Aero Design Team

Team leads: William Martin & Micah Sulich
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Advisor: Dr. Mostafa Hassanalian **Sponsor:** NMT Mechanical Engineering department

Project Background and Obejective

The principle task of the NMT Airplane design team was designing a micro plane to bring to the SAE Aero Design East Competition in Florida.

For the Micro Class division of the competition, the objective is to design a micro UAV style aircraft that can not only be quickly deployed from a small package in under 3 minutes, but also be capable of carrying as much payload (represented as a 2” diameter PVC pipe) as possible. The team is scored on the design of the plane, assembly time, and the amount of payload the plane can fly with.

Previous Work

Last semester, we intended to participate in the AIAA Aero design competition, but were rejected. As a result of this complication, we had to completely change the parameters of our design project and start over. Fortunately, we were able to enter the Micro class which simplified the design requirements and project costs, allowing us to still travel and compete in Florida.

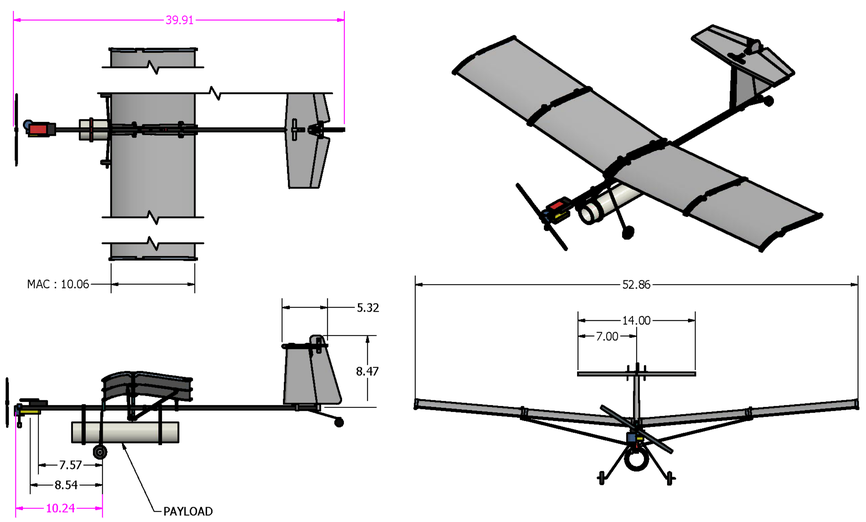
Future Goals

Next year we hope to compete again in the SAE Aero Design West competition. We gained a lot of valuable insight and experience this year that we could apply to next year's project. Additionally the extra time would allow us to pursue the more challenging Normal or Advanced aircraft classes. Also the West competition is held much closer to NMT and held later in the year which would greatly reduce the team's travel expenses and give us more time to design .

Design Overview

Our final aircraft design during testing without the payload installed

- **Wingspan:** 53 inches
- **Airfoil:** Eppler 376
- **Motor:** Himax HC 2812-1080
- **Payload capacity:** 11 inch PVC pipe
- **Est. unladen weight:** 1.3 lb s
- **Materials:** Foam wings/tail and carbon fiber



☐ ALL DIMENSIONS ARE IN INCHES.

Engineering drawing

Competition Results

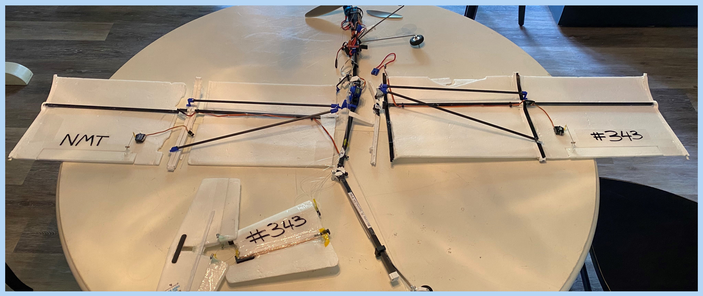
Teams are given a final score and ranking determined from the composite of 3 main sub-scores pertaining to aircraft’s design, an oral presentation about the teams' design, and flight performance.

Overall, NMT had a final ranking in the micro class of 17/20. There were two significant and unexpected hurdles that Impacted our score:

First, due to our shortened project time frame, we had to make revisions to the wingspan after we submited our final design report to SAE which incurred a sizable penalty to our design score.

Exerpt from the video showing the wing breaking and resulting crash

Secondly, on the two days the flight section was held strong winds presented a serious problem for our lightweight aircraft and its slow flightspeed. Even with the heavy PVC pipe, the plane was still battered by the wind and became hard to control. On our third flight attempt, it was pushed into a steep dive and the forces experienced by the wings overexerted the thin Styrofoam, causing the right wing to tear off and leading the plane into a crash.



The recovered plane after the crash