

Dynamic Soaring- Pushing the Limits





Dynamic Soaring

Spencer Lisenby

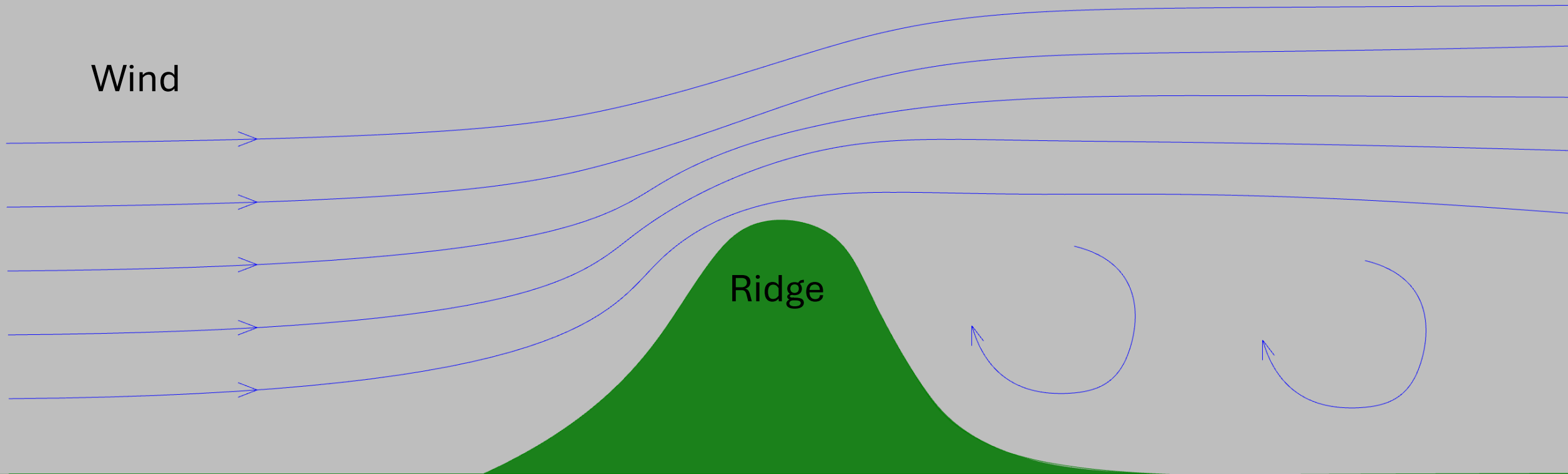
June 2 2017

Dynamic Soaring

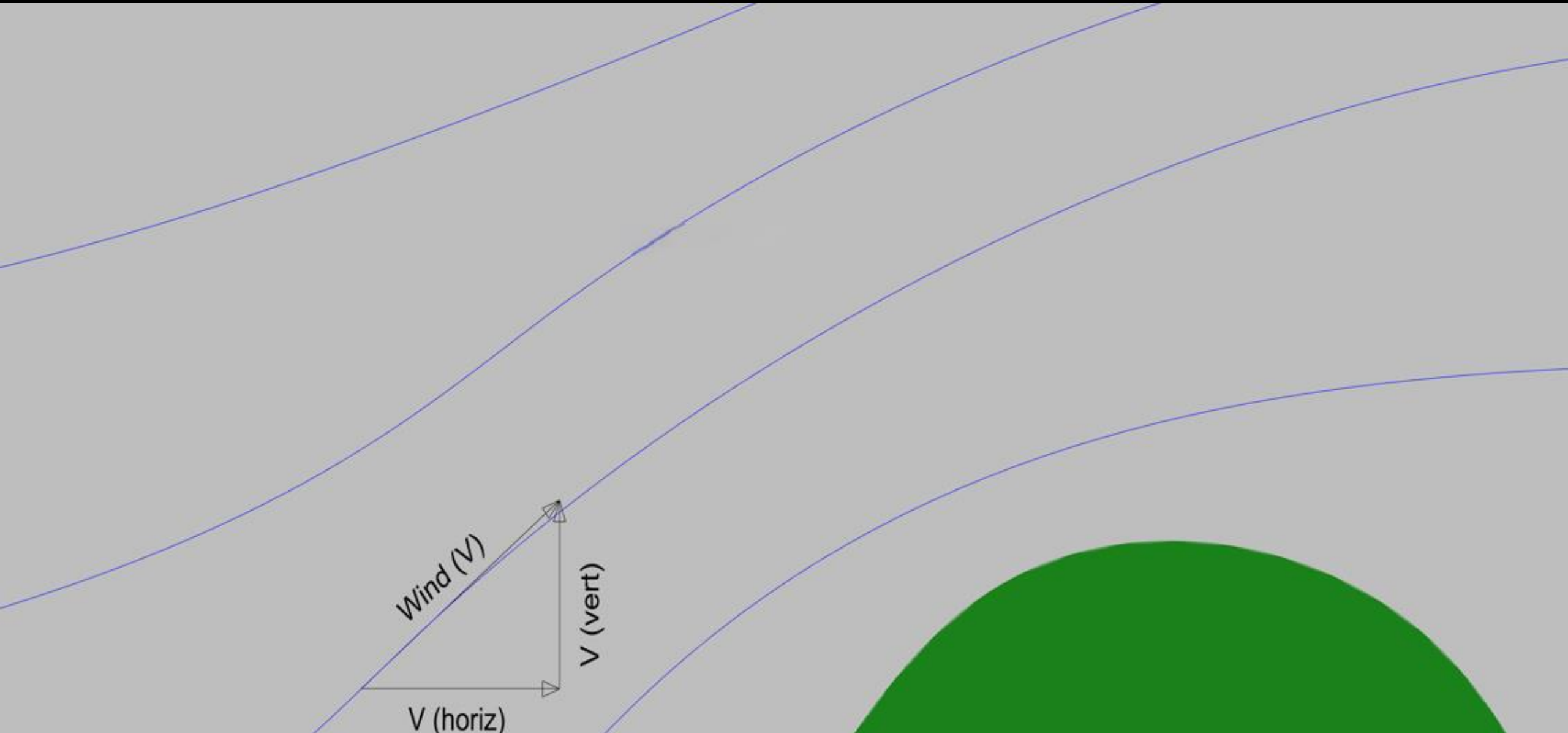
- Top Speed Record= 564mph (908kph). Actual > 600mph (965kph).
- 10x the acceleration of a fighter jet
- As fast as a passenger jet but has no motor
- Wingspan: 3.3m
- Mass: 10kg
- Load factor Limit: +120G/-80G



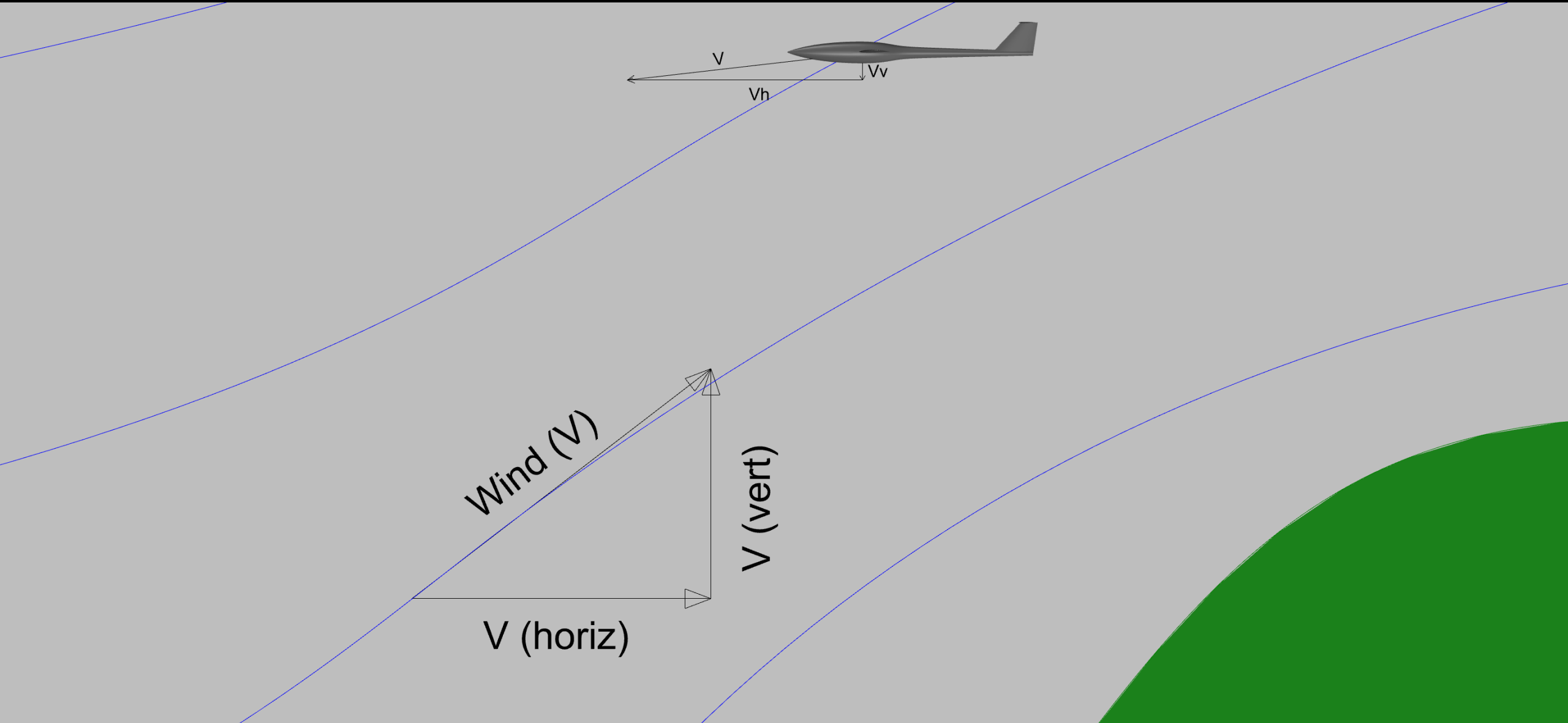
Wind Deflected by Ridge



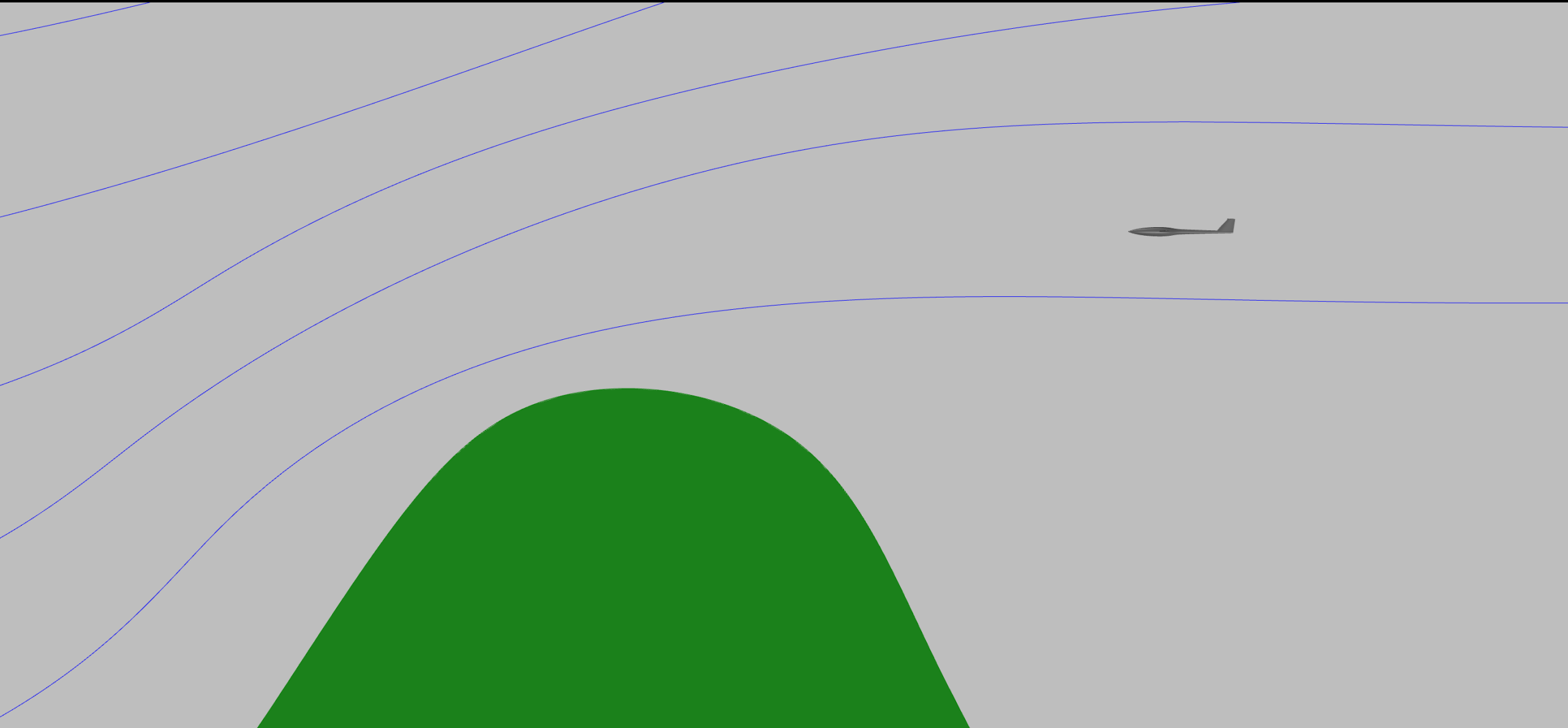
Slope / Ridge Lift



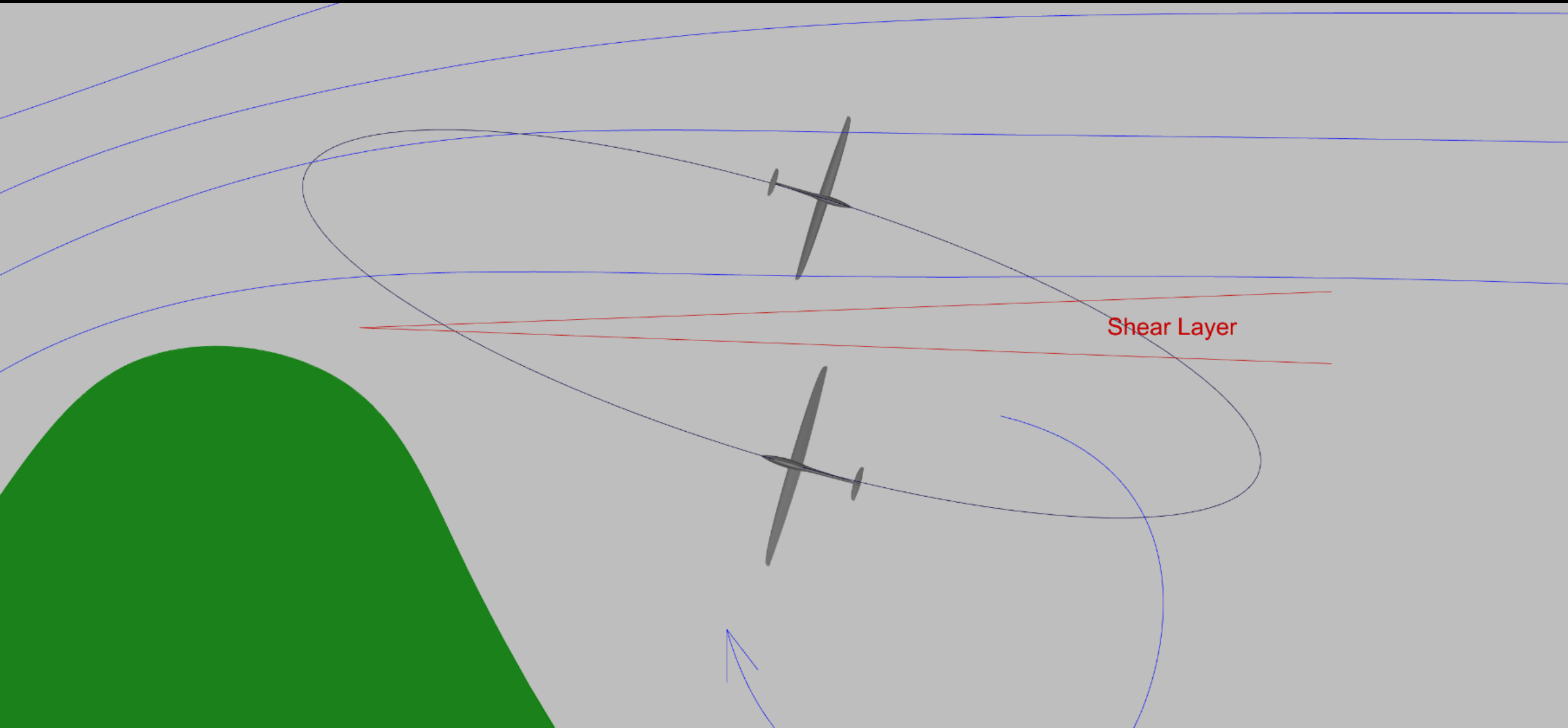
Slope Soaring



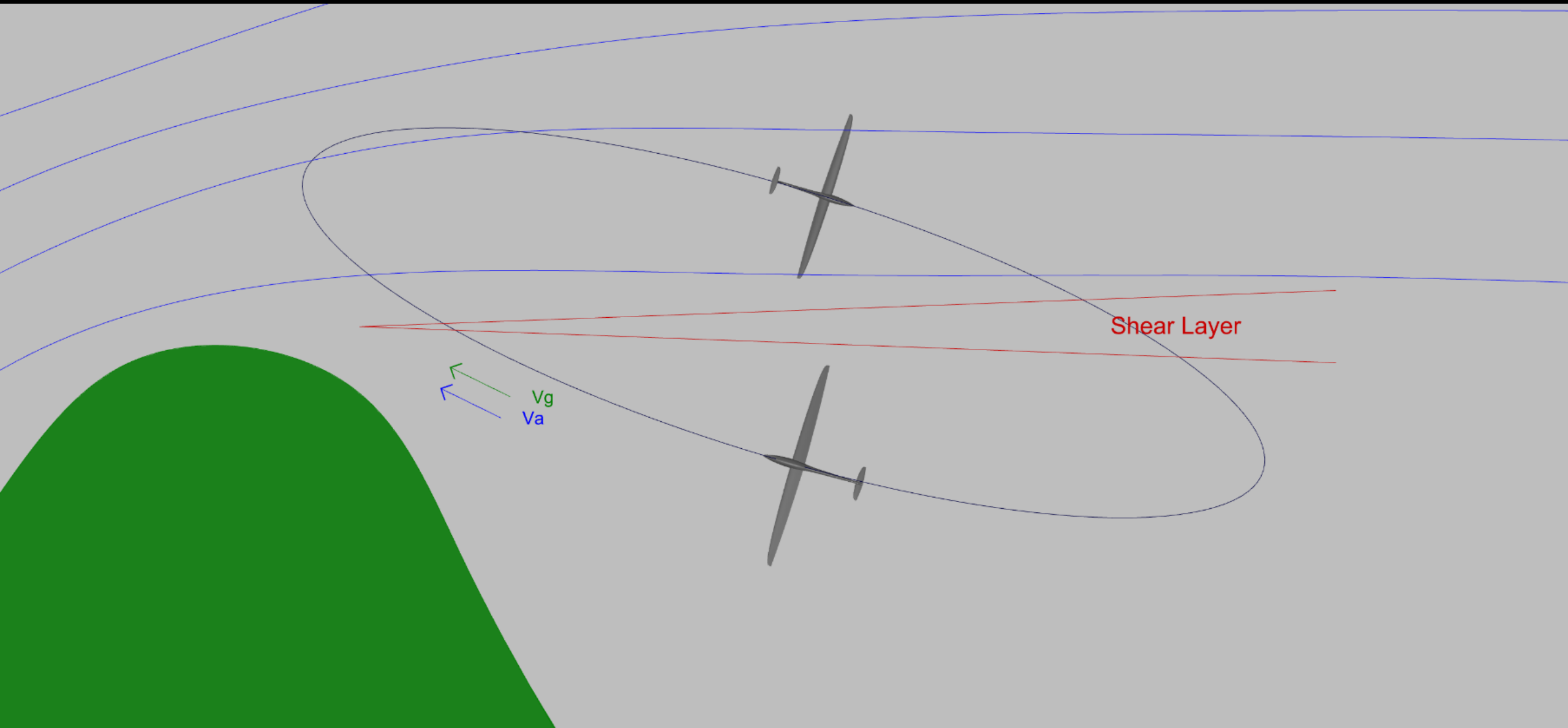
Danger Zone



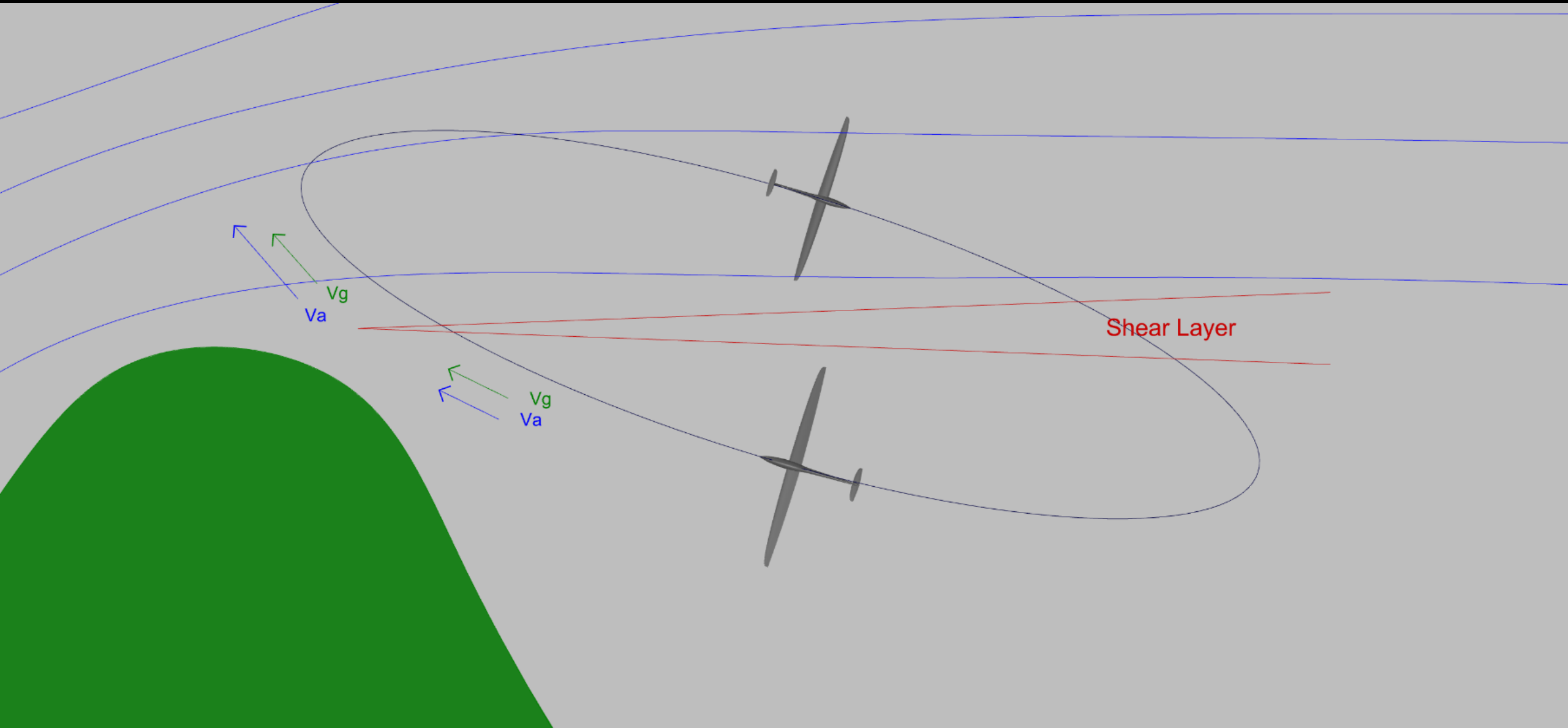
Dynamic Soaring



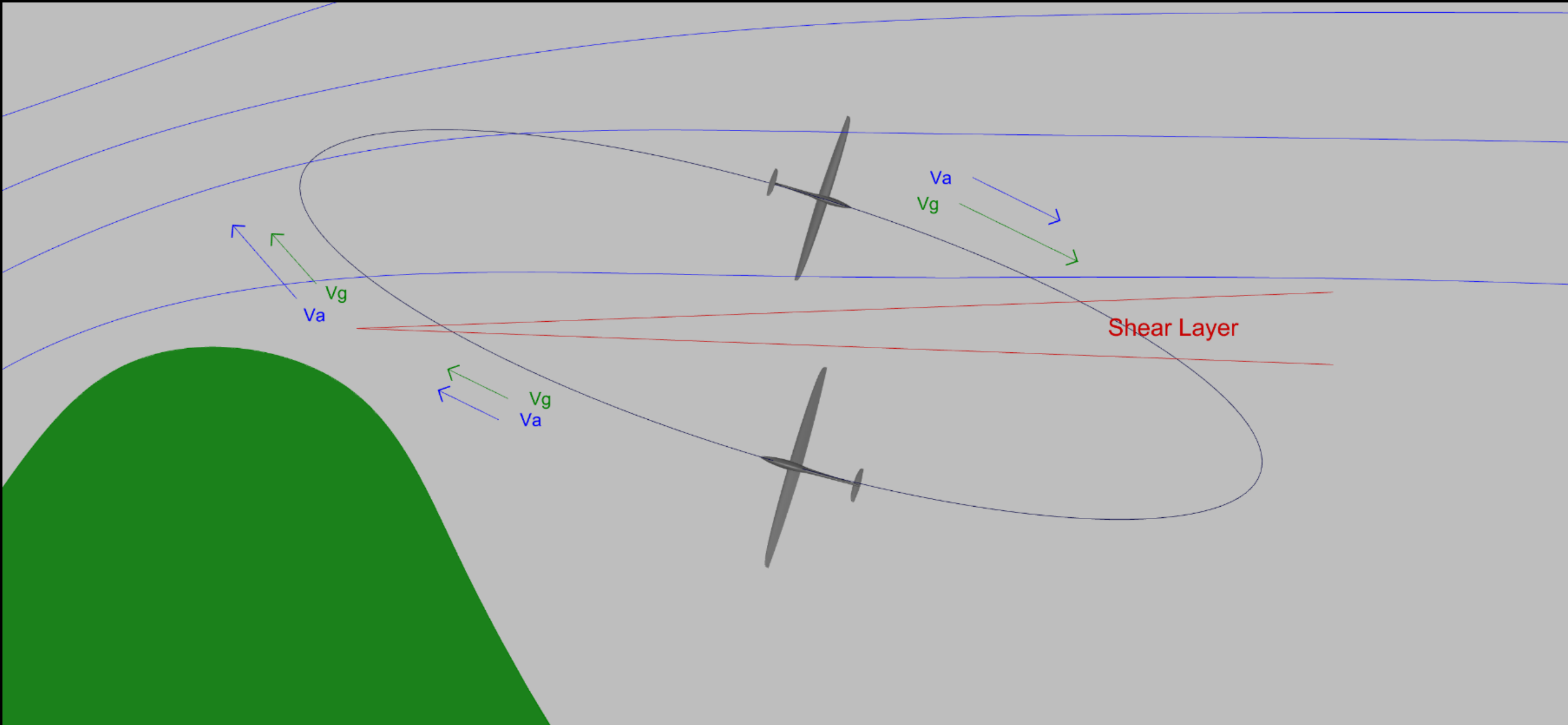
Dynamic Soaring



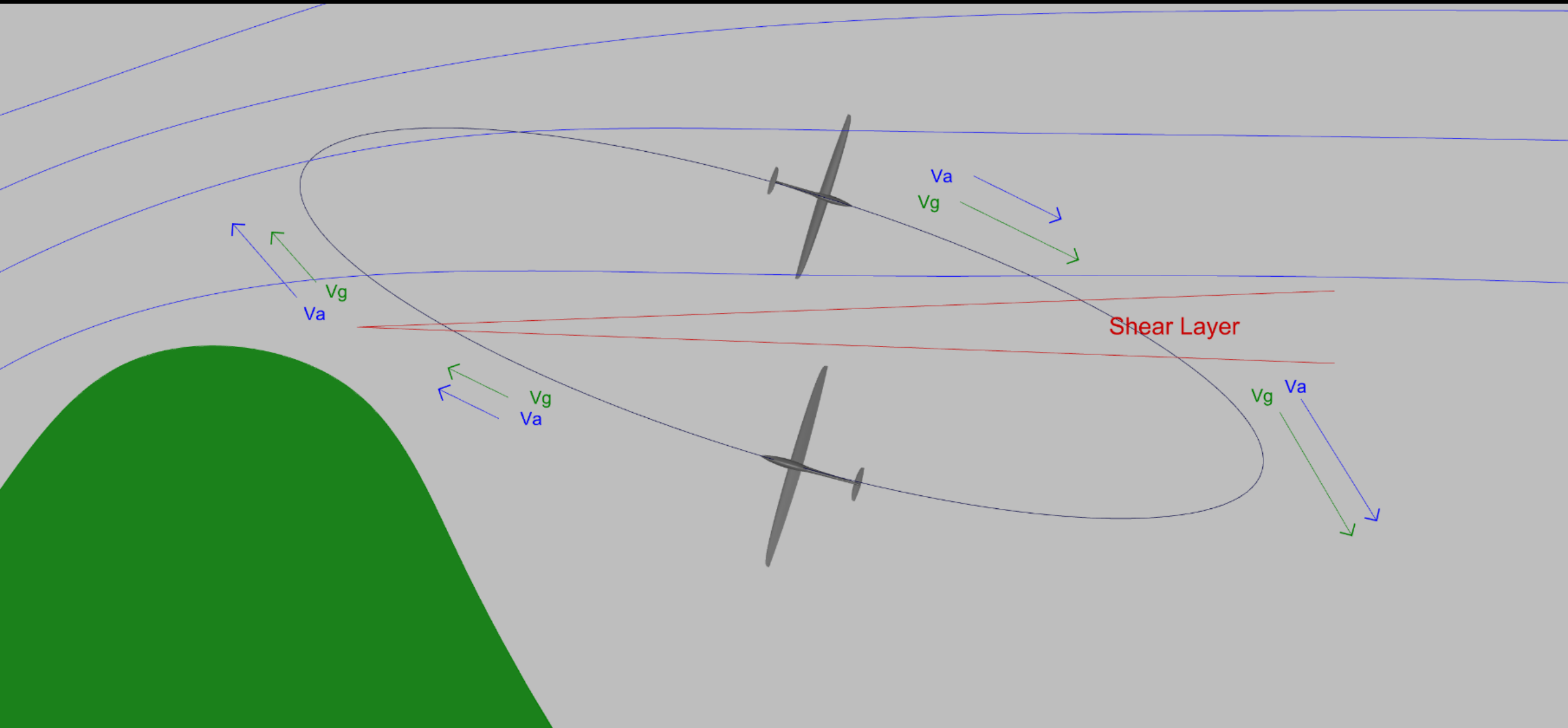
Dynamic Soaring



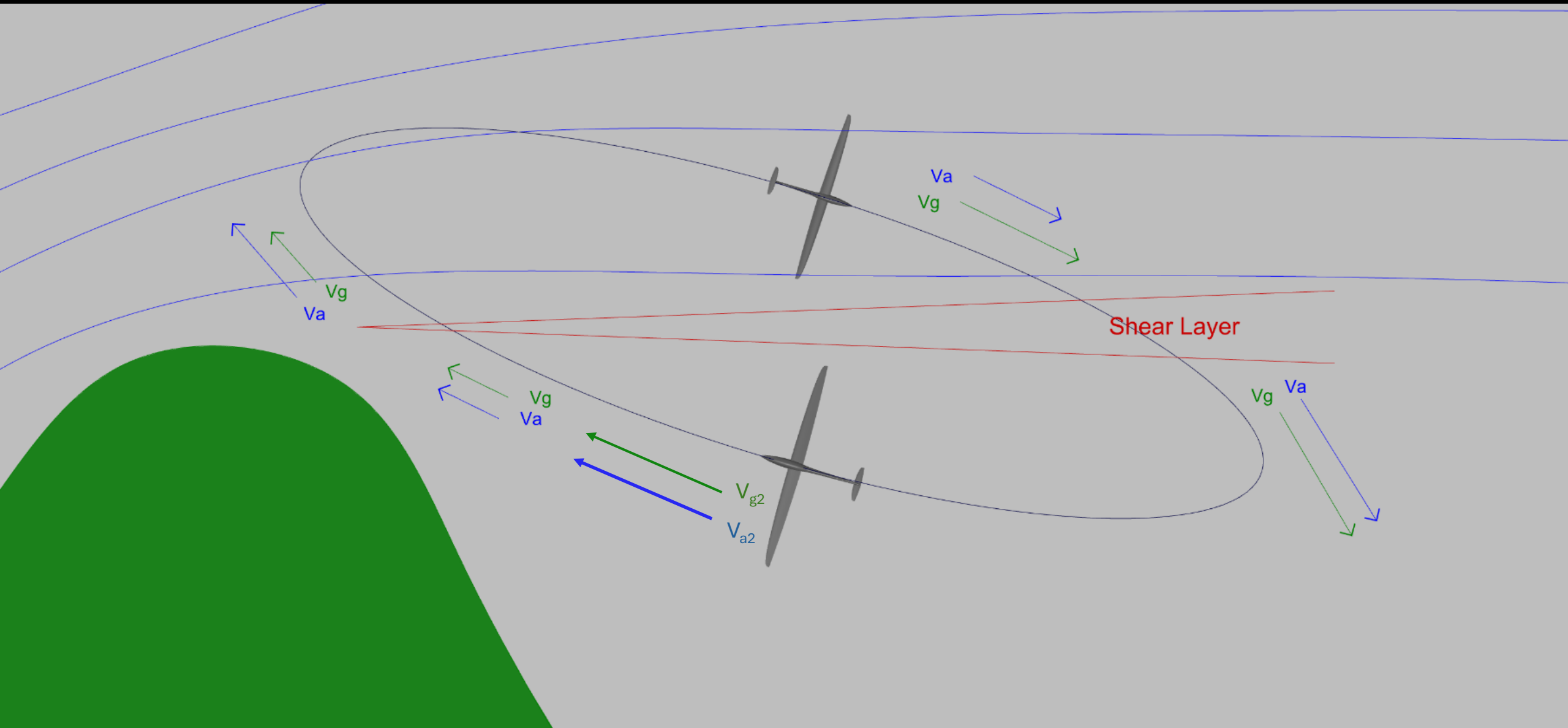
Dynamic Soaring



Dynamic Soaring



Dynamic Soaring



Still Air

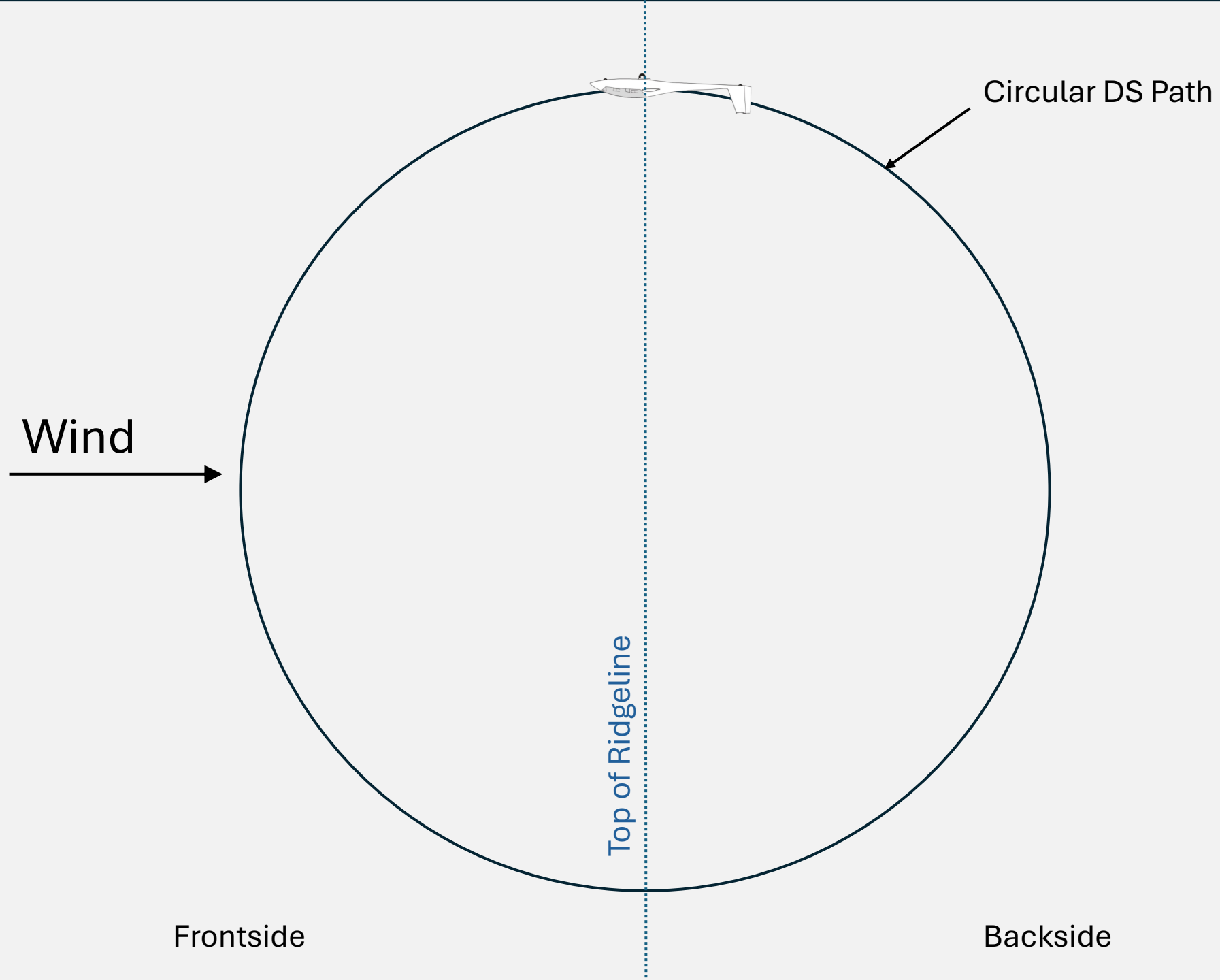


Steady Flight

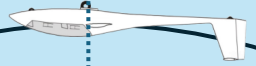
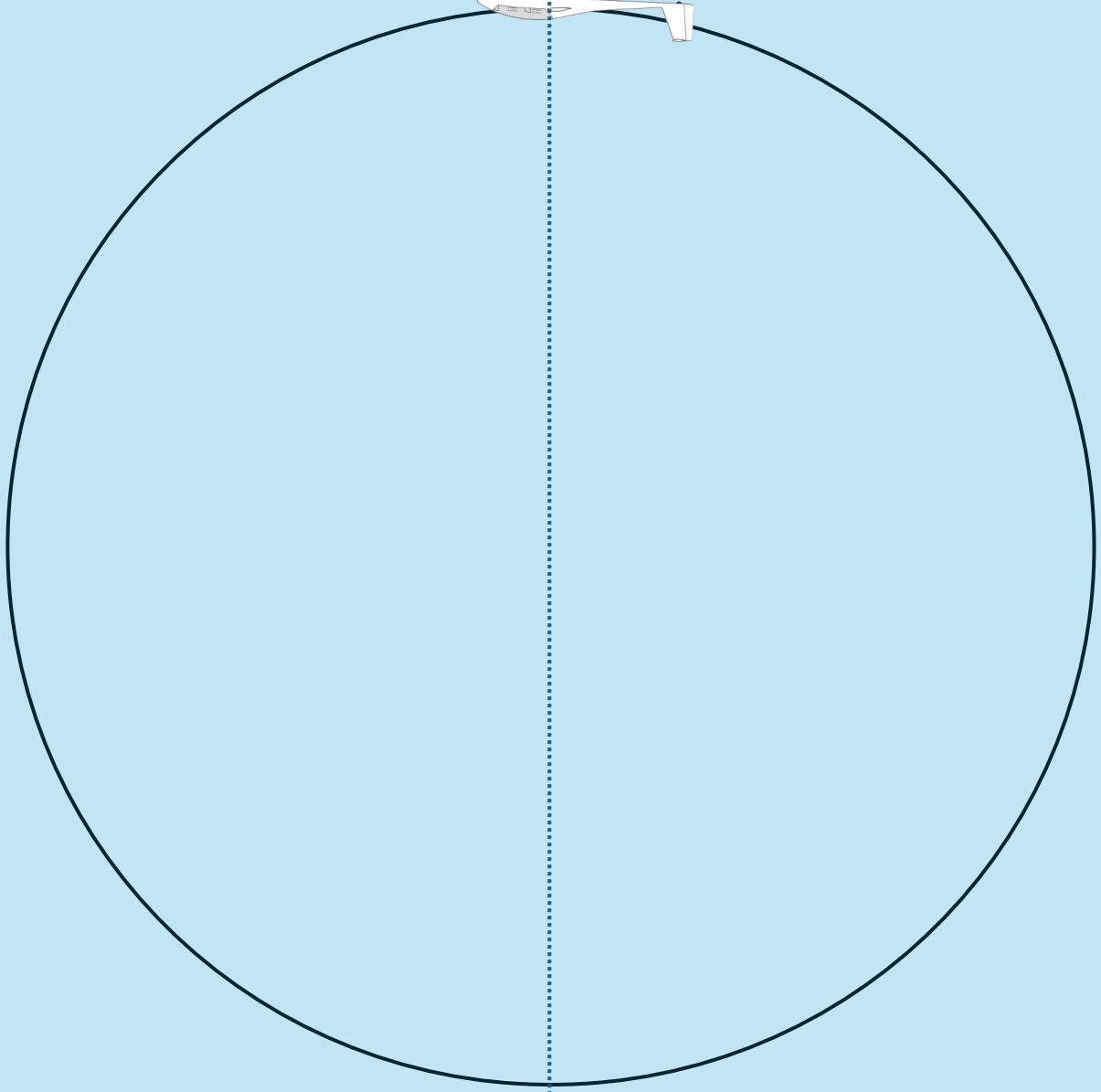
Rising Air (Lift)

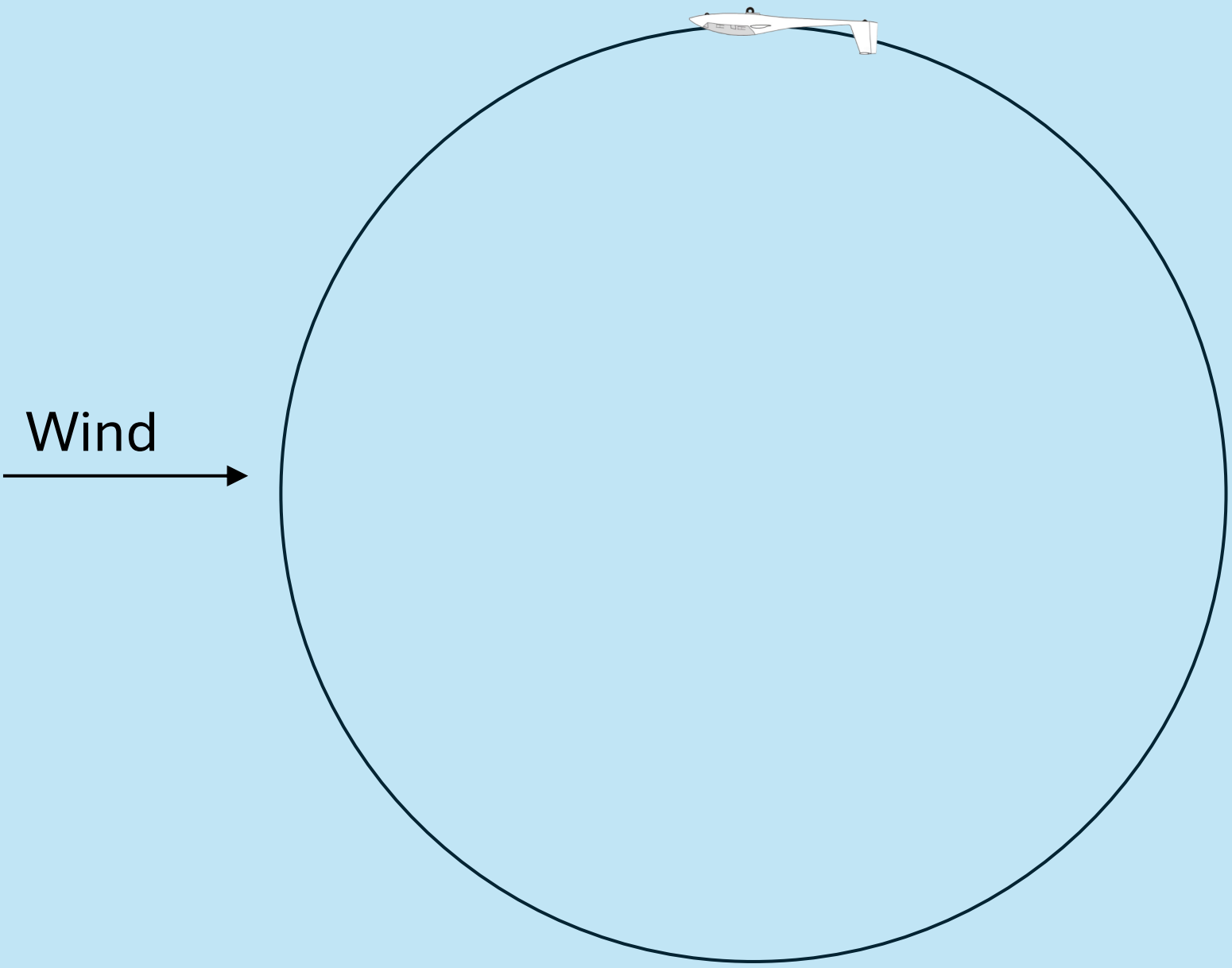
Rises in Lift

Accelerates in Lift if Constrained to Level Flight



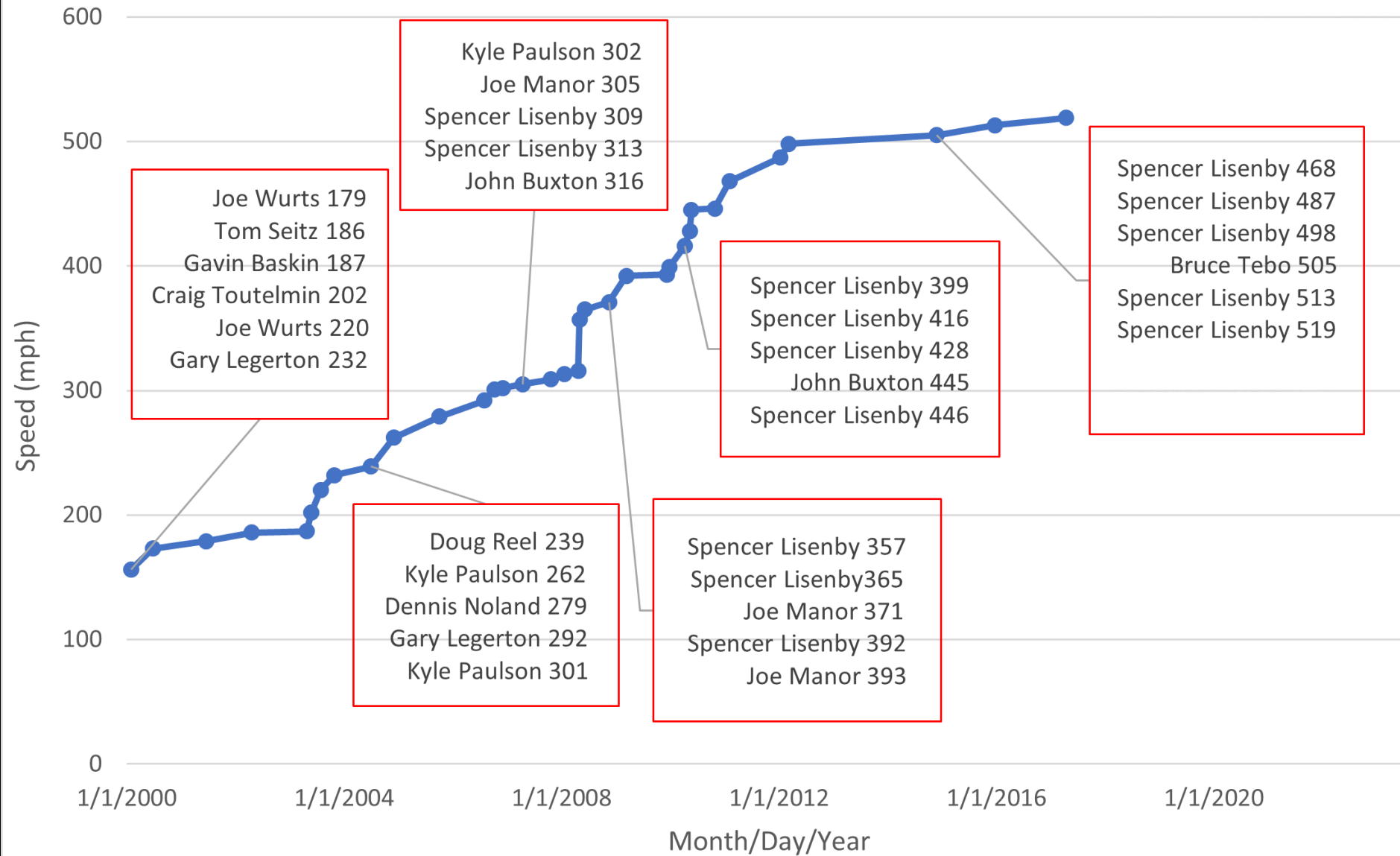
Wind





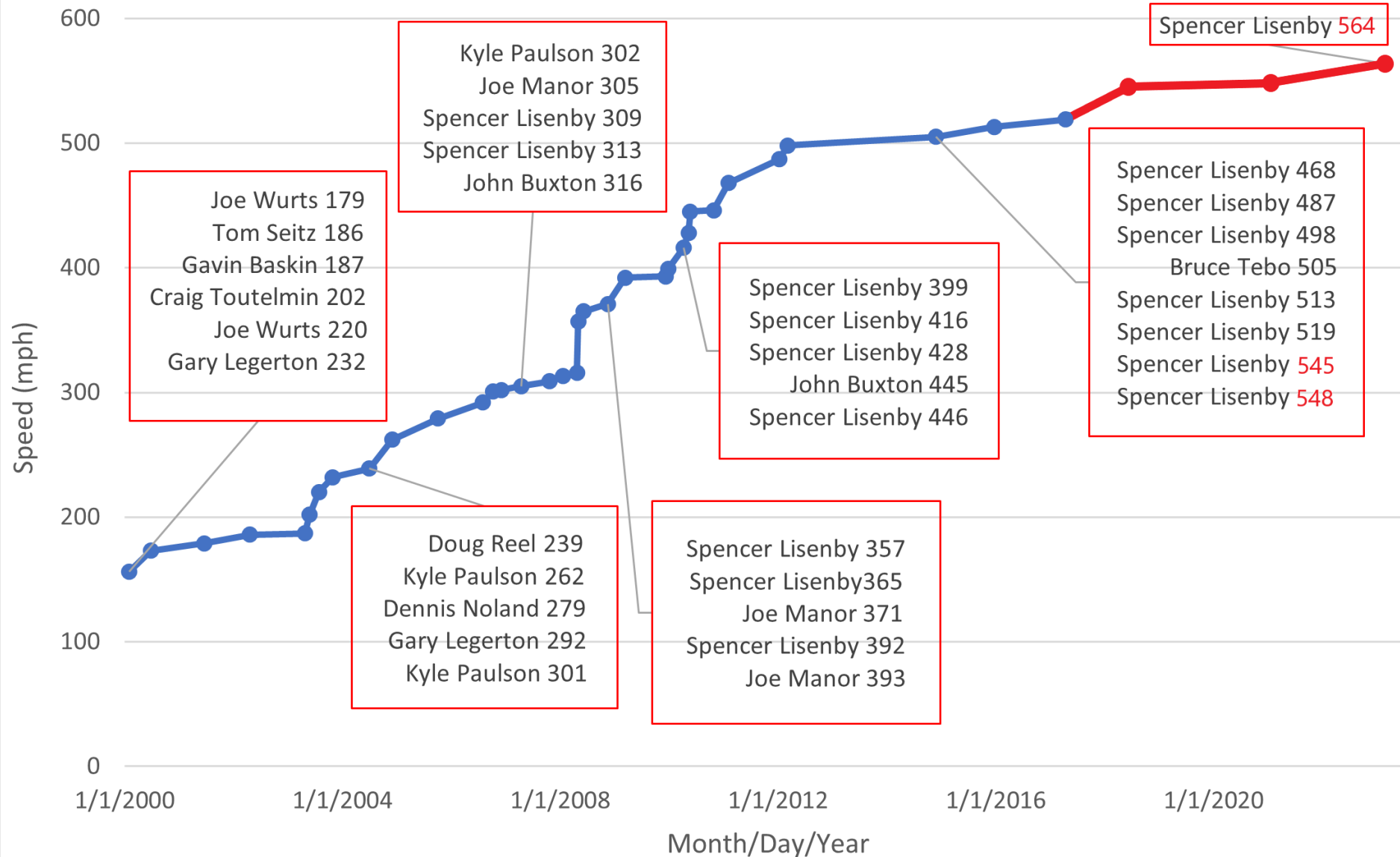
Dynamic Soaring Speed Records

2000 - 2017



Dynamic Soaring Speed Records

2000 - 2024





Dynamic Soaring World Record

564mph

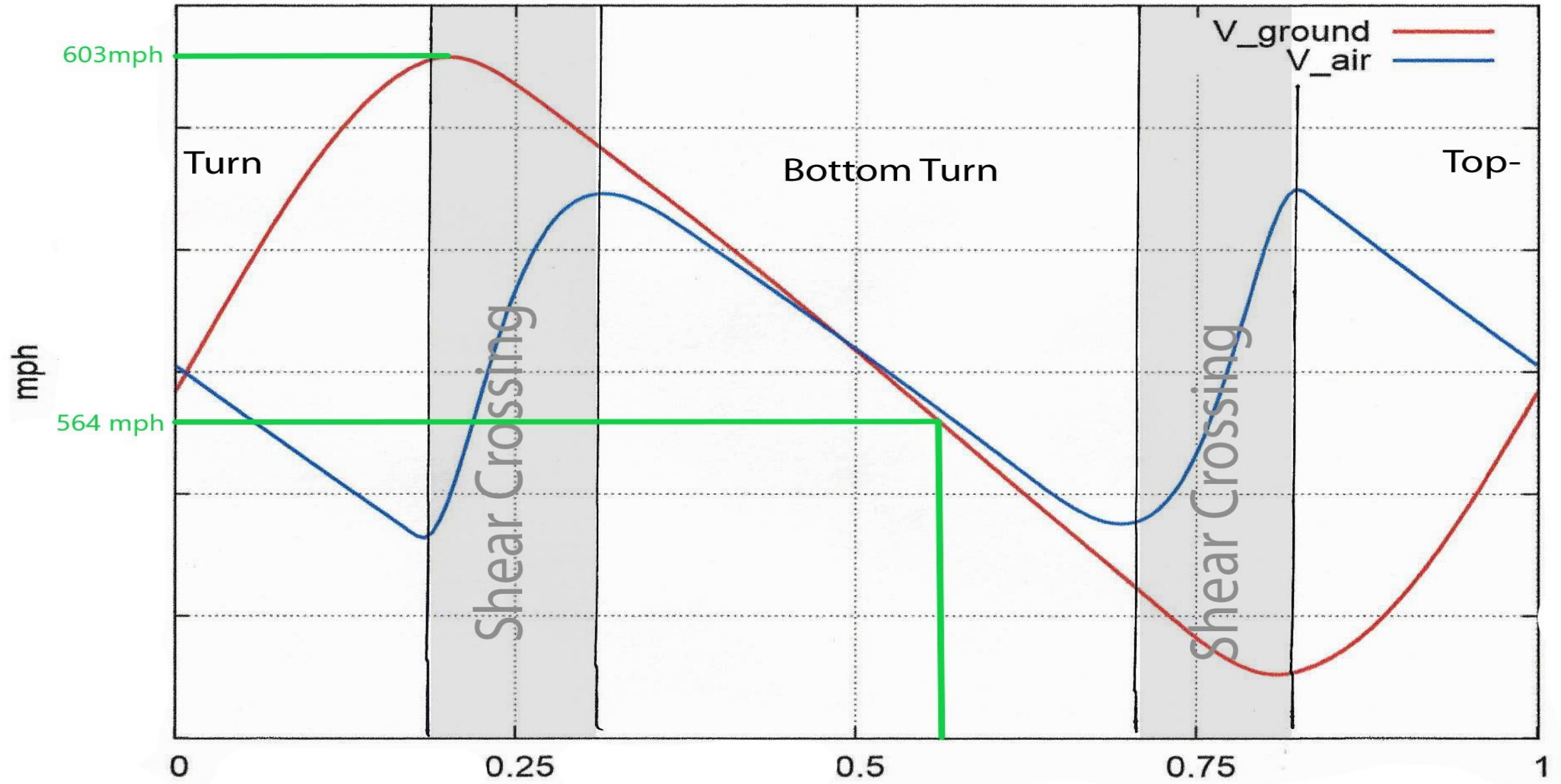


Transonic DP - Spencer Lisenby / Dirk Pflug / Thomas Pils

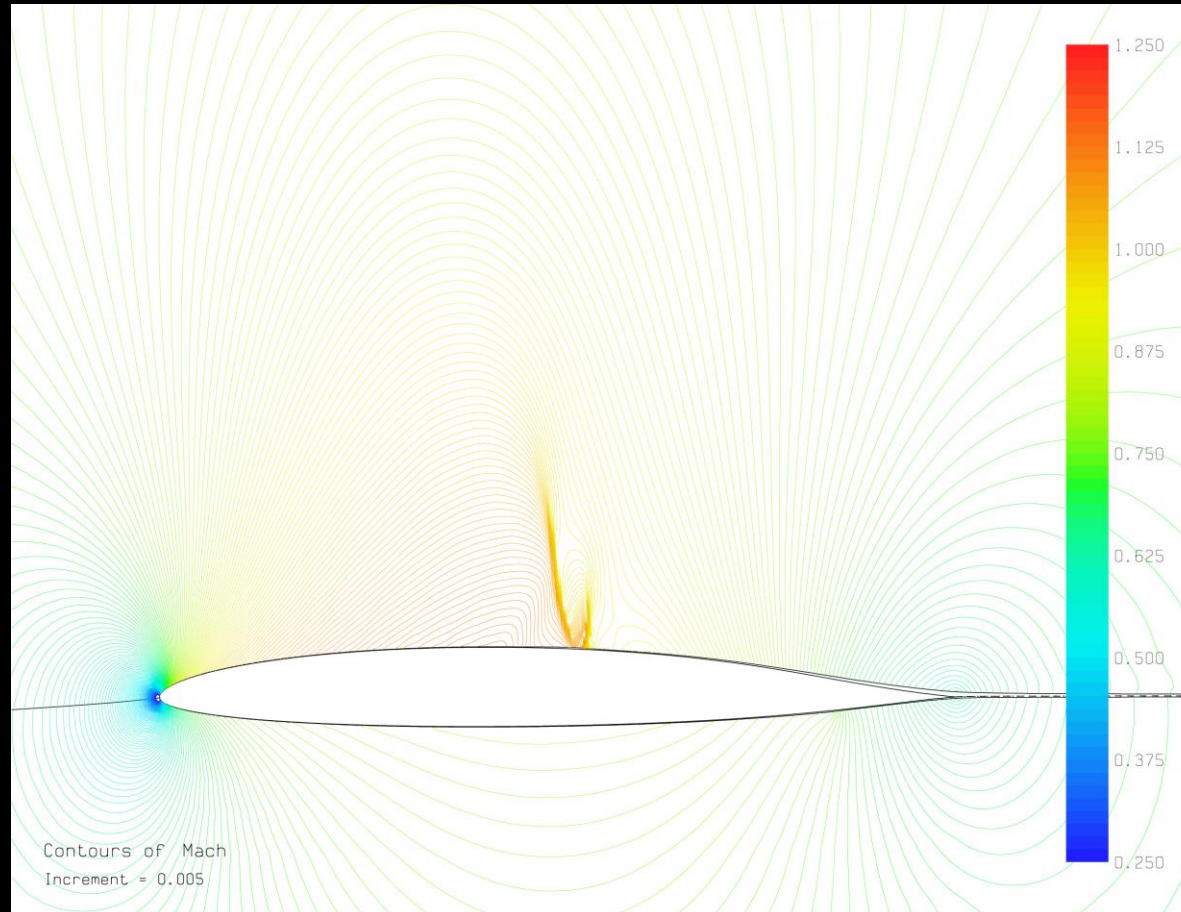
Approximate DS Circuit at Weldon, CA



Variation of Ground and Air Speed



Lambda Shock on Upper Surface



M_{crit}

Weak Shock Wave

M_{DD}

Sharp Drag Rise

Mild Shockwaves Visible





Atlanta to Munich

Distance 4298 mi

Time 7:24

★ Paris

• Ypres



WIND

Tail Wind

3mph

Time Since Departure

1:05

Distance Traveled

581 mi

DEPARTURE CITY

Atlanta

DISTANCE

554 mi

7:56 pm Today, July 03



AIRSPEED
550 MPH

VERTICAL SPEED
170 FT/MIN
ALTITUDE
29000 FEET



46 DEG



TRUE AIRSPEED
550 MPH



HEADING
46°

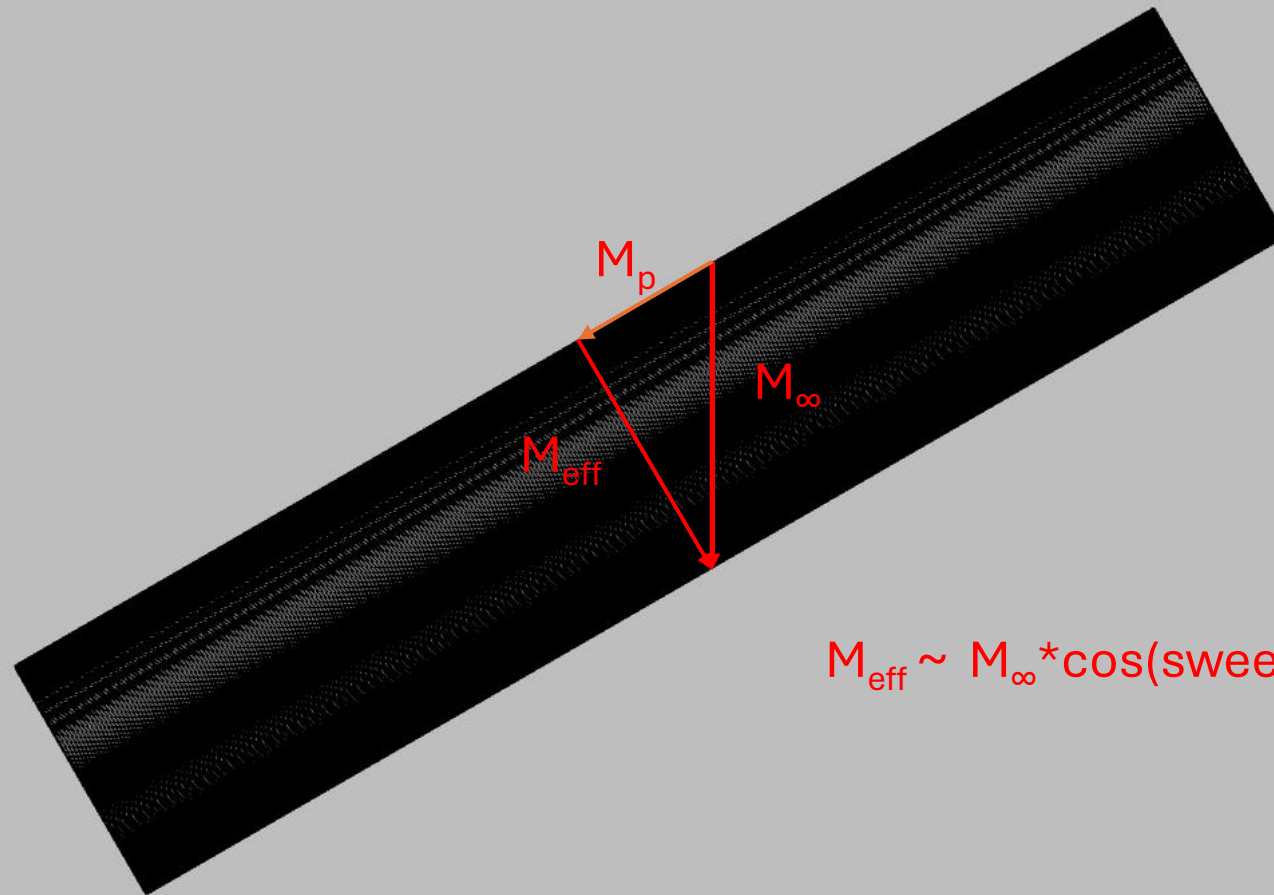


ALTITUDE
29000 FEET

Swept Wings!

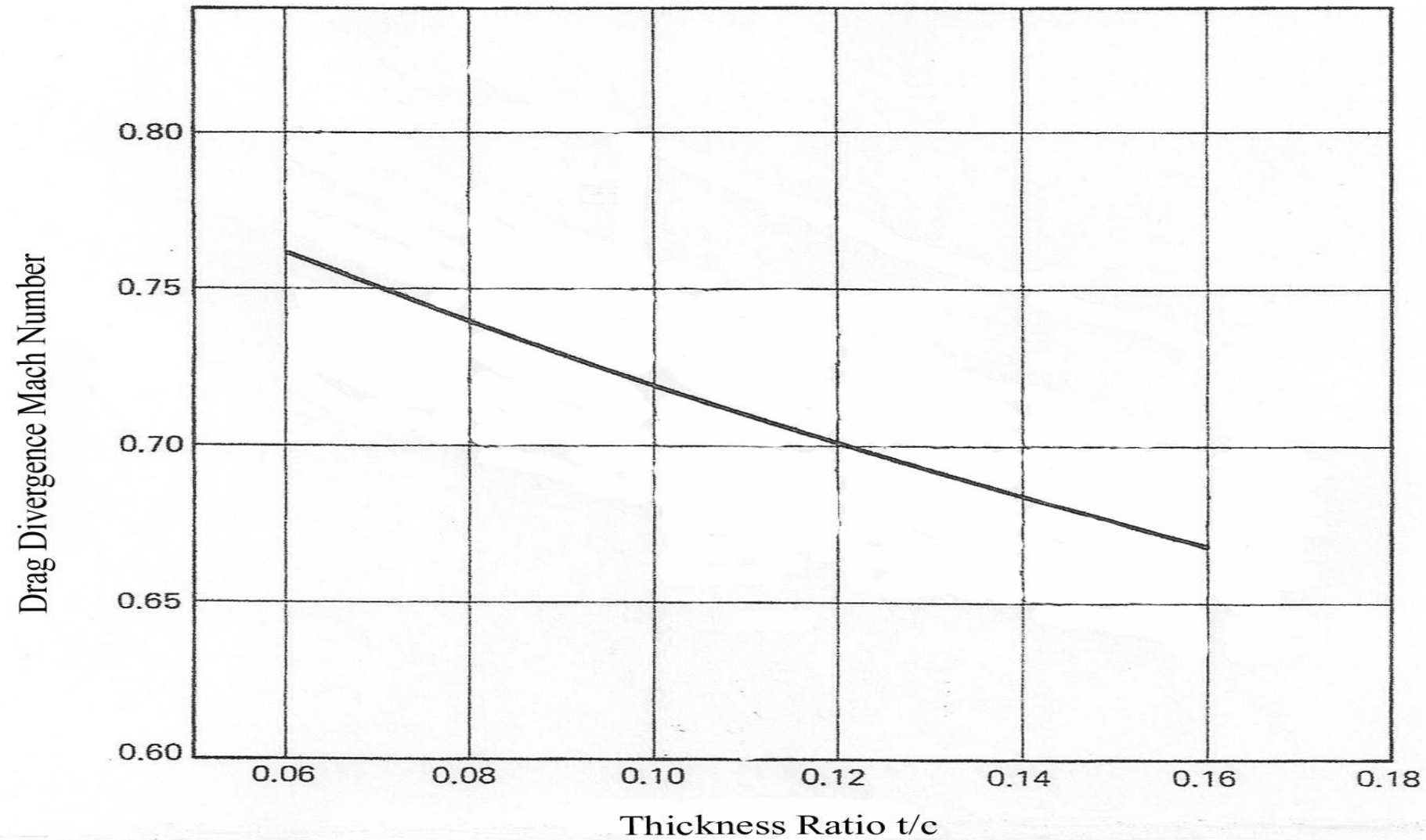


Effective Mach # with Sweep

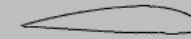


$$M_{eff} \sim M_\infty \cdot \cos(\text{sweep angle})$$

M_{DD} Vs Thickness Ratio (t/c)



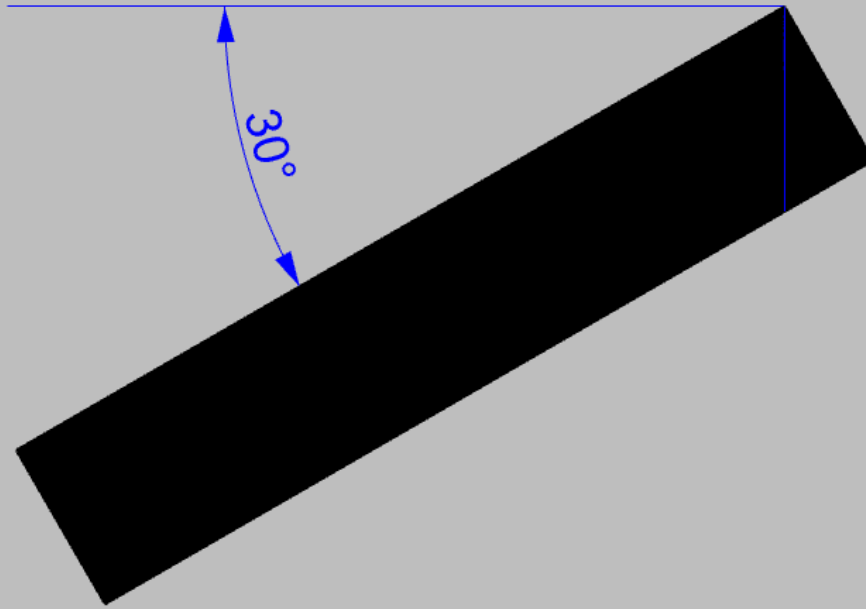
Effect of Sweep on t/c

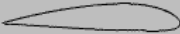


0° Sweep

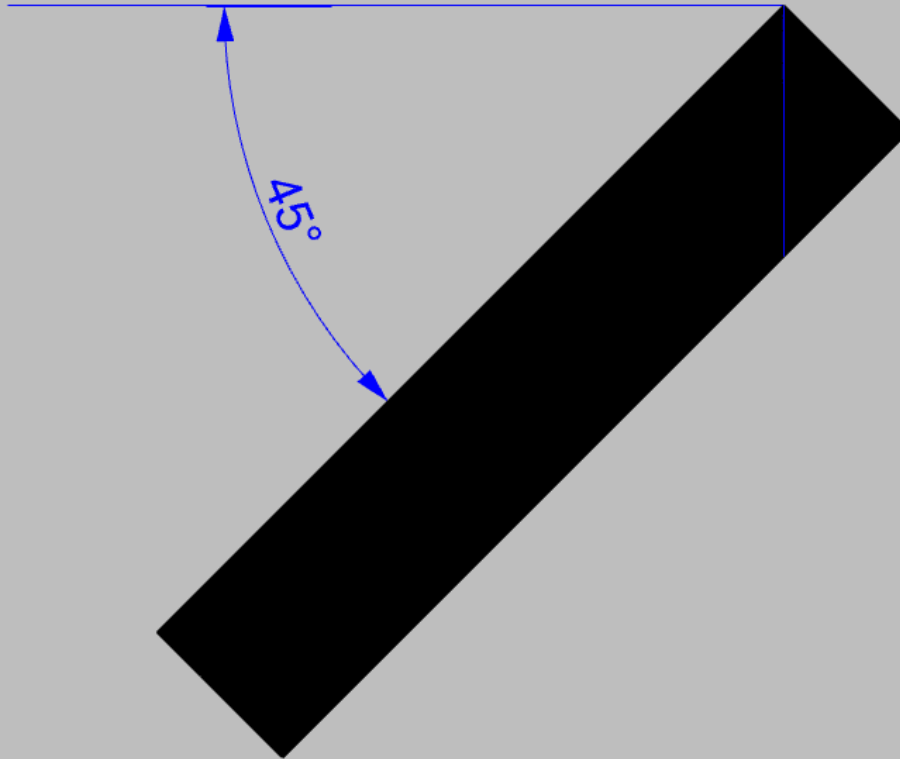
t/c=15%

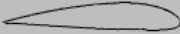
Effect of Sweep on t/c



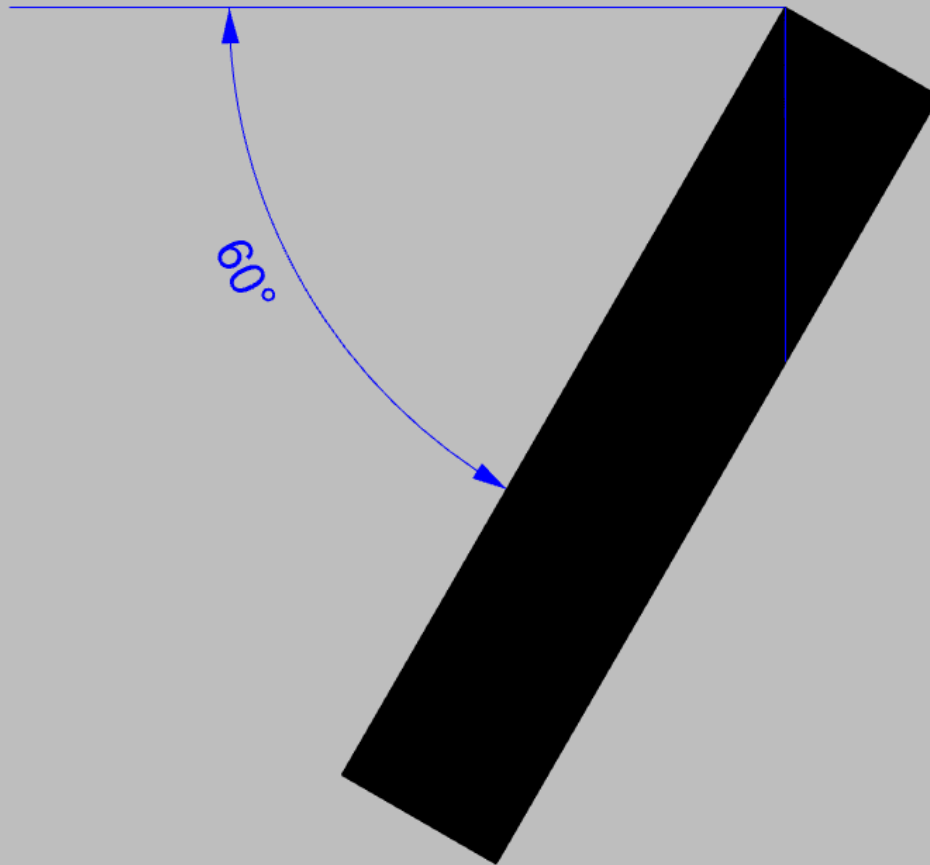
	0° Sweep	t/c=15%
	30° Sweep	t/c=13%

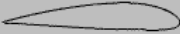
Effect of Sweep on t/c



	0° Sweep	t/c=15%
	30° Sweep	t/c=13%
	45° Sweep	t/c=10.5%

Effect of Sweep on t/c



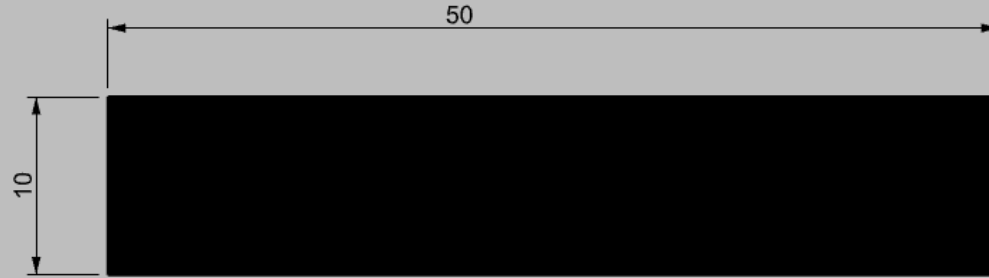
	0° Sweep	t/c=15%
	30° Sweep	t/c=13%
	45° Sweep	t/c=10.5%
	60° Sweep	t/c=7.5%

Swept Wings!



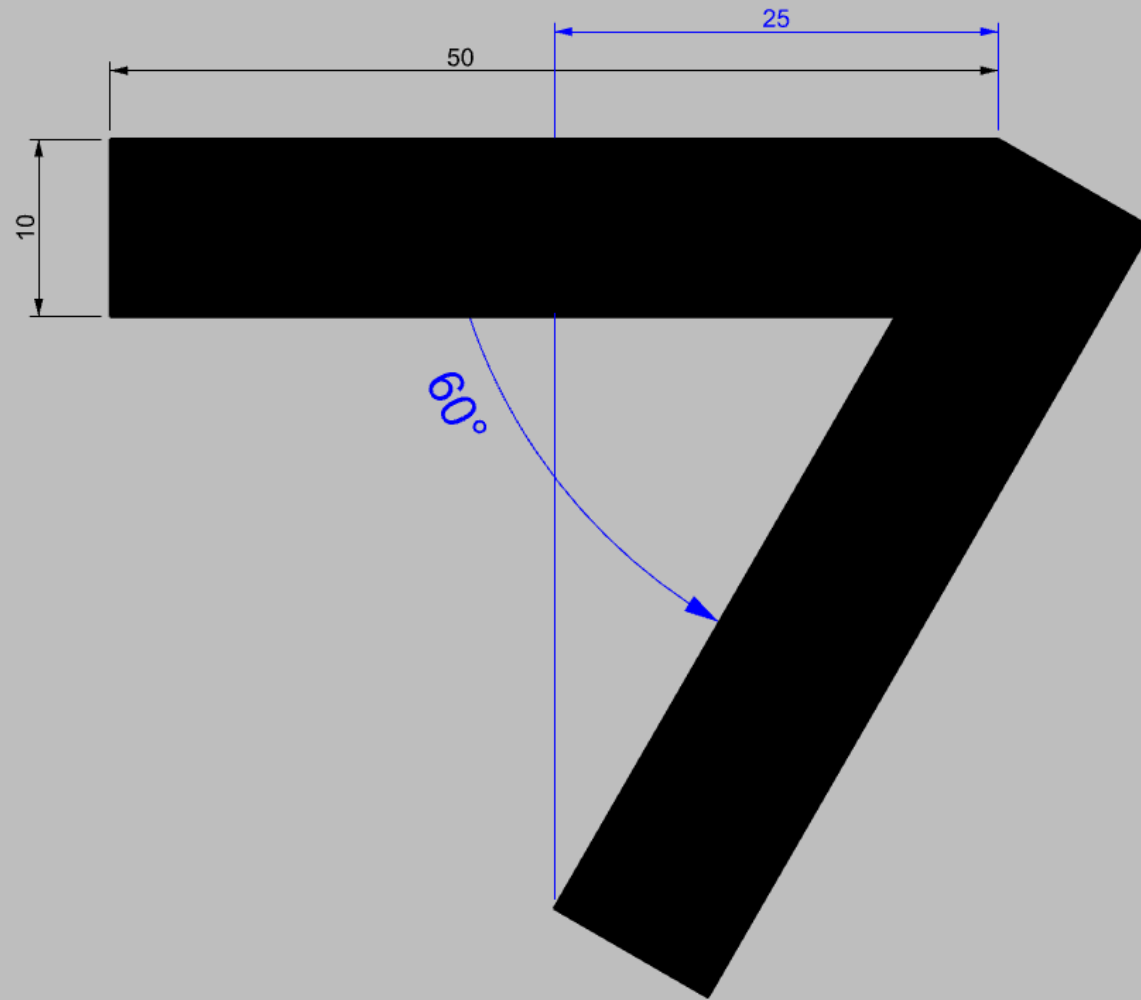
Effect of Sweep on AR

$$AR = (\text{Span})^2 / \text{Area}$$



$$AR @ 0^\circ = 5 : 1$$

Effect of Sweep on AR



AR @ 0° = 5 : 1

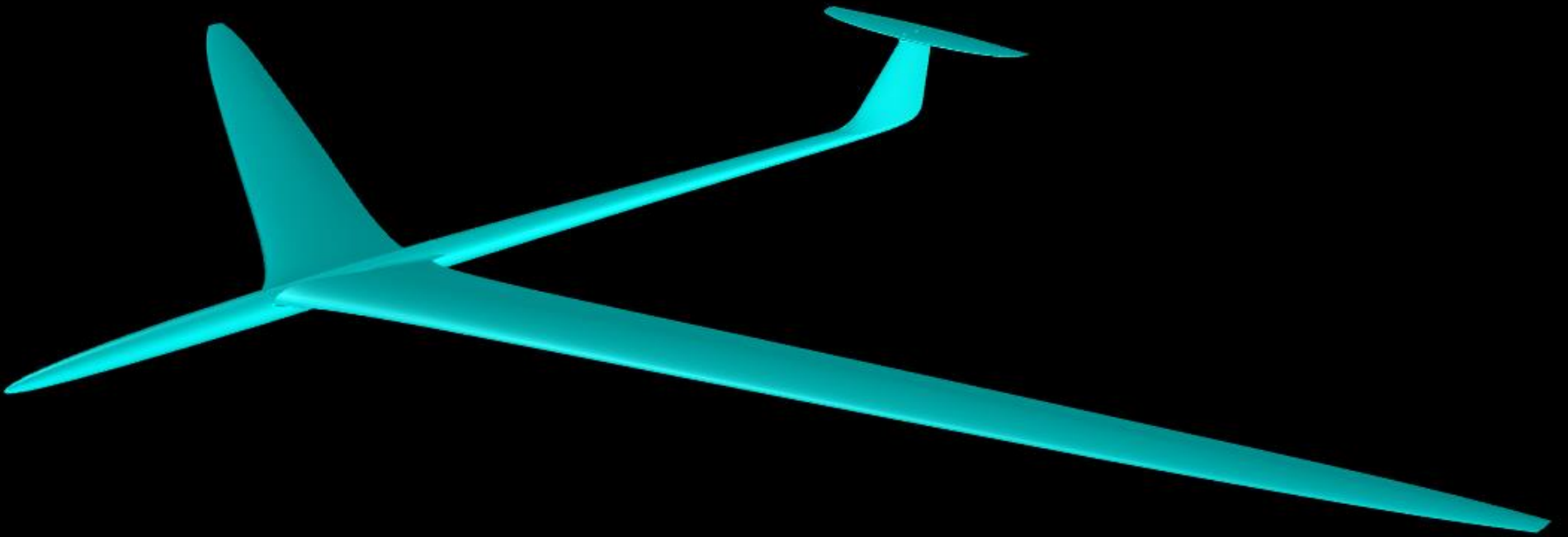
AR @ 60° = 1.25 : 1

OUR GOAL

620mph

1000kph

Swept Wing Transonic DP



3.3m (130in) Wing Span

Spencer Lisenby & Dirk Pflug

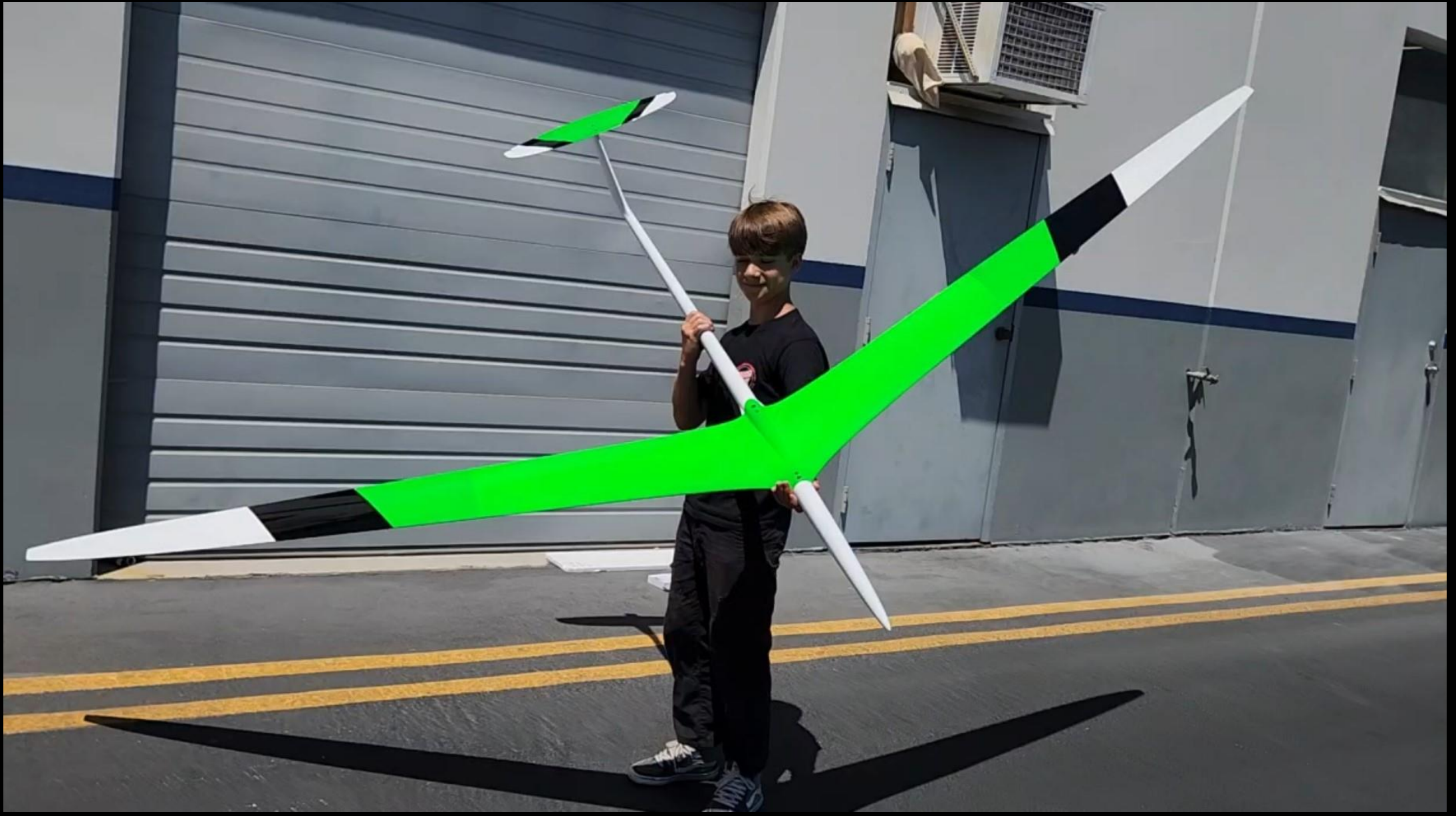
Thank You Henrik and TNG!!



Completed Mold Set



Version 1: Light Layup 5.3kg



Transonic Sweeper DP



Maiden Flight
September 21 2023

Version 2: Heavy Layup 8.9kg





MITEC

OPTIMA 9

2.4GHz
Telemetric
AFHSS

ADAPTIVE FREQUENCY HOPPING
SPREAD SPECTRUM

CH1

CH2

CH3

CH4

CH5

CH6

CH7

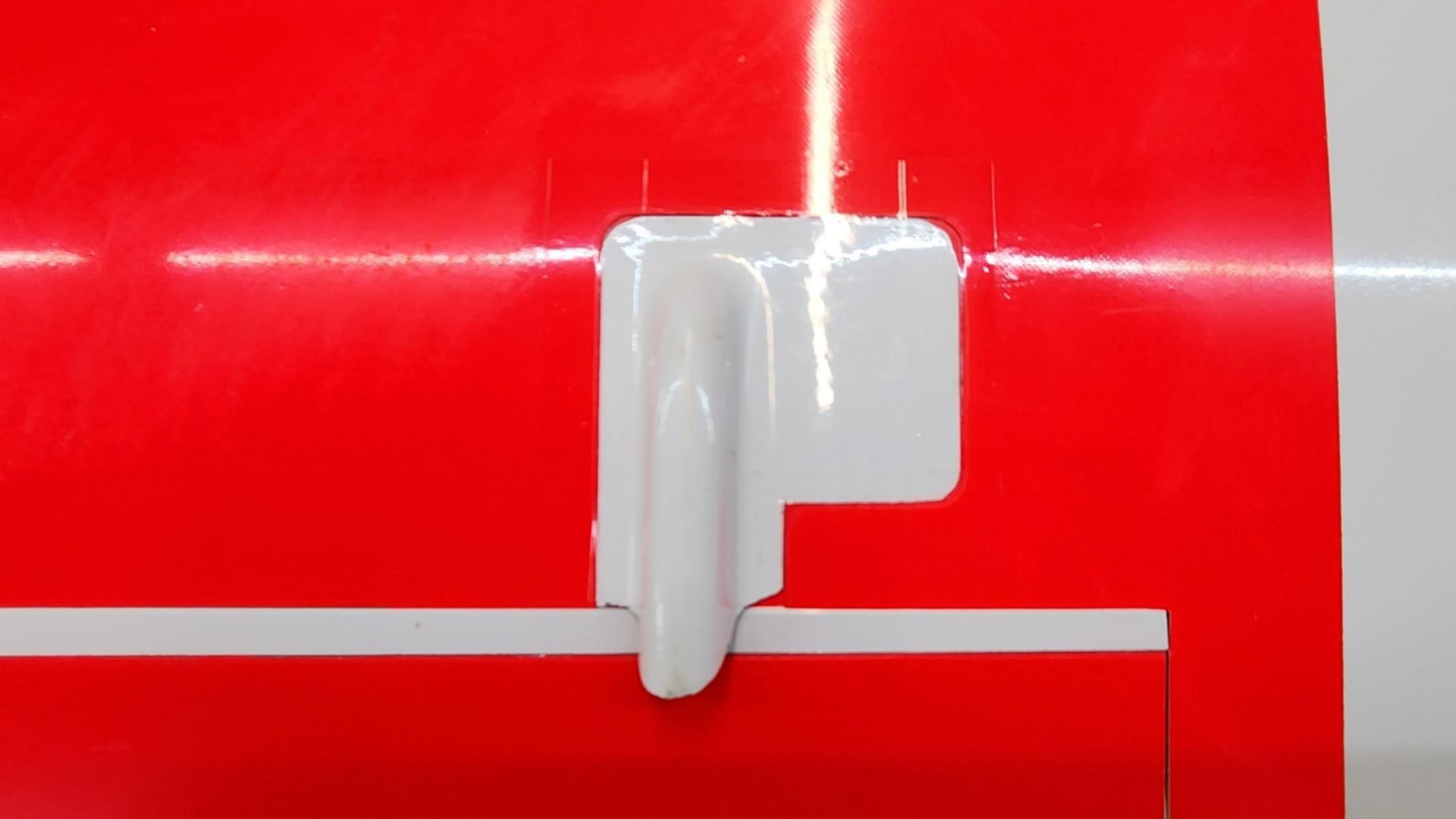
CH8

SPC

CH9

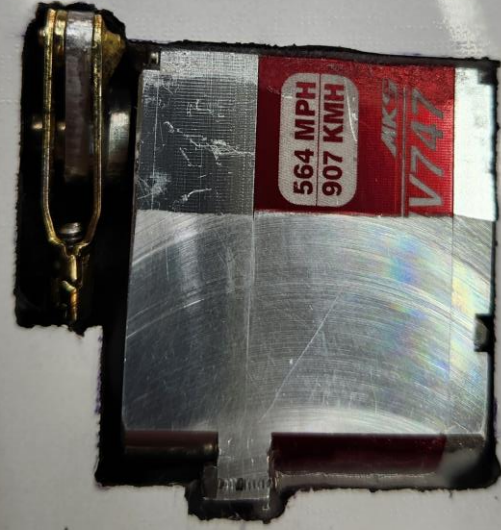


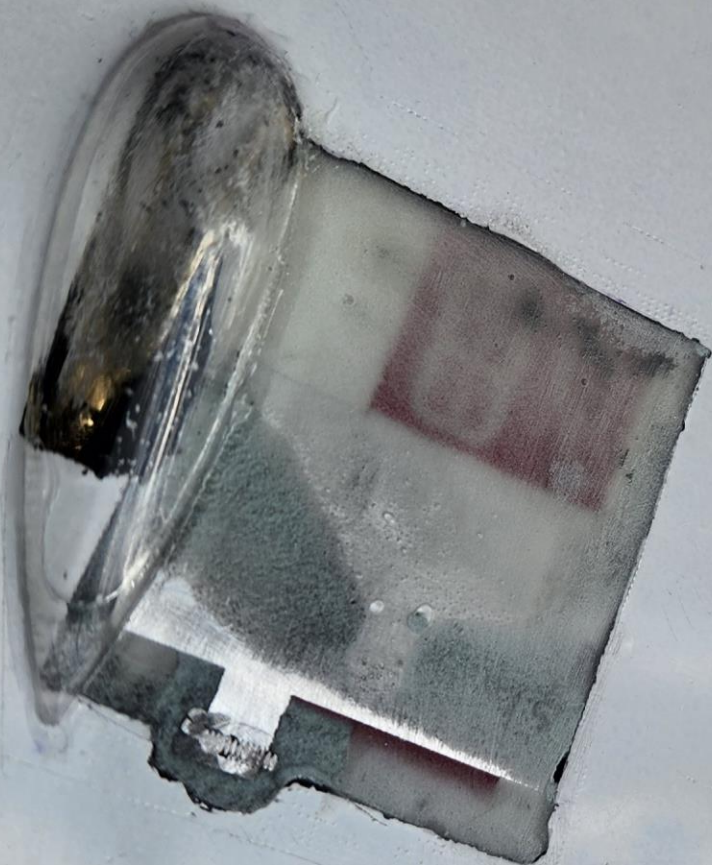
AKS 0.00
HV61
3.0 kg-cm 0.11s @ 7





Dynamic Soaring
**NEW WORLD
RECORD**
Speaker Liberty
AKS HV747
564 MPH
907 KMH















Forecast for Bird Spring Pass

April 26, 2024

