Subject Code & Name**: 23AST205 AEROSPACE STRUCTURES**

UNIT: **5. STRESS ANALYSIS IN WING AND FUSELAGE**

TOPIC**: 2. Lift distribution on aircraft wing**

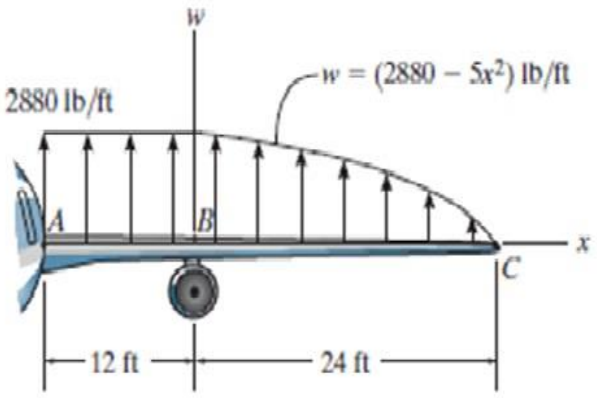
The Lift and Drag of Wings

The study of airfoils in Chapter 3 gave insight into how wings generate lift, but it did not tell the whole story. The flow over a wing near the wingtips is very different from the two-dimensional flow around an airfoil. The differences have profound effects on the lift and drag generated by a wing. Understanding these effects is crucial to the aircraft designer who must shape an aircraft's wing to optimize its performance. Section 4.2 discusses wing lift and drag theory and analysis methods.

Aerodynamic lifting force is distributed along the aircraft wing as shown in the figure: a uniform distribution from A to B, then a semi-parabolic distribution from B to C.

1. **Calculate the magnitude and the location of the resultant aerodynamic force.**
2. **Determine the shear force and the bending moment that the wing root is applying to the wing at point A**

   The engine weighs 3,000 lbs, its centerline is located 3 ft below the wing centerline and it produces 9,000 of thrust.
3. **Determine the internal forces and moments acting in the wing at point B, just inboard of the wing pylon.**

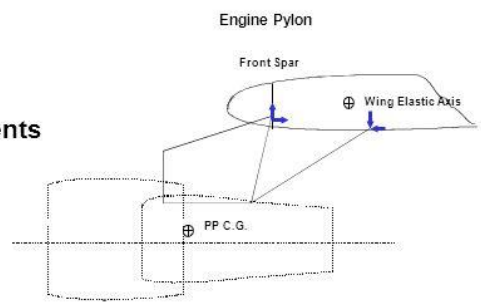


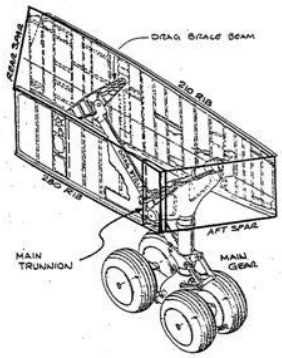
Internal Loads/Load Paths - Wing/Stabilizer

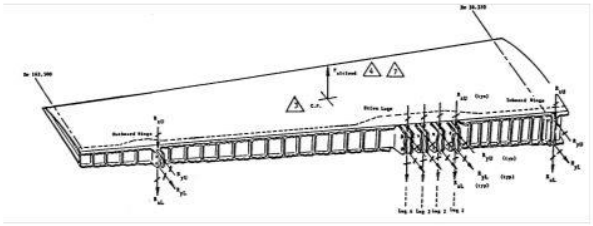
Ribs redistribute concentrated loads into cellular box structure.

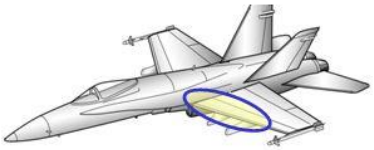
Concentrated Loads

- Landing Gear
- Power Plant
- Fuselage Attachments
- Ailerons
- Flaps
- Lift devices









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