Iced Up Lowdown: Examining the Degrading Effects of Ice on Laminar Flow and Performance of Airfoils

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Ice buildup on wings had been cited as the cause of many aircraft accidents. The purpose of this research is to determine the effect ice generation has on the laminar flow and lift capability of aircraft. The expected outcome of the research is as ice is allowed to form on wings, the result is a significant decrease in lift capability. This experiment uses three model wings built using the aerodynamic specification for a Boeing 737 aircraft Three wing models were tested equally throughout the experiment to mitigate the effects of construction variables. The wings were tests in a wind tunnel with the relative velocity, temperature, and angle of attack held constant. A fishing line connected to the wing inside the wind tunnel allowed additional weights to be added until the wing failed to produce lift. As each test was conducted, the degrading effects of applied salt solution simulating ice generation degraded the model wings' ability to create lift. The crystals created by the salt solution (similar to ice buildup) degraded the generating capability of the wing even after only a minimal application. The crystal structure interrupted the smooth flow of air around the wing and thus contributed to wing lift failure with smaller application of force.

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