

Team Sponsors

Dr. Robert Taylor, Dr. Shaffer

Team Mentors

Chuck Norris, Steven Malley,
Brandon Pruitt, Brian Sperry

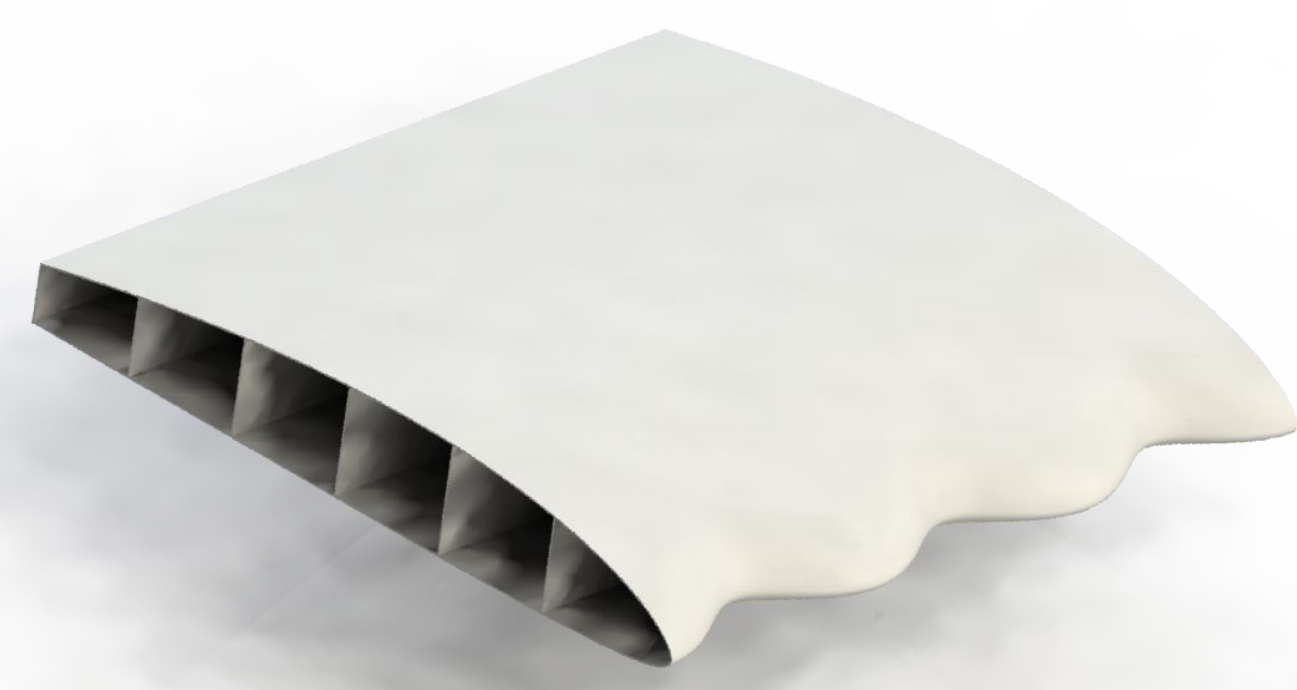
Overview

The goal of this capstone senior design project is to design and manufacture a 3D printed aircraft to compete in the 5th annual 3D Printed Aircraft Competition (3DPAC) hosted at the University of Texas Arlington in July 2021. In this competition it is expected that the aircraft will be almost entirely 3D printed with rules such as; all lifting surfaces and aircraft components must be 3D printed, except for electronics, the propeller, and some hardware. The goal of the competition is to achieve a maximum amount of airtime with maximum of five seconds of continuous propulsion.

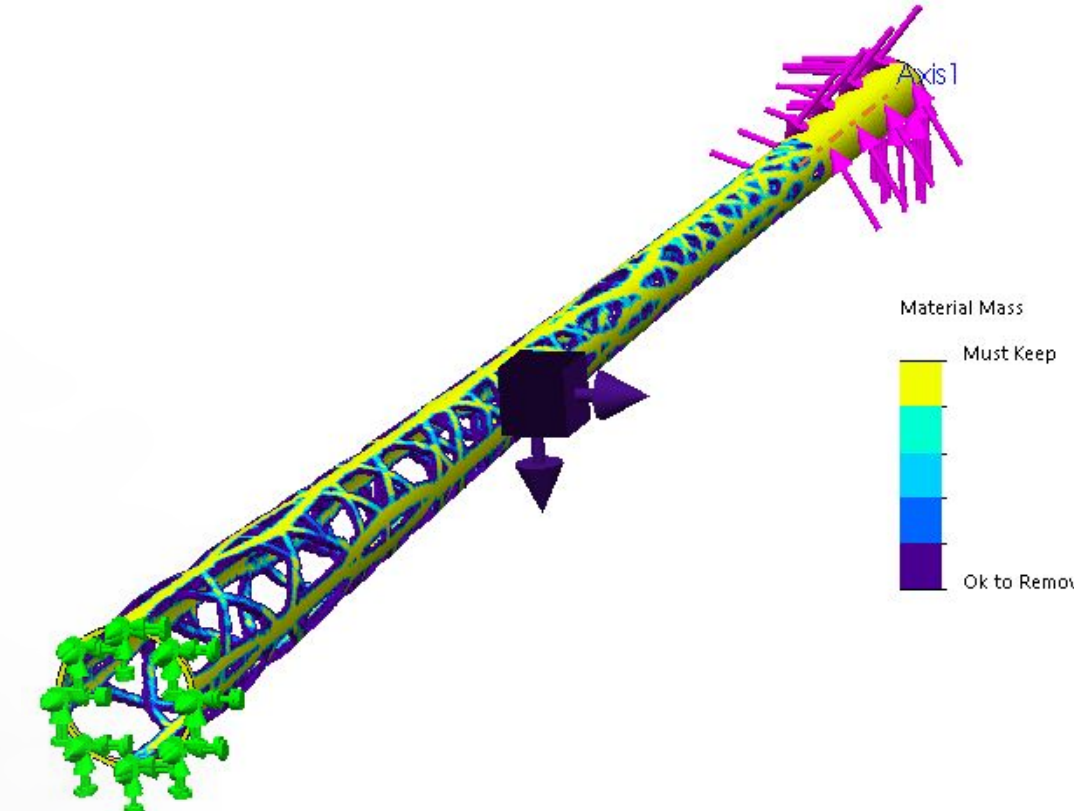
Innovative Designs

Innovative design is meant to use the more flexible manufacturing abilities of 3D printing to push the boundaries of what engineers can design.

- **Tubercle Design:** Bumps on the leading edge of an airfoil channel air into streams with a greater velocity which increase lift while reducing flow over the wing tip, decreasing parasitic drag.
- **Topology Optimization:** A mathematical model that distributes material to the critical areas of a part based on a set of constraints and loadings which yields the best strength to weight ratio.



Tubercle Design



Topology Optimization

**3D Printed Aircraft Competition
Team Flying Fish**

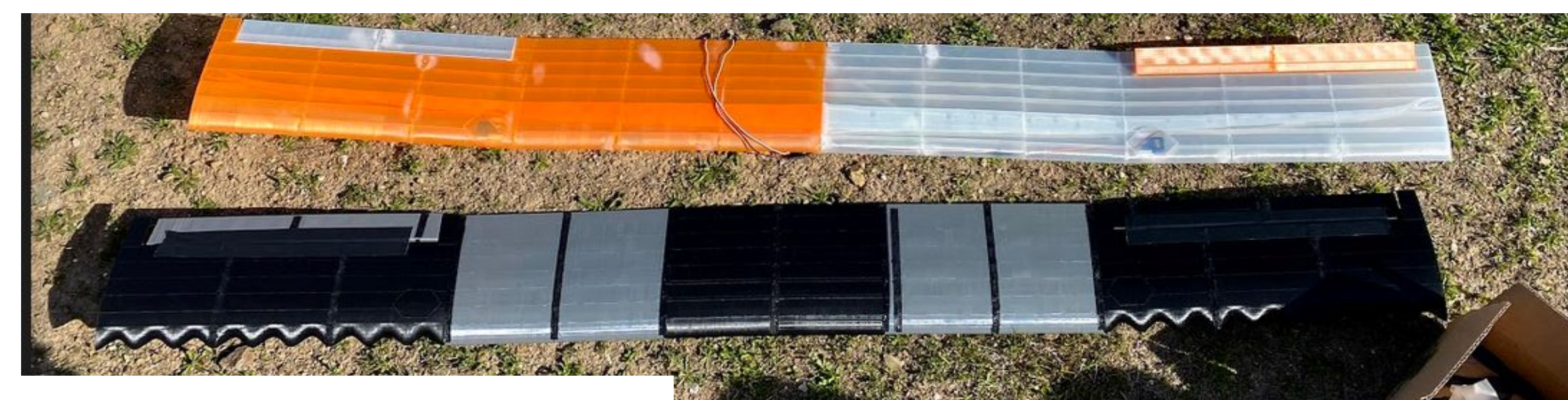


Team Members

Jona Mae Tagaca, Matthew Larsen,
Erin Mar, Tyler Rhoads



Iteration 3



Iteration 2 both wings



Iteration 2



Iteration 1



Foam Prototype

Iteration 3 Specs

Weight: 1.05 kg **Wingspan:** 1.8 m
Chord Length: 20 cm **Dihedral:** 10 degrees
Total Parts: 38 **Wing Loading:** 29.2 g/dm²

- **Airfoil choice:** S 7055
 - Airfoil found using: <http://airfoiltools.com>

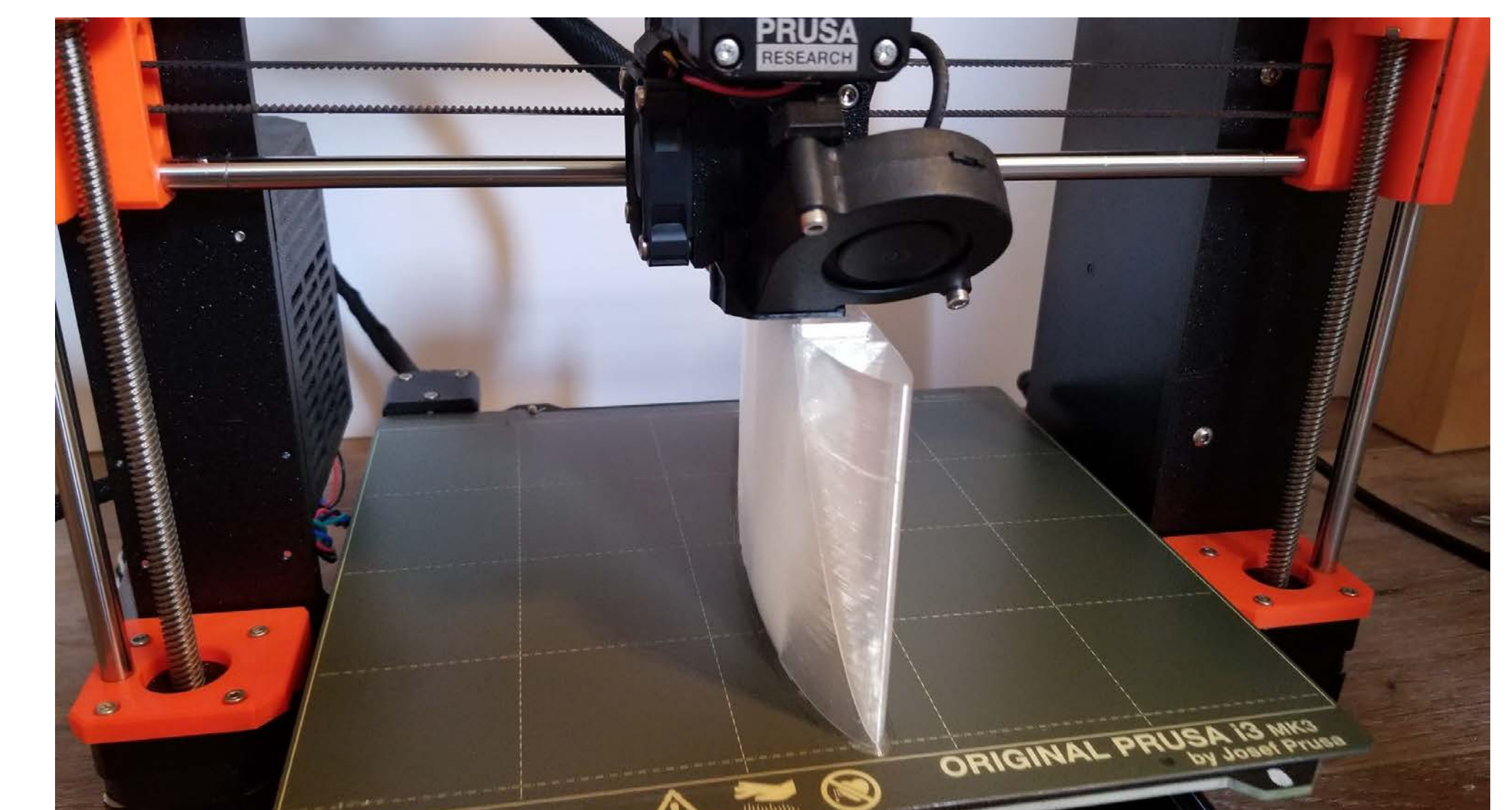


Flight Testing

- Flight tests at Black Mountain park, and SDSU
 - Average flight time of about **16 seconds** (5 sec of power)
- Pilots: Matthew Larsen and Erin Mar

Fabrication and Assembly

- Solid modeling done using Solidworks
- Slicers such as Cura and Prusa Slicer were used
- 3D printed using FDM (Fused Deposition Manufacturing)
 - About **140 hours** to print one iteration
- Filament used in 3D printers is PLA or Poly Lactic Acid
- Assembly done with CA glue, screws, threaded inserts, velcro and rubber bands



3D Printer with airfoil in progress