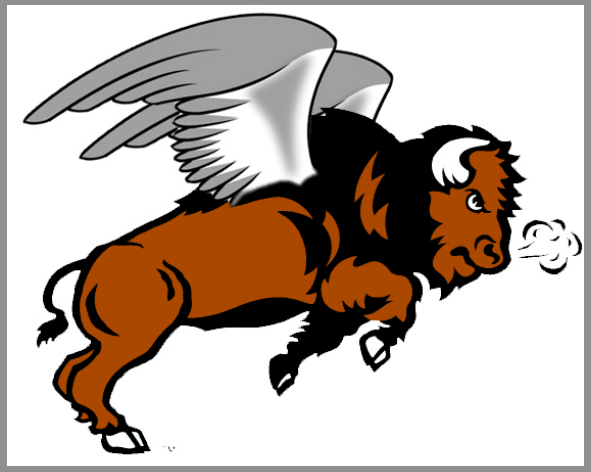
NDSU NORTH DAKOTA STATE UNIVERSITY

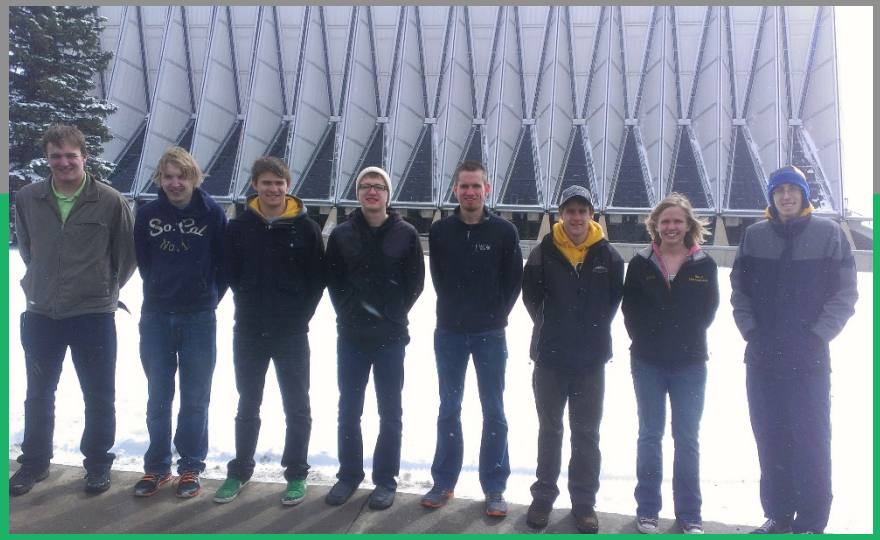
AIAA

Student Branch of the American Institute of Aeronautics and Astronautics
at North Dakota State University, Fargo, ND



NDSU AIAA

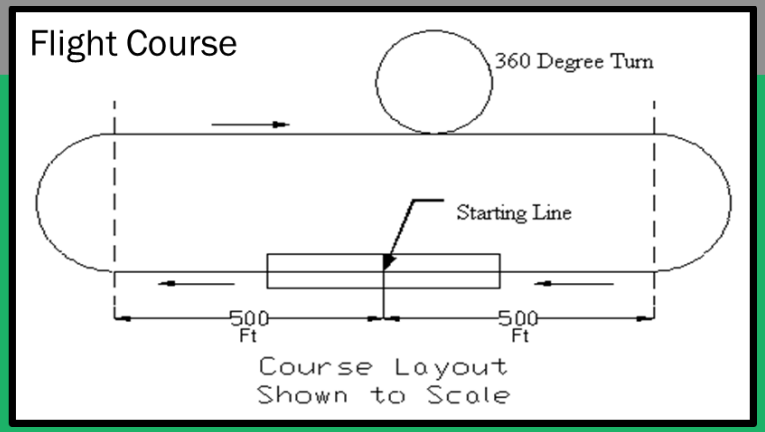
- Started in 2009
- Mission: To join students interested in all things related to aviation.
- Main Focus: Design Build Fly with Senior Design Group
- Side Projects:
  - MAV Competition
  - CANSAT Competition
- Members: >15 & Growing



Design, Build, Fly

- Sponsored by AIAA, Cessna, & Raytheon
- Started in 1996-97
- Mission: "Students teams will design, fabricate, and demonstrate the flight capabilities of an unmanned, electrical powered, radio controlled aircraft which can best meet the specified mission profile."
  - Mission profile changes every year
- Scoring: Balanced between Report Score and scoring of the Three Missions

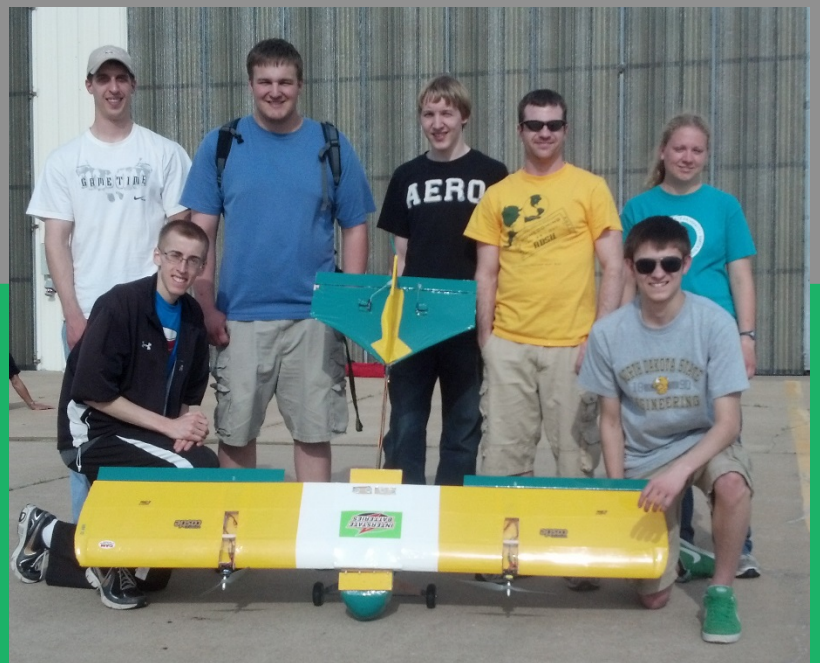
Cessna Aircraft Company
Raytheon Missile Systems
AIAA Foundation



NDSU DBF 2011 & 2012

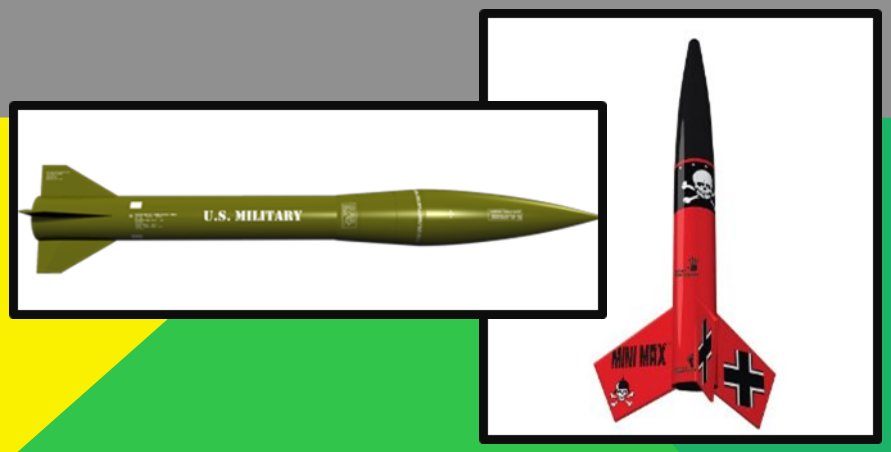
- 2011 First Year
  - Suitcase Mission
  - 32nd of 82

- 2012 without Senior Design
  - Water Drop Mission
  - 37th of 68



NDSU DBF 2013

- Mission 1: Timed Ferry Flight
  - Complete as many laps as possible in 4 minutes
- Mission 2: Stealth Mission
  - Complete 3 laps with 4 internal rockets
- Mission 3: Strike Mission
  - Complete 3 laps with one of 6 rocket configurations
  - Configurations include Internal and external rockets

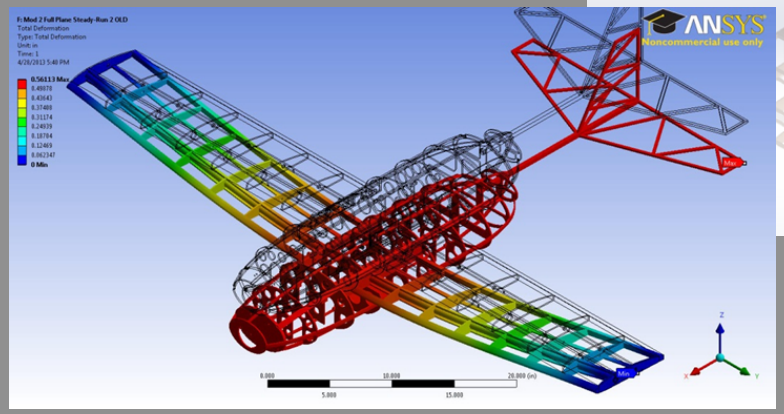


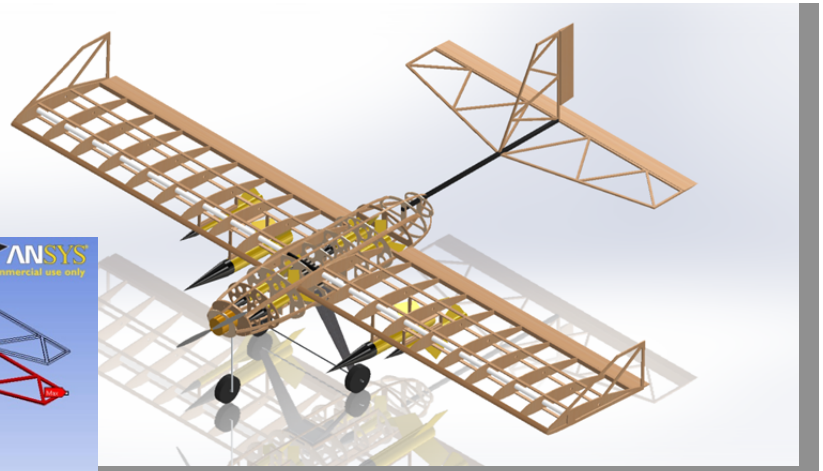
Major Constraints

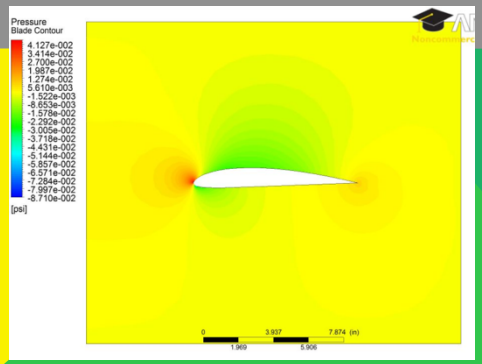
- Contest Constraints
  - Rockets ballast to specific weights
  - 30ft square take off area
  - 1.5 lb max battery weight
  - 20 Amp max current
- Performance Constraints
  - Light weight
  - Aerodynamic shape
- Feasibility Constraints
  - Easily manufacturable and repairable
  - Detachable wing
- Budget

Design, Build

- Model
- Testing
  - FEA
  - CFD
- Balsa
- Carbon Fiber
- Monokote
- 3D Printing





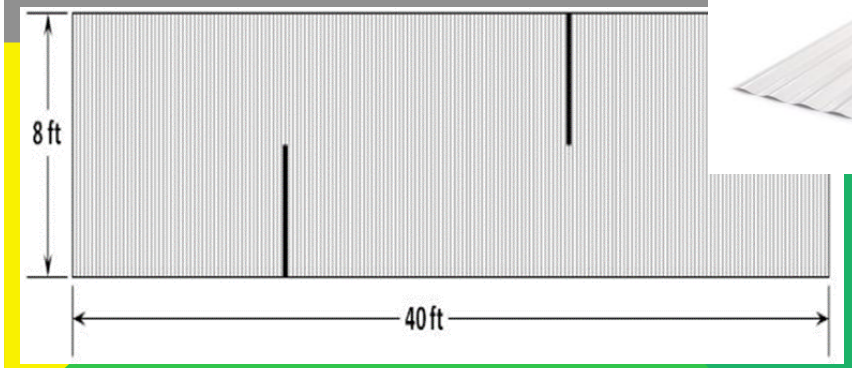


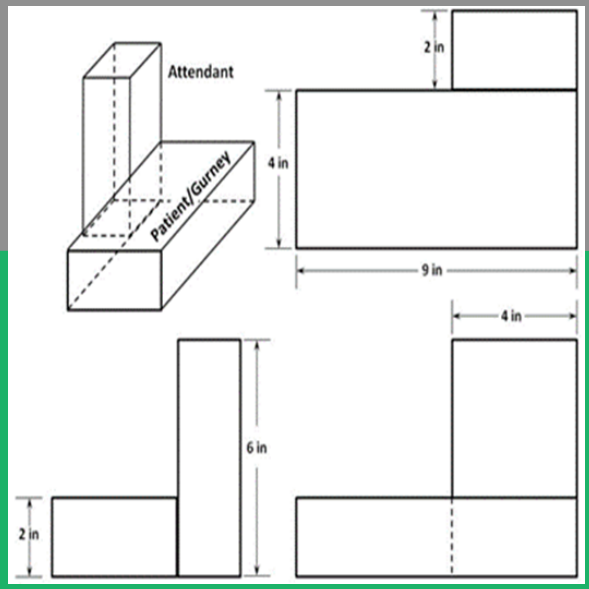
Fly

- Completed
- 36th out of 81

NDSU DBF 2014

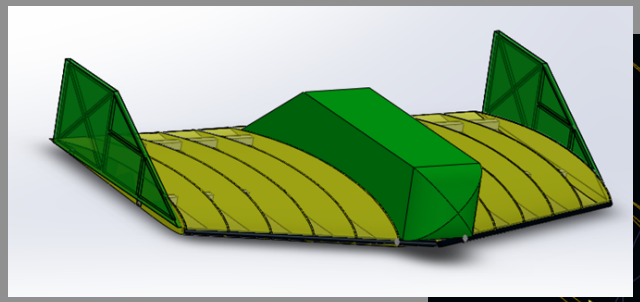
- Mission 1: Timed Ferry Flight
  - Complete as many laps as possible in 4 minutes
- Mission 2: Maximum Load Mission
  - Complete 3 laps with wooden blocks
- Mission 3: Emergency Medical Mission
  - Complete 3 laps with patient and gurney blocks
- Ground Taxi Mission

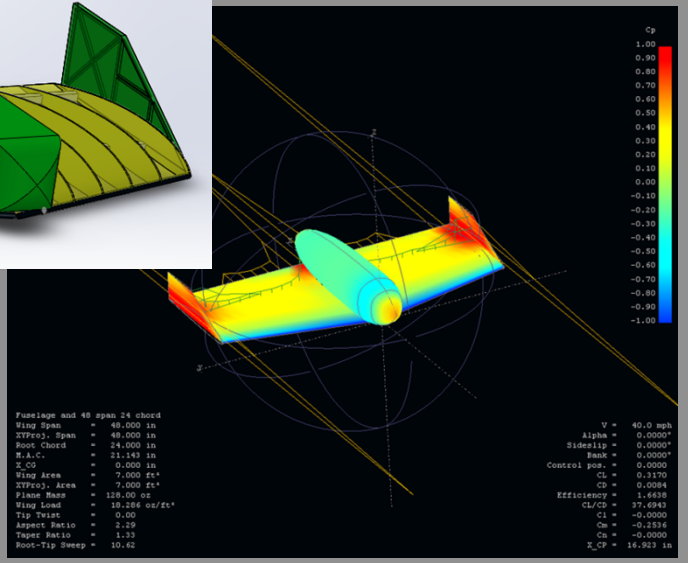


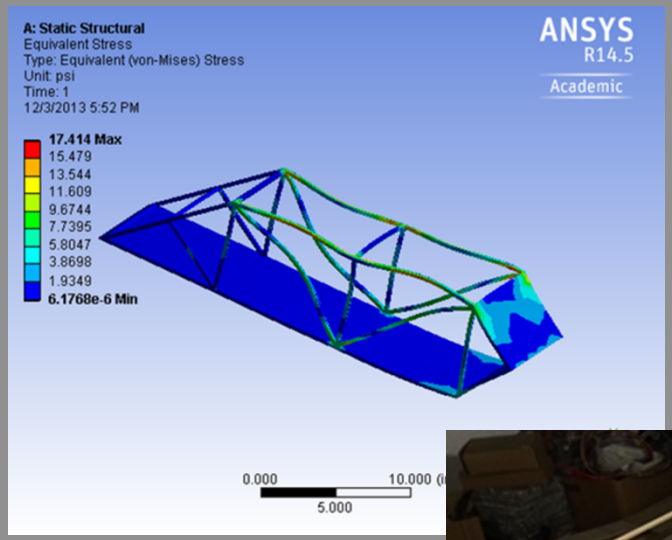


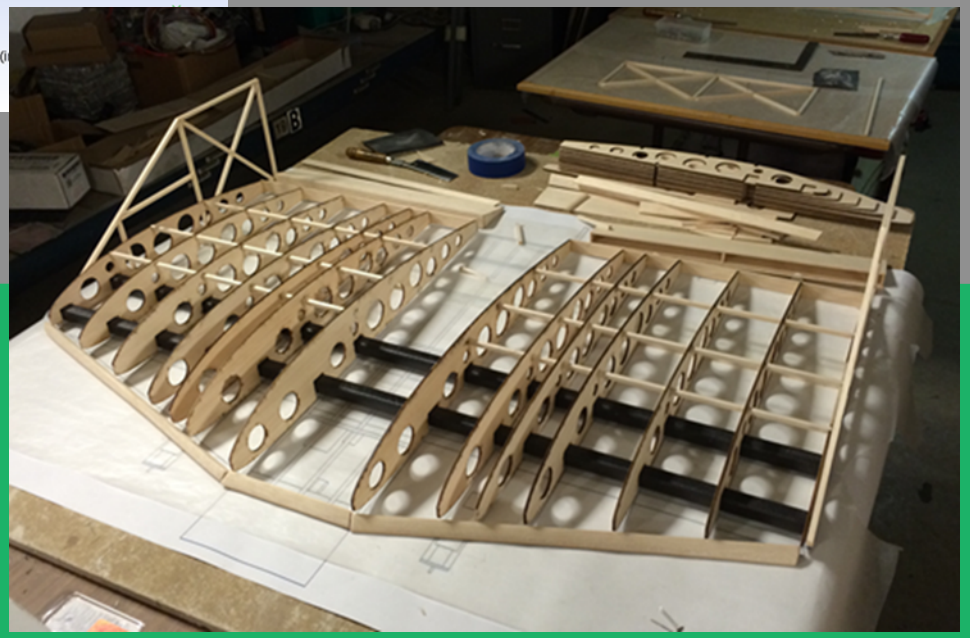
Design, Build

- Model
- Testing
  - FEA
  - XFLR







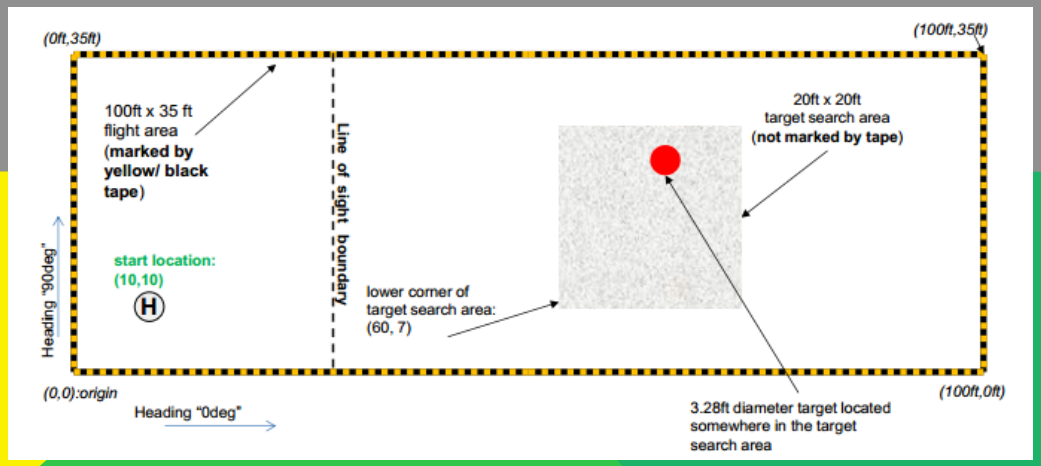


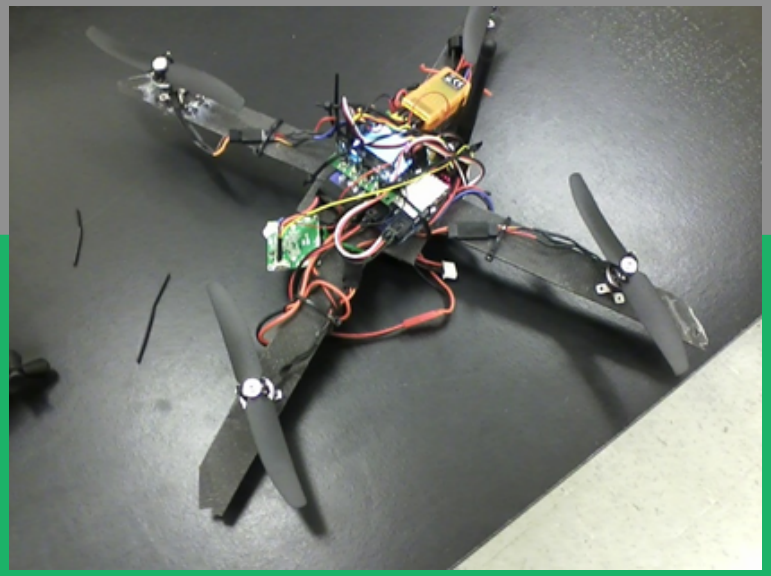
Fly

- Crashed 1st Mission
- 69th out of 80

MAV Competition

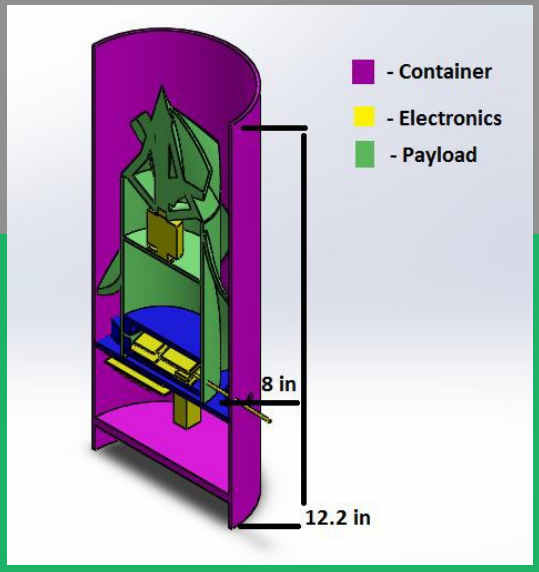
- Mission: Create MAV less than 500 grams and 1.5 feet across to autonomously find a target in a field
- Scoring:
  - Form-unique, innovative, and robust
  - Function-best flight and autonomy
- Received Honorable Mention: $600





CANSAT Competition

- Mission: “simulate a sensor payload traveling through a planetary atmosphere sampling the atmospheric composition during descent.”
  - Container & Payload must deploy from rocket at specific altitudes
  - Payload must harness its own energy
  - Both must send and store data
- Placed 25th



QUESTIONS