Holes Can Lift: A Continuing Study of the Separation Effects of Airfoil Slots

Rutherford, Kate

Hancock, Sarah

This experiment was testing different angles of airfoil slots on the separation effects (drag, lift, and moment). It was hypothesized that the 30° and 45° slots would have higher aerodynamic efficiency separation effects (less drag, more lift, and less moment), while the 90° slot would have lower aerodynamic efficiency separation effects (more drag, less lift, and more moment). The slot angles tested were Control (no hole), 90°, 75°, 60°, 45°, and 30°. The airfoils were mounted inside a wind tunnel, and trials were ran at 10, 12, and 15 meters/second for each slot, while the airfoil was completing an alpha sweep from angle of attack at 17° to an angle of attack at -4°, and the computer was recording the data for the trial. The Control overall performed the best, having the highest aerodynamic efficiency. Out of the slots, the 30° and 45° slots had the highest aerodynamic efficiency separation effects overall, while the 60°, 75°, and 90° slots had the lowest aerodynamic efficiency separation effects overall. The hypothesis was proven partially right by the evidence of the data. While the 30° and 45° slots had high efficiency and the 90° slot had low efficiency, each slot acted differently from one angle of attack to another, therefore not making one slot completely better or worse than the others. Further research could be conducted to observe the effect of slots on the wind energy generated by the airfoil or the effect of an increased aspect-ratio on the separation effects of airfoils.

Awards Won: