

FORMULA ONE AIR RACING



PRESENTED BY: JP O'DELL

OUTLINE

- WHAT IS FORMULA ONE AIR RACING?
- AIRCRAFT REQUIREMENTS
- RACE FORMAT
- TRAINING
- PYLON RACING SCHOOL
- DATA COLLECTION SYSTEM
- RACE WEEK
- NEW WING!



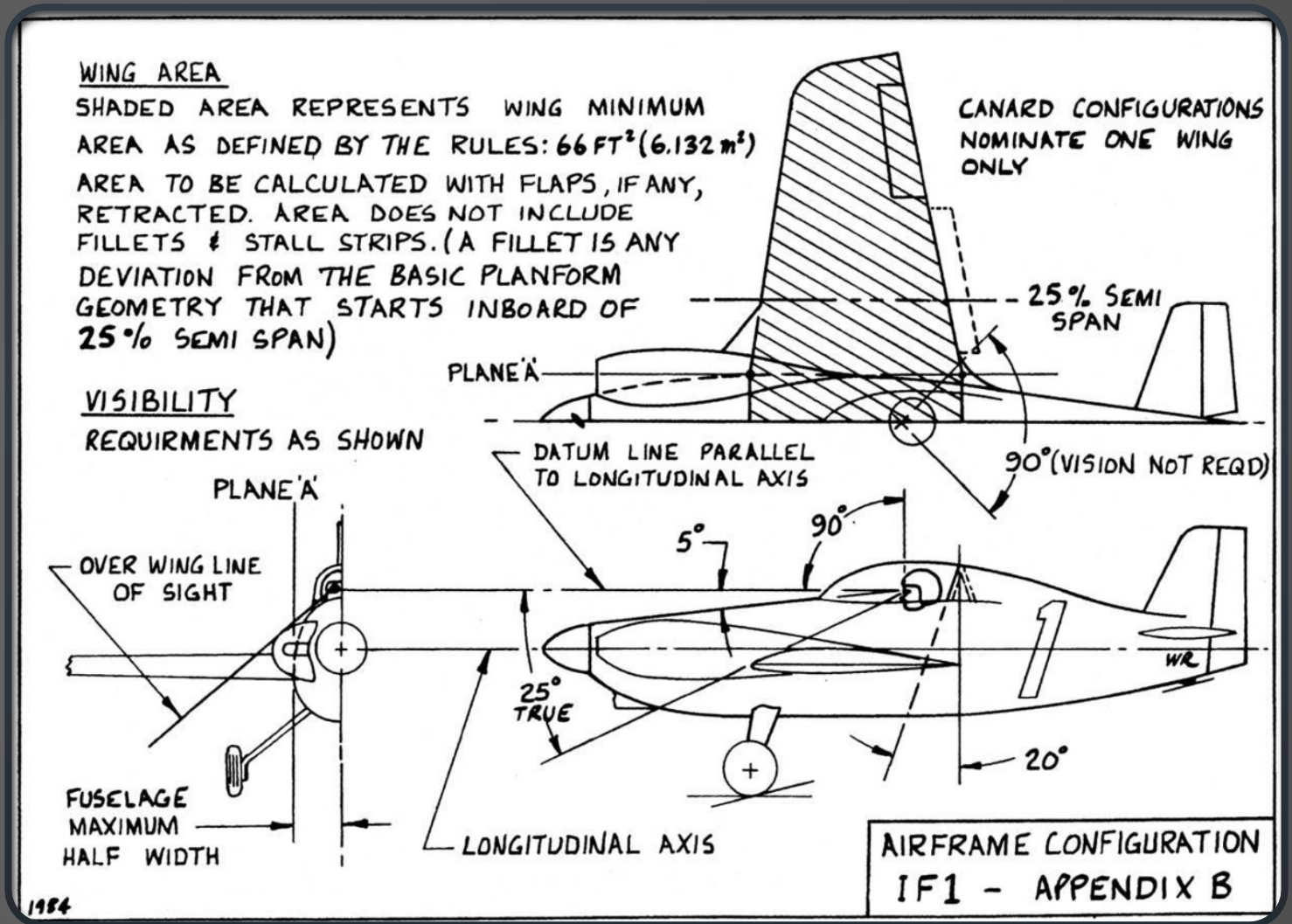
WHAT IS F1 AIR RACING?

- CLASS OF AIR RACING CONSISTING OF VERY SMALL AIRCRAFT POWERED BY CONTINENTAL O-200s, REACHING SPEEDS OF 250+MPH.
- RACES ARE HEAD TO HEAD WITH UP TO 8 AIRPLANES AT A TIME.
- MAIN RACE EVERY YEAR IS AT THE "RENO AIR RACES."



F1 AIRCRAFT REQUIREMENTS

- WING AREA > 66FT²
- POWERED BY O-200
 - CARBURETED
 - NORMALLY ASPIRATED
- 5 GAL FUEL MINIMUM
- FIXED MLG AND PROPELLER
- 500LB TOW MINIMUM
- VISIBILITY REQUIREMENTS



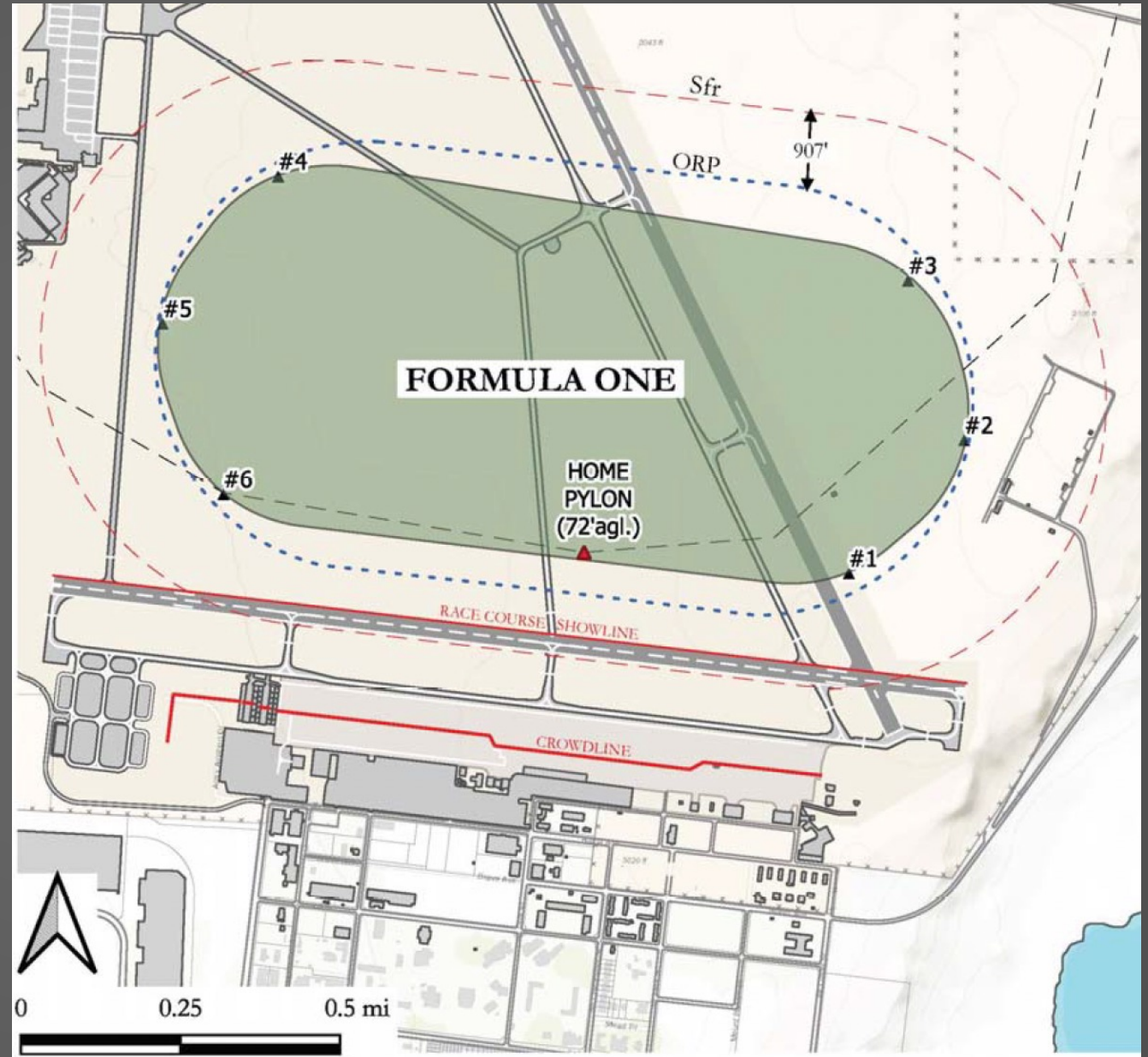
AIRCRAFT REQUIREMENTS

- MANY WAYS TO MEET THE DESIGN!



RACE FORMAT

- THE START
 - 8 PLANES IN 3-2-3 FORMATION.
 - GREEN FLAG DROPS- EVERYONE LAUNCHES SIMULTANEOUSLY
 - RACE TO GET TO PYLON 1
- THE COURSE
 - 3.119 MILE OVAL
 - 8 LAPS
 - ALTITUDE 50' TO 250' AGL
 - 6+2 PYLONS



THE ADOPTION OF MONKEY NINJA

- *CASSUTT IIIIM, FINISHED IN 2009*
 - *15 FOOT WINGSPAN*
 - *620LB EMPTY*
 - *WOOD WING, TUBE & FABRIC FUSELAGE/TAIL*
- *AIRPLANE RACED IN RENO FIRST TIME IN 2021*
- *RECEIVED CHECKOUT IN PITTS S-2A PRIOR TO FLYING*



TRAINING

- *HAD <2 MONTHS UNTIL PYLON RACING SCHOOL (PRS)*
 - *NEEDED TO LEARN THE AIRPLANE WELL ENOUGH TO BE SAFE FLYING PYLONS*
 - *GOAL = 15 HOURS*
- *MANEUVERS TO MASTER FOR PRS:*
 - *ABORTED TAKEOFFS FROM ~30MPH (+-20 FT FROM CENTERLINE)*
 - *ALL TAKEOFFS +- 10 FT FROM CENTERLINE*
 - *180 DEGREE TURNS, 60 DEGREE BANK, NO LOSS OF ALTITUDE*
 - *AILERON ROLLS IN EACH DIRECTION (<50FT LOSS OF ALTITUDE)*
 - *HALF ROLL LEFT, HALF ROLL RIGHT (<50FT LOSS OF ALTITUDE)*
 - *SIMULATED ENGINE FAILURE FROM RACING ALTITUDE AND SPEED*



"TRAINING"



“COOL” THINGS ABOUT THE CASSUTT

- SITTING VERY CLOSE TO CG IN ALL THREE AXIS
- CRUISE SPEED \approx 175MPH (TRUE)
- \sim 4-5GPH FUEL BURN
- $V_s \approx$ 75MPH, STALL CHARACTERISTICS GOOD
- $V_{REF} \approx$ 90-100MPH
- WING DESIGN LLF = $\pm 8G$
- LARGE AMOUNT OF INDUCED DRAG
- SEMI-AEROBATIC (NO INVERTED SYSTEMS)
- NEGATIVELY STABLE IN YAW
- 180 DPS ROLL RATE



PRS

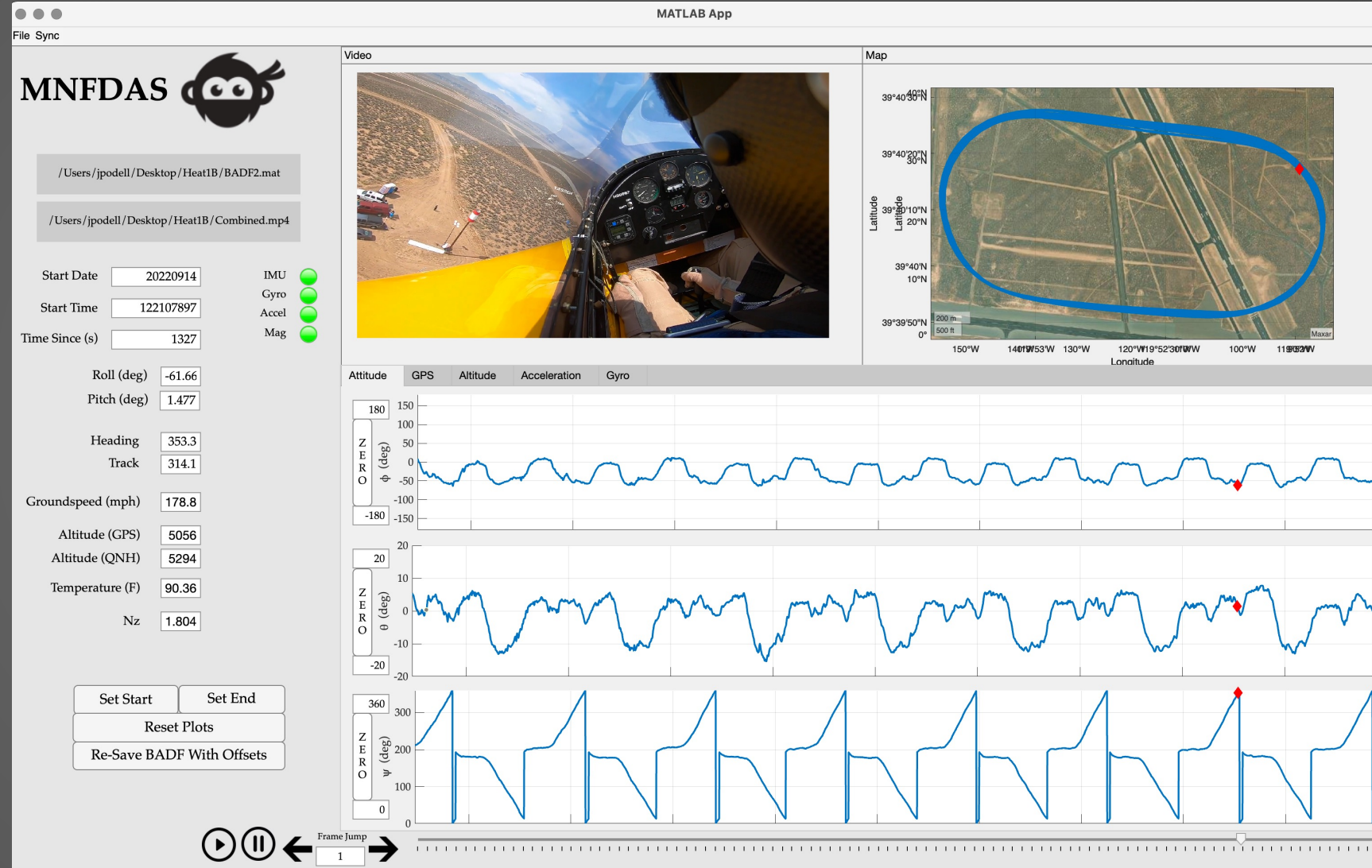
- *OVER 150 LAPS ON COURSE*
- *8 SIMULATED ENGINE FAILURES ON COURSE*
- *MULTIPLE RACE STARTS*
- *CHECKRIDE PASSED!*



K G ECCLES 2022

DATA ACQUISITION/ANALYSIS SYSTEM

- *DESIGNED ACQUISITION SYSTEM WITH SENSORS THAT RECORD 23 PARAMETERS ABOUT THE FLIGHT.*
- *ANALYSIS SOFTWARE I WROTE COMBINES SENSOR DATA AND GOPRO FOOTAGE.*
- *ALLOWS FOR EASY ANALYSIS OF FLIGHT PROFILES.*



PRACTICE!



RACE WEEK!

- FLEW TO RTS WITH #74
- TECH INSPECTION
- RACE PROP BALANCE



QUALS

- 3 AIRPLANES ON COURSE AT A TIME
- 2 CONSECUTIVE TIMED LAPS, BEST TIME TAKEN
- QUALIFIED 174.8MPH



HEAT 1B

- *FIRST RACE OF THE WEEK*
 - *FINISHED 7.5 LAPS*
 - *CALLED MAYDAY FOR POPPING NOISE AND LOSS OF RPM*
-
- *LESSONS LEARNED:*
 - *DON'T PUT SPEED TAPE RIGHT WHERE YOUR BREATHER SPITS OIL*
 - *BE MORE CAREFUL WITH TAPE JOBS IN GENERAL*



MID WEEK MODS

- YOU CAN ALWAYS GO FASTER



HEAT RACES



PYLONS 2+3 WITH IMMINENT PASS



WAKE TURBULENCE



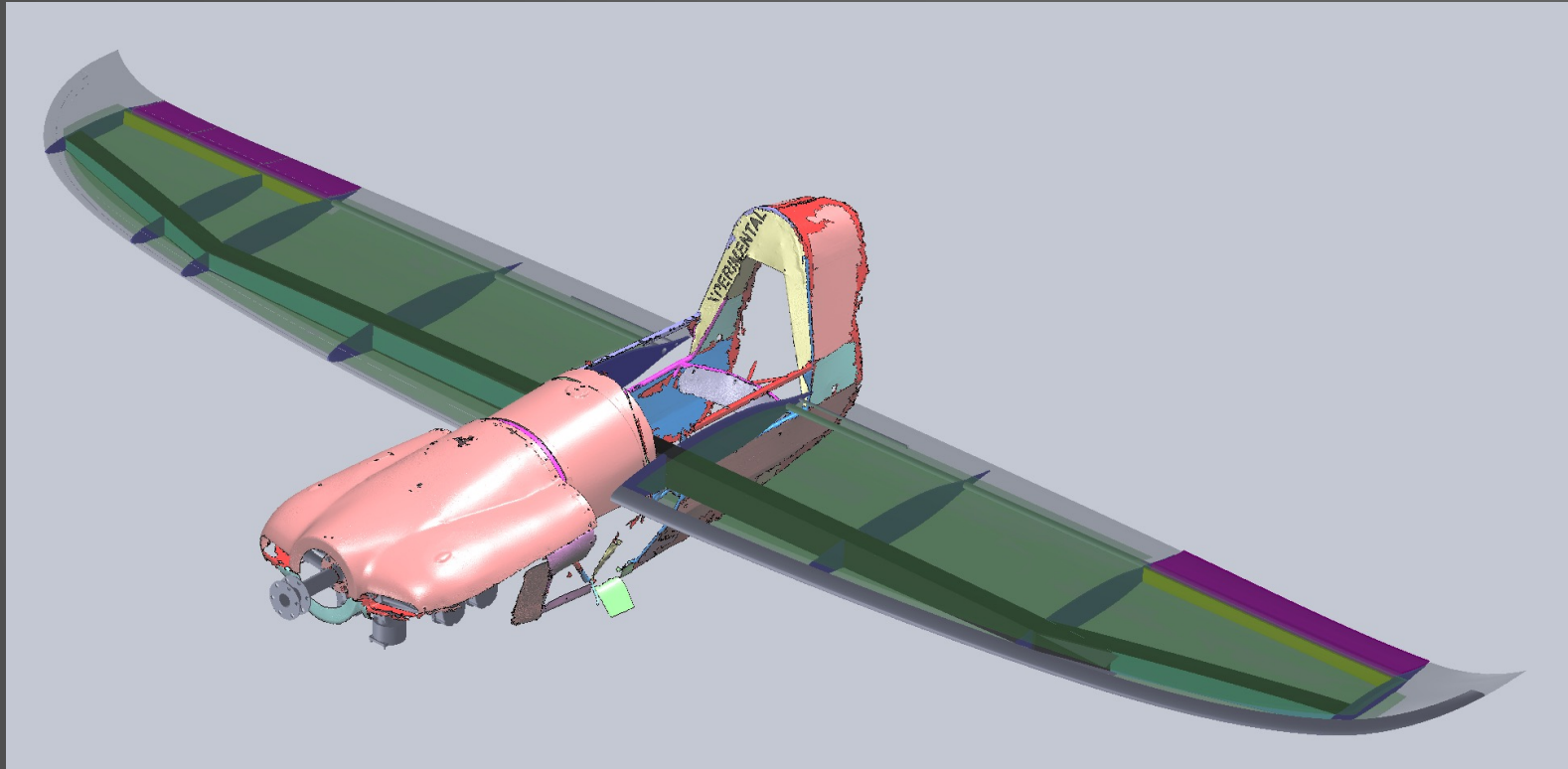
SILVER RACE

- FINISHED LAST :)
- ACHIEVED BEST LAP TIME 182MPH



FUTURE PLANS

- MAJOR MODS ALREADY IN THE WORKS...

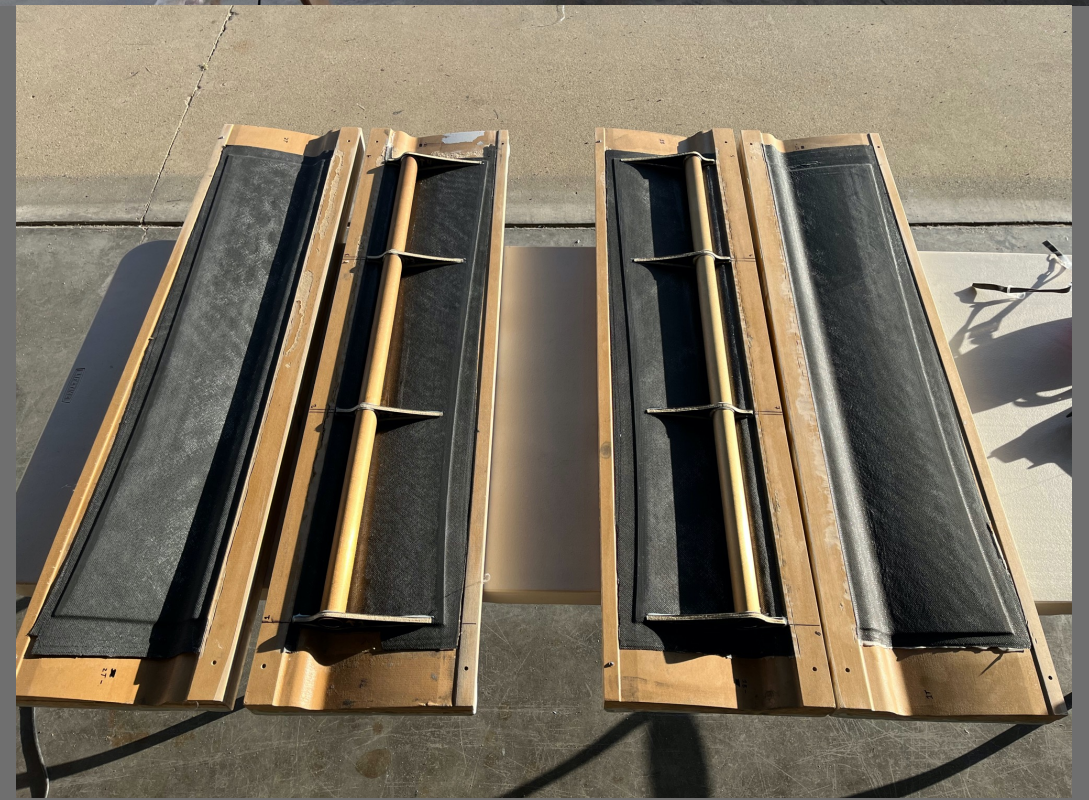


THE NEW WING

- DESIGNED BY PAULO ISCOLD
- ~21 FT WINGSPAN
- MINIMUM WING AREA FOR F1 RULES
- LAMINAR FLOW AIRFOIL
 - MOD NASA NLF0414
- CARBON FIBER AND FOAM CONSTRUCTION
- MONKEY NINJA MODS
 - MODIFIED TRAILING EDGE
 - MODIFIED WINGTIPS



CONSTRUCTION



QUESTIONS?



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