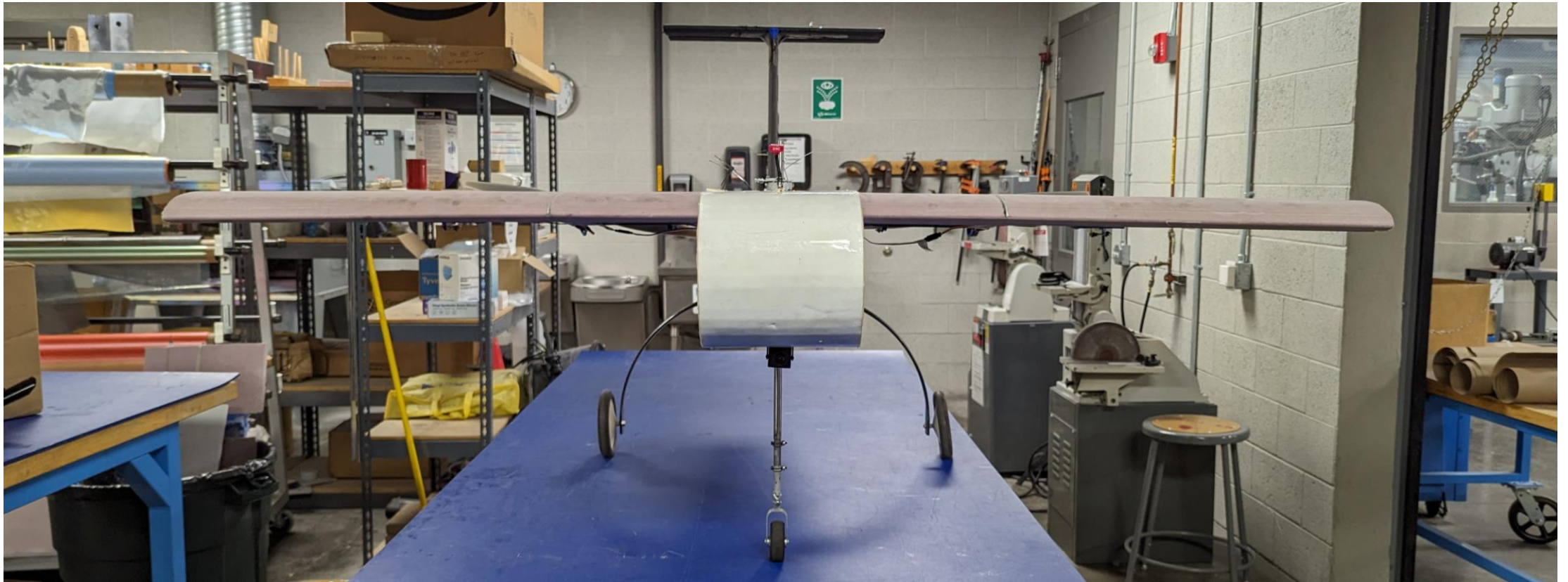




Project Calypso: Maritime Search & Rescue

Flight Readiness Review

Flight Test Article Overview



Team Introduction



Jacob McMillin
Videographer



Ryan Lundell
Test Pilot



Joshua Carver
Test Conductor



Caleb Lynch
Safety Engineer



Anthony Mclevsky
Flight Engineer



Khaled Alhammadi
Mechanical Support



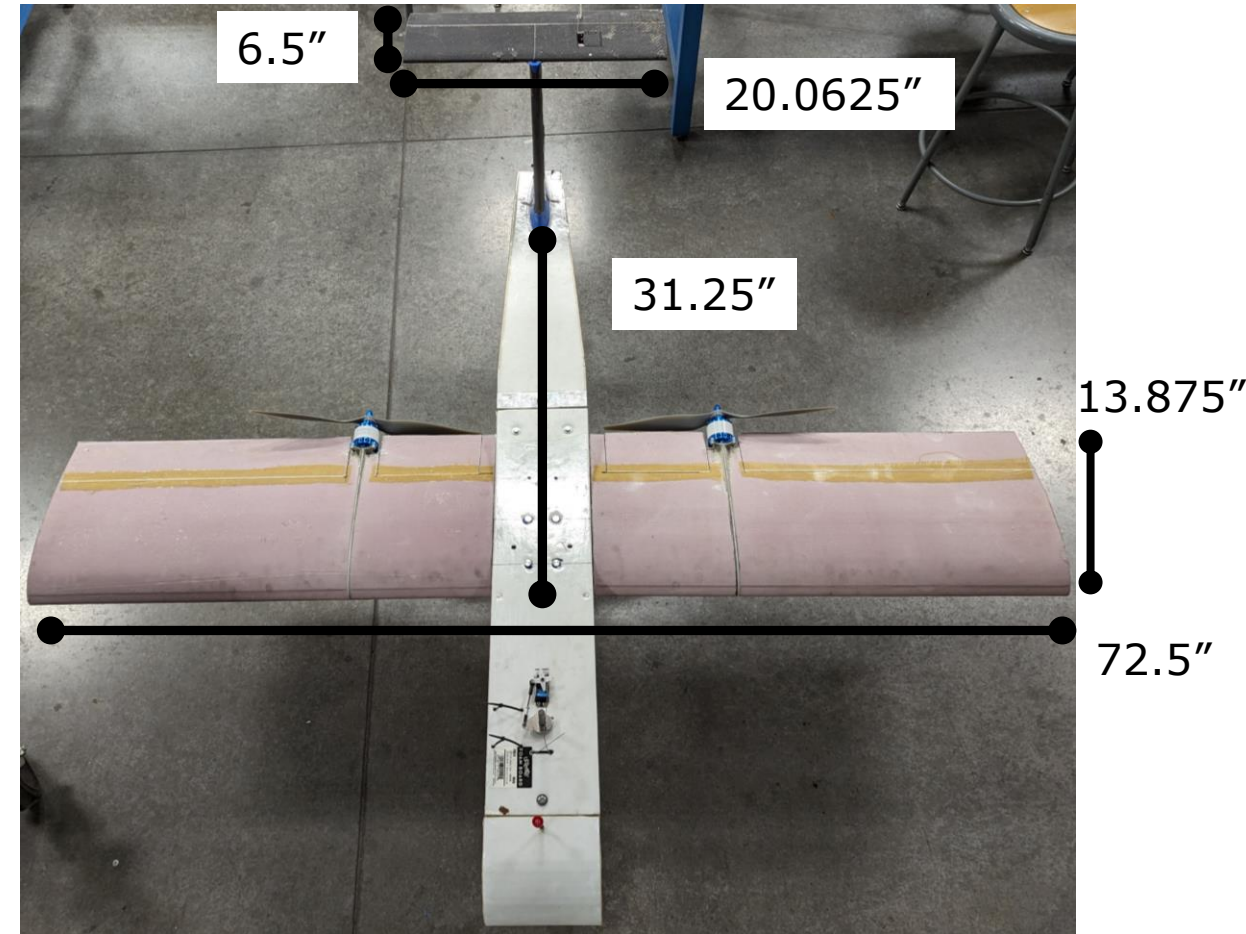
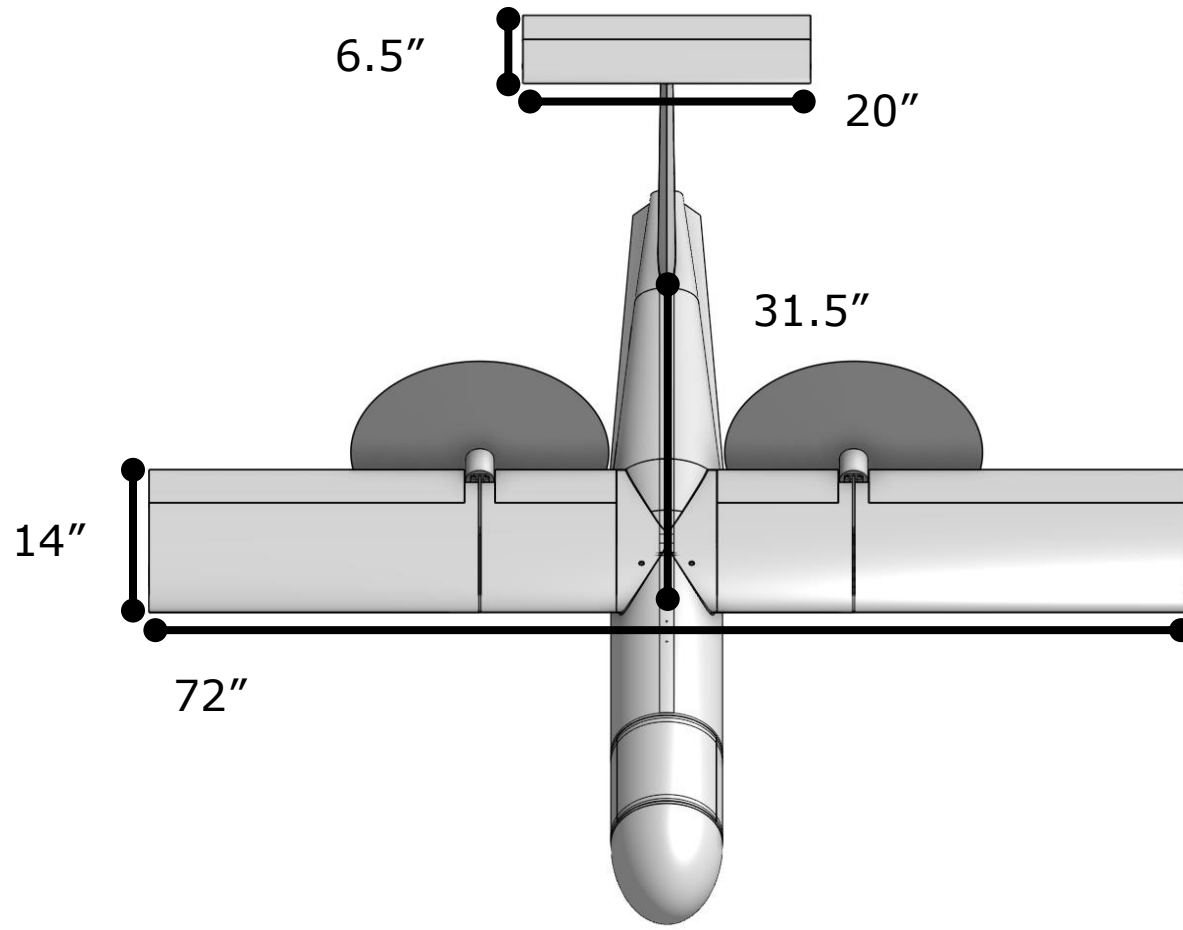
Tyler Phillips
Mechanical Support



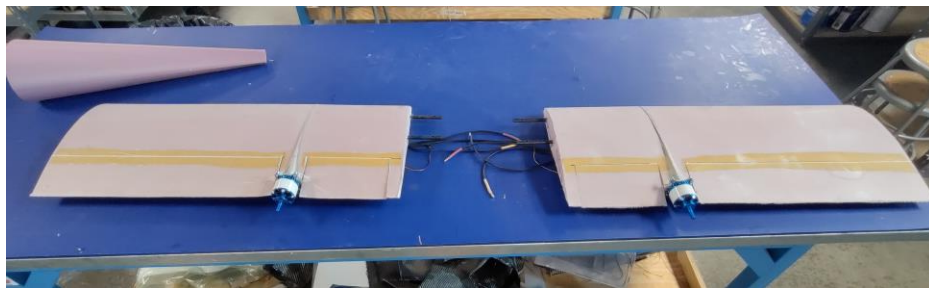
Marcello Montes
Data Analyst

FTA-Design Comparison

Overall Comparison

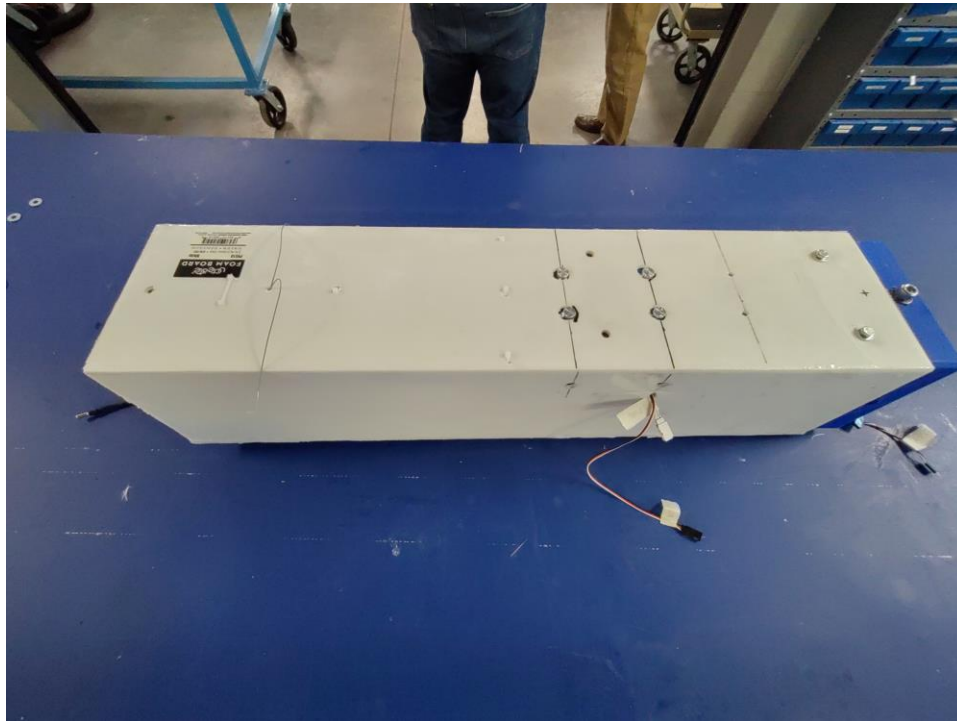


Aerodynamics Closely Match Design



Parameter	Design	FTA
Wingspan, in	72	72.5
Wing Chord, in	14	13.875
Vertical Tail Span, in	15	15.125
Vertical Tail Chord, in	10-6.5	10-6.5
Horizontal Tail Span, in	20	20.0625
Horizontal Tail Chord, in	6.5	6.5
Wing-Tail Distance, in	31.5	31.25
Static Margin	30%	25%

Fuselage Shape and Dimensions Differ from Design, but do not affect Performance Significantly



Parameter	Design	FTA
Fuselage Length, in	68.75	62.25
Fuselage C-S	7.75" Diameter	7" x 7" Square
Wing Spar	1x 1.075" square CF	2x 0.375" round CF
Aerodynamic Surface Skin	Vacuum-bag CF	Vacuum-bag CF tail, fiberglass wing
Fuselage Material	Molded CF	Foam board, basswood, PLA joints/wing box

FTA is Equipped with Fixed Landing Gear for Ease of Testing



Dimensions

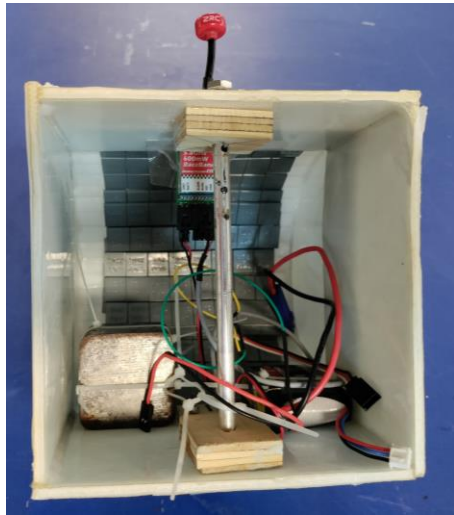
- 12" height
- 12" track
- 30° departure angle
- 3° incidence

4" diameter main gear wheels

2.5" diameter nose gear wheel

Steerable nose gear

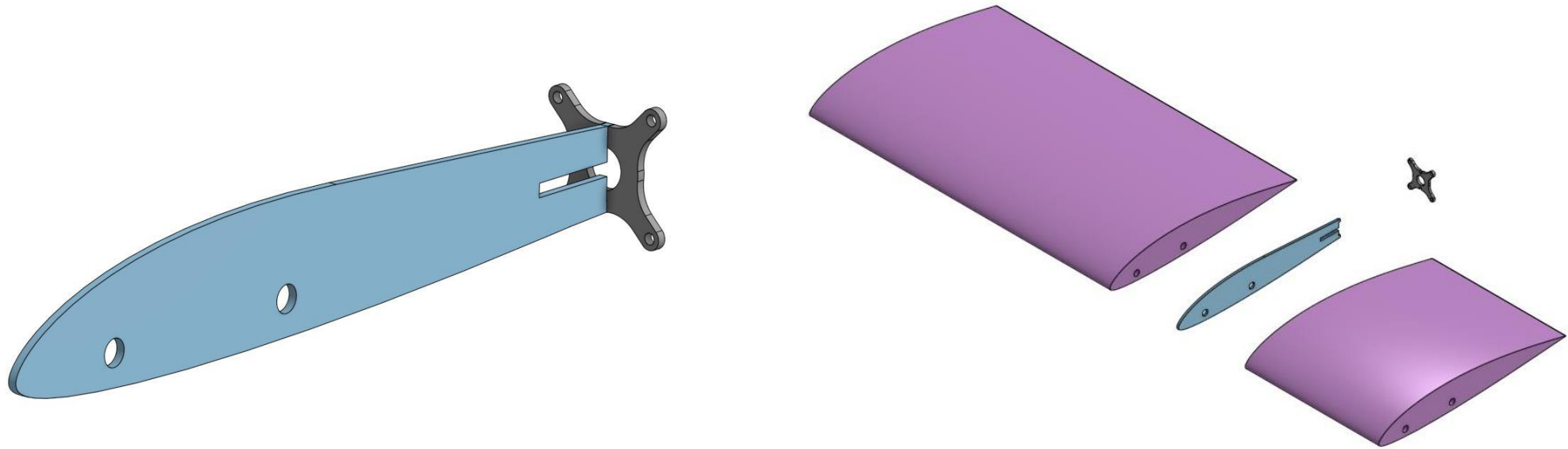
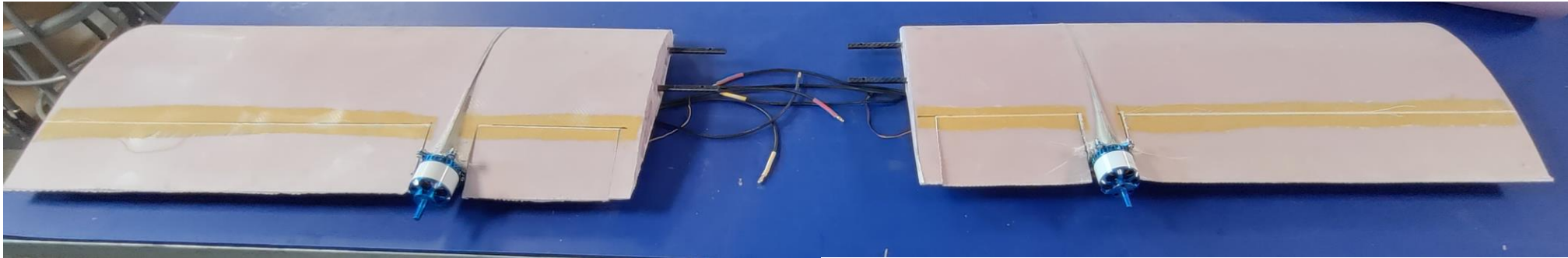
Propulsion and Avionics are Similar to Design



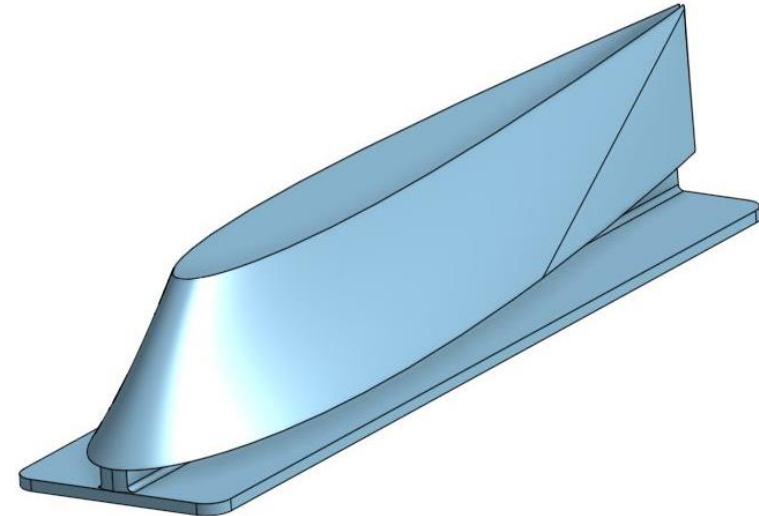
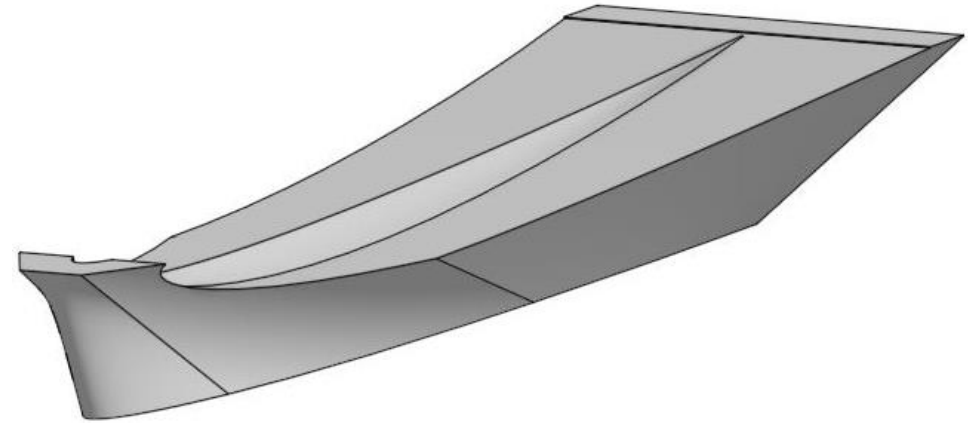
Parameter	Design	FTA
Battery	6S LiPo 30 Ah	6S LiPo 10 Ah
Motors	Sunnysky X4125 V3 480	Sunnysky X4125 V3 480
Props	18x12e	18x10e
ESCs	Spektrum Avian 130A	Spektrum Avian 130A
Receiver	~	Spektrum AR8020t
Flight Controller	Pixhawk 4	Pixhawk MDR

FTA Construction

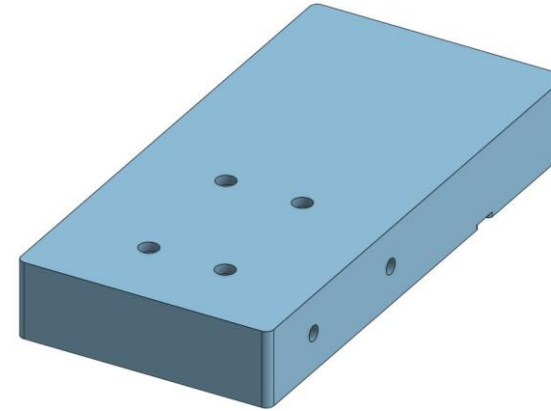
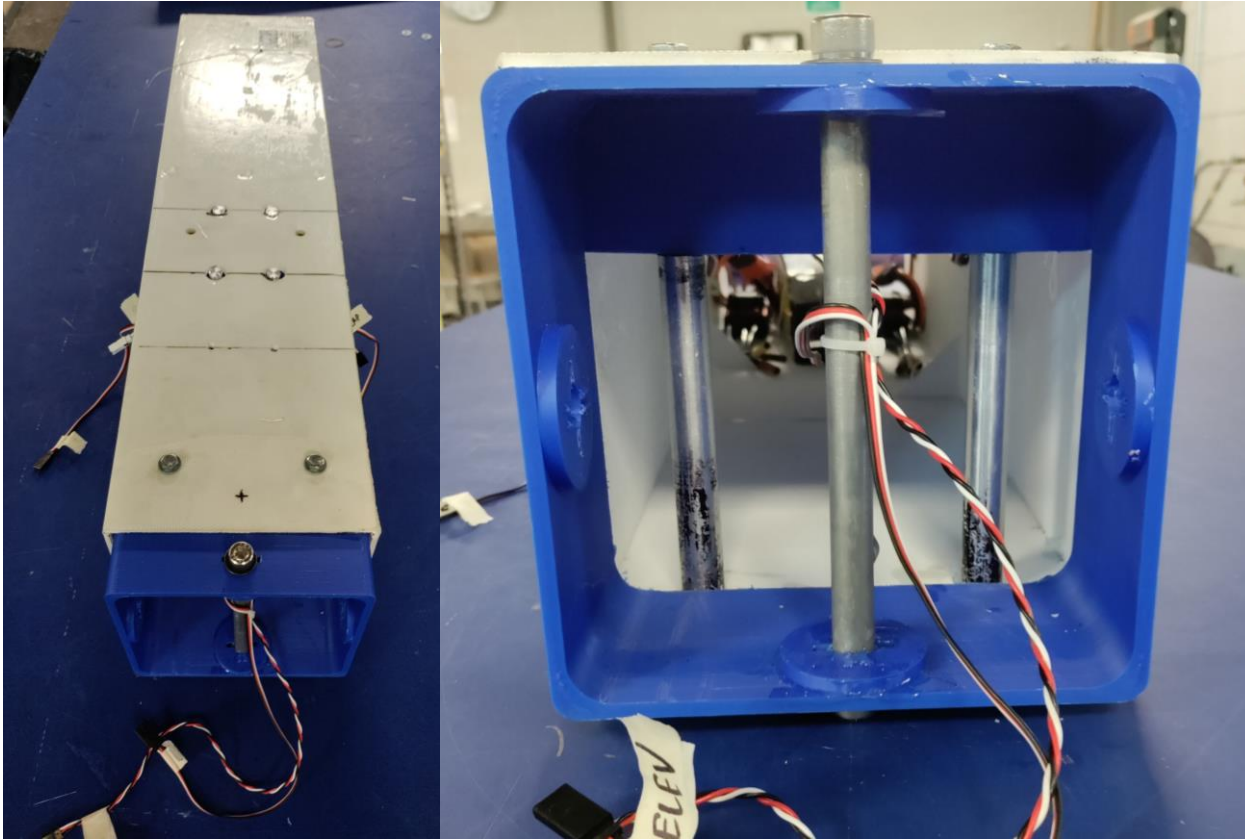
Wing Constructed from Rigid Foam and Vacuum-Bagged Fiberglass



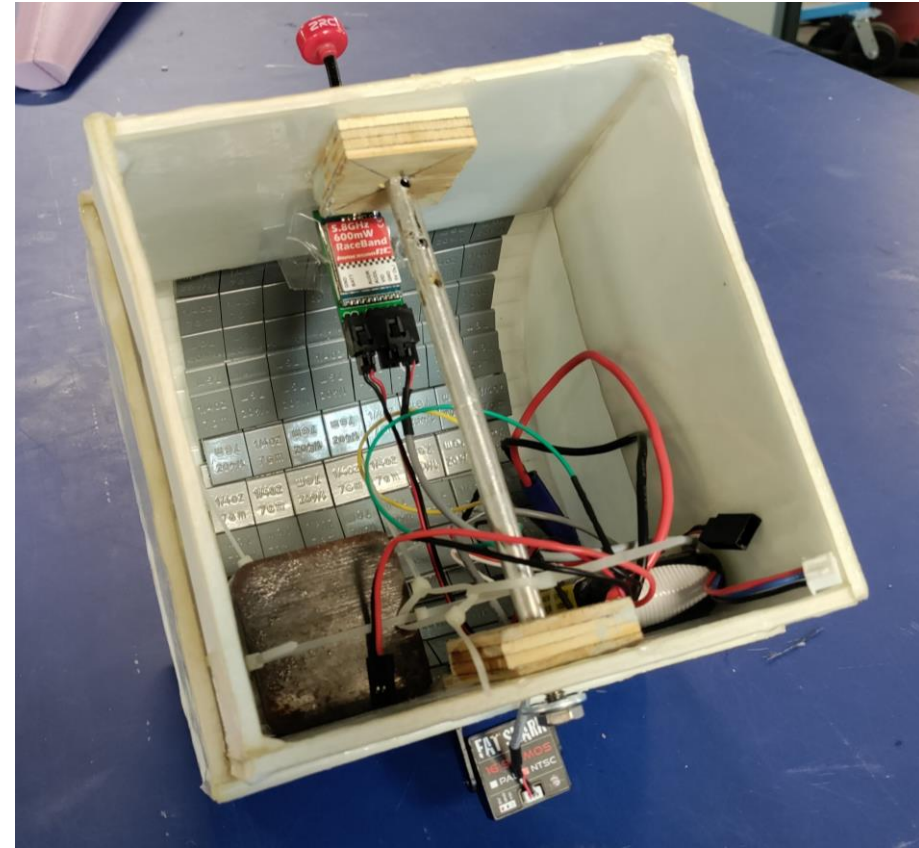
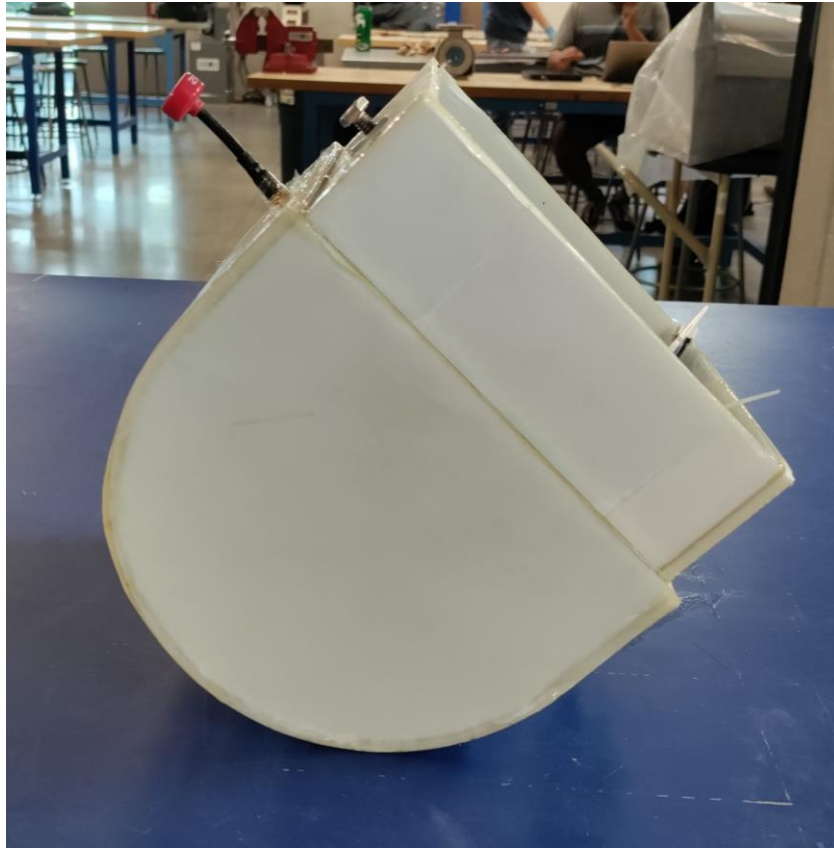
Tail Section Constructed from 3D Printed Components and Composites



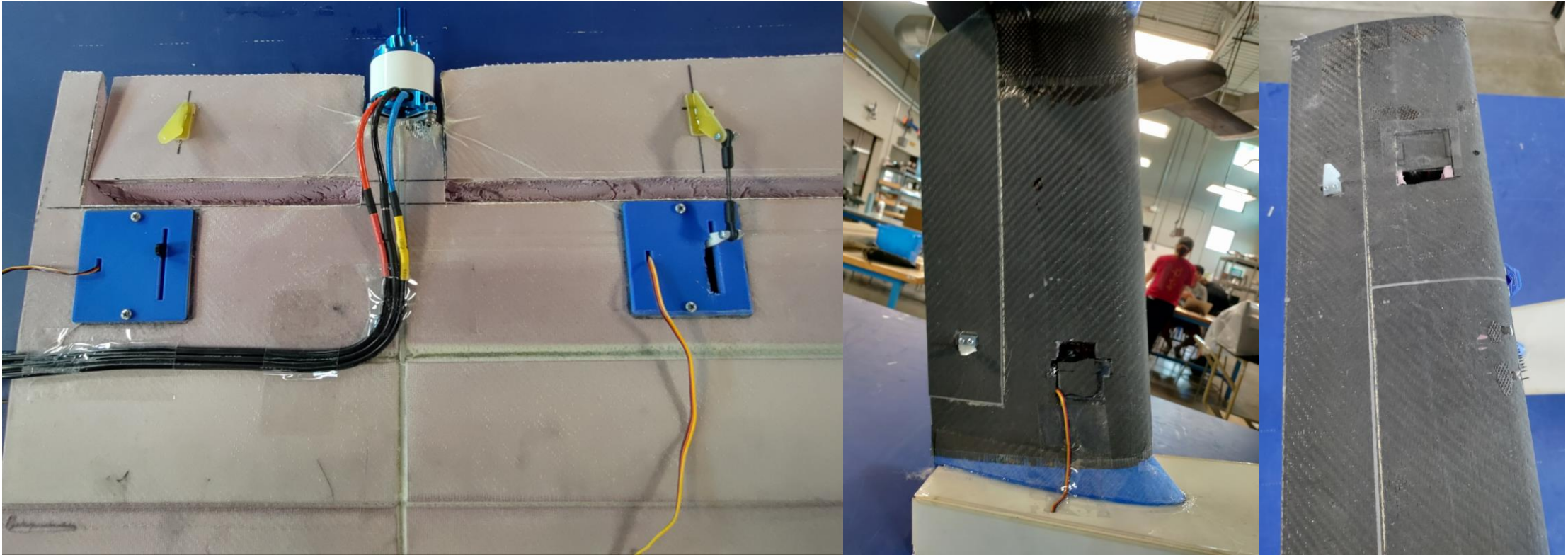
Fuselage Constructed from 3D Printed Parts and Foam Board



Nose is Ballasted to Provide Positive Static Margin and Contains FPV Gear



Control Surfaces Attached with Kevlar Hinges



Flight Test Article Demonstration

Flight Test Plan

Test Plan Completes Program Objectives in Four Flight Sessions

Flight Designation	Test Items	Test Date
Maiden (FTA-1)	Low-Speed Taxi High-Speed Taxi Short Hop Flight	11/21/2023
Performance Validation (FTA-2)	Race-Track Flight	11/27-12/1
Flight Controller Integration (FTA-3)	Autonomous Cruise	11/27-12/1
Integrated Testing (FTA-4)	Top Speed Test Autonomous Flight Pathing Payload Deployment	12/2-12/3

Data to be Collected

Endurance

- Extrapolated from battery consumption rate

Top Speed

- Collected from GPS data from the Pixhawk

Stall Speed

Aircraft Stability

Test Procedure

Safety Checks

- Aircraft preflight
- Location
- Environment/Weather

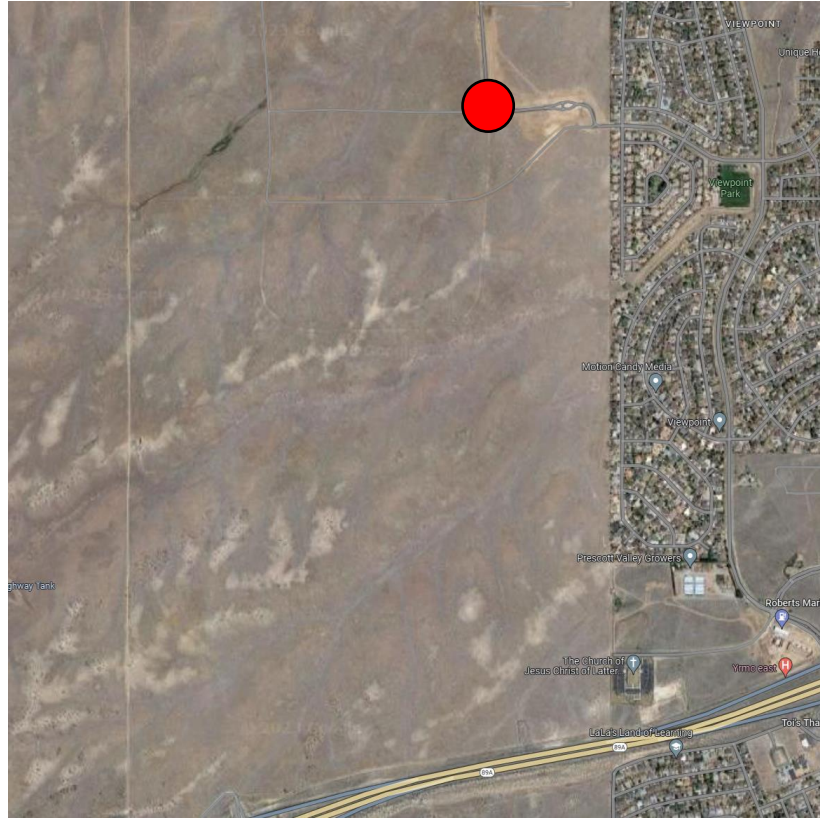
Perform Test Flight

- Conduct maneuvers according to flight objectives
- Gather required data

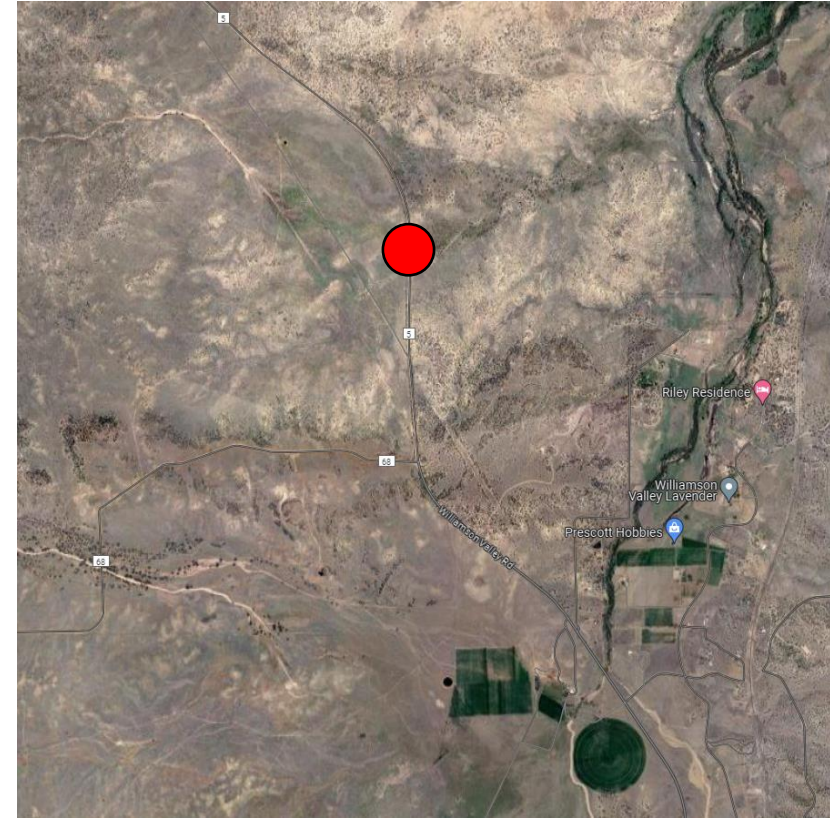
Debrief

Multiple Test Locations Provide Redundancy in Case of Poor Conditions

Primary Location (North of 89 in PV)

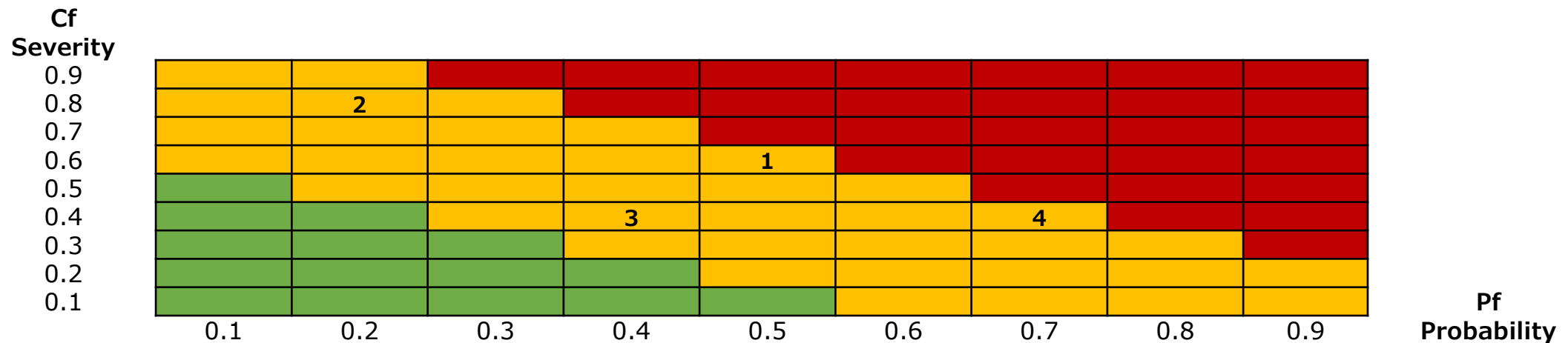


Secondary Location (East of Chino Valley)



Risk Analysis

Risk Matrix



1. Loss of control due to pilot inexperience
2. Collision with object or bystander
3. Mechanical/avionics failure
4. Damage to aircraft during landing

Risk Mitigation

Loss of Control Due to Pilot Inexperience

- Implementation of attitude control with Pixhawk
- Schedule test flights for days with low wind

Collision with Object or Bystander

- Use test locations with minimal objects to collide with
- Ensure Safety Engineer clears the test location before flight

Risk Mitigation Cont.

Mechanics/Avionics Failure

- Conduct comprehensive preflight check to ensure proper aircraft functionality

Damage to Aircraft During Landing

- Choose takeoff/landing surface to minimize roughness
- Determine stall speed during test flight to use lowest possible landing speed

Questions?

