NMSU AIAA Design Build Fly 2019

Lead Engineer: **John Martinez**
Project Manager: **Isaac Kassim**

Introduction to AIAA DBF

- International RC Aircraft Flyoff competition hosted by AIAA in Tucson AZ at Raytheon TIMPA airfield
- Unique design requirements are given yearly for a novel aircraft design

Focuses of the 2019 DBF Team

- All design and manufacture centralized
- Emphasis on theoretical design and CAD analysis
- Emphasis on inclusion and outreach
- Extensive technical documentation from conception to final product
- Efforts to improve equipment and instrumentation

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This Year's Challenge "Aircraft Carrier Operations"

- Short take off via 10 ft ramp
- Automatic folding wing deployment
- Attack store deployment
- Mechanized radome deployment

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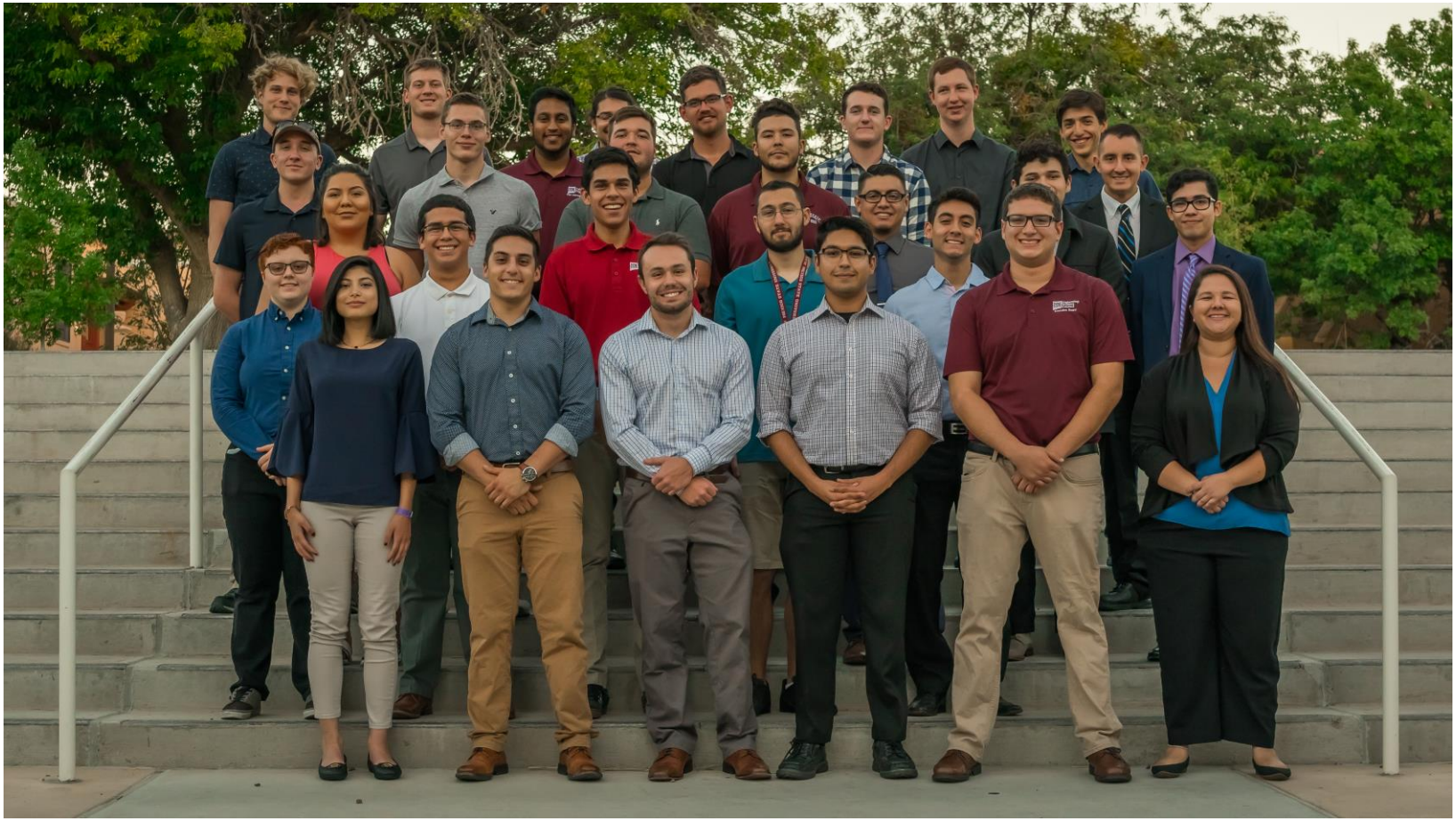
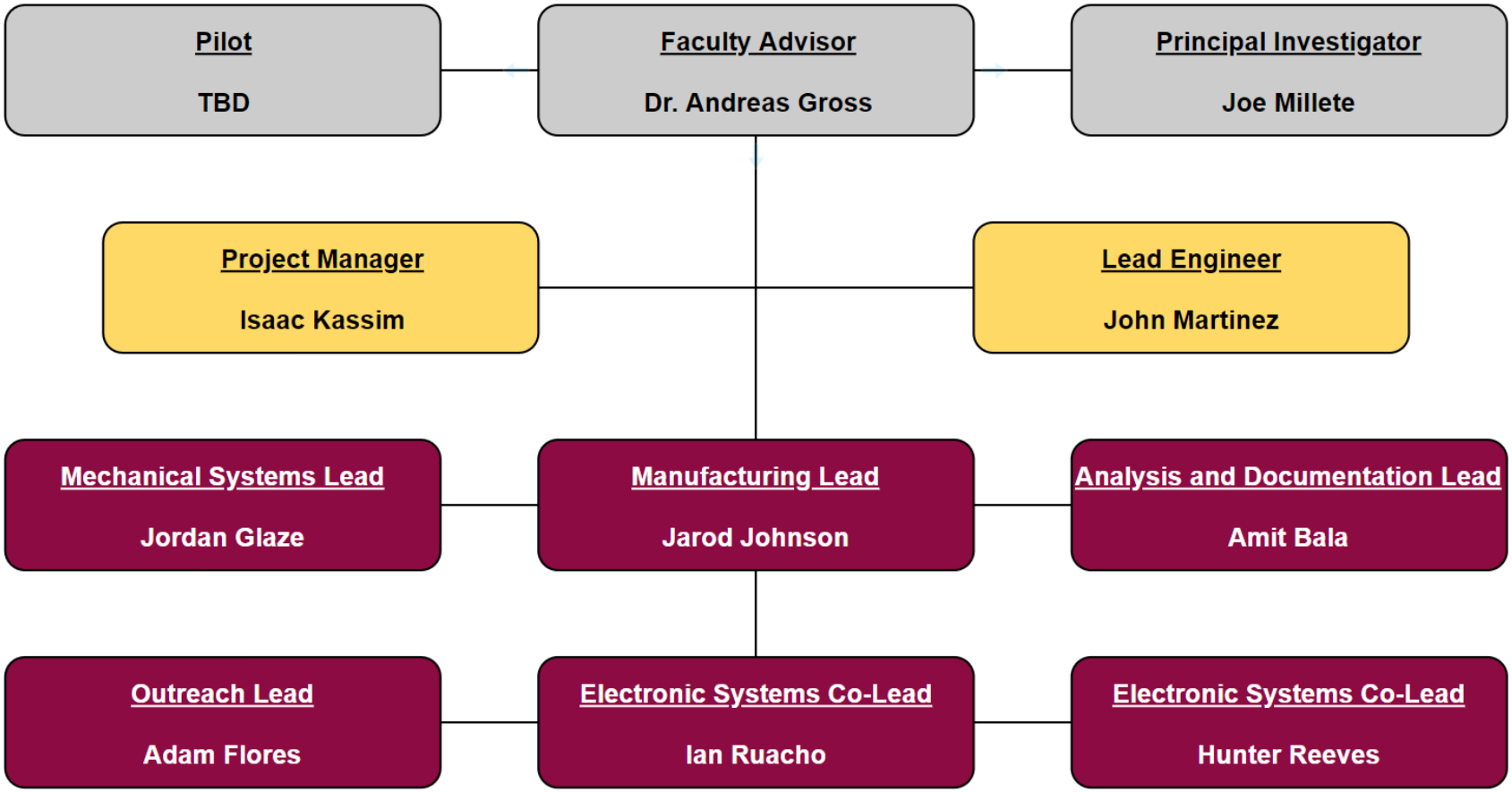
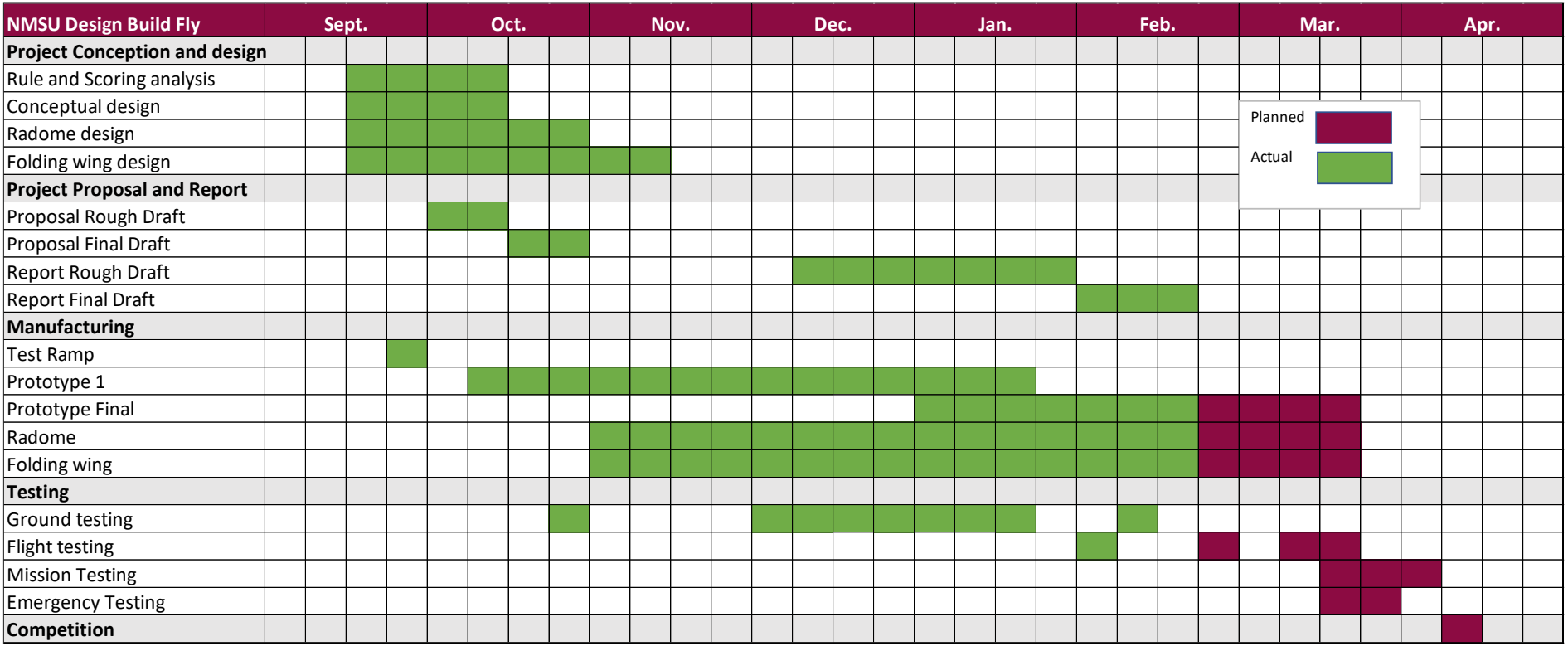
This Year's Team



This Year's Team



Project Gantt Chart



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Proposal Phase

- ***NMSU 45th***
- Florida Tech (51st)
- Virginia Tech (53rd)
- UCLA (54th)
- Texas A&M (56th)
- U of Maryland (58th)
- U of Arkansas (60th)
- U of Central Florida (
- UT Austin (63rd)
- MIT (75th)
- Embry Riddle Florida (80th)
- Stanford (81st)
- U of Oklahoma (87th)
- CSU (94th)
- UCSD (98th)
- Cornell (99th)
- Princeton (102nd)
- Georgia Tech (103rd)
- Penn State (108th)
- NM Tech (109th)
- John Hopkins (113th)

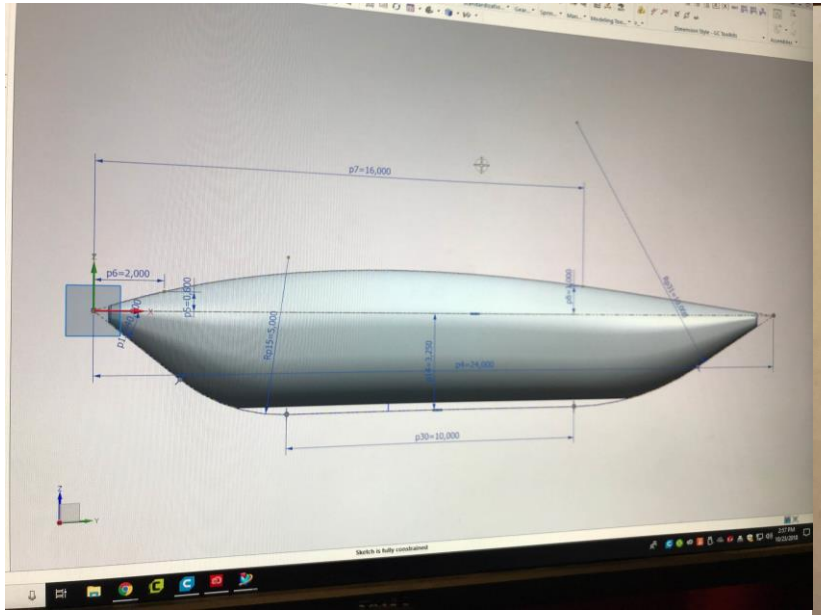
- Technical writing quality has vastly improved over previous NMSU DBF seasons with our highest proposal score in team history

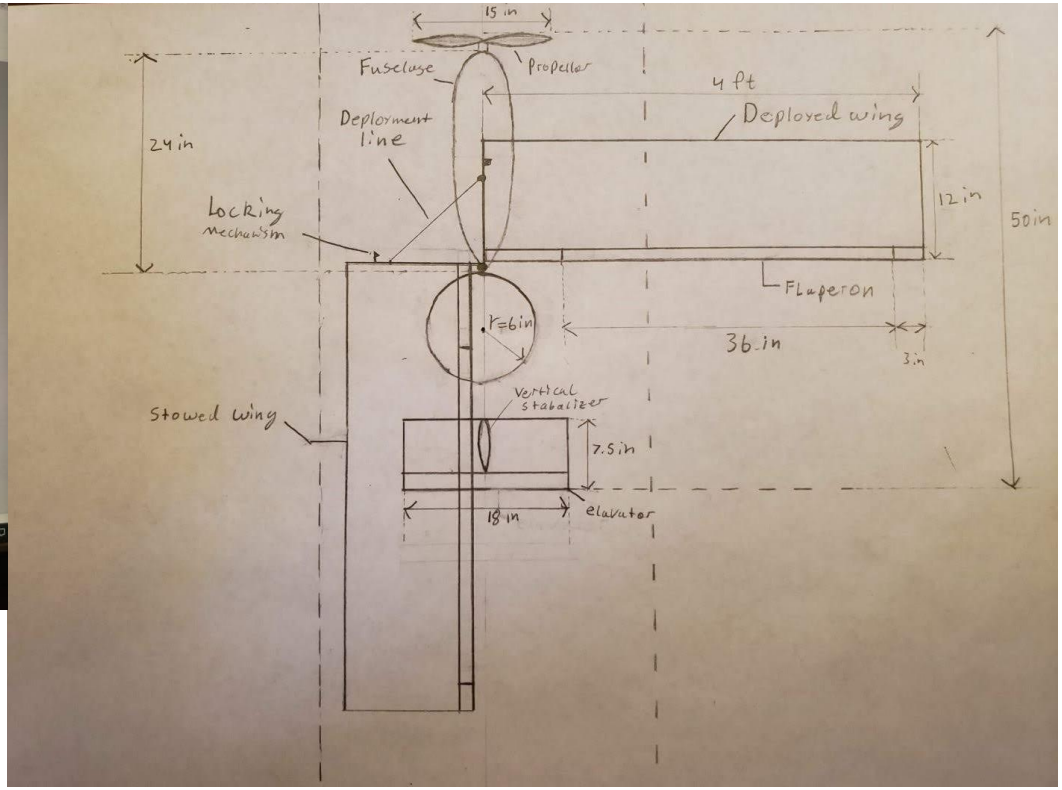
- **(45th out of 140 submissions)**

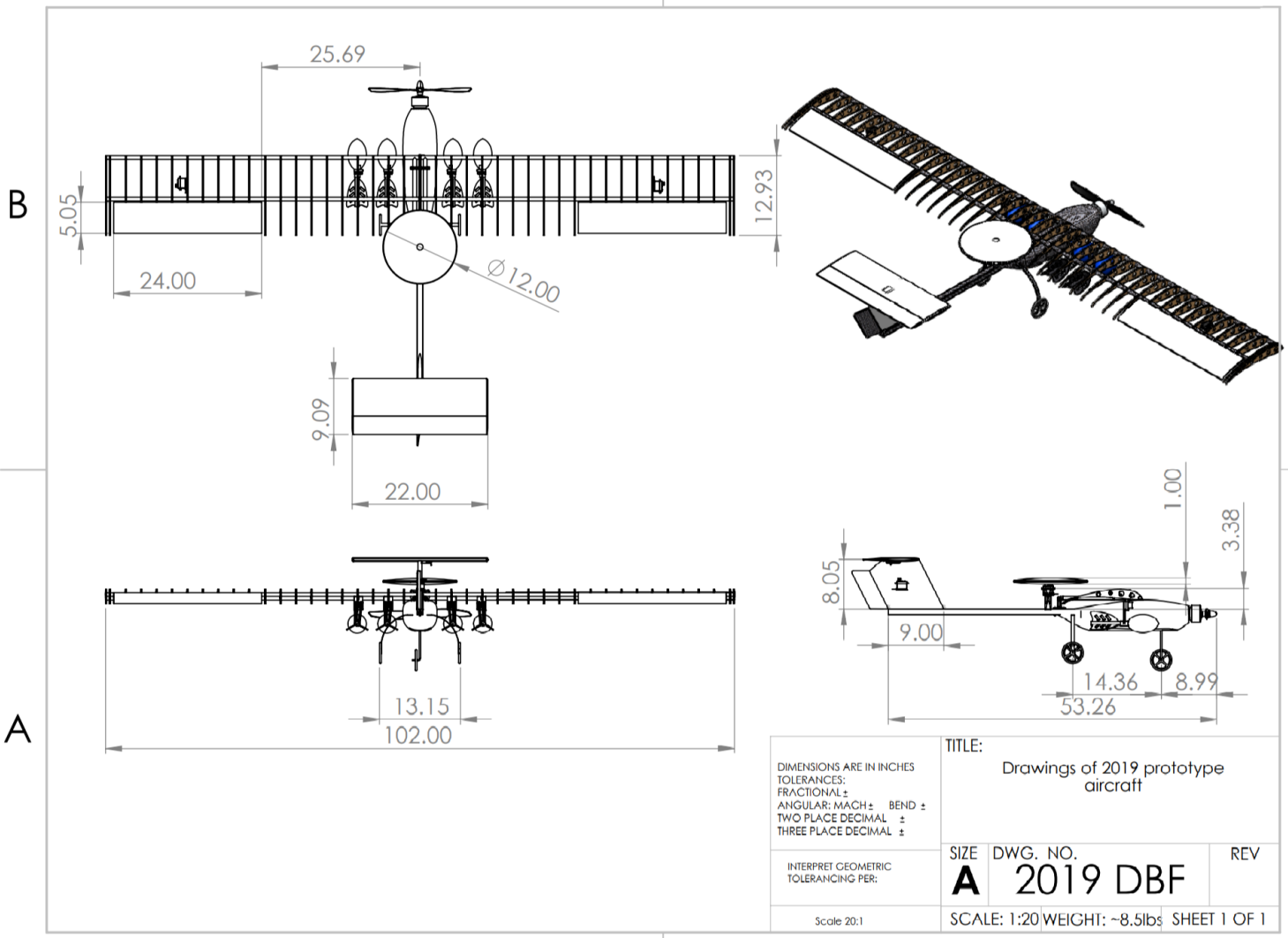
Novel Elements of NMSU's 2019 Design

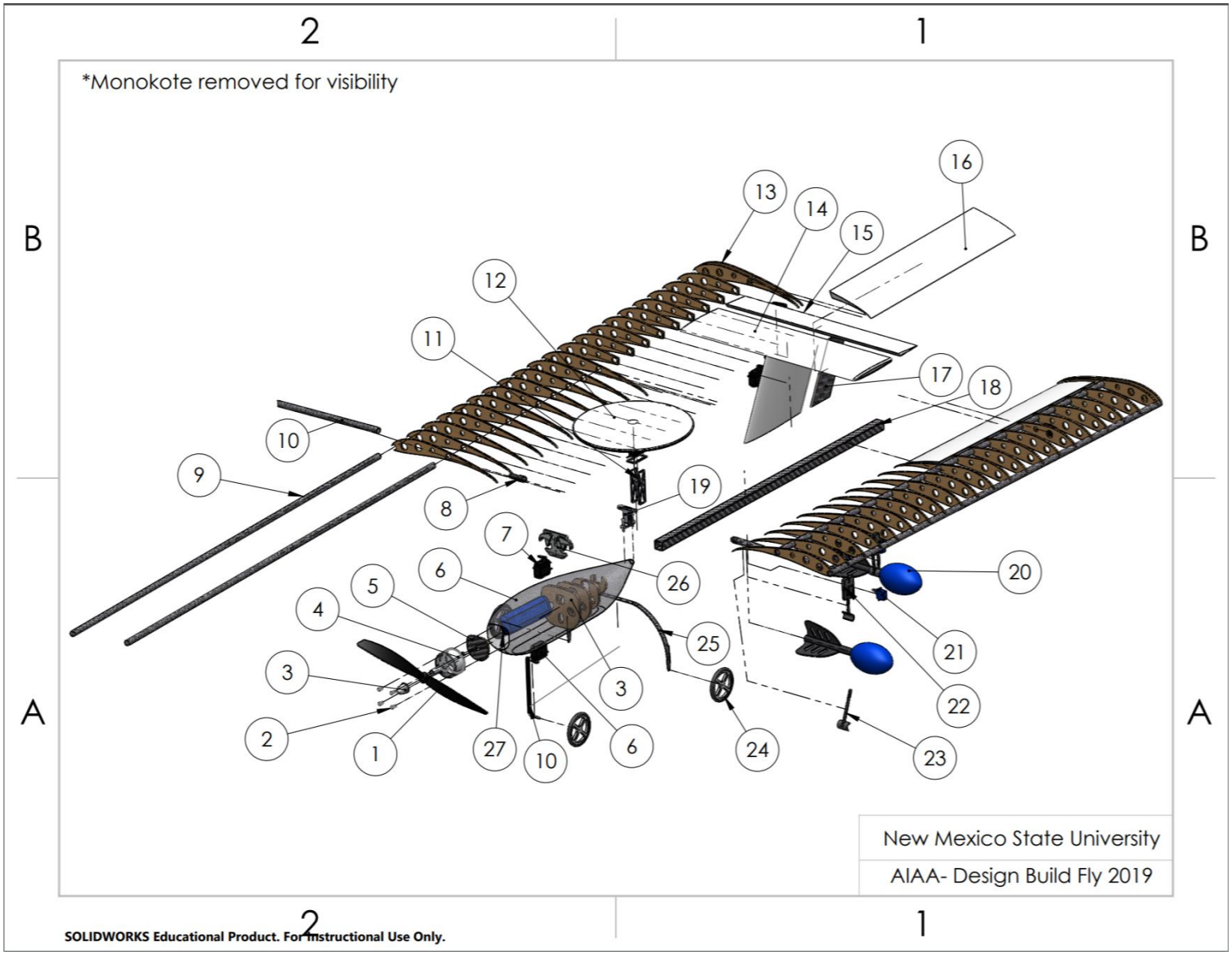
- Carbon fiber monocoque fuselage and structural components
- Professionally CNC cut aerospace aluminum subsystem components
- Emphasis on exhaustive design analysis over rapid prototyping

Initial Planform and Fuselage Concept





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New Mexico State University
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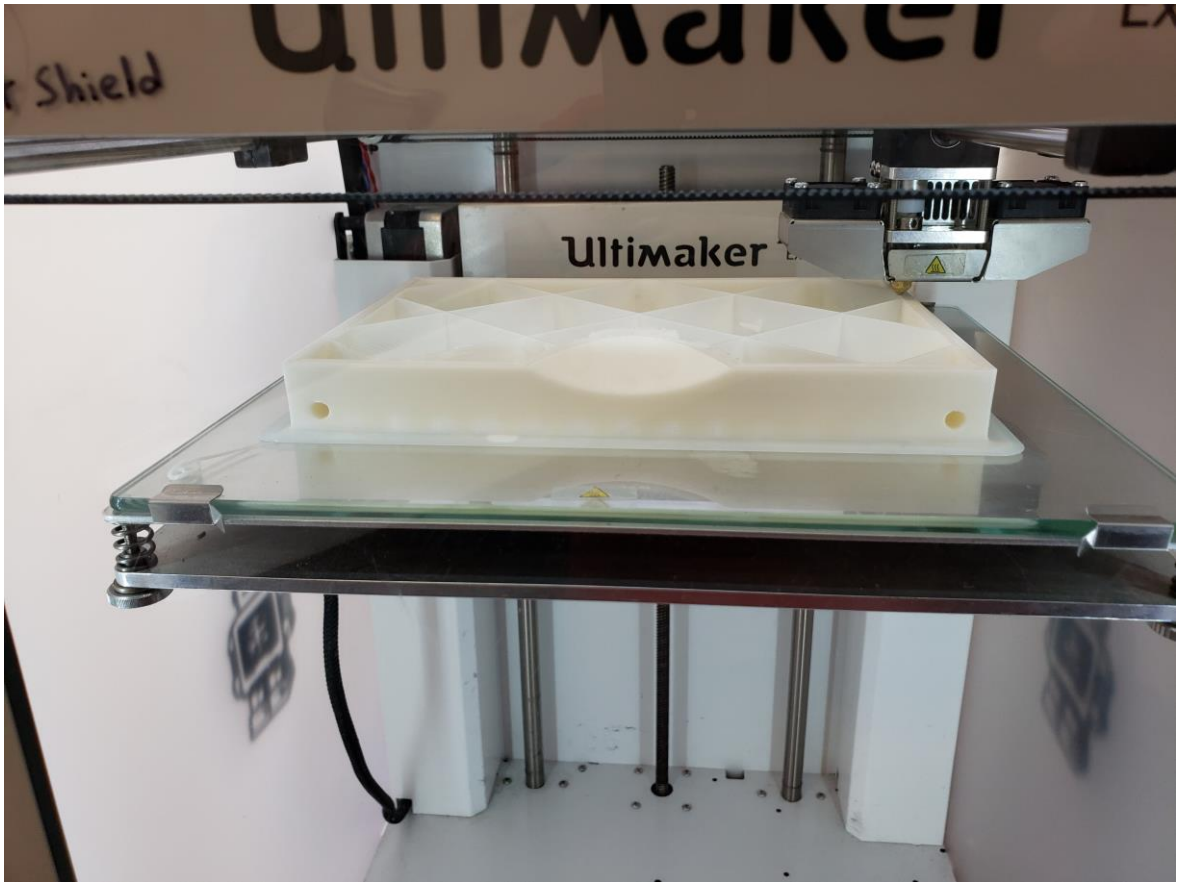
CAD Render of Final Design

Folded Wing CAD Render

Folding Animation

Printing of Fuselage Mold

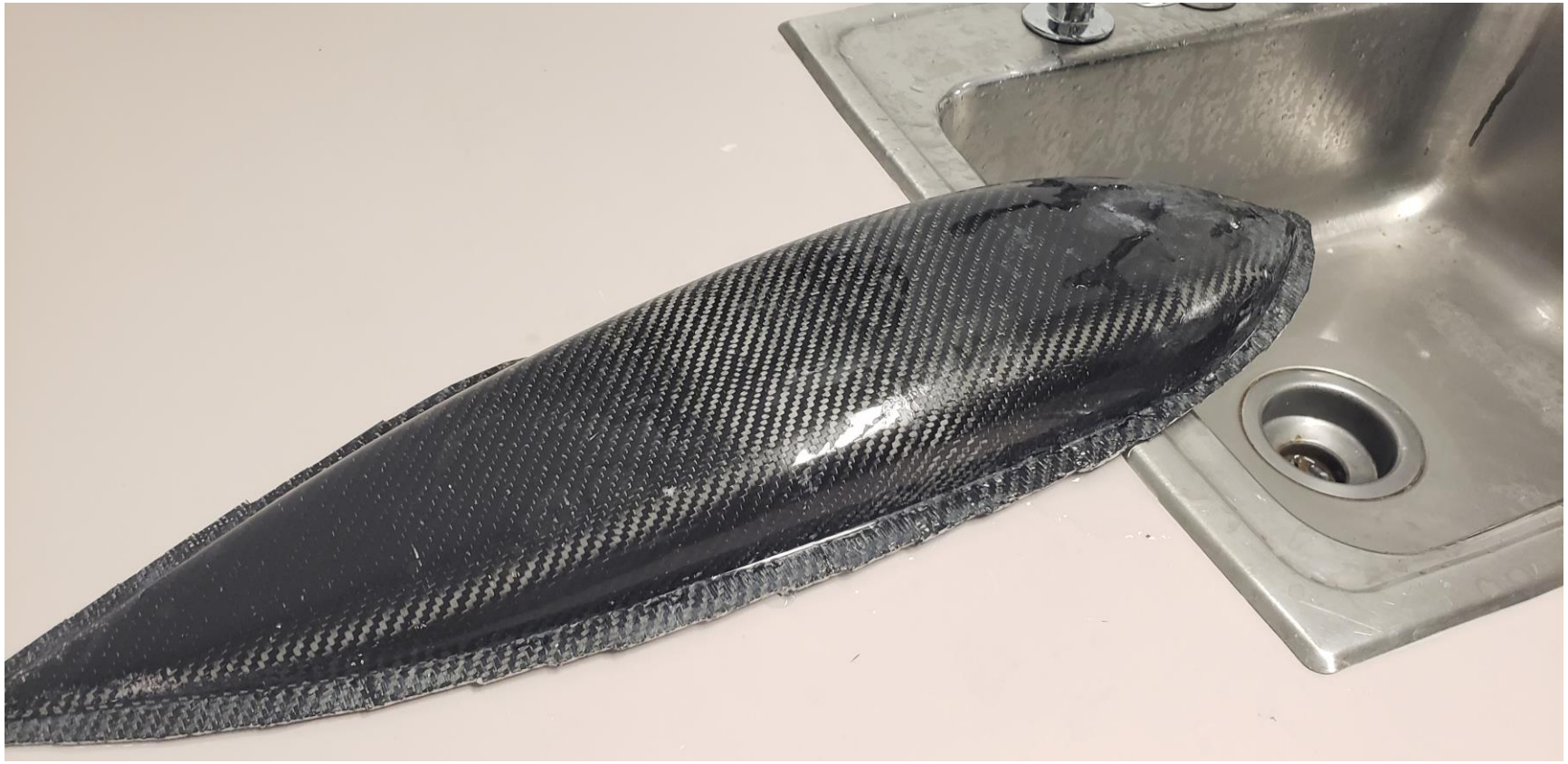


Construction of Fuselage Mold

Vacuum Bag Resin Infusion of Fuselage

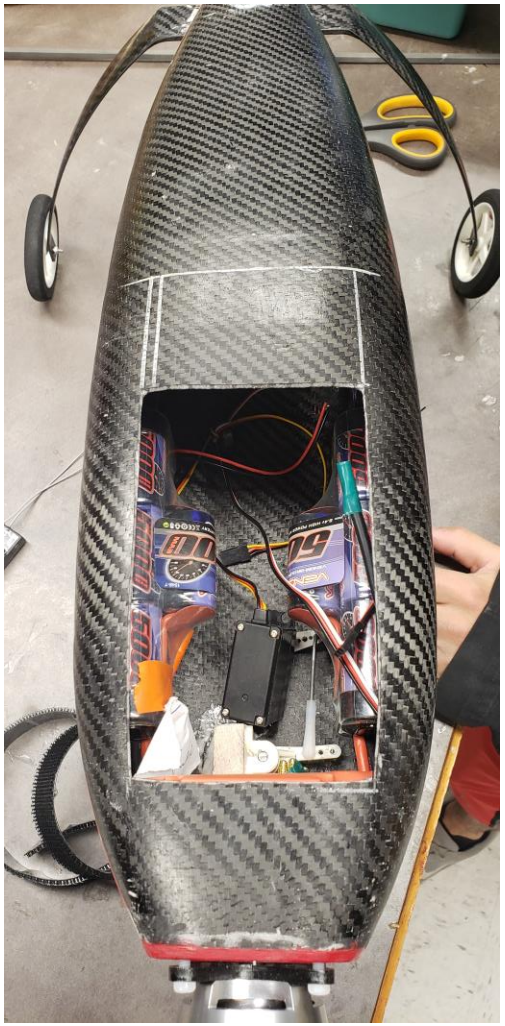
Vacuum Bag Form Carbon Balsa Plate

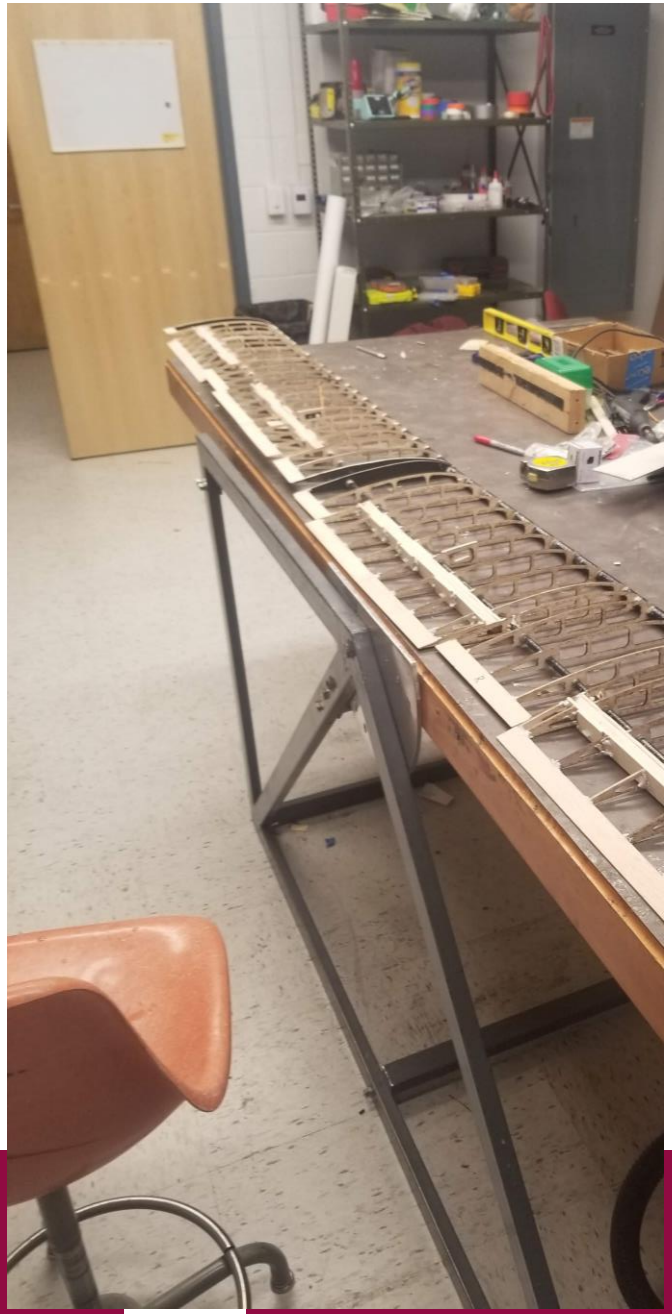
Carbon Fiber Fuselage



Fuselage Joining

Landing Gear and Propulsion System Integration





Wing Construction

Servo Mounting

Geometry Study

Wing Prototype 1

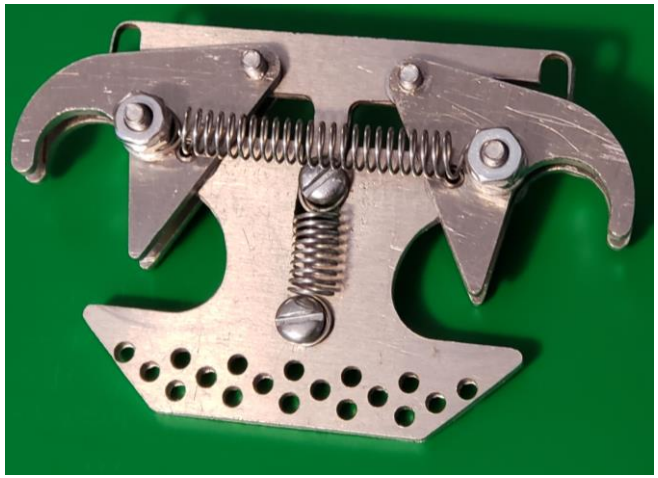
Propulsion Tests

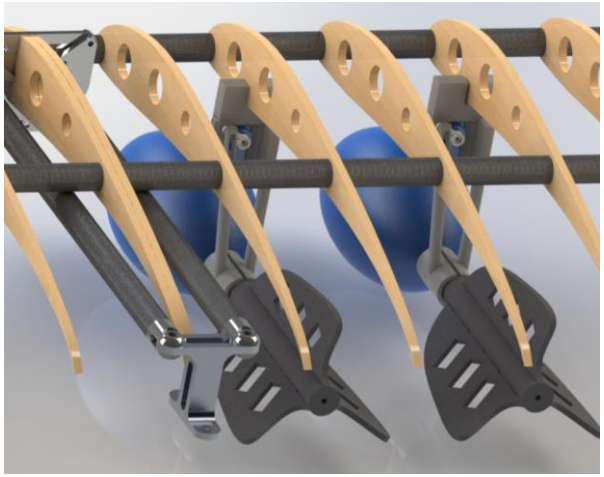
Wing Integration

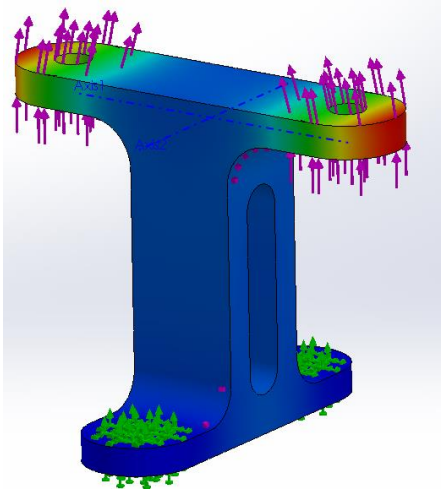
Finished Prototype

Maiden Flight

Subsystem Development







Milestones

Major Milestones Accomplished

- Prototype 1 flight is complete
- Proposal scored 45th out of 140
- Submit design report
- Design and analysis of folding wing, radome, and attack store subsystems is complete

Milestones to be Finished

- Manufacturing mission subsystems
- Manufacture new iteration of wings
- Final flight tests of mission subsystems

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Timeline

End of February

- Submit Design Report
- Begin final manufacturing of subsystem components
- Final ordering of manufacturing supplies

March

- Mission subsystem integration
- Test flights to validate subsystem performance

April

- Duplication of aircraft components for potential repairs at competition
- Mission training drills
- Final preparation for competition accommodations
- Competition (April 11th-14th)

2019 Budget

Travel: $3000

Shop and Building supplies: $3300

Tooling and Instrumentation: $900

Promotional Material: $700

Total: $7900

Thank you!

- New Mexico Space Grant
- MAE Academy
- MAE College
- Aggie Innovation Space

Without your support, this year's level of achievement and professionalism would not be possible

Thank You to the NMSU Engineering Advisory Board!

Questions?