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# Effects of Aircraft Wing Configuration on Aerodynamic Efficiency

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**Abstract :** In recent years, air travel has seen volatile growth. Due to this growth, the maximization of efficiency and space utilization has been a major issue for aircraft manufacturers. Elongation of the wingspan of aircraft has resulted in increased lift; and, thereby, efficiency. However, increasing the wingspan of aircraft has been detrimental to the manufacturing process and has led to airport congestion and required airport reconfiguration to accommodate the extended wingspans of aircraft. This project outlines differing wing configurations of a commercial aircraft and the effects on the aerodynamic loads produced. Multiple wing configurations are analyzed using Finite Element Models. These models are then validated by testing one wing configuration in a wind tunnel under laminar flow and turbulent flow conditions. The wing configurations to be tested include high and low wing aircraft, as well as various combinations of the two, including a unique model hereon referred to as an infinity wing. The infinity wing configuration consists of both a high and low wing, with the two wings connected by a vertical airfoil. This project seeks to determine if a wing configuration consisting of multiple airfoils produces more lift than the standard wing configurations and is able to provide a solution to manufacturing limitations as well as airport congestion. If the analysis confirms the hypothesis, a trade study will be performed to determine if and when an arrangement of multiple wings would be cost-effective.

**Keywords :** aerodynamics, aircraft design, aircraft efficiency, wing configuration, wing design
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