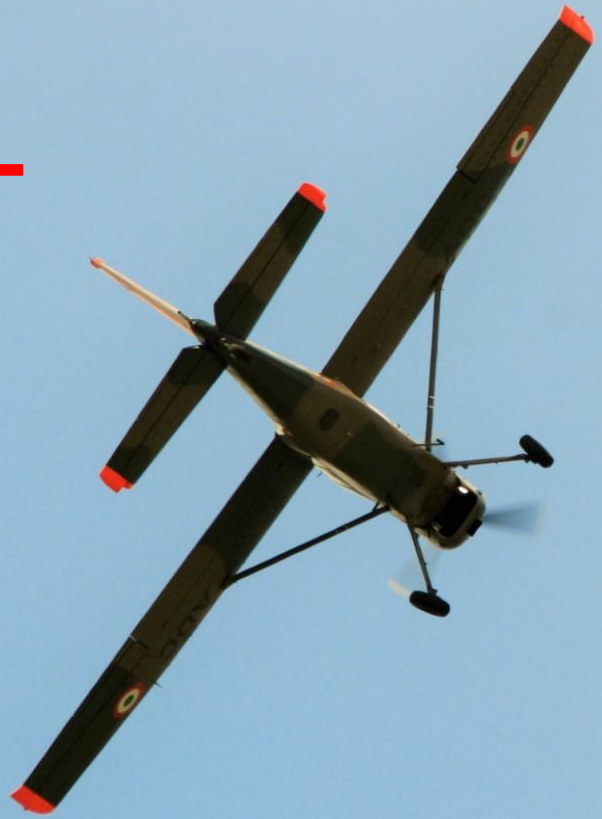
Lip Wing

Lift at zero speed

Fixed wings aircraft

STALL



cannot fly slow

big safety issue

needs runways

restricted to airfields

Helicopter

SLOW

most efficient VTOL

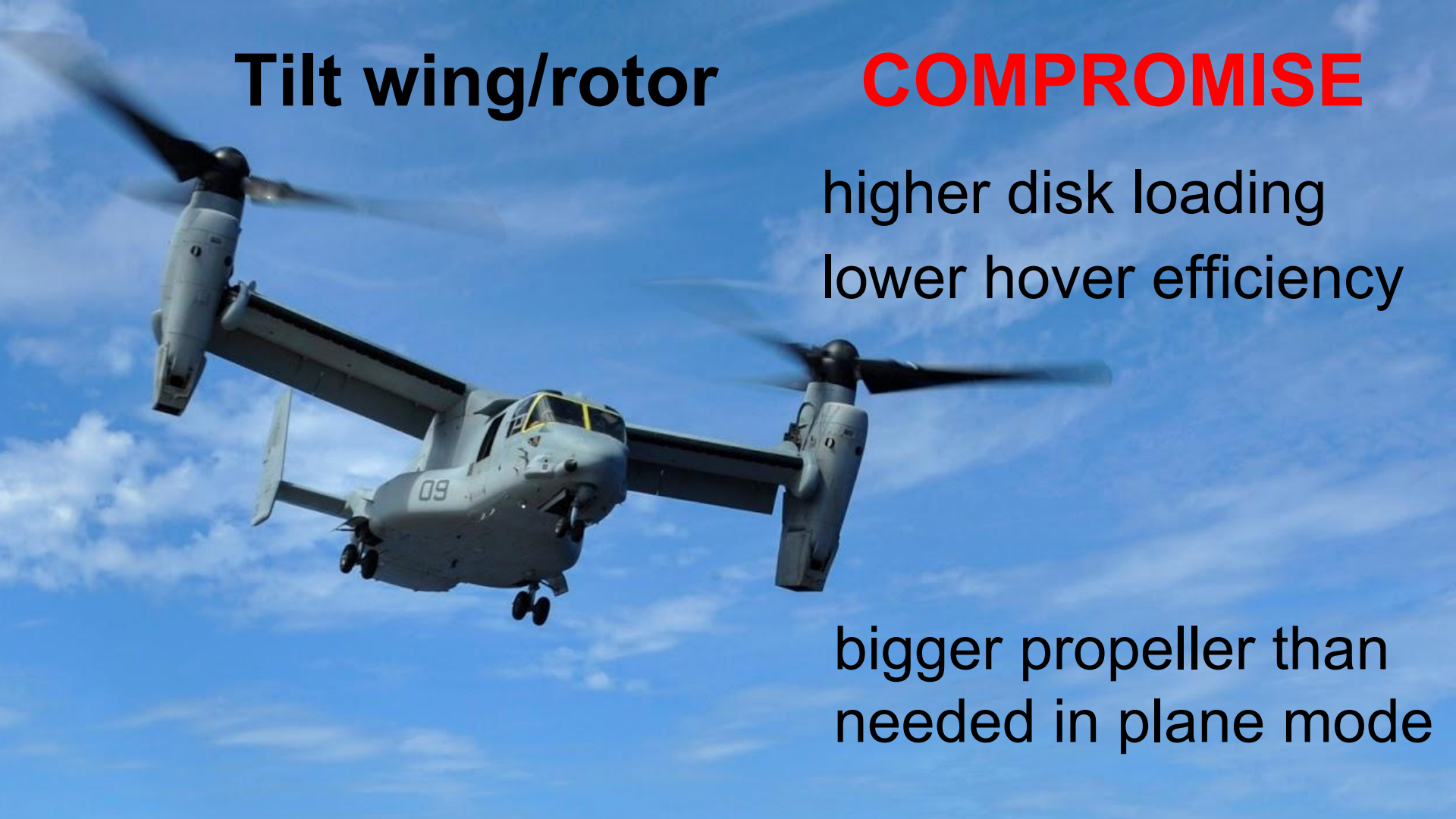
open rotor

low disk loading

inefficient and slow for transport

Tilt wing/rotor

COMPROMISE



higher disk loading

lower hover efficiency

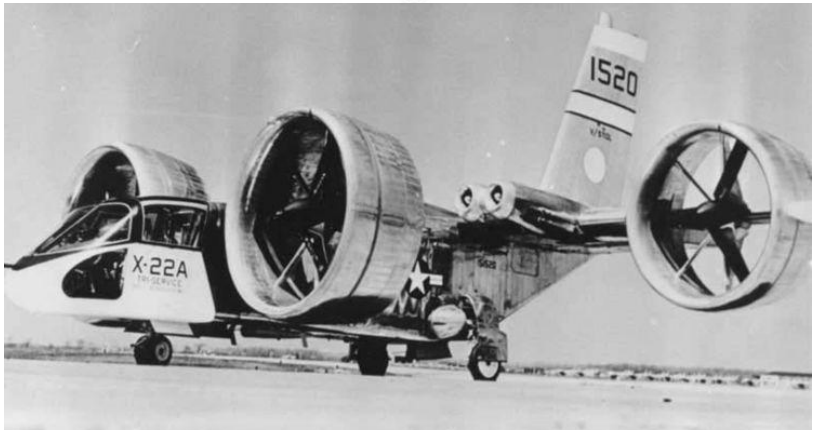
bigger propeller than needed in plane mode

Shrouded prop./Ducted fan

more static thrust

single design point

less efficient at high speeds

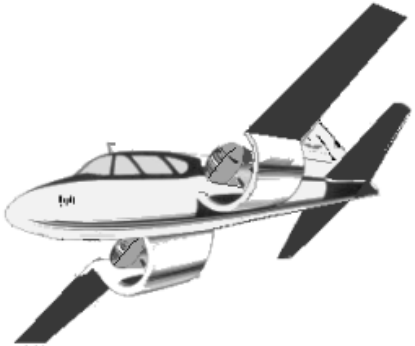


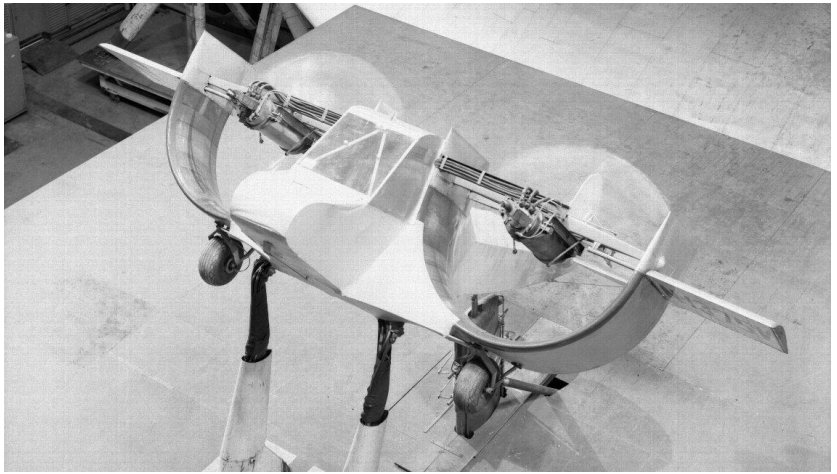
Channel Wing

no control at slow speed

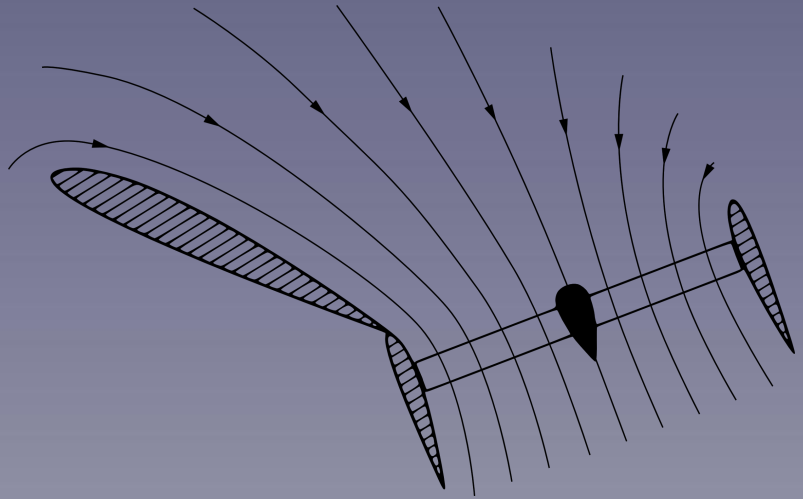
too small thrust increase

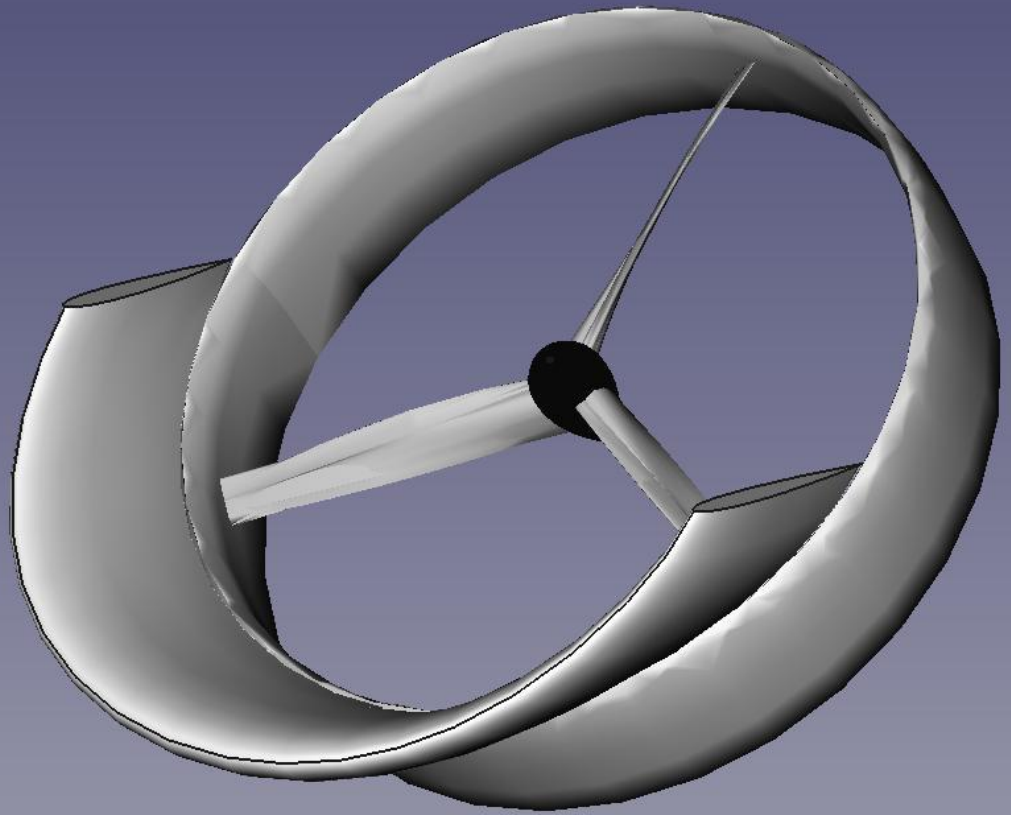
other problems



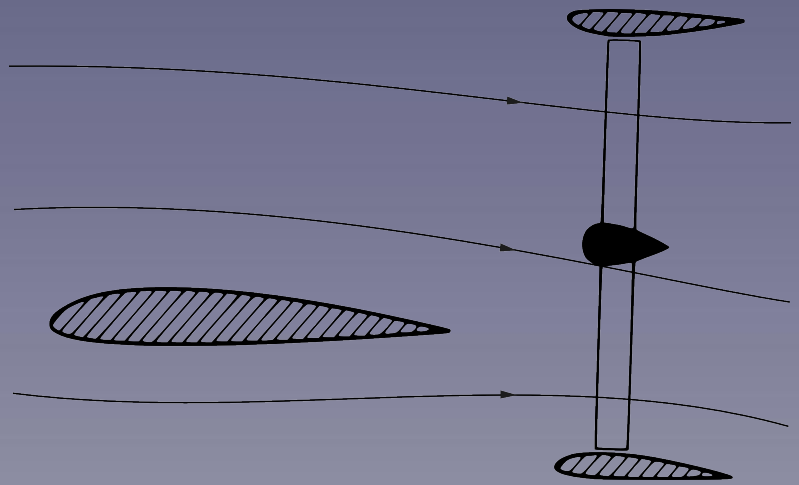


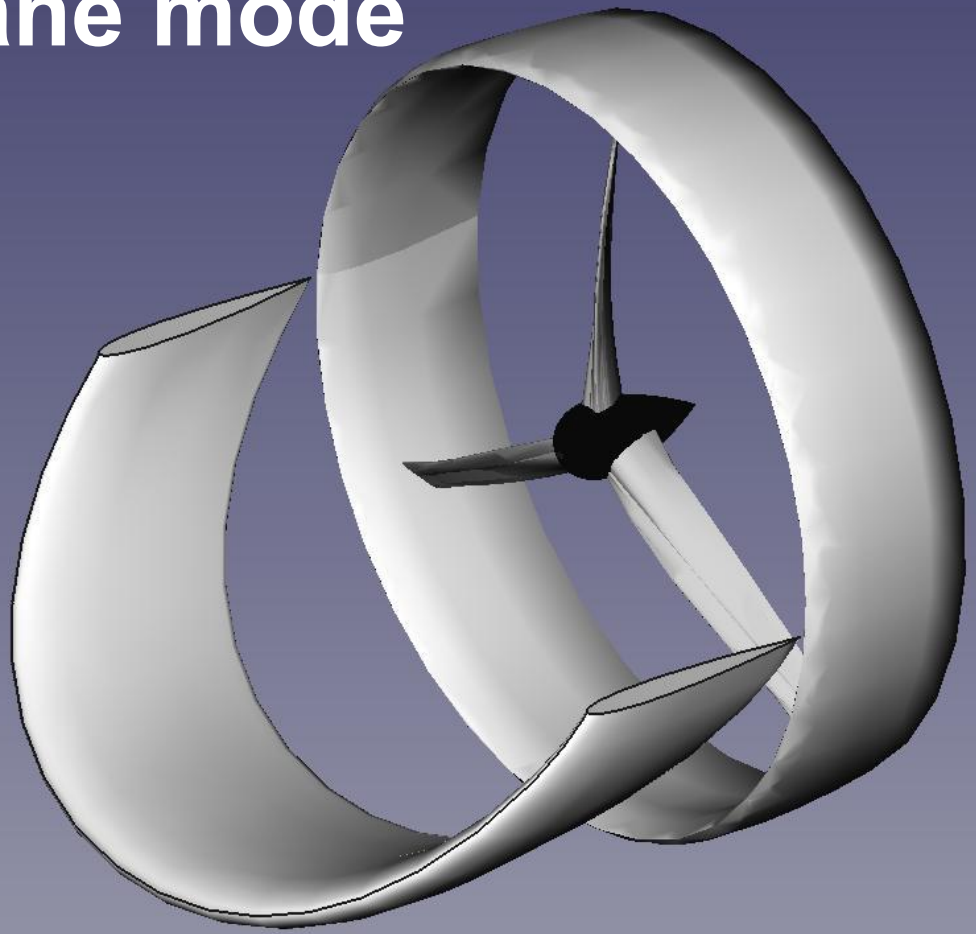
Lip Wing in VTOL mode





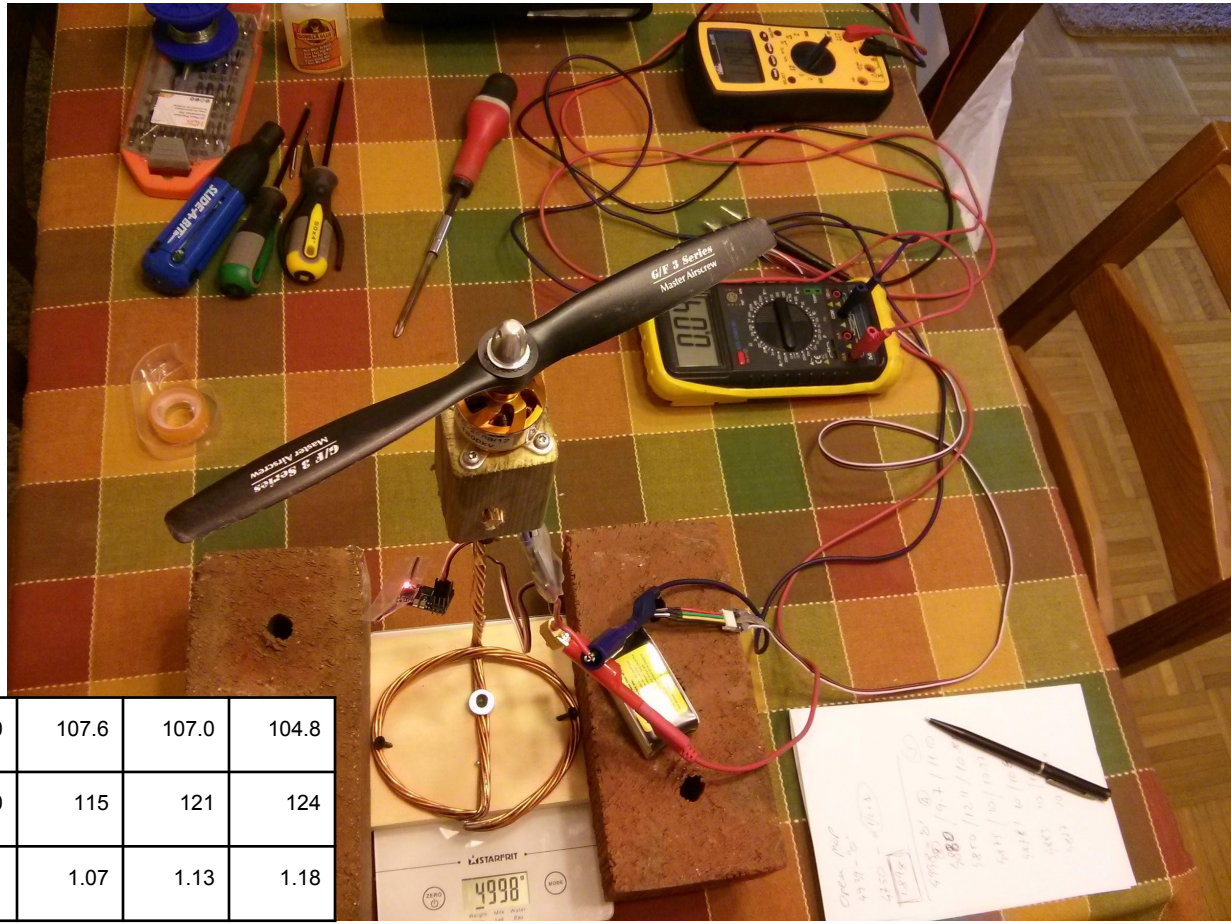
Lip Wing in airplane mode





Experiments

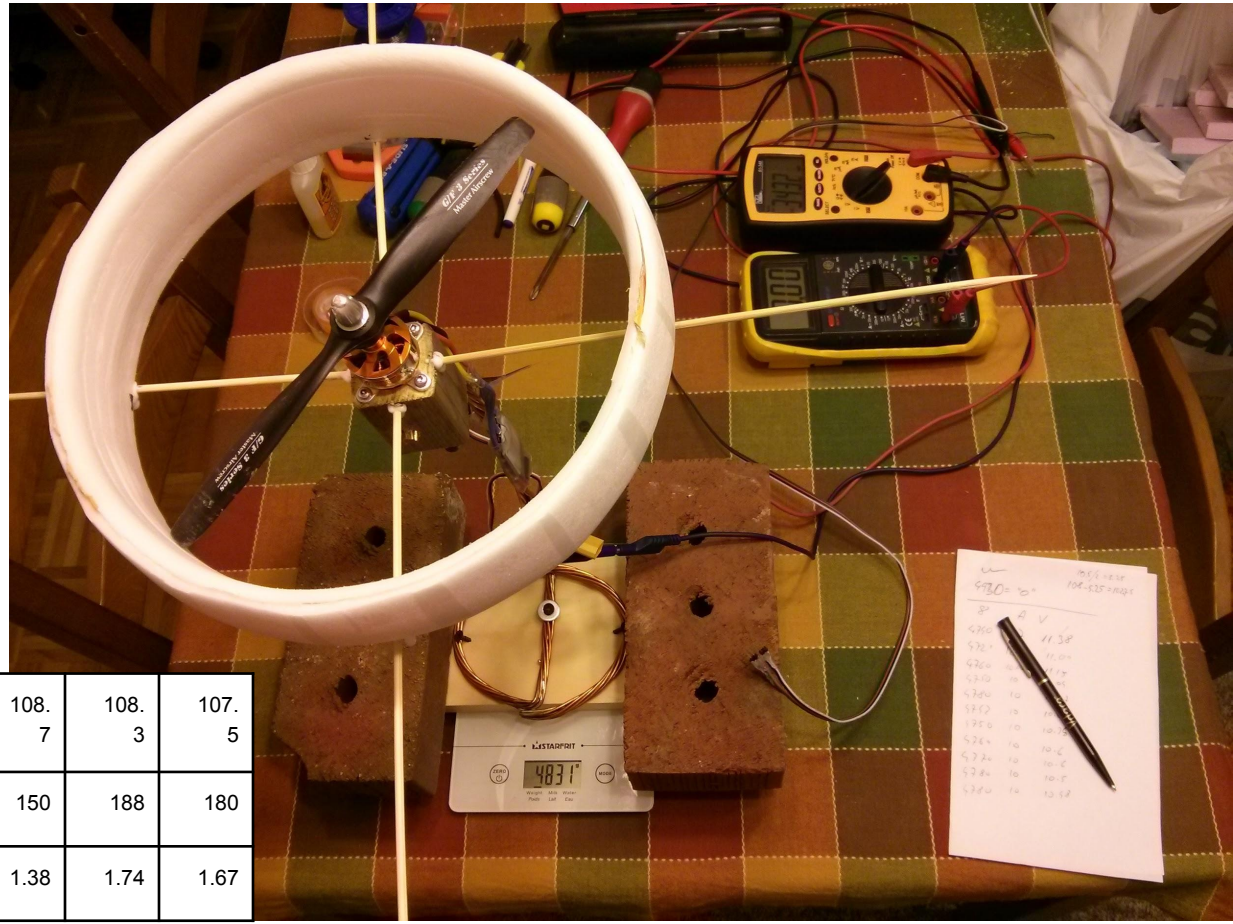
Open propeller



Pwr [W]	107.7	131.4	109.7	108.0	107.6	107.0	104.8
Thrust [g]	118	148	123	120	115	121	124
T/P [g/W]	1.10	1.13	1.12	1.11	1.07	1.13	1.18

Experiments

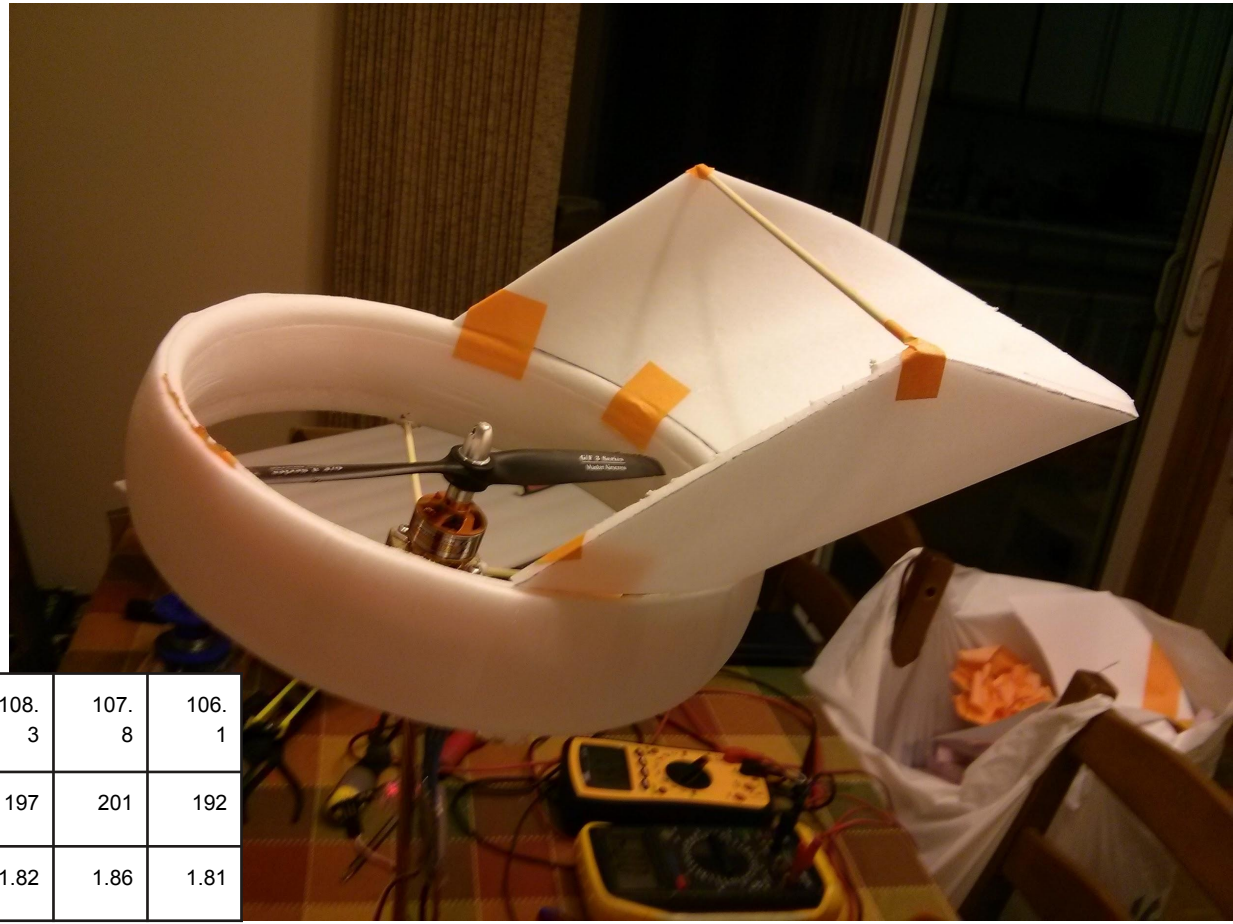
Shrouded propeller



Pwr [W]	110.4	136.4	111.5	110.4	108.7	108.3	107.5
Thrust [g]	190	209	170	180	150	188	180
T/P [g/W]	1.72	1.53	1.52	1.63	1.38	1.74	1.67

Experiments

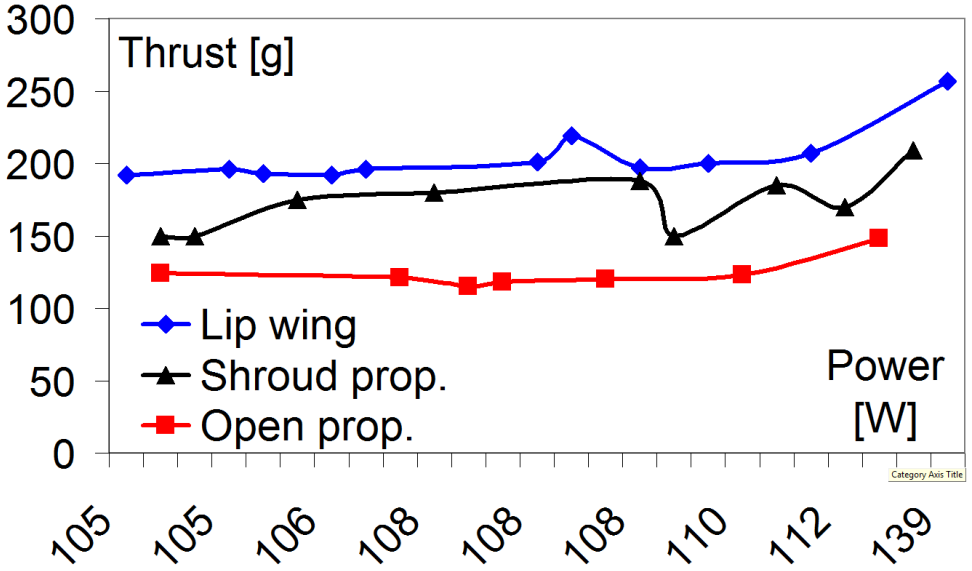
Lip Wing



Pwr [W]	108.0	138.7	110.7	109.0	108.3	107.8	106.1
Thrust [g]	219	257	207	200	197	201	192
T/P [g/W]	2.03	1.85	1.87	1.83	1.82	1.86	1.81

Experiments

Conclusion



	Avg. thrust @100W grams [oz]	Total %
Open air propeller	111.96 [3.95]	100.00%
Shrouded propeller	156.11 [5.51]	139.43%
Lip wing system	185.83 [6.55]	165.97%

Lip Wing Aircraft

VTOL

carry 2 persons + luggage

roadable

Lip Wing Aircraft

Preliminary calculations

2.4m rotor(95 inch) + 1.6m(63 inch) aux rotor

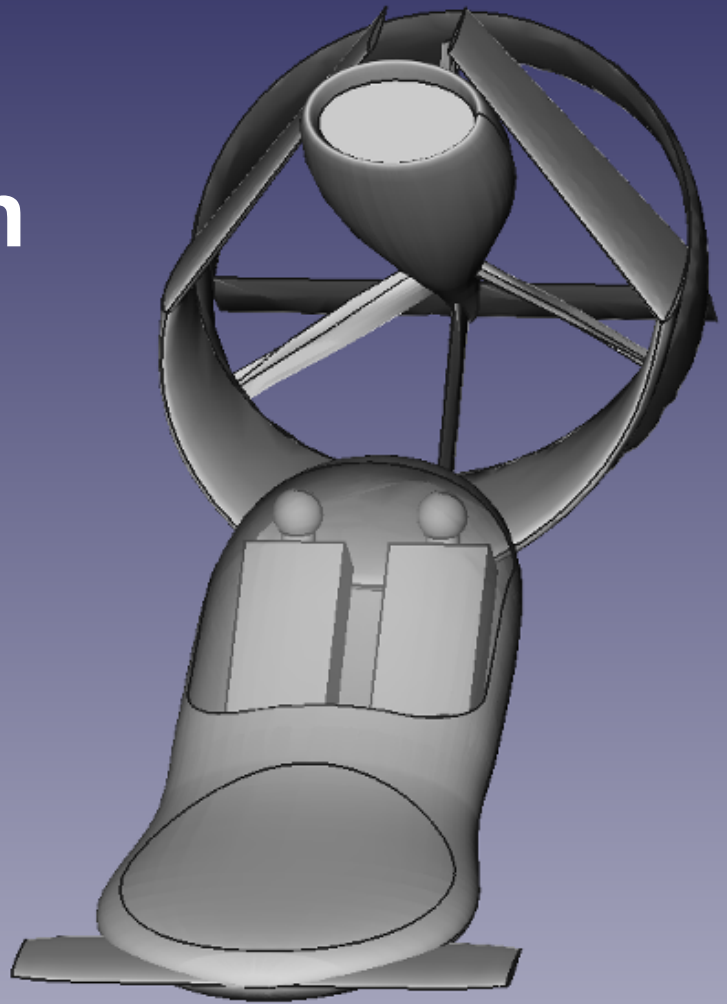
180 hp engine -> 1720 lb thrust/1400 lb W(1.2)

Raymer spreadsheet: foldable wing 18ft span;

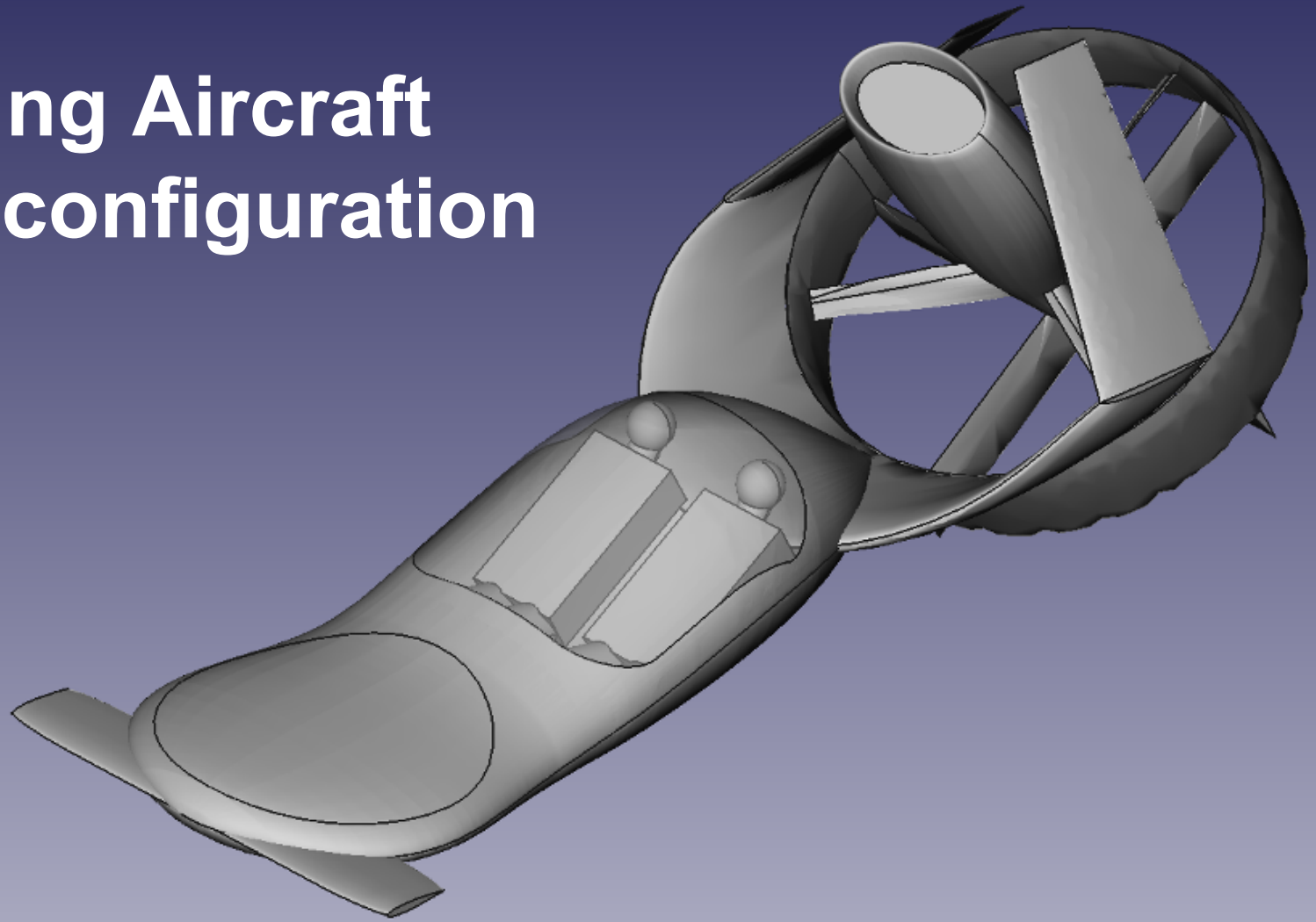
2100ft/min; Stall 63 kts; Cruise 170 kts;

Max speed 210 kts; Range 480 nmi;

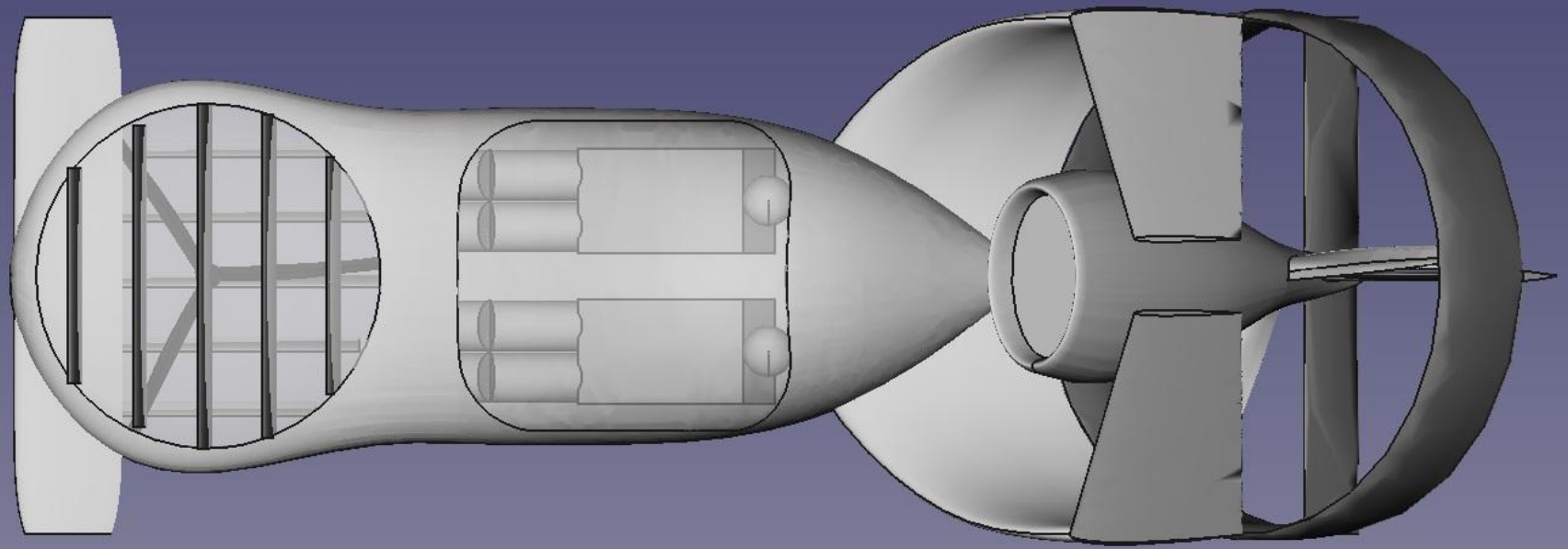
Lip Wing Aircraft
VTOL configuration



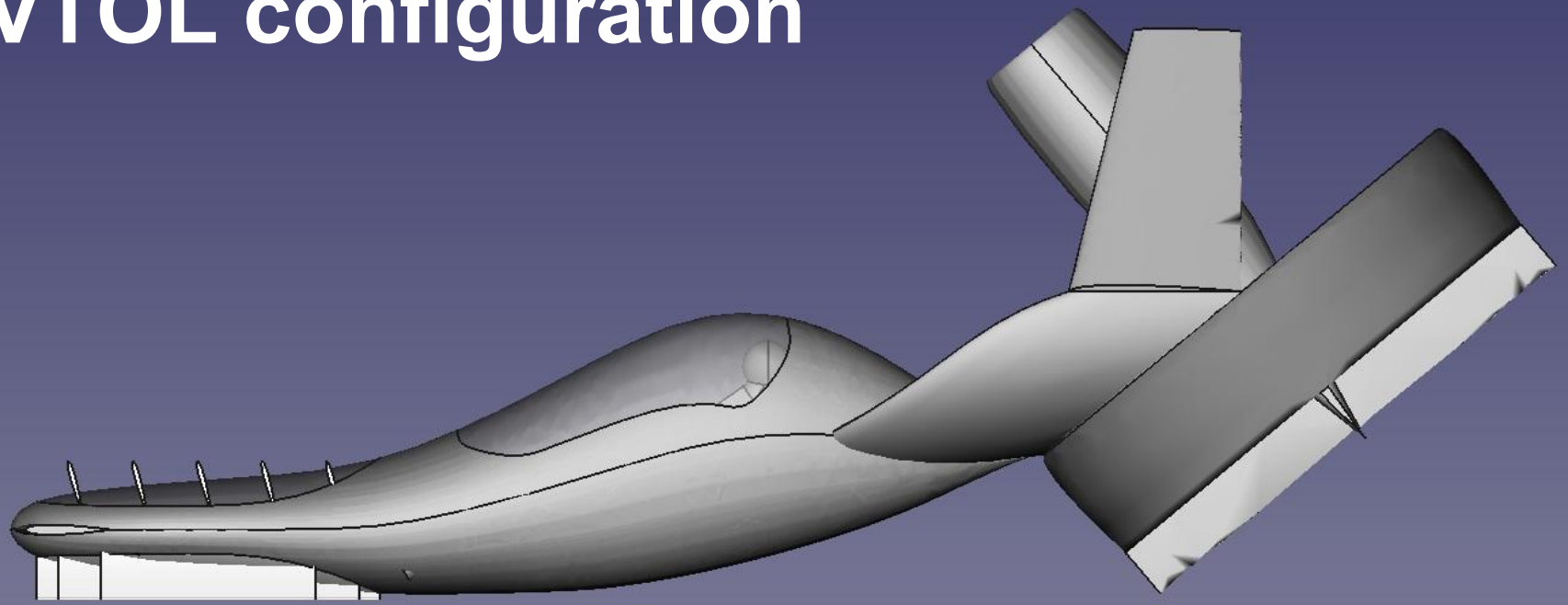
Lip Wing Aircraft
VTOL configuration



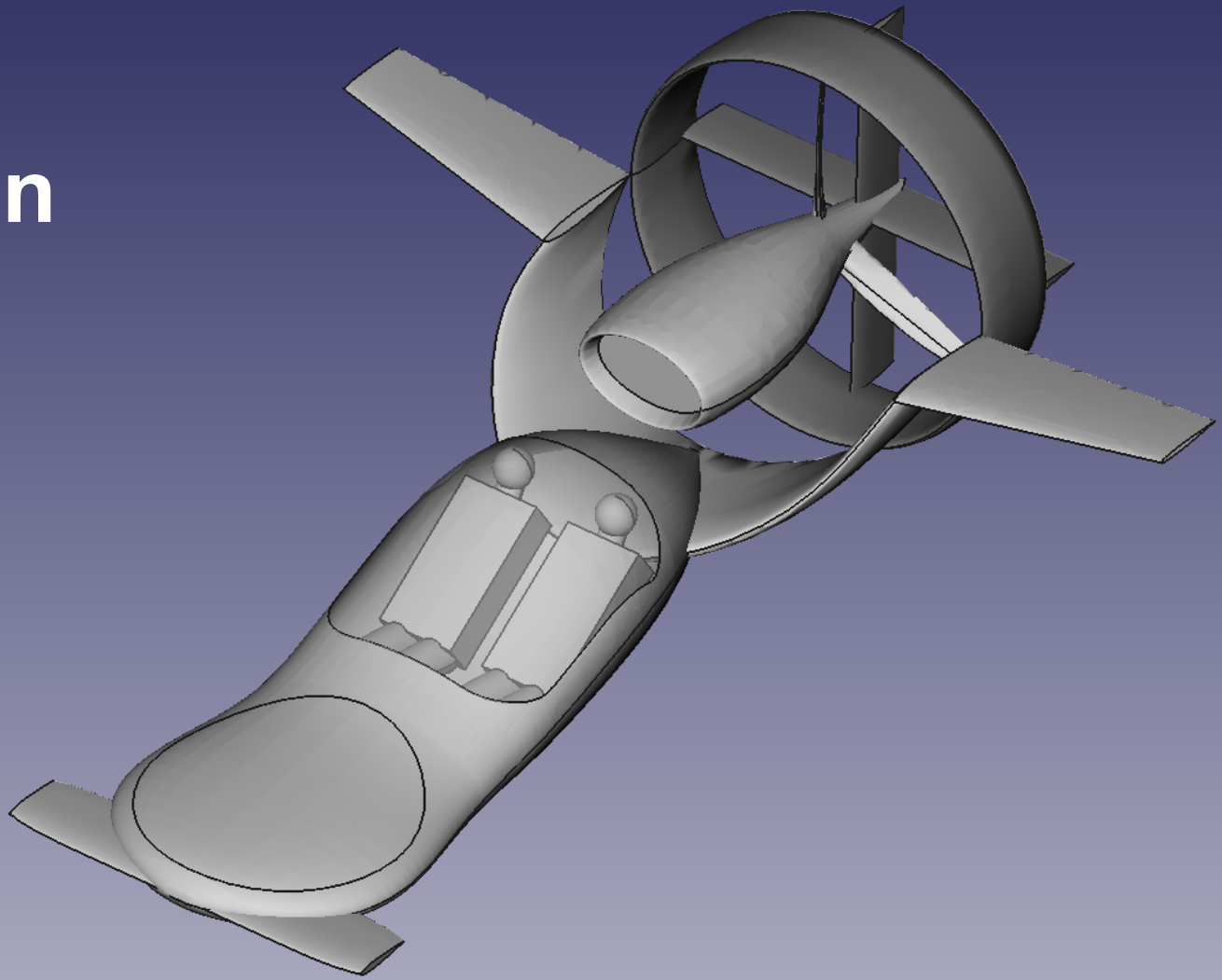
Lip Wing Aircraft
VTOL configuration



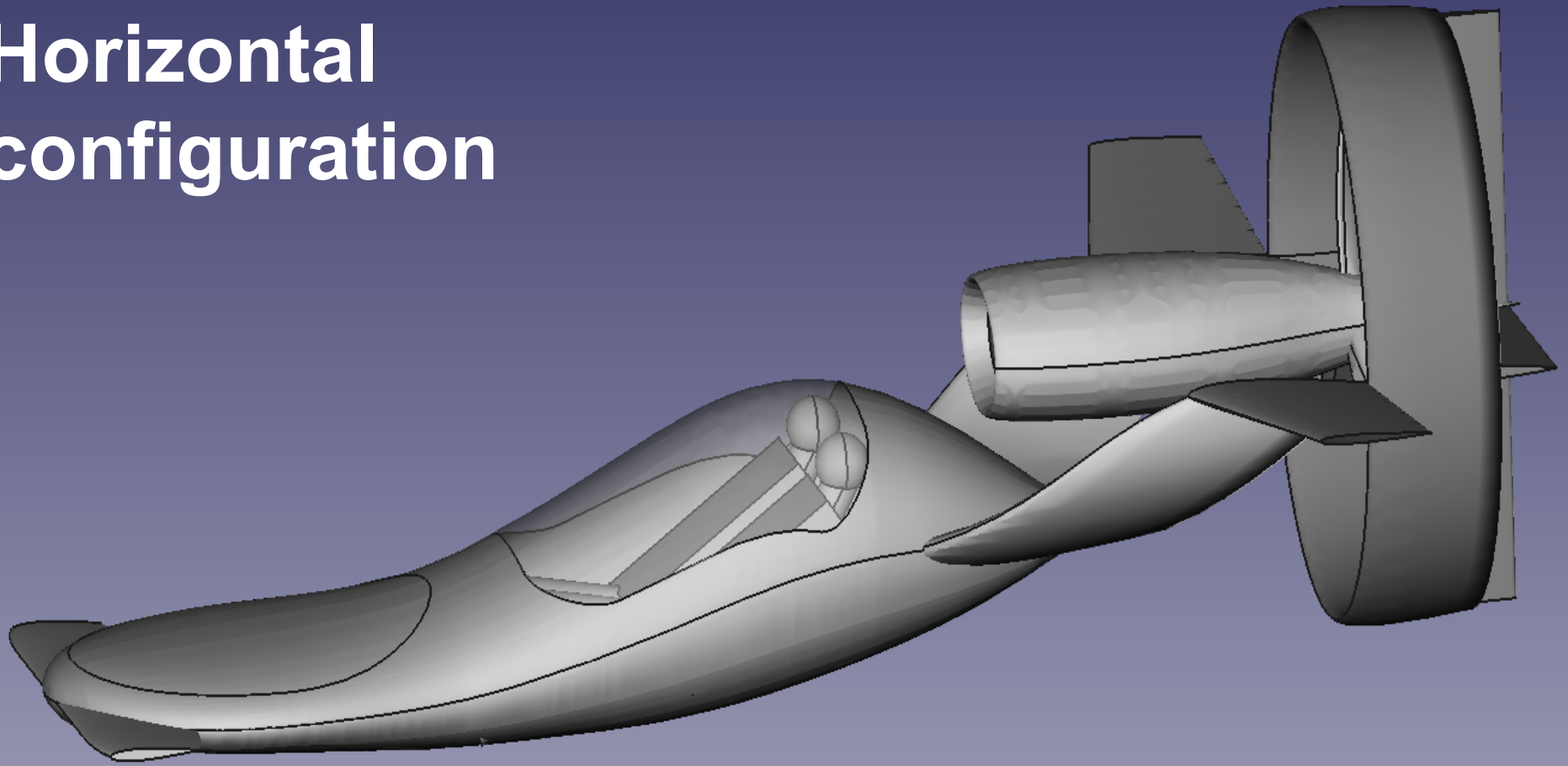
Lip Wing Aircraft
VTOL configuration



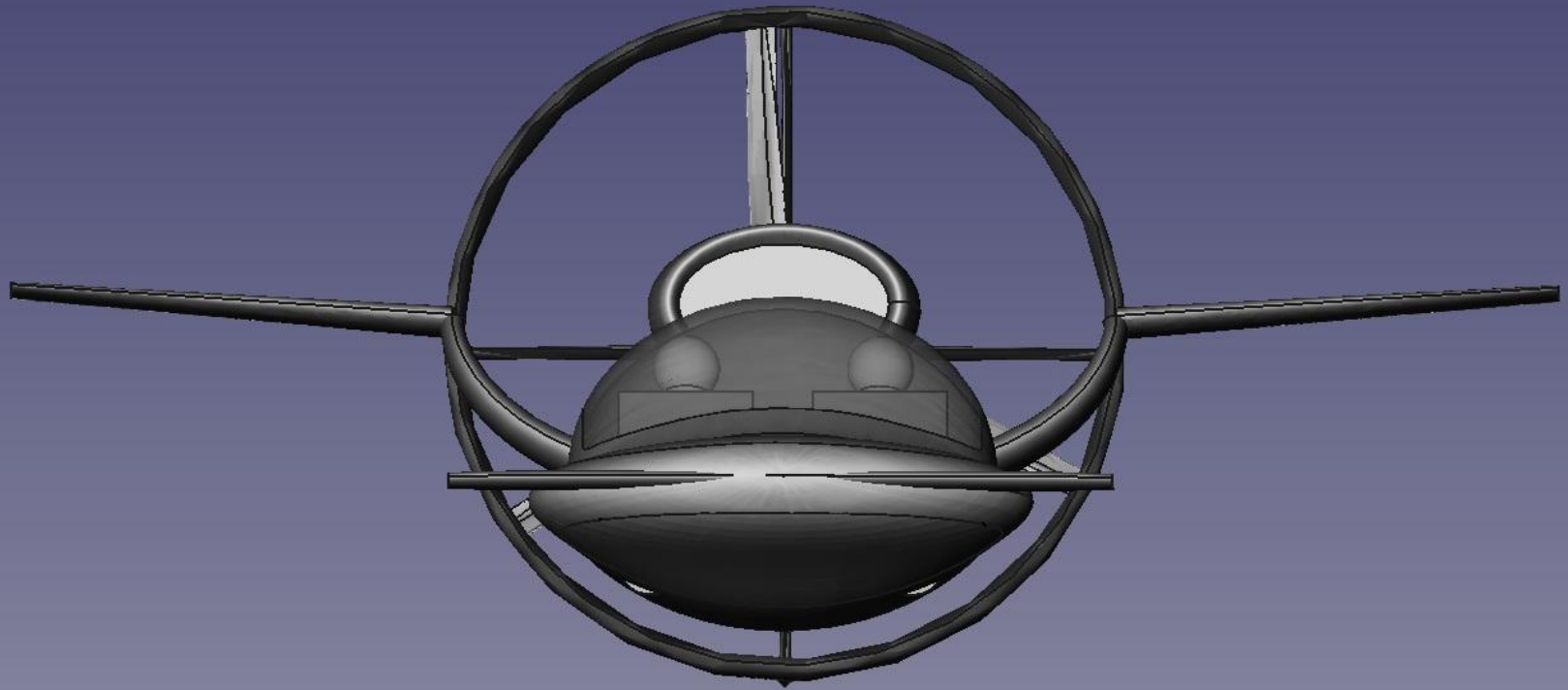
Horizontal configuration



Horizontal configuration



Horizontal configuration



Horizontal configuration