Effect of Simulation Covert Feathers on Airfoil Lift and Drag

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Located along the lengthwise middle of a bird's wing are the covert feathers. During flight, some of these feathers vibrate and lift up from the wing. Scientists speculate that putting synthetic covert feathers on an airfoil can reduce drag and increase lift by getting rid of the boundary layer of air that surrounds the airfoil in flight. This experiment was designed to test the theory of covert feathers reducing drag and increasing lift in a wind tunnel environment to potentially provide a more effective, more fuel efficient way of utilizing airfoils. Tests were performed using a NACA 0012 airfoil. The experiment supported the hypothesis. The data showed that the simulation-coverts did reduce drag and improve the performance of the airfoil. All of the airfoils with simulation-coverts produced less drag than the Control. The 1 cm MIDDLE configuration had a much higher lift over drag ratio, with a maximum of almost 2.6. Though the tabbed airfoils did not increase lift as expected, the 1, 2, and 4 cm BOTTOM configurations reduced the effect of the stall that occurred at about an Angle of Attack of 10 degrees, supporting other studies that believed covert feathers reduced or prevented stall. The huge increase in the lift over drag ratio of the 1 cm MIDDLE configuration in comparison to the Control holds great potential for the future of airfoil efficiency. Airlines can save millions of dollars using more effective wings, and anything from wind turbines to cars to helicopters can use simulation-coverts to increase their lift over drag ratio, saving energy, fuel, and money.

Awards Won:

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