

**Project Title:** Investigation of Ice Accretion Effects on a Three-Dimensional Swept Wing

**Advisers:** Prof. Michael B. Bragg

**Project Description:**

Ice accretion remains a leading aviation hazard and most aircraft certification is based on simple icing models. This is especially true for three dimensional ice shapes and three dimensional flows which are prevalent on the swept wings typically seen on commercial airliners. In order to gain a better understanding of three dimensional ice shapes, a full wing model will be tested with and without simulated ice shapes. The goal of the project is to test the wing in the F-1 wind tunnel in France, however the first step is to develop design and testing techniques in the Illinois 3' by 4' tunnel. The first wing model (shown in figure 1) is a rapid prototype shell over a steel frame designed and tested last year. Due to significant taper and a high aspect ratio, there were a number of structural challenges in designing the wing, and the rapid prototype shell already is showing signs of fatigue. The Illinois tunnel model will be useful over the next few years to continue to develop testing techniques, so a more robust shell will be needed.



*Figure 1: The steel frame and complete model used in wind tunnel testing in the University of Illinois 3'x4' tunnel. Only the complete model on the right is used in testing.*

**Student Research Activities:**

We are looking for a student who is interested in CAD design and experimental aerodynamics. Experience with Pro/Engineer or other CAD software and a basic understanding of wing design is preferred. The student will work with the icing research group to redesign the wind tunnel model around the existing steel structure using the Pro/Engineer software. If time permits, the student may also assist in the assembly of the new model.

**Contact:** Prof. Michael B. Bragg (mbragg@illinois.edu)

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