Abstract for SURC 2015
By Kristen Egan and Katie Eberhart

Static Force Analysis of a Wing Strut for the Cessna 172 Skyhawk

The Cessna 172 Skyhawk is the world's most popular single engine aircraft. It is considered the safest general aircraft on the market while still being remarkably agile and stable. Aircraft are predominantly thought of as dynamic vehicles although static analysis can be applied to them with fairly accurate results.

This project demonstrates the use of theoretical static equilibrium concepts in understanding real life, experimental situations. A 3D mechanical model of a Cessna 172 Skyhawk was created to analyze different forces acting on the plane during simulated flight. The 3D model was hung by two points on the wings and fastened to the ceiling. Four load sensors were applied to collect data on the forces acting on the wing strut and fuselage during the simulations. The experiments were conducted using the 3D structural model, load cells and Pasco-Capstone software to analyze the compression and tension forces acting on given members under simulated flight.

From the results the theoretical concepts of static equilibrium were validated. Additional analysis of stress and strain forces were conducted to provide a more complete analysis. The results of analysis were used to demonstrate how the presence of support members affect the stability of a wing in flight.

Keywords: Strut, Static Equilibrium, Lift Forces on Wing