and in the engine and how those materials make the plane strong enough to fly effectively.

**Mixer**

This part of the engine combines the high temperature air coming from the engine core with the lower temperature air that was bypassed in the fan. By processing the air in this way, the engine is a little more quiet.

**Nozzle**

The nozzle is the exhaust duct of the engine. The air that has passed through the engine passes through the exhaust and produces the thrust or forward motion of the engine.

**Pitch**

Pitch is to make a plane descend or climb. The pilot adjusts the elevators on the tail to make a plane descend or climb. Lowering the elevators caused the airplane's nose to drop, sending the plane into a down. Raising the elevators causes the airplane to climb.

**Propulsion**

(as a field of study in relation to Aeronautics) is the study of how to design an engine that will provide the thrust that is needed for a plane to take off and fly through the air.

**Regimes of Flight**

The ranges of speed that airplanes fly. Subsonic: 100-350 MPH. Transonic: 350-750 MPH. Supersonic: 760-3500 MPH. Hypersonic: 3500-7000 MPH

### **Roll**

To roll the plane to the right or left, the ailerons are raised on one wing and lowered on the other. The wing with the lowered aileron rises while the wing with the raised aileron drops.

### **Rudder**

The rudder is found on the tail of the plane. Moving it right and left controls the left and right movements of the plane.

### **Slats**

The slats move out from the front of the wings to make the wing space larger. This helps to increase the lifting force of the wing at slower speeds like takeoff and landing.

### **Spoilers**

The spoilers are used like air brakes to reduce any remaining lift and slow down the airplane.

### **Stability and Control**

Stability and Control is the study of how to control the speed, direction, altitude and other conditions that affect how a plane flies

### **Shock Wave**

A series of air waves that form in front of a fast moving plane. In order to travel faster than sound the plane must push through these waves. This creates a sonic boom.

### **Sonic Boom**

When a plane pushes through a shockwave it creates a sonic boom. The noise is the result of breaking through the air waves which form in front of a fast moving plane. The sonic boom sounds when the plane is going faster than 760 MPH.

### **Sound Waves**

Sound is made up of molecules of air which move. When they push together they form sound waves.

### **Speed of Sound**

When a plane travels faster than 760 a sound barrier forms in front of the plane.  
If a plane is going at the speed of sound it is traveling at Mach 1.

**Subsonic**

Subsonic is a speed of 100-350 MPH. Small planes such as crop dusters and seaplanes are examples of planes that travel at this speed.

**Supersonic**

Planes which travel faster than Mach 1 (or the speed of sound) are traveling at supersonic speeds. An example of this speed regime is the Concorde. The speed range is 760 - 3500 MPH or Mach 1 - Mach 5.

**Transonic**

This speed of flight includes most of the commercial flights which carry passengers and cargo. Transonic speed is 350 - 750 MPH.

**Tail**

The part of the plane that provides stability for the plane

**Thrust**

The force of flight that pushes a plane forward. The engine provides the thrust for flight.

**Turbine**

A part of the engine

**Weight**

A force that acts on the plane to pull it back to earth.

**Wings**

Also called airfoils. The wings provide the lift for the plane.

**Yaw**

Yaw is the turning of a plane. When the rudder is turned to one side, the airplane moves left or right. The airplane's nose is pointed in the same direction as the direction of the rudder. The rudder and the ailerons are used together to make a turn.