Portfolio by

SVEN BLASER

UCI HyperXite

SPACEX

Description

The Hyperloop aims to revolutionize transportation by allowing for economical and efficient transit at nearly the speed of sound. I spent this summer working on the UCI HyperXite team, which is preparing to compete in the SpaceX Hyperloop Pod Competition in January of 2017.

I was in charge of the team designing and manufacturing our levitation system, which is a flexible hovercraft-like skirt.

We developed an in house PVC vacuum forming process which was aided by ANSYS Fluent simulations to optimize the design of our skirts to withstand the 230 mph competition speeds.

Responsibilities

Levitation Team Lead

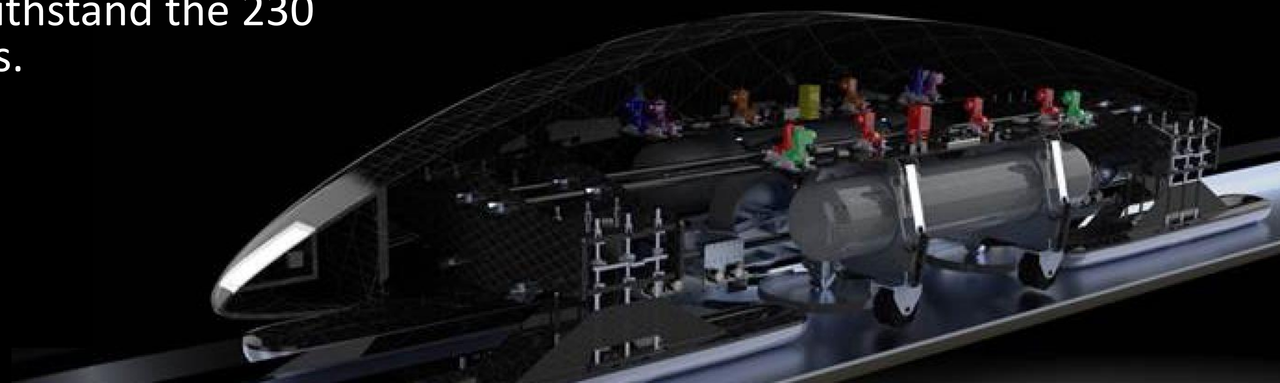
- Design, manufacture, and test air levitation skirt and carbon fiber top ski

Fuselage Team Member

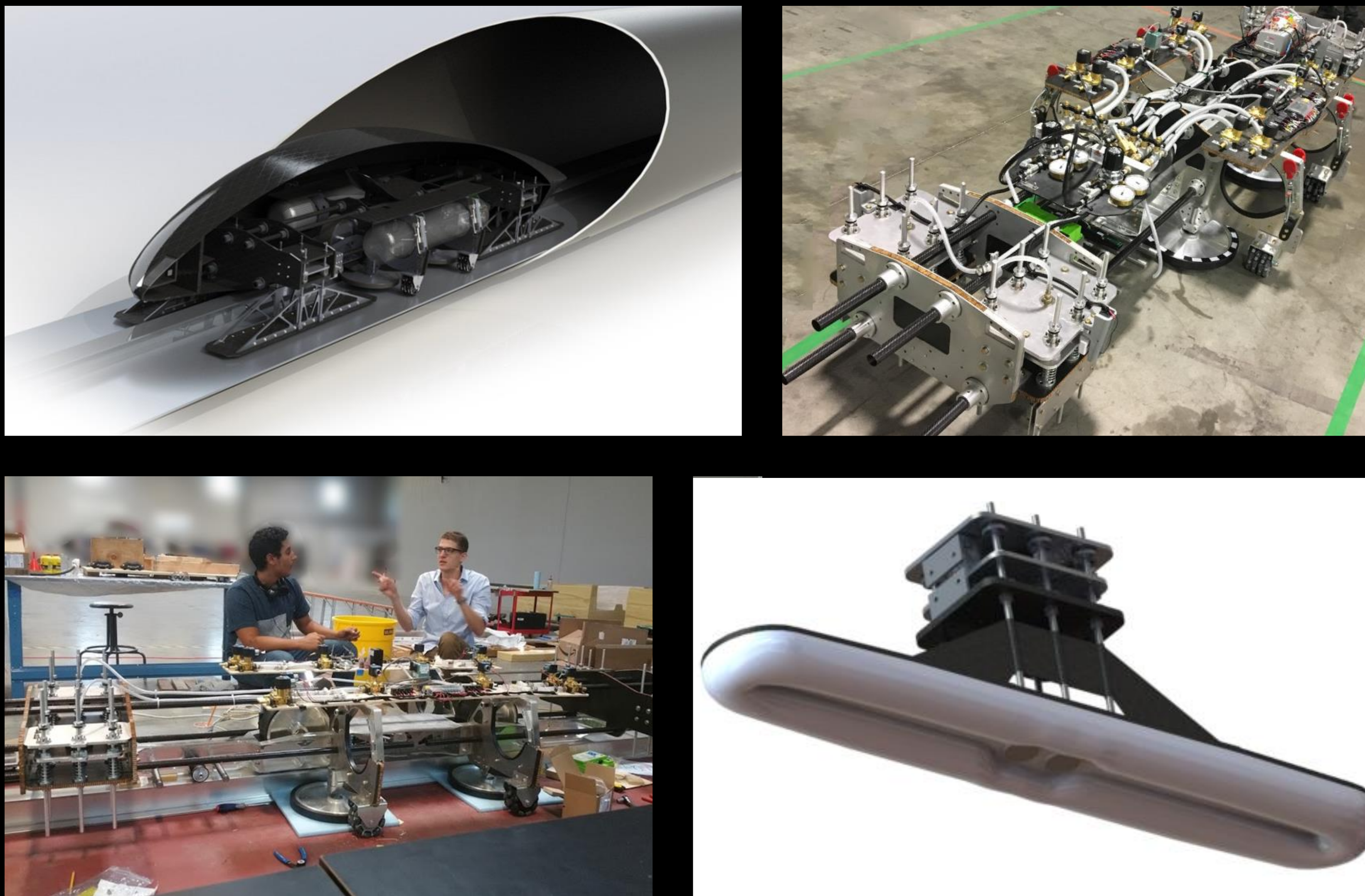
- Assist mold making process for fuselage, levitation skirt, and levitation ski

Skills

- ANSYS fluent
- Composites
- Mold making
- SOLIDWORKS
- Teamwork
- Testing
- Vacuum Forming



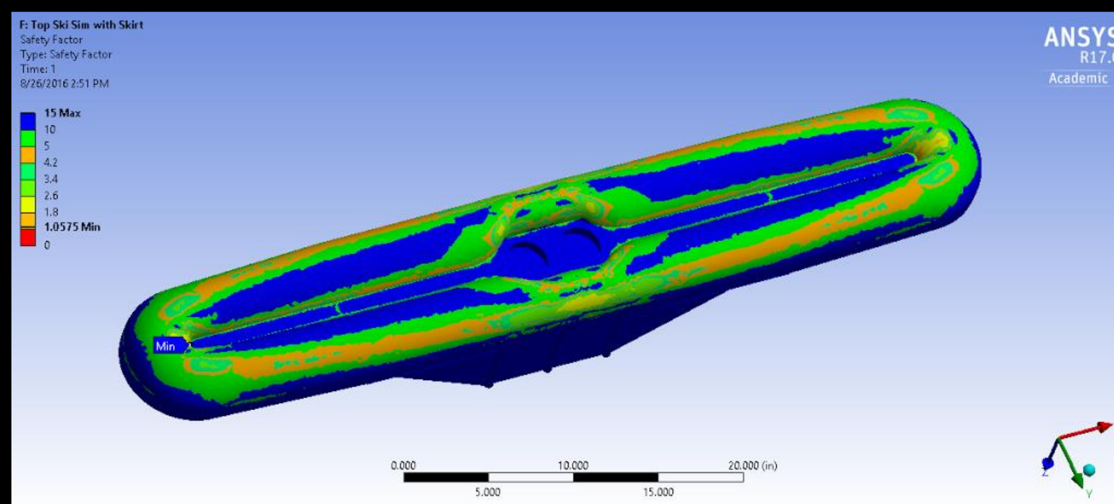
UCI HyperXite



HyperXite pod design featuring air levitation

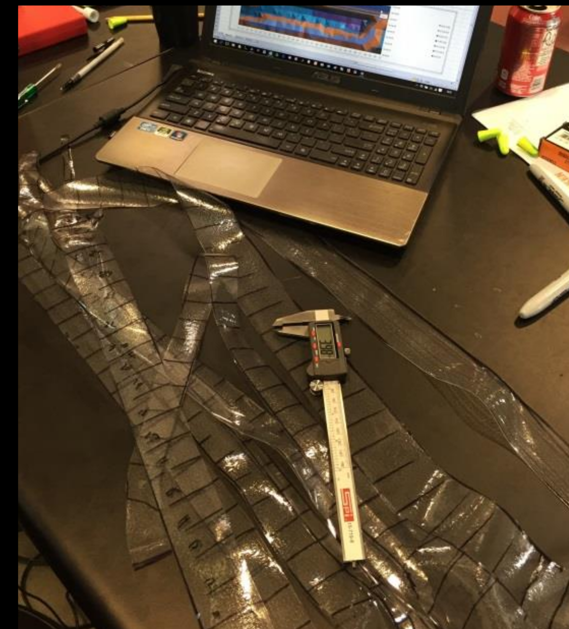
UCI HyperXite

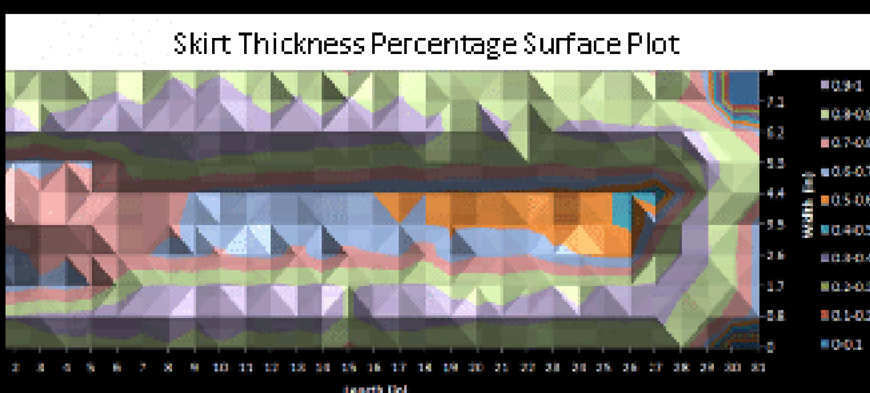
SPACEX

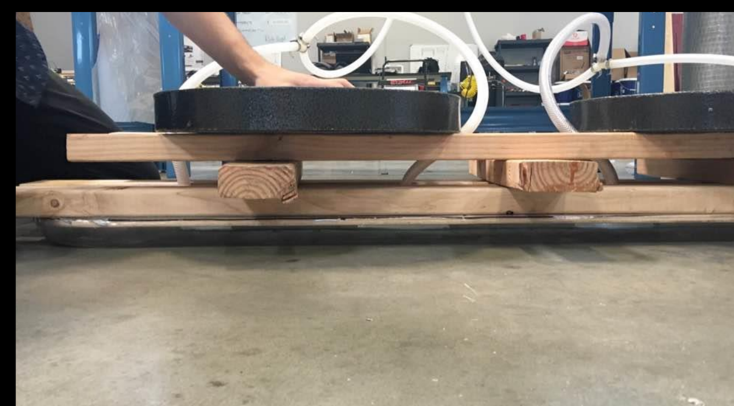


Skirt fabrication and simulation

UCI HyperXite







400 lbs low speed skirt test with 80 psi input

Sorenson Engineering Internship

Description

As part of the quality department, I worked four consecutive summers learning both quality and engineering in a fast paced manufacturing environment.

Rotating through the positions of OGP inspector and FAIR inspector, I analyzed the production line as parts were machined and processed. I was tasked with optimizing some parts of the First Article process, and with training new employees on quality control equipment and procedures.

My greatest accomplishment at the internship was noticing the need for and creating software that uses empirical crimp forces data and a 13 variable algorithm as a prediction tool to save material and manufacturing time (estimated maximum savings of $6400 per setup).

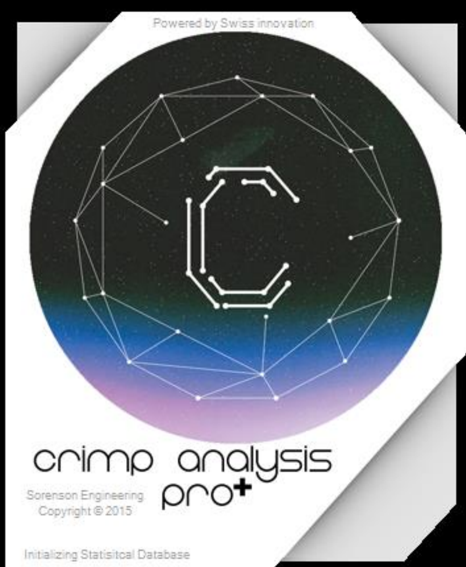
Skills

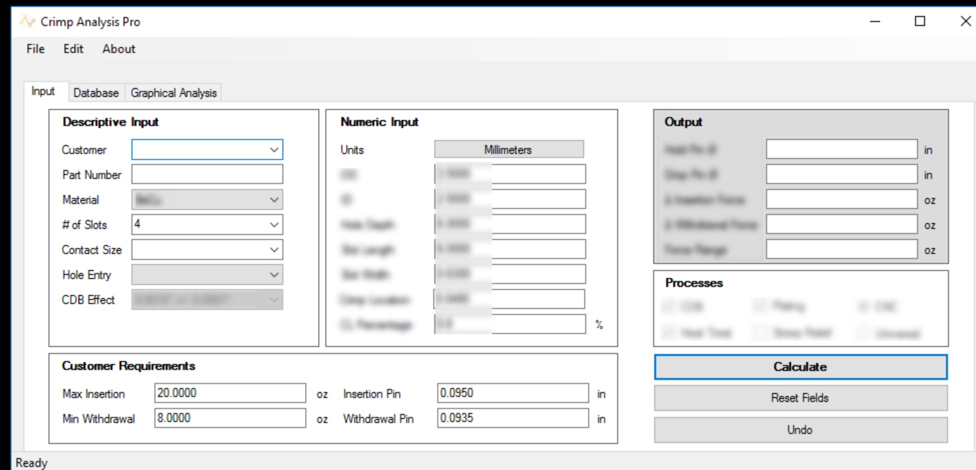
- C# programming
- First Articles
- GD&T
- Multivariable statistics
- Research and Development
- Visual inspection

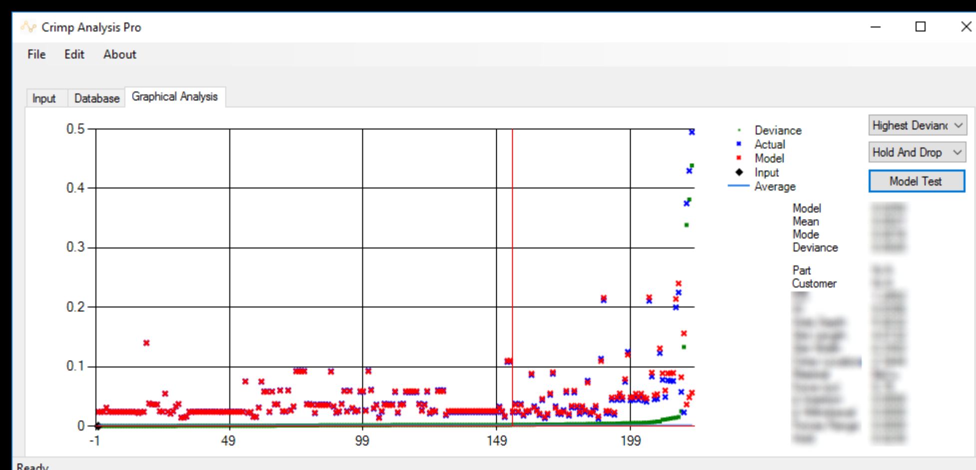
Responsibilities

- R&D for CAP^+ program
- First Article inspector
- OGP inspector
- Quality control
- Reviewing First Article process

Sorenson Engineering Internship







Layout of my crimp forces prediction software

MAE 159 Aircraft Design

Description

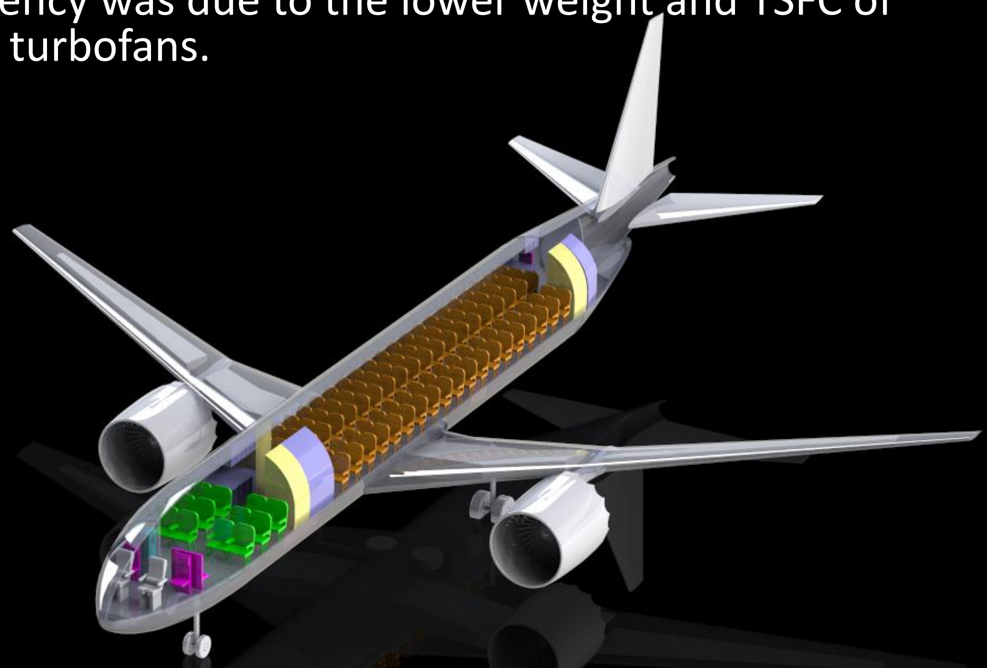
The goal of this airplane sizing study was to optimize and design two passenger jets through the analysis and interpretation of known aerodynamic equations and performance graphs. The aircraft were optimized by writing a MATLAB program.

Each plane was modeled after the technological capabilities of its respective era, one is set in the 1970's, while the other can make use of modern engines, materials, and airfoils.

The main parameter which defines the performance of each aircraft is the Direct Operating Cost (DOC). After optimizing, the modern jet had a much lower DOC by a margin of 26%, most of the efficiency was due to the lower weight and TSFC of modern materials and high bypass turbofans.

Skills

Aircraft design
Graph digitization
Iterative optimization
MATLAB
SOLIDWORKS



MAE 159 Aircraft Design

```matlab
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%    Drag
DragHeight = 30000;
DragMach = 0.5;
DragDensity = 8.91 * 10 ^ -4;
DragViscocity = 3.107 * 10 ^ -7;
RNK = (DragDensity * 994 * DragMach) / DragViscocity;
RNwing = RNK * S / b;
[CfWing,ERRORCODE] = FunctionSkinFrictionFromReynolds(RNwing,ERRORCODE);
RNfuselage = RNK * FuselageLength;
[Cffuselage,ERRORCODE] = FunctionSkinFrictionFromReynolds(RNfuselage
CR = 2 * Sref / ( b * (TaperRatio + 1)); % TaperRatio = ct/cr
CT = TaperRatio*CR;
MAC = 2/3 * (CR + CT - ((CR * CT)/(CR + CT)));
Ymac = b/6 * ((CR + 2*CT)/(CR + CT));
CTwet = (CR-(CR-CT)/(b/2) * FuselageDiameter/2);
MACwet = 2/3 * (CR + CTwet - ((CR * CTwet)/(CR + CTwet)));
SwetWing = 2*(S - MACwet * FuselageDiameter/2 )*1.02;
SwetFuselage = 0.9 * pi * FuselageDiameter * FuselageLength;
SwetNacelles = 2.1 * (TperEngine)^ 0.5 * EnginesNumber;
[WingFormFactor,ERRORCODE] = Function11_3Shevell(tcRatio,Sweep,ERROR
[BodyFormFactor,ERRORCODE] = Function11_4Shevell(FinenessRatio,ERROR
Fwing = WingFormFactor * CfWing * SwetWing;
Ffuselage = BodyFormFactor * Cffuselage * SwetFuselage;
if EngineLocation == 0
    Fts = 0.35 * Fwing;
else
    Fts = 0.45 * Fwing;
end
NacellesFormFactor = 1.25;%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%    Tes
Fnacelles = NacellesFormFactor * CfWing * SwetNacelles;
Fpylons = 0.2 * Fnacelles;
Ftotal = (Fwing + Ffuselage + Fts + Fnacelles + Fpylons) * 1.06;
Cdo = Ftotal / Sref;
Edrag = 1/(1.035 + 0.38 * Cdo * pi * AR);
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%    Appr
CLap = CLmaxTO / (1.3^2);
[DeltaCdoAP,ERRORCODE] = FunctionIncrementalProfileDragForHighLiftSy
CDap =  Cdo + DeltaCdoAP + CLap^2/(pi*AR*Edrag);
LDap = CLap/CDap;
Wldg = WSldg * S ;
TreqAP = Wldg / LDap;
VAP = ((296 * WSldg)/(0.925 * CLap))^0.5;
Uap = VAP / 659;
if EngineType == 0
    [TaAP,ERRORCODE] = JT8D9SeaLevel(1,Uap,ERRORCODE);
else
    [TaAP,ERRORCODE] = JT9D7SeaLevel(2,Uap,ERRORCODE);
end
TaPerEngineAP =  TperEngine /TSLST * TaAP;
GradAP = ((EnginesNumber - 1) * TaPerEngineAP - TreqAP) / Wldg  * 100;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%    Landing
CLLDG = CLmaxLDG / (1.3^2);
[DeltaCdoLDG,ERRORCODE] = FunctionIncrementalProfileDragForHighLiftSystems(1/(1.3)^2,Land
CDLDG =  Cdo + DeltaCdoLDG + CLLDG^2/(pi*AR*Edrag);
LDLDG = CLLDG/CDLDG;
TreqLDG = WSldg * S / LDLDG;
Vldg = ((296 * WSldg)/(0.925 * CLLDG))^0.5;
Uldg = Vldg / 659;
if EngineType == 0
    [TaLDG,ERRORCODE] = JT8D9SeaLevel(1,Uldg,ERRORCODE);
else
```

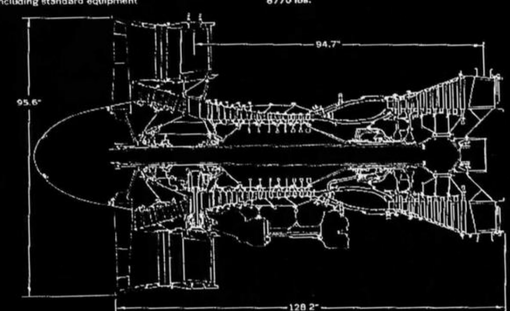
GUARANTEED CALIBRATION STAND PERFORMANCE

RATING	SEA LEVEL STATIC OUTPUT THRUST-lbs.	SEA LEVEL STATIC OUTPUT TSFC lb/hr/lb
TAKE-OFF *	45,500	0.355
MAXIMUM CONTINUOUS	38,500	0.337
MAXIMUM CLIMB	38,500	0.337
MAXIMUM CRUISE	35,500	0.332

* T. O. Thrust of 47,000 lbs. available to 86° F with water injection (40 lb. increase in weight for water injection equipment).

GUARANTEED DRY WEIGHT

Including standard equipment 8770 lbs.



STANDARD EQUIPMENT

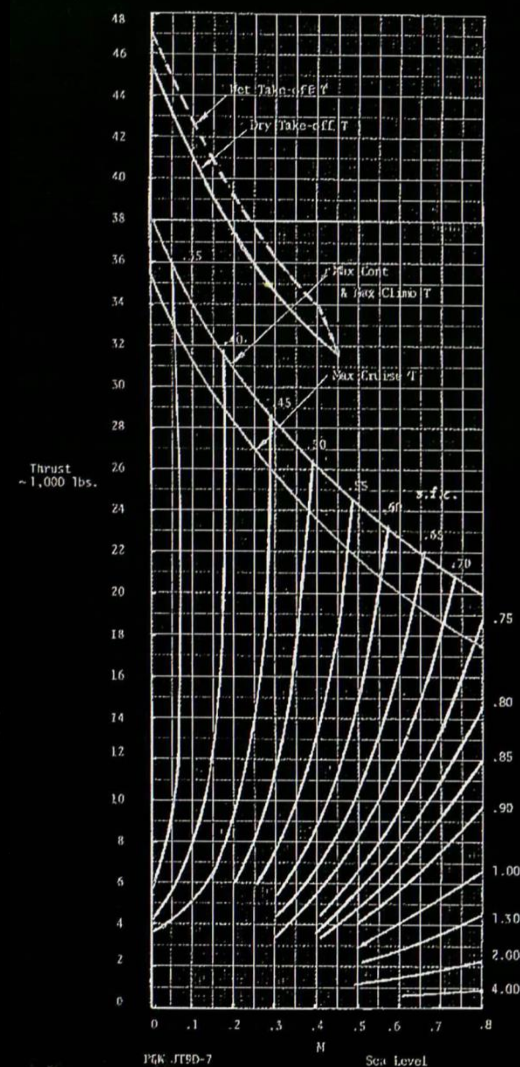
(Included in engine price and dry weight)

Fuel Control System Including Fuel Pump, Altitude Compensated Thrust and Speed Control Unit
Engine Ignition System Without Power Source
Fuel Heater, Fuel Oil Cooler and Oil Tank Assemble
Acoustic Treatment in Fan Discharge Air Passage Walls
Fireseal
Exhaust Thermocouples and Pressure Probes
Rotating Spinner
Provisions for Driving the Following Accessories:
High Pressure Rotor — Tachometer, Two Fluid Pumps, Starter and Constant Speed Drive Unit
Provision for Mounting an Alternator on the High Pressure Rotor Gearbox and Low Pressure Rotor Tachometer

ADDITIONAL EQUIPMENT

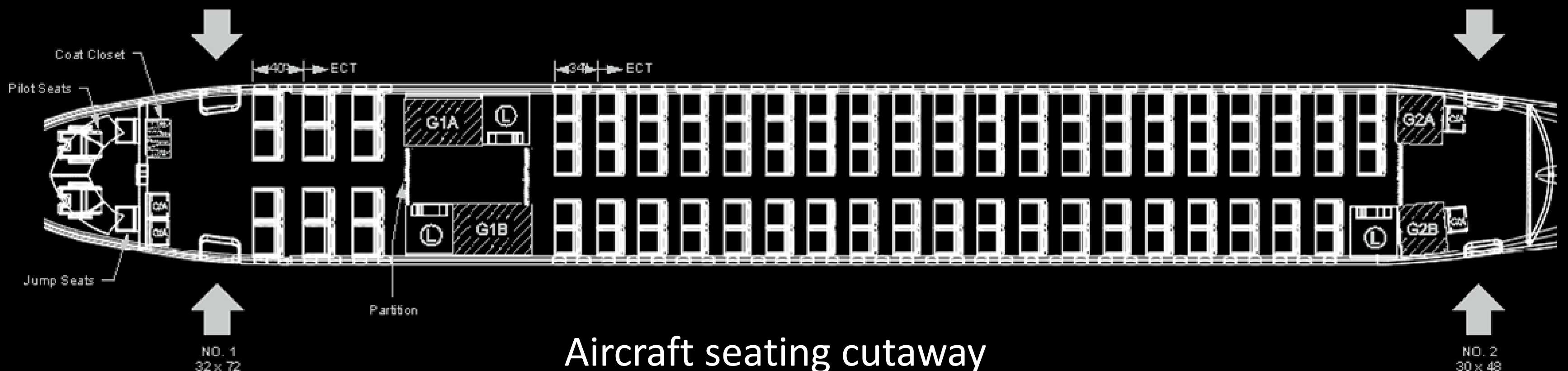
(Available at increased price and increased dry weight)

Water Injection Equipment Including:
- Water Regulator
- Piping
- Water Spray Nozzles

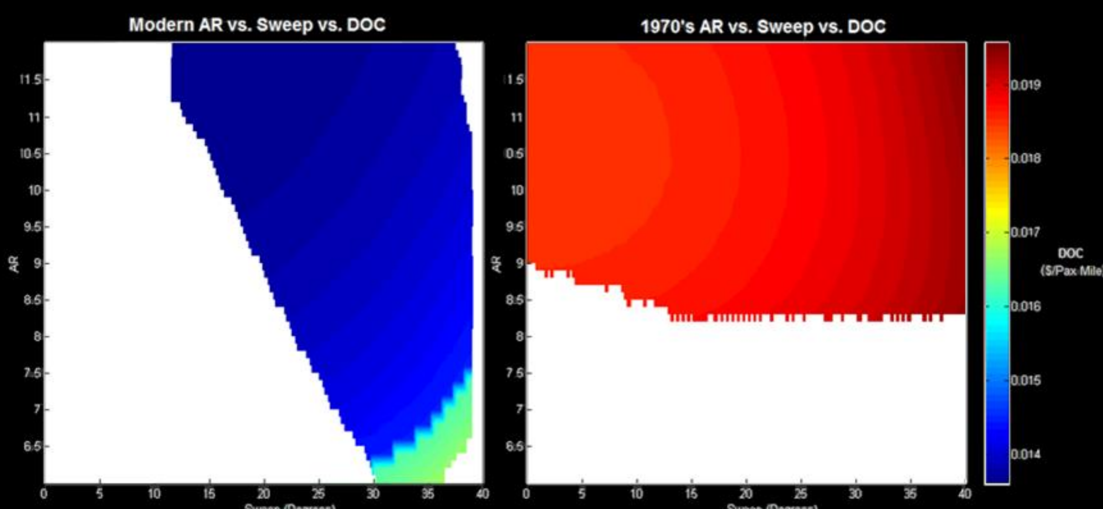


MATLAB code and JT9D-7 Turbofan performance characteristics

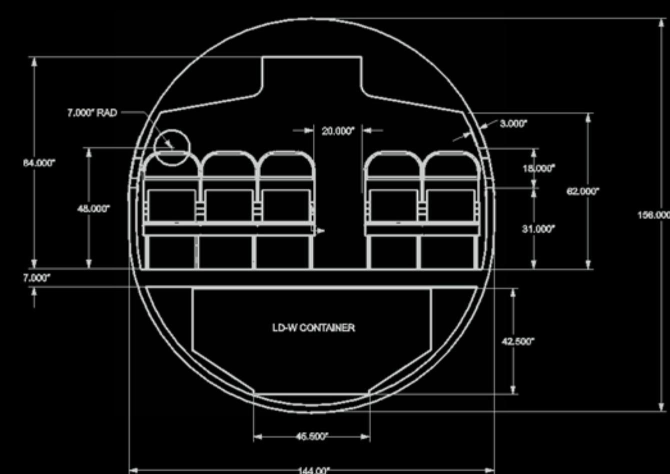
MAE 159 Aircraft Design



Aircraft seating cutaway



Graphical representation of optimization code



Fuselage cross section

Quadcopter VTOL 3D Printing

Description

Along with a small team of engineers, I worked on creating several UAVs with the goal of fulfilling DARPA's UAVForge Challenge requirements. Learning the basics of flight and PID calibration for a standard quadcopter gave us an insight into our VTOL design.

The VTOL aircraft is capable of transitioning from vertical to horizontal flight by rotating its wings independently. It is constructed out of wire cut foam, carbon fiber, wood, and ABS plastic. Rapid prototyping of the wing transition mechanism led to a quick fabrication process.

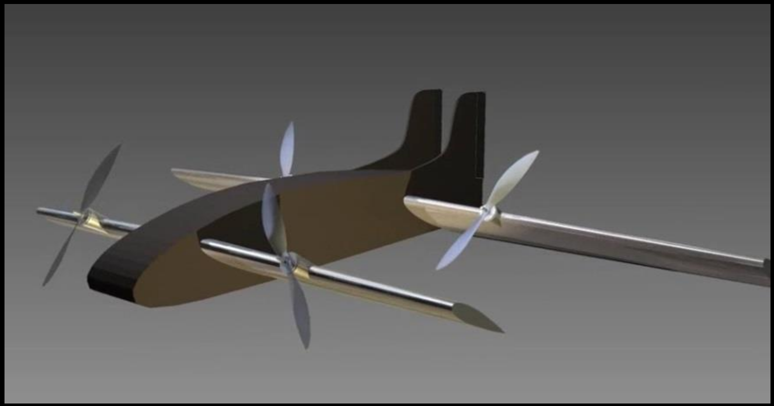
The VTOL aircraft is fully constructed and is awaiting calibration and the development of software which will allow for a smooth in-air transition.

Responsibilities

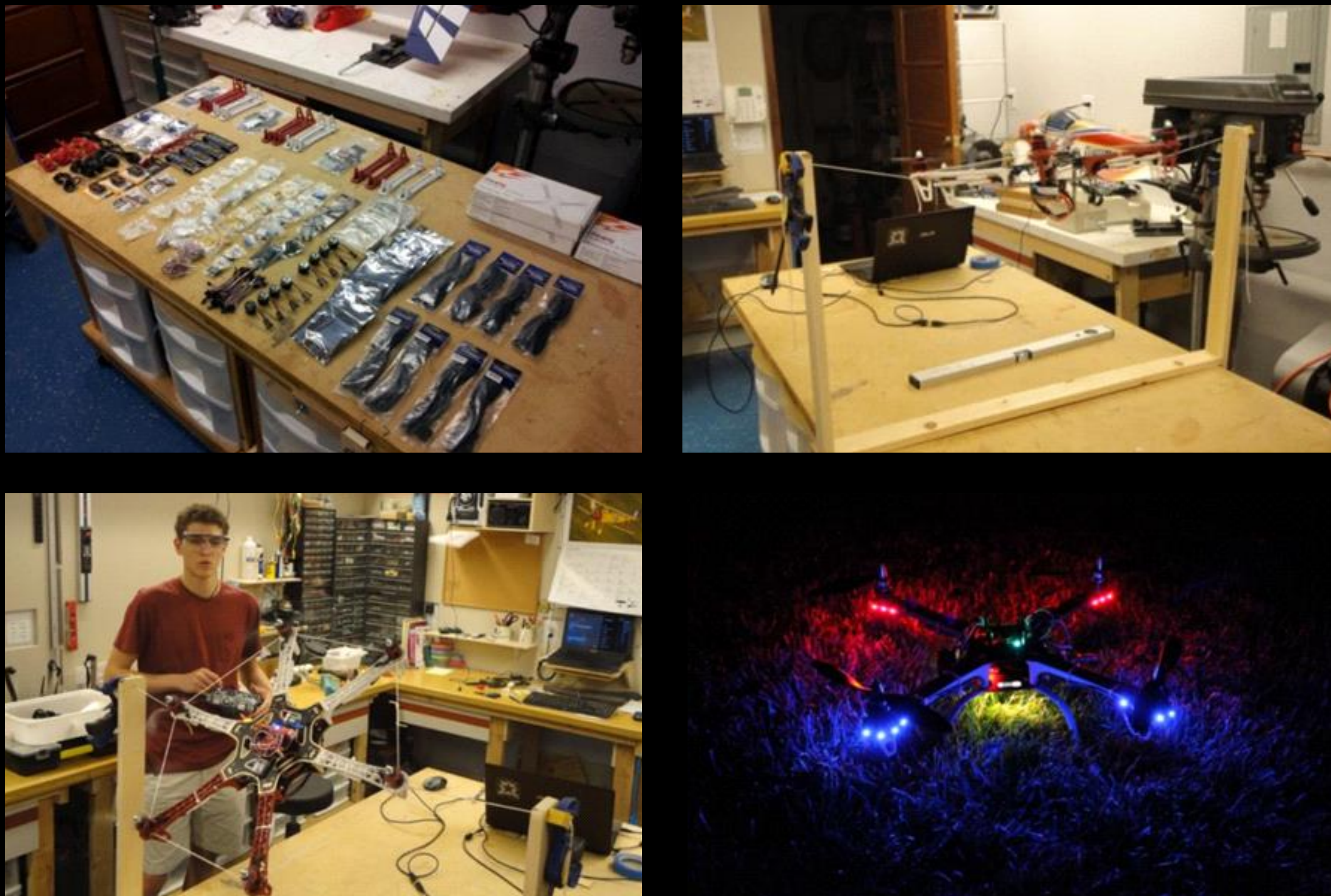
- PID Calibration
- Designing and printing tilt-wing mechanism
- Manufacturing airframe

Skills

- Additive manufacturing
- Ardupilot
- Autodesk Inventor
- Flying quadcopters
- Gear design
- PID calibration
- Soldering

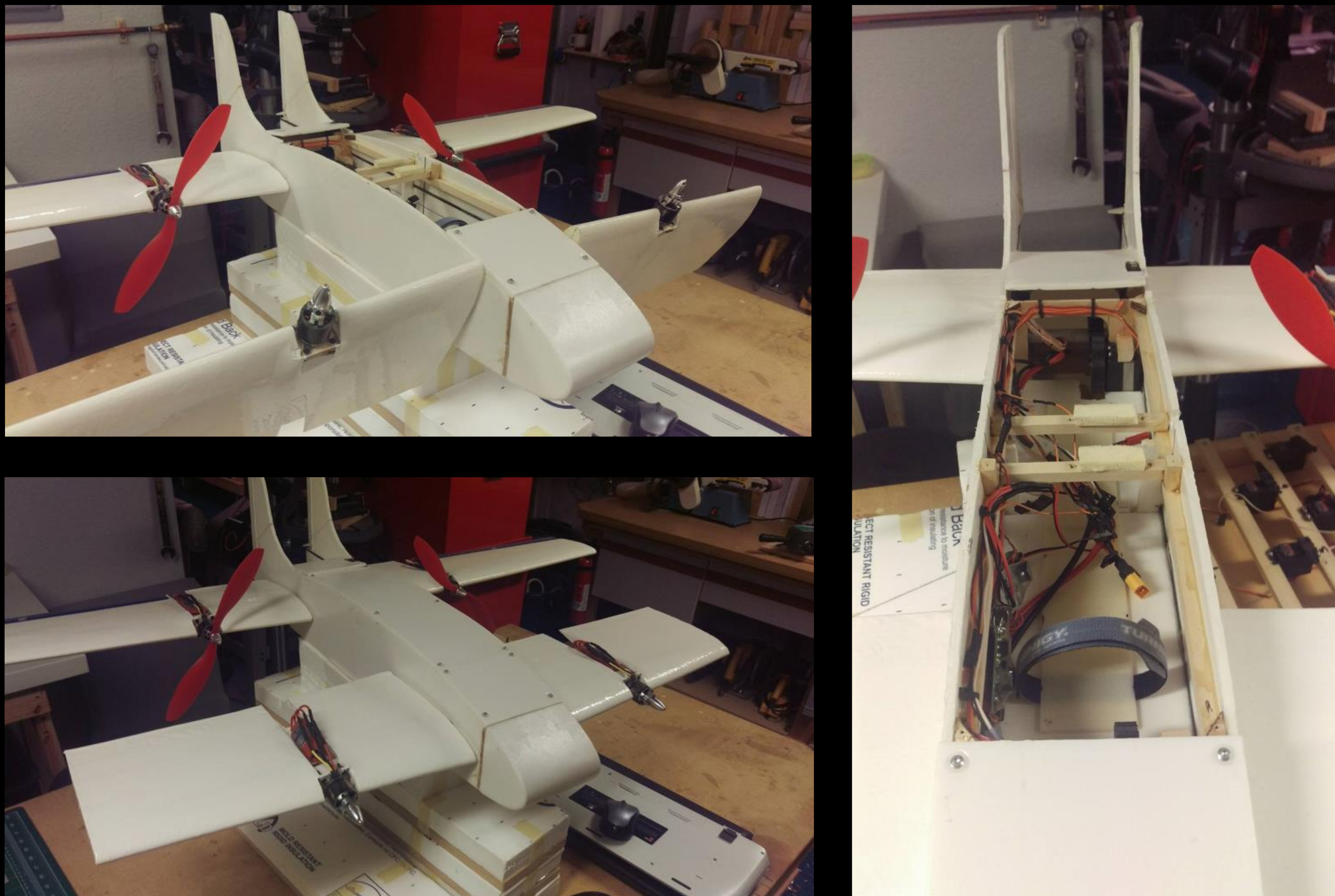


Quadcopter



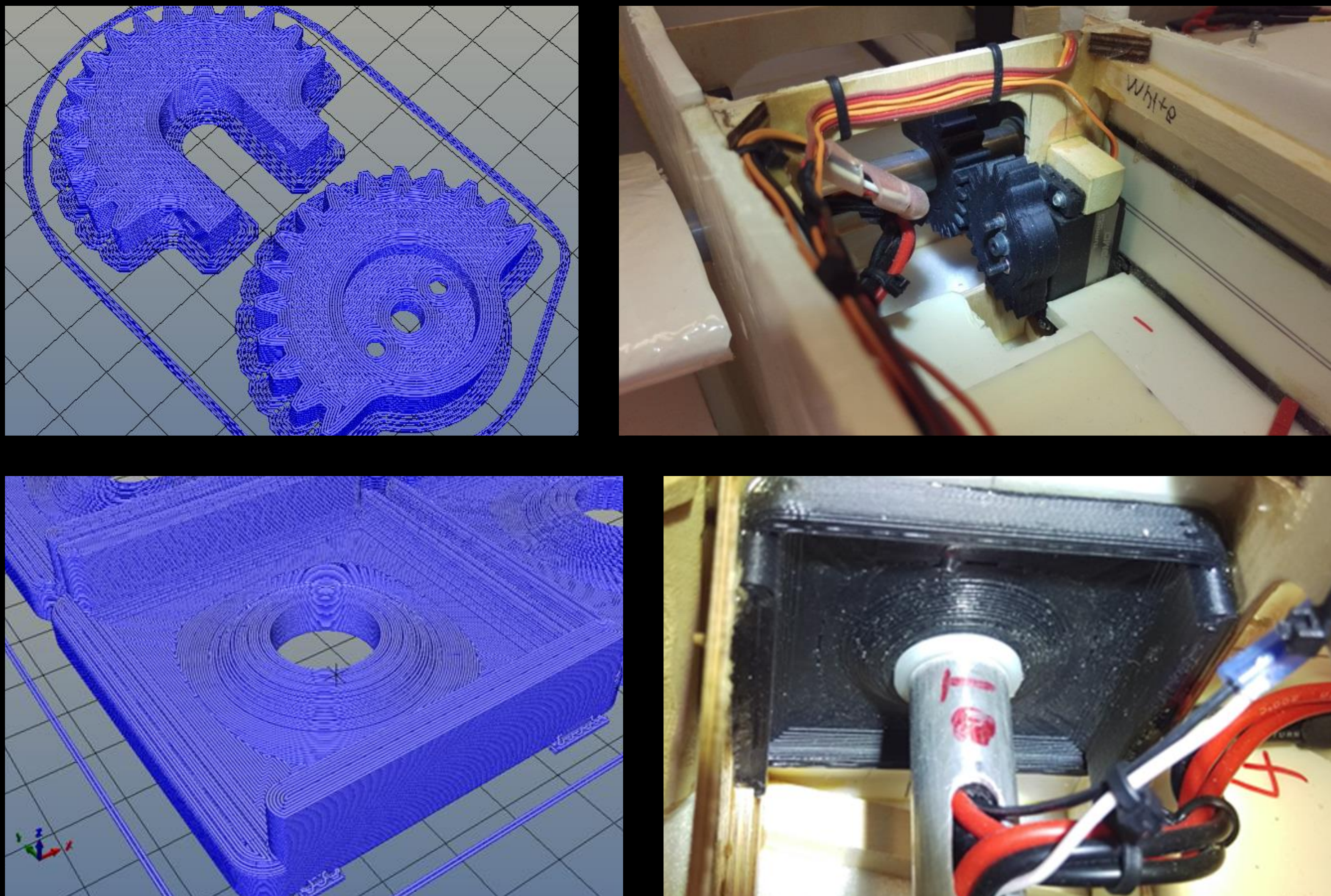
Assembly and PID calibration

VTOL



VTOL aircraft after construction, displaying independent tilt wing capabilities

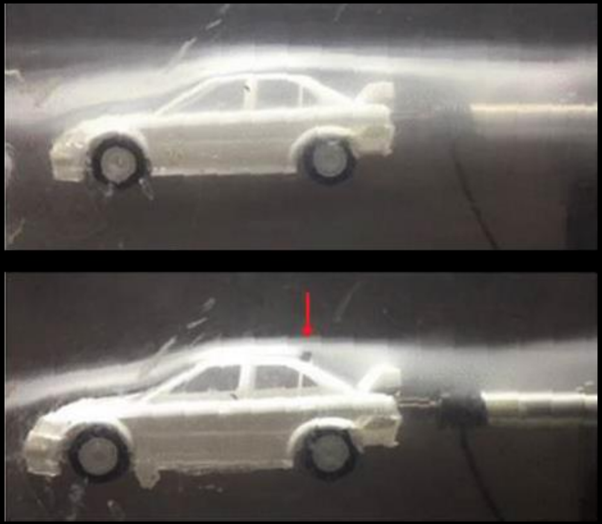
3D Printing



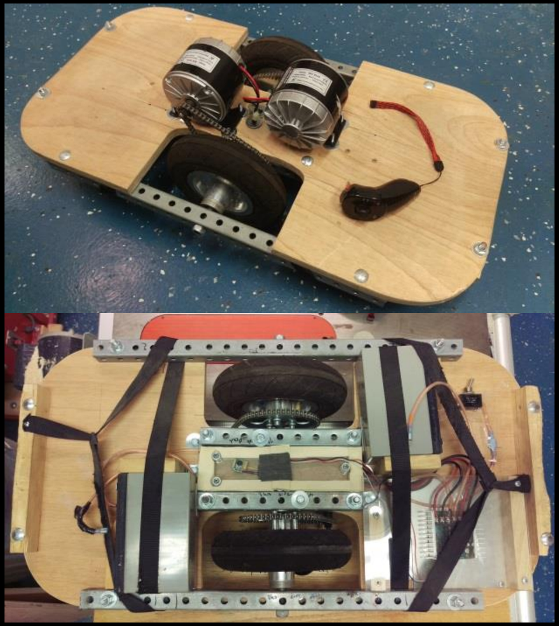
3D printed gears for wing transition mechanism and housing for nylon wing axel bearing

Other Projects

Whiteboard cleaning robot with infrared marker detection (2016)



Vortex generators drag reduction (2015)



Self balancing skateboard (2012)

MAE 98 hovercraft champions (2013)

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