

2.1 Universal Law of Conservation of Energy and Mass

- This fundamental law states that energy and mass can neither be created nor destroyed; they
- can only be changed from one form to another. This principle underpins all aerodynamic
- theory.

2.2 The Principle of Continuity

- This principle describes how air behaves as it flows through a tube of varying cross-sectional
- area, like the flow around an aerofoil.
- ☐ The Continuity Equation: The air mass flow (mass per unit time) is constant at all points
- along the tube. The equation is:
- $\text{Area (A)} \times \text{Velocity (V)} \times \text{Density } (\rho) = \text{Constant}$
- ☐ Incompressible Flow: At low subsonic speeds (below approximately Mach 0.4 or
- knots), changes in air density are insignificant and can be ignored. In this case, the equation
- simplifies to:
- $\text{Area (A)} \times \text{Velocity (V)} = \text{Constant}$
- ☐ Core Concept: From this, we can see that a reduction in the cross-sectional area of the tube
- results in an increase in the velocity of the air flowing through it. This is key to
- understanding how an aerofoil generates lift.

2.3 Bernoulli's Theorem

- Bernoulli's theorem relates the pressure and velocity of a moving fluid.
- ☐ The Principle: In the steady flow of an ideal fluid (one that is incompressible and has no
- viscosity), the sum of its static pressure and dynamic pressure remains constant.
- ☐ The Equation:
- $\text{Static Pressure} + \text{Dynamic Pressure} = \text{Constant (Total Pressure)}$
- ☐ Key Relationship: Since Total Pressure must remain constant, Bernoulli's theorem proves

Join live classes for guided practice and doubt clearing.

- that an increase in velocity will cause a decrease in static pressure, and vice versa. This
- is the single most important principle in the generation of aerodynamic lift. Total pressure is
- also referred to as
- Pitot Pressure.

© Ghost Aviator · Technical General for Aviators · Ghost Aviator

GHOST AVIATOR

GHOST AVIATOR