Wing Ding

Sherwin III, Charles (School: Niceville High School)

Question: "How can a traditional wing be simplified to benefit stealth?" To create the hypothesis, Bernoulli's principle, aerodynamics, and wing control were used to design a flapless/slatless airfoil. If air is forced out of the leading edge of a wing, then lift or stall can be applied upon the wing thus controlling it. This is because the attached laminar flow over the wing will be changed causing different pressures over the wing and in turn lift. The hypothesis was tested using two NACA 0020 airfoils, a control solid airfoil, and an airfoil with a duct to push out the air. The two airfoils were tested at different angles and the test wing emitted different pressures. A manometer collected the data. Once the pressure was converted into lift, the control had a lift coefficient of 0.673 and a stalling AOA of 15 degrees. The test airfoil with 0 psi applied, was similar to the control, had a slightly greater lift. But the test airfoil with 10 psi applied had a lower lift and stalling AOA of 10 degrees, 5 degrees less than all of the models. The test airfoil omitting 30 psi had the greatest lift increasing the total lift curve compared to the control. The data supported the hypothesis and furthermore, Bernoulli's Equation confirmed that pressures higher than 14psi will create lift on the wing, likewise below 14 psi stall is created. By manipulating pressure, lift and stall were achieved, which in turn stealthily maneuvers the wing.