A Wing of the Future, Part II

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Aerodynamic drag, either parasitic or induced, limits efficiency of aircraft, increasing fuel consumption or reducing performance. Data shows that in 2010 American commercial aviation consumed over 20 billion gallons of jet fuel, releasing over 200 million tons of CO2 into the atmosphere. A more efficient wing could save over 2 million tons of CO2 for every 1% reduction of fuel consumption. Three new wings were constructed based on a known airfoil, NACA 2415. One wing was unmodified as the control, one wing had a small vent height (1.5% of chord), and one wing had a large vent (3% of chord). Testing was performed in a wind tunnel to control variables. A computerized system captured data from pressure ports in the wing and through a pitot tube that measured the wake behind the airfoil. Since the wing actually produces thrust from the wing vent, calculations were performed to remove the thrust from the equation and only count the change in lift production. The small vent test wing showed a 300% increase in efficiency over the control wing as measured by the lift drag ratio across all angles of attack. The small vent wing also had a greatly increased stall angle (20 degrees vs 10 degrees on control wing). The test wing shows great potential for many applications including, allowing aircraft to carry more weight, allow takeoff and landing at lower speeds, improved propeller and rotor designs, and the ability to add a stall protection system to training aircraft, improving safety.

Awards Won:

Fourth Award of $500