

Adjust the desired Option(s).

### JavaProp

Version 1.70 - August 1, 2021.

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#### • Translations

- Translation to English by Martin Hepperle, 2001.
- Translation to German by Martin Hepperle, 2001.
- Translation to French by Giorgio Toso, 2002.
- Translation to Italian by Giorgio Toso, 2002.
- Translation to Portuguese (European) by João Alveirinho Correia, 2008.

#### • Your current system settings

- Your user name is Bobbi.
- You are running Windows 10, Java version 1.8.0\_321, Java memory is 498688 kB.
- System language code is en.
- Selected country is United States, selected language is English.

Country Settings: English (United States) (decimal character is: ',')

Density  $\rho$ : 0.9334 [kg/m<sup>3</sup>]

Kinematic Viscosity  $\nu$ : 0.000014607 [m<sup>2</sup>/s]

Speed of Sound  $a$ : 340.29 [m/s]

Save...

Load...

Clear preferences on exit

Air

Water

Enter Design Parameters and press the 'Design It!' button.

Propeller Name:

Number of Blades B:  [-]

Revolutions per minute rpm:  [1/min]

Diameter D:  [m]

Spinner Dia. Dsp:  [m]

Velocity v:  [m/s]

Thrust T:  [N]

shroud chord:  [-]

shroud angle:  [°]

shrouded rotor     square tip     open hub

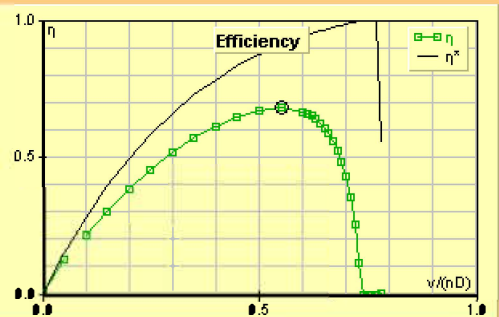
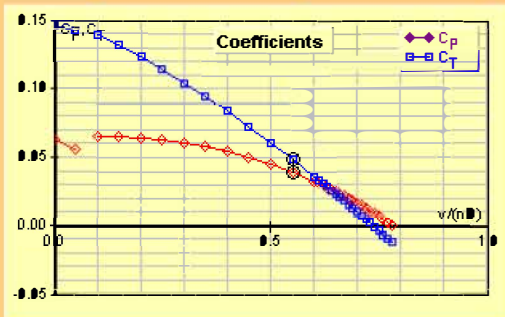
Propeller			
$v/(nD)$	0.475	$v/(QR)$	0.151
Efficiency $\eta$	66.206 %	loading	medium
Thrust T	1,484.56 N	Ct	0.0669
Power P	71.75 kW	Cp	0.048
Torque Q	338.87 Nm	Cs	0.8715
$\beta$ at 75%R	16.2°	Pitch H	1.37 m

Remark: The RPM setting is also used for Analysis page.

Propeller Off-Design Analysis for full v/nD range.

Cs	Tc	Pc	$\eta$	$\eta^*$	stalled	v	rpm	Power	Thrust	Torque
[-]	[-]	[-]	[%]	[%]	[%]	[m/s]	[1/min]	[kW]	[kN]	[Nm]
0.0055	0.999999	0.999999	0.01	0.01	17.00	0.00	1743	45.746	1.8410	250.62
0.0072	0.999999	0.999999	12.73	15.03	57.00	2.91	1743	40.813	1.7882	223.60
0.017214	0.999999	0.999999	21.29	27.97	2.00	5.81	1743	47.645	1.7463	261.03
0.025804	0.999999	0.999999	30.33	39.38	0.00	8.72	1743	47.799	1.6635	261.87
0.045906	7.880574	0.999999	38.31	49.45	0.00	11.62	1743	47.317	1.5601	259.23
0.034938	4.637481	0.999999	45.35	58.40	0.00	14.53	1743	45.943	1.4345	251.71
0.025503	2.950149	5.718842	51.58	66.05	0.00	17.43	1743	44.401	1.3141	243.26

show: Coefficients Cp, Ct Coefficients Pc, Tc Thrust Power rpm Torque



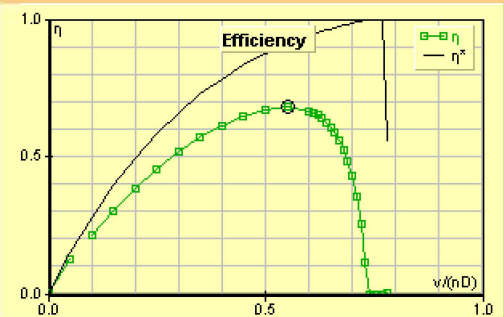
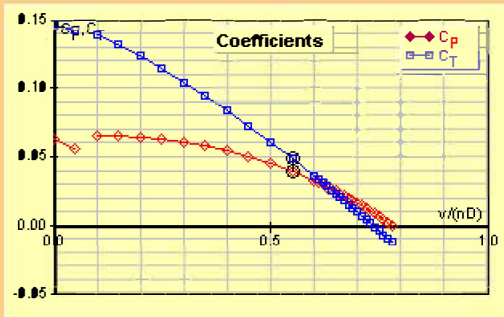
Add to existing plots Analysis with rpm=prescribed (Results are valid for B, rpm, D, p from Design card)

Analyze! Copy Text Copy (HTML) Print... Save...

Propeller Off-Design Analysis for full v/nD range.

525503	2.950149	5.718842	51.59	66.05	0.00	17.43	1743	44.401	1.3141	243.26
518778	1.957924	3.438772	56.94	72.64	0.00	20.34	1743	42.396	1.1871	232.27
715804	1.331214	2.168146	61.40	78.30	0.00	23.24	1743	39.901	1.0542	218.60
818148	0.912736	1.406712	64.88	83.14	0.00	26.14	1743	36.860	0.9148	201.94
928193	0.621149	0.924038	67.22	87.29	0.00	29.05	1743	33.214	0.7686	181.97
049696	0.411351	0.604432	68.06	90.83	0.00	31.95	1743	28.917	0.6159	158.43
189081	0.256860	0.385643	66.61	93.85	0.00	34.86	1743	23.953	0.4577	131.23
220026	0.231021	0.350553	65.90	94.40	0.00	35.44	1743	22.880	0.4255	125.35
252413	0.206464	0.317677	64.99	94.93	0.00	36.02	1743	21.771	0.3928	119.28
78226	0.182301	0.286952	63.85	95.44	0.00	36.80	1743	20.622	0.3599	113.04

show: Coefficients Cp, Ct Coefficients Pc, Tc Thrust Power rpm Torque



Add to existing plots Analysis with rpm=prescribed (Results are valid for B, rpm, D, p from Design card)

Analyze! Copy Text Copy (HTML) Print... Save...



## INPUTS

## ALTITUDE:

 (FEET)

## REF. LENGTH:

 (FEET)

## FLIGHT SPEED:

 (Feet Per Second)



## UNITS

 FEET

 METERS

**PUSH TO UPDATE  
ALL VALUES**



## RESULTING ATMOSPHERIC AND PERFORMANCE VALUES

## DENSITY:

 (Slugs Per Cubic Foot)

## PRESSURE:

 (Pounds Per Square Foot)

 (Atmospheres)

## TEMPERATURE:

 (Degrees Fahrenheit)

 (Degrees Rankine)

## SPEED OF SOUND:

 (Feet Per Second)

 (Miles Per Hour)

 (Knots)

## VISCOSITY:

 (lb-sec / Foot<sup>2</sup>)

## REYNOLDS NUMBER:

## MACH NUMBER:

## DYNAMIC PRESSURE (Q):

 (Pounds Per Square Foot)

## CRITICAL CP (where Sonic flow appears):

## FRICTION COEFFICIENT (Assuming Laminar):

## FRICTION COEFFICIENT (Assuming Turbulent):

Flow Conditions

Wing Layout

ANALYZE

Stall Speeds / W/S

CFD Export/Slice

CAD Export

WING Imp/Exp

**Atmospheric Conditions**

**UPDATE**

Altitude: **9000** Feet

Density: **0.001811** Slugs/Cubic Foot

Temperature: **26.92** °F

Pressure: **1512.44** Pounds/Square Foot

Dynamic Pressure: **10.59** PSF

Speed of Sound: **1081.2** Feet Per Second

Viscosity: **0.0000003554873**  
(lb-sec / Ft<sup>2</sup>)

(Press the UPDATE button after changing ALTITUDE)

**Root Airfoil Reynolds Number and Velocity**

(Note: Based on root chordlength from Wing Layout)

Get From Atmospheric Model

**6602937**

Send Value To Virtual Wind Tunnel

Get Velocity From Reynolds Num

**108.0** Feet Per Second

Get From Atmospheric Model

Resulting MACH NUMBER: **0.100**

**3D Wing View**

WARNING: Wing/data may not represent recent change.

Push BUILD/ANALYZE to update.



Y-Axis View Rotation (not AOA)



Z-Axis View Rotation

(Drag box with left mouse button to zoom)

RESET

WING LAYOUT NAME

**03-22 HeavyLift WING BODY**

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**

Help

Close

Flow Conditions | **Wing Layout** | ANALYZE | Stall Speeds / W/S | CFD Export/Slice | CAD Export | WING Imp/Exp

### Airfoil Assignments

(Unless otherwise noted, all units are in feet.)

		Buttline: (span)	Chord:	Incidence:	C/4 Offset:
<input checked="" type="checkbox"/> Root Airfoil	MyAirfoil_2: this is v16 flipped ups	0	12	0	0
<input checked="" type="checkbox"/> Airfoil #1	MyAirfoil_2: this is v16 flipped ups	2	12	0	0
<input type="checkbox"/> Airfoil #2	MyAirfoil_2: this is v16 flipped ups				
<input type="checkbox"/> Airfoil #3	MyAirfoil_2: this is v16 flipped ups				
<input type="checkbox"/> Airfoil #4	MyAirfoil_2: this is v16 flipped ups				
<input type="checkbox"/> Airfoil #5	MyAirfoil_1: AH 80-140				

Actions -----> EVENLY EVENLY EVENLY Zeros

**Dihedral**

2 Degrees

**Mean Aerodynamic Info:**

Mean Chord: 12.00 Ft.  
Span Location: 1.00 Ft.

**Resulting Parameters**

Wing Area: 48.00 Sq. Ft.  
Wingspan: 4.00 Ft.  
Aspect Ratio: 0.33  
Taper Ratio: 1.00  
C Sweep: 0.00 Deg.

**Trailing Edge Thickness**

0.25 Inches

### 3D Wing View

WARNING: Wing/data may not represent recent change.

Push BUILD/ANALYZE to update.

Y-Axis View Rotation (not AOA)

Z-Axis View Rotation (Drag box with left mouse button to zoom)

RESET

WING LAYOUT NAME

03-22 HeavyLift WINGBODY

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**

Help Close

Flow Conditions

Wing Layout

**ANALYZE**

Stall Speeds / W/S

CFD Export/Slice

CAD Export

WING Imp/Exp

**Wing Analysis Options**

Assume elliptical lift degradation

Oswald Efficiency Factor:

**Root-Airfoil Angle Of Attack**

Degrees

Set To ZERO

**NOTE: Stall is not predicted with this tool.**

**BUILD / ANALYZE**

**Drag RESULTS**

Frictional Drag:  Pounds

Induced Drag:  Pounds

**TOTAL DRAG:**  Pounds

Frictional Cd:

Induced Cd:

**TOTAL Cd:**

Frictional Cd\*S

Induced Cd\*S

**TOTAL Cd\*S**

**Lift RESULTS**

Total Lift Force (LBS):

Total Lift Coefficient:

L/D:

**Moment RESULTS**

Total Pitching Moment:

FootPounds

Moment Coefficient:

- Referenced to Root Quarter Chord
- Referenced to Root Nose
- No Transfer (Debugging Only)

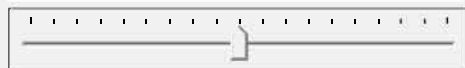
**3D Wing View**

WARNING: Wing/data may not represent recent change.

Push BUILD/ANALYZE to update.



Y-Axis View Rotation (not AOA)



Z-Axis View Rotation

(Drag box with left mouse button to zoom)

RESET

WING LAYOUT NAME

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**

Help

Close



## INPUTS

## ALTITUDE:

 (FEET)

## REF. LENGTH:

 (FEET)

## FLIGHT SPEED:

 (Feet Per Second)

## UNITS

 FEET METERS**PUSH TO UPDATE  
ALL VALUES**

## RESULTING ATMOSPHERIC AND PERFORMANCE VALUES

## DENSITY:

 (Slugs Per Cubic Foot)

## PRESSURE:

 (Pounds Per Square Foot) (Atmospheres)

## TEMPERATURE:

 (Degrees Fahrenheit) (Degrees Rankine)

## SPEED OF SOUND:

 (Feet Per Second) (Miles Per Hour) (Knots)

## VISCOSITY:

 (lb-sec / Foot<sup>2</sup>)

## REYNOLDS NUMBER:

## MACH NUMBER:

## DYNAMIC PRESSURE (Q):

 (Pounds Per Square Foot)

## CRITICAL CP (where Sonic flow appears):

## FRICTION COEFFICIENT (Assuming Laminar):

## FRICTION COEFFICIENT (Assuming Turbulent):

Flow Conditions

Wing Layout

ANALYZE

Stall Speeds / W/S

CFD Export/Slice

CAD Export

WING Imp/Exp

**Atmospheric Conditions**

**UPDATE** Altitude:  Feet  
 Density:  Slugs/Cubic Foot  
 Temperature:  °F  
 Pressure:  Pounds/Square Foot  
 Dynamic Pressure:  PSF  
 Speed of Sound:  Feet Per Second  
 Viscosity:  (lb-sec / Ft<sup>2</sup>)

(Press the UPDATE button after changing ALTITUDE)

**Root Airfoil Reynolds Number and Velocity**

(Note: Based on root chordlength from Wing Layout)

**Get From Atmospheric Model**

**Send Value To Virtual Wind Tunnel**

**Get Velocity From Reynolds Num**

Feet Per Second

**Get From Atmospheric Model**

Resulting MACH NUMBER:

**3D Wing View**

WARNING: Wing/data may not represent recent change.

Push BUILD/ANALYZE to update.



Y-Axis  
View  
Rotation  
(not  
AOA)



Z-Axis View Rotation

(Drag box with left mouse button to zoom)

RESET

WING LAYOUT NAME

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**

Help

Close

Flow Conditions	Wing Layout	ANALYZE	Stall Speeds / W/S	CFD Export/Slice	CAD Export	WING Imp/Exp
<b>Airfoil Assignments</b>						
(Unless otherwise noted, all units are in feet.)						
<input checked="" type="checkbox"/> Root Airfoil	MyAirfoil_1: AH 80-140	Buttline: (span)	Chord:	Incidence:	C/4 Offset:	
<input checked="" type="checkbox"/> Airfoil #1	MyAirfoil_1: AH 80-140	0	6.5	0	0	
<input type="checkbox"/> Airfoil #2	MyAirfoil_2: this is v16 flipped ups					
<input type="checkbox"/> Airfoil #3	MyAirfoil_2: this is v16 flipped ups					
<input type="checkbox"/> Airfoil #4	MyAirfoil_2: this is v16 flipped ups					
<input type="checkbox"/> Airfoil #5	MyAirfoil_1: AH 80-140					
Actions ----->		EVENTLY	EVENTLY	EVENTLY	Zeros	
						<b>Dihedral</b> <input type="text" value="2"/> Degrees
						<b>Mean Aerodynamic Info:</b> Mean Chord: <input type="text" value="6.50"/> Ft. Span Location: <input type="text" value="11.00"/> Ft.
						<b>Resulting Parameters</b> Wing Area: <input type="text" value="286.00"/> Sq. Ft. Wingspan: <input type="text" value="44.00"/> Ft. Aspect Ratio: <input type="text" value="6.77"/> Taper Ratio: <input type="text" value="1.00"/> <input type="checkbox"/> C Sweep: <input type="text" value="0.00"/> Deg.
						<b>Trailing Edge Thickness</b> <input type="text" value="0.25"/> Inches

**3D Wing View**

Y-Axis View Rotation (not AOA)

Z-Axis View Rotation  
(Drag box with left mouse button to zoom)

RESET

**WING LAYOUT NAME**

03-22 HeavyLift WING BODY

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**

Help Close

Flow Conditions
Wing Layout
**ANALYZE**
Stall Speeds / W/S
CFD Export/Slice
CAD Export
WING Imp/Exp

**Wing Analysis Options**

Assume elliptical lift degradation

Oswald Efficiency Factor:

**Root-Airfoil Angle Of Attack**

Degrees

**NOTE: Stall is not predicted with this tool.**

BUILD / ANALYZE

**Drag RESULTS**

Frictional Drag: <span style="background-color: #c8e6c9; padding: 2px;">36.31</span> Pounds	Frictional Cd*S: <span style="background-color: #c8e6c9; padding: 2px;">3.44</span>
Induced Drag: <span style="background-color: #c8e6c9; padding: 2px;">200.60</span> Pounds	Induced Cd*S: <span style="background-color: #c8e6c9; padding: 2px;">18.99</span>
<b>TOTAL DRAG:</b> <span style="background-color: #c8e6c9; padding: 2px;">254.77</span> Pounds	<b>TOTAL Cd*S:</b> <span style="background-color: #c8e6c9; padding: 2px;">24.12</span>

---

Frictional Cd: <span style="background-color: #c8e6c9; padding: 2px;">0.0120</span>
Induced Cd: <span style="background-color: #c8e6c9; padding: 2px;">0.0664</span>
<b>TOTAL Cd:</b> <span style="background-color: #c8e6c9; padding: 2px;">0.0843</span>

**Lift RESULTS**

Total Lift Force (LBS): 3211.69

Total Lift Coefficient: 1.063

L/D: 12.61

**Moment RESULTS**

Total Pitching Moment: -959.24 FootPounds

Moment Coefficient: -0.049

Referenced to Root Quarter Chord  
 Referenced to Root Nose  
 No Transfer (Debugging Only)

**3D Wing View**

Y-Axis  
View  
Rotation  
(not  
AOA)

RESET

**Z-Axis View Rotation**  
(Drag box with left mouse button to zoom)

**WING LAYOUT NAME**

03-22 HeavyLift WINGBODY

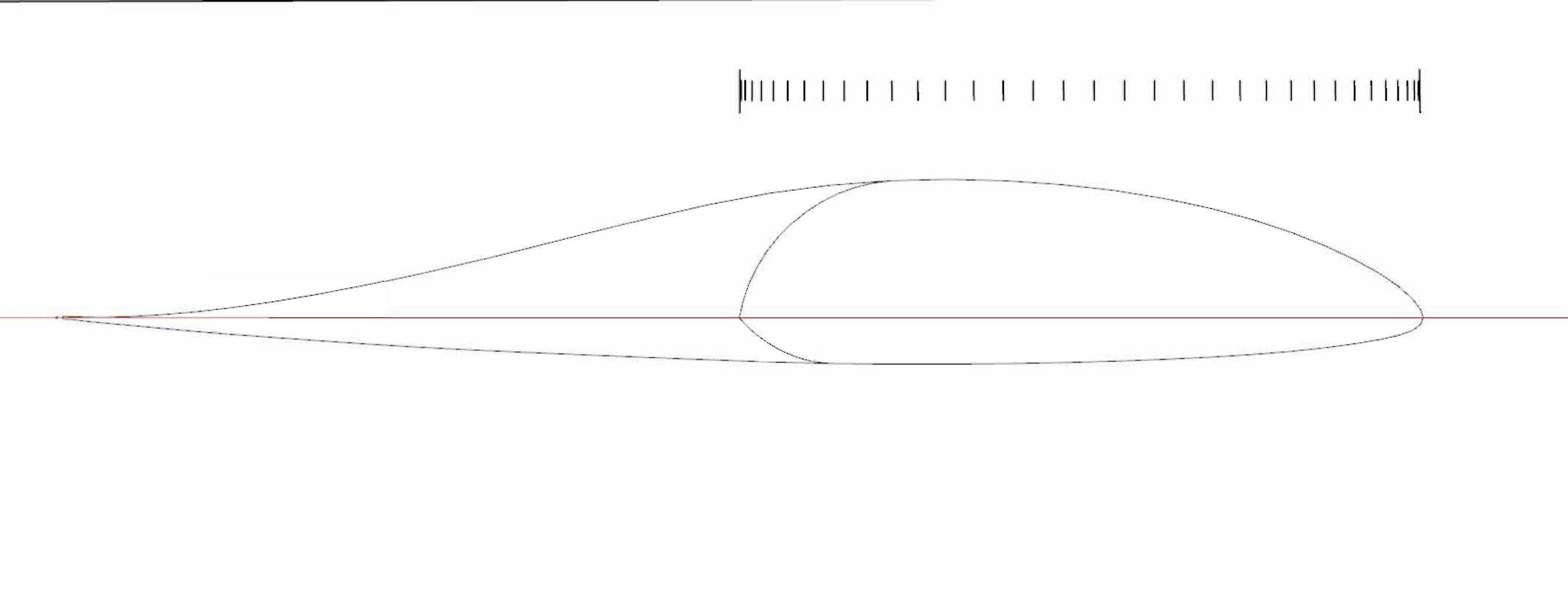
BUILD / ANALYZE

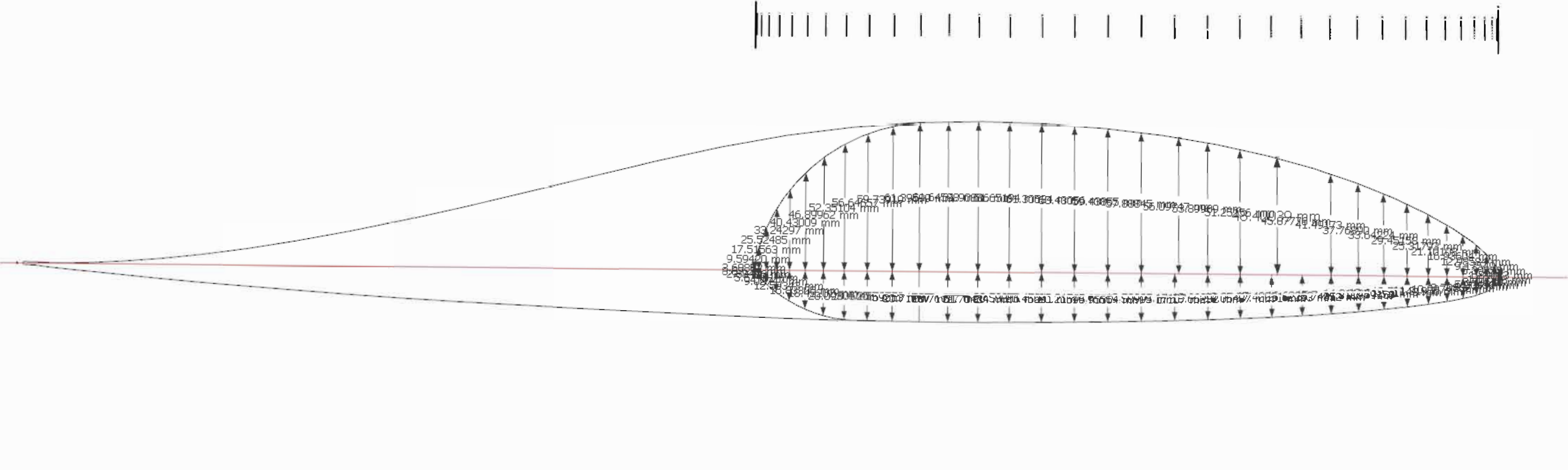
NOTE: Stall is not predicted with this tool.

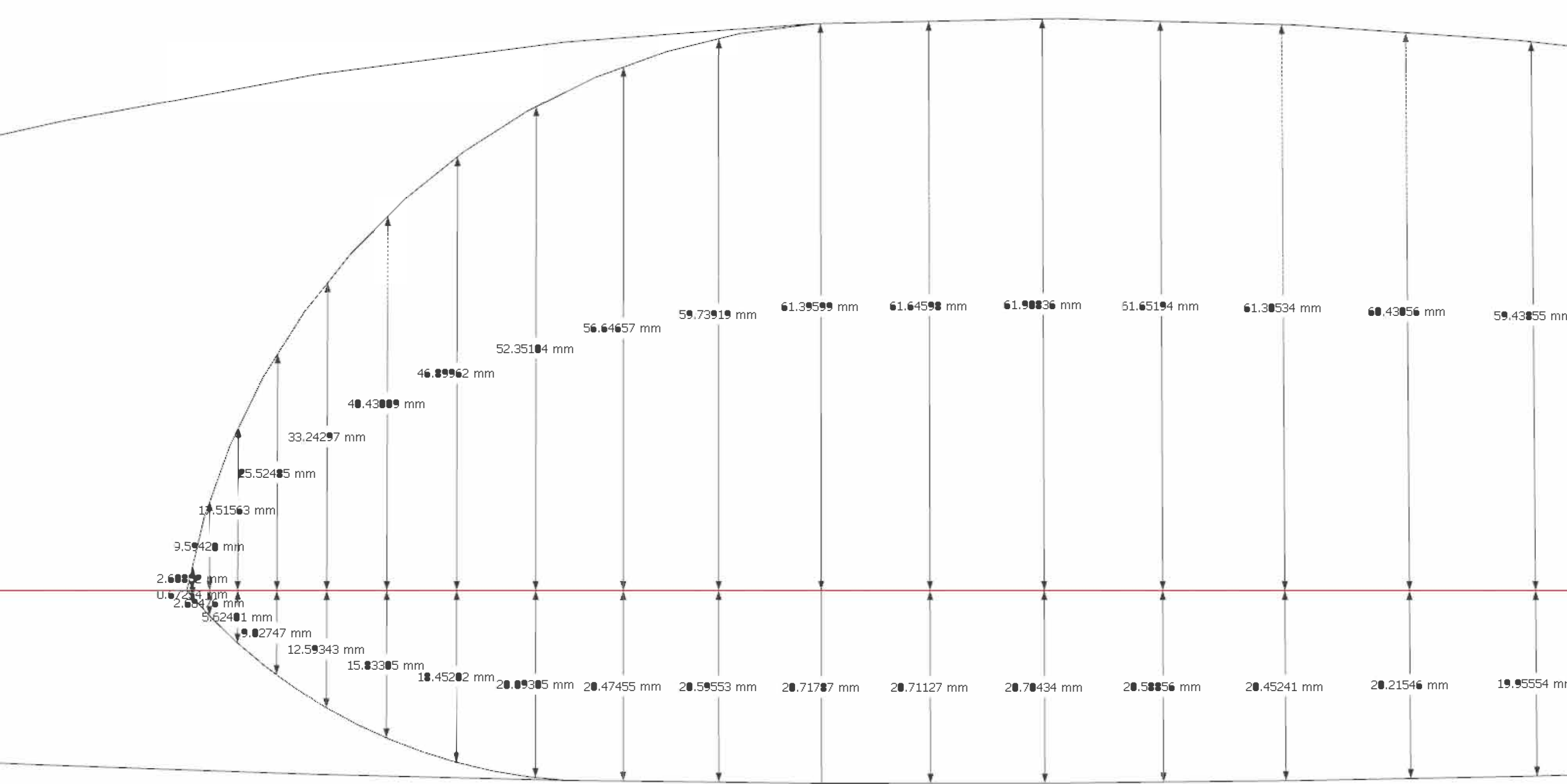
Help

Close









U. 0.234 mm  
 2.0047 mm

5.6241 mm  
 9.02747 mm

12.59343 mm  
 15.83305 mm

18.45202 mm  
 20.09305 mm

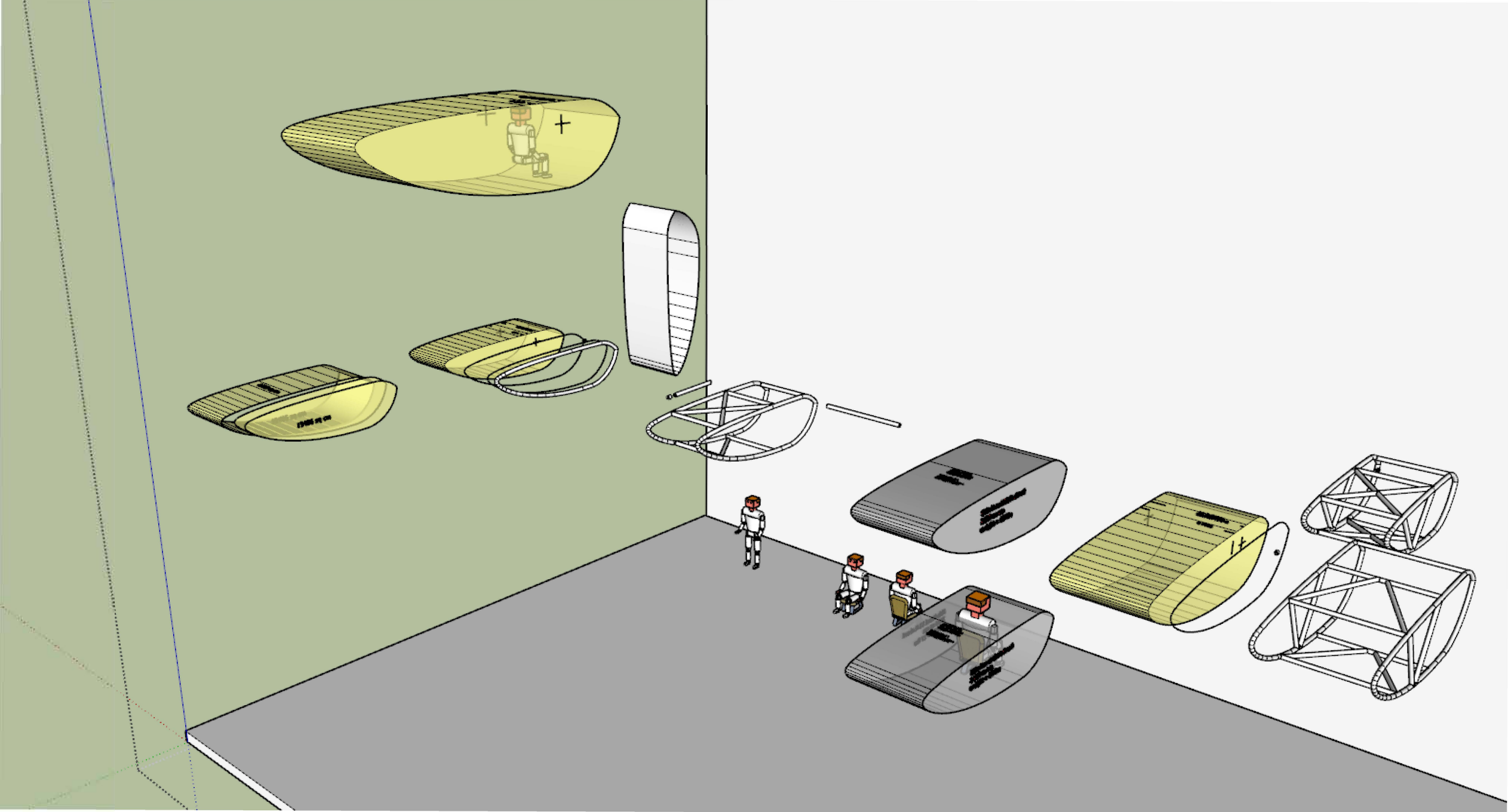
20.47455 mm  
 20.59553 mm

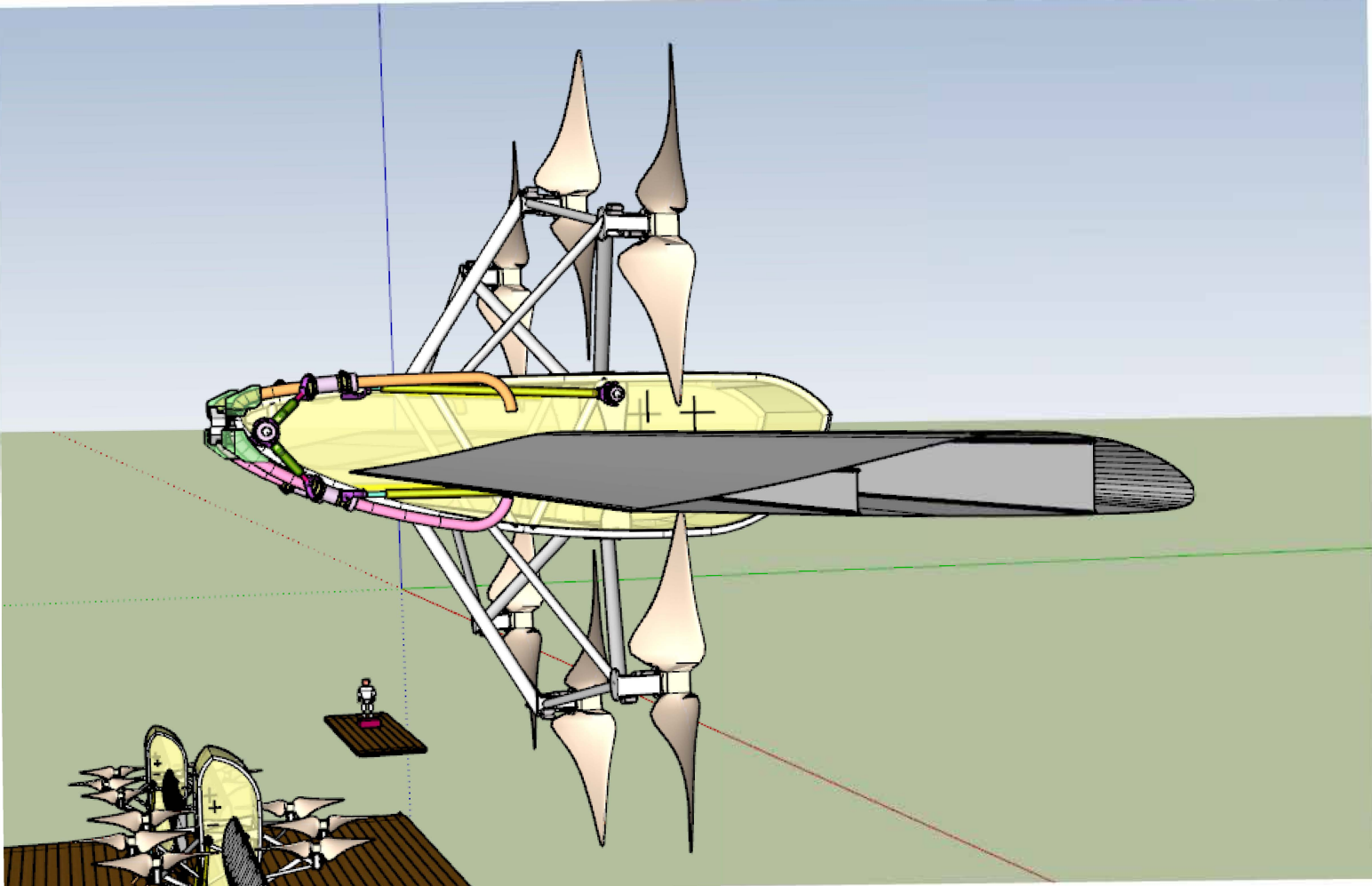
20.71707 mm  
 20.71127 mm

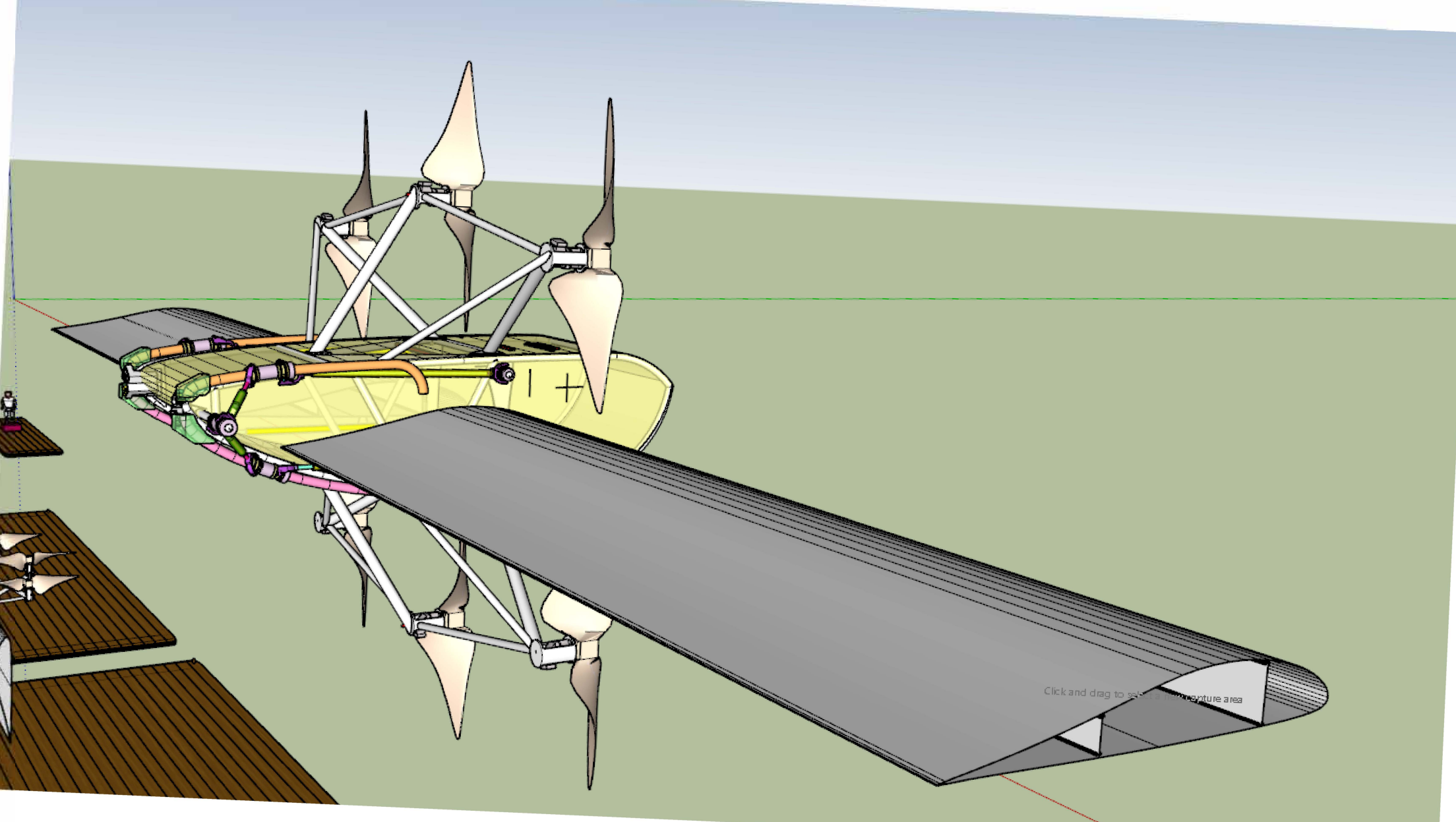
20.70434 mm  
 20.58856 mm

20.45241 mm  
 20.21546 mm

19.95554 mm







Click and drag to select a new capture area

## FILE OPERATIONS:

no modifications of ah80140 by pg v3.dat  
 shrunk by one half ah80140 by pg v10.dat  
 v11 shrunk by one half ah80140 by pg.dat  
 v12 shrunk by one half ah80140 by pg.dat  
 v13 shrunk by one half ah80140 by pg.dat  
 v14 shrunk by one half ah80140 by pg.dat  
 v15 shrunk by one half ah80140 by pg.dat  
 v16 shrunk by one half ah80140 by pg.dat  
 v17 flipped upside down using v16 shrunk by o

Browse Files...

View File Contents

## Notes About Airfoil From Imported File

this is v16 flipped upside down AH 80-136: v16  
 shrunk by one half ah80140 by pg.dat

## File Properties

Raw Chordlength:

1.000

Number Of Points

Upper Lower Total

0000 0000 71

Import Fixes

Raw Percent Thickness:

27.104%

 Force Thickness?

12

Help

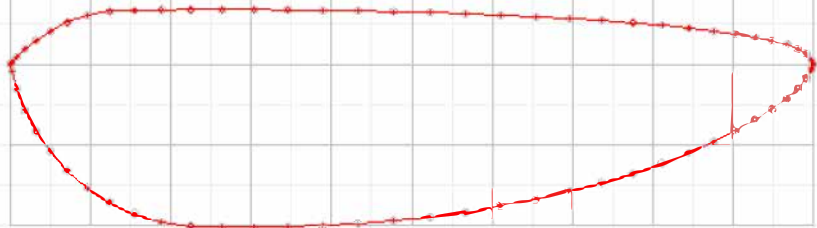
Restore View

## File Error Summary

No duplicates found.

## Spline Options

- Use Raw Points
- Use B-Spline
- Use Alt-Spline
- Alt Nose



-&gt; Drag A Box With Left Mouse to ZOOM In

-&gt; Hold SHIFT And Drag Left Mouse to PAN

-&gt; RIGHT-CLICK Mouse to DELETE Point

### Standard Atmosphere Model

**INPUTS**

**ALTITUDE:**  (FEET) Help

**REF. LENGTH:**  (FEET)

**FLIGHT SPEED:**  (Feet Per Second) Help Convert

**UNITS**

FEET  METERS

**PUSH TO UPDATE ALL VALUES**

---

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

**DENSITY:**  (Slugs Per Cubic Foot)

**REYNOLDS NUMBER:**

**PRESSURE:**  (Pounds Per Square Foot)

(Atmospheres)

**MACH NUMBER:**

**TEMPERATURE:**  (Degrees Fahrenheit)

(Degrees Rankine)

**DYNAMIC PRESSURE (Q):**  (Pounds Per Square Foot)

**CRITICAL CP (where Sonic flow appears):**

**SPEED OF SOUND:**  (Feet Per Second)

(Miles Per Hour)

(Knots)

**FRICITION COEFFICIENT (Assuming Laminar):**

**FRICITION COEFFICIENT (Assuming Turbulent):**

**VISCOSITY:**  (lb-sec / Foot^2)

### Virtual Wind Tunnel

**Angle Of Attack**

Degrees

**2D AERO Coefficient Summary**

Lift	Drag	Pitch Moment
0.000	0.0099	0.117
L/D: 0.0		Modify MRC

**PRESSURE Coefficient Summary**

Pressure Coefficient (MIN):

Pressure Coefficient (MAX):

Center Of Pressure (X/C):  % X/C

Select Airfoil For Analysis

**Drag Polar**

**Boundary Layer / Mach Parameters**

Reynolds Number:  ?

Compressibility effects: Mach Number:

Add insects to Leading Edge

**Plot Options**

Show Pitching moment Reference Center (MRC)

Show Center Of Pressure Location (COP)

Show Boundary Layer Transitions

Show Airfoil

**Trailing Edge Treatment**

Close Trailing Edge (Default)

Use Raw Trailing Edge (w/ gap)

**Pressure Coefficients** | **VW\_Freestream** | **Boundary Layers**

AOA = +6.594  
 ReN = 6.6x10^6  
 M = N/A  
 CL = +0.000  
 CM = +0.117  
 CD = 0.0099

NOTE: CL\_Max prediction for flapped airfoils is invalid.

-> Hold SHIFT And Drag Left Mouse  
 -> RIGHT-CLICK Mouse To DELETE P

Click and drag to select a new capture area



**Airfoil Assignments**

(Unless otherwise noted, all units are in feet.)

	Buttline: (span)	Chord:	Incidence:	C/4 Offset:
<input checked="" type="checkbox"/> Root Airfoil	MyAirfoil_2: this is v16 flipped ups	12	0	0
<input checked="" type="checkbox"/> Airfoil #1	MyAirfoil_2: this is v16 flipped ups	12	0	0
<input type="checkbox"/> Airfoil #2	MyAirfoil_2: this is v16 flipped ups			
<input type="checkbox"/> Airfoil #3	MyAirfoil_2: this is v16 flipped ups			
<input type="checkbox"/> Airfoil #4	MyAirfoil_2: this is v16 flipped ups			
<input type="checkbox"/> Airfoil #5	MyAirfoil_1: AH 80-140			

**Dihedral**  
 Degrees

**Mean Aerodynamic Info:**  
 Mean Chord:  Ft.  
 Span Location:  Ft.

**Resulting Parameters**  
 Wing Area:  Sq. Ft.  
 Wingspan:  Ft.  
 Aspect Ratio:   
 Taper Ratio:   
 MC Sweep:  Deg.

Actions ----->      Trailing Edge Thickness Inches

**3D Wing View**

Y-Axis View Rotation (not AOA)

Z-Axis View Rotation  
 (Drag box with left mouse button to zoom)

**WING LAYOUT NAME**

**NOTE: Stall is not predicted with this tool.**

My Airfoils (Long Term Storage) X

AH 80-140

**PUSH TO STORE STORAGE-1**

this is v16 flipped upside down AH 80

**PUSH TO STORE STORAGE-2**

GOE 505 AIRFOIL

**PUSH TO STORE STORAGE-3**

PG-11-04-20-v1

**PUSH TO STORE STORAGE-4**

PG-11-04-20-v1

**PUSH TO STORE STORAGE-5**

<--- EXPAND VIEW --->

**Standard Atmosphere Model**

**INPUTS**

**ALTITUDE:**  (FEET) Help

**REF. LENGTH:**  (FEET)

**FLIGHT SPEED:**  (Feet Per Second) Help Convert

**UNITS**

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

**SEND BACK REYNOLDS NUMBER**

**SEND BACK REYNOLDS NUMBER and SPEED**

---

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

**DENSITY:**  (Slugs Per Cubic Foot)

**PRESSURE:**  (Pounds Per Square Foot)  
 (Atmospheres)

**TEMPERATURE:**  (Degrees Fahrenheit)  
 (Degrees Rankine)

**SPEED OF SOUND:**  (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

**VISCOSITY:**  (lb-sec / Foot<sup>2</sup>)

**REYNOLDS NUMBER:**

**MACH NUMBER:**

**DYNAMIC PRESSURE (Q):**  (Pounds Per Square Foot)

**CRITICAL CP (where Sonic flow appears):**

**FRICTION COEFFICIENT (Assuming Laminar):**

**FRICTION COEFFICIENT (Assuming Turbulent):**

**WingCrafter(tm): Wing Layout & Preliminary Performance Tool**

Flow Conditions | Wing Layout | ANALYZE | Stall Speeds / W/S | CFD Export/Slice | CAD Export | WING Imp/Exp

**Atmospheric Conditions**

**UPDATE** Altitude:  Feet  
 Density:  Slugs/Cubic Foot  
 Temperature:  °F  
 Pressure:  Pounds/Square Foot  
 Dynamic Pressure:  PSF  
 Speed of Sound:  Feet Per Second  
 Viscosity:  (lb-sec / Ft<sup>2</sup>)

(Press the UPDATE button after changing ALTITUDE)

**Root Airfoil Reynolds Number and Velocity**  
(Note: Based on root chordlength from Wing Layout)

**Get From Atmospheric Model**

**Send Value To Virtual Wind Tunnel**

**Get Velocity From Reynolds Num**

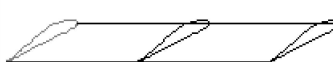
Feet Per Second

**Get From Atmospheric Model**

Resulting MACH NUMBER:

---

**3D Wing View**



Y-Axis View Rotation (not AOA)

(Slider)

Z-Axis View Rotation

(Drag box with left mouse button to zoom)

(Slider)

**RESET**

**WING LAYOUT NAME**


**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**


**Help** **Close**

**My Airfoils (Long Term Storage)**

**PUSH TO STORE STORAGE-1**



this is v16 flipped upside down AH 00-140 **PUSH TO STORE STORAGE-2**



**INPUTS**

**ALTITUDE:**  
 (FEET)

**REF. LENGTH:**  
 (FEET)

**FLIGHT SPEED:** (Feet Per Second)  
 [Help Convert](#)

[Help](#)

**UNITS**

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

**SEND BACK REYNOLDS NUMBER**

**SEND BACK REYNOLDS NUMBER and SPEED**

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

**DENSITY:**  
 (Slugs Per Cubic Foot)

**REYNOLDS NUMBER:**

**PRESSURE:**  
 (Pounds Per Square Foot)  
 (Atmospheres)

**MACH NUMBER:**

**TEMPERATURE:**  
 (Degrees Fahrenheit)  
 (Degrees Rankine)

**DYNAMIC PRESSURE (Q):**  
 (Pounds Per Square Foot)

**CRITICAL CP (where Sonic flow appears):**

**SPEED OF SOUND:**  
 (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

**FRICTION COEFFICIENT (Assuming Laminar):**

**FRICTION COEFFICIENT (Assuming Turbulent):**

**VISCOSITY:**  
 (lb-sec / Foot^2)

WingCrafter(tm): Wing Layout & Preliminary Performance Tool

Flow Conditions | **Wing Layout** | ANALYZE | Stall Speeds / W/S | CFD Export/Slice | CAD Export | WING Imp/Exp

**Airfoil Assignments**  
 (Unless otherwise noted, all units are in feet.)

	Buttline: (span)	Chord:	Incidence:	C/4 Offset:
<input checked="" type="checkbox"/> Root Airfoil	MyAirfoil_1: AH 80-140	6.5	0	0
<input checked="" type="checkbox"/> Airfoil #1	MyAirfoil_1: AH 80-140	22	0	0
<input type="checkbox"/> Airfoil #2	MyAirfoil_2: this is v16 flipped ups			
<input type="checkbox"/> Airfoil #3	MyAirfoil_2: this is v16 flipped ups			
<input type="checkbox"/> Airfoil #4	MyAirfoil_2: this is v16 flipped ups			
<input type="checkbox"/> Airfoil #5	MyAirfoil_1: AH 80-140			

Dihedral:  Degrees

**Mean Aerodynamic Info:**  
 Mean Chord:  Ft.  
 Span Location:  Ft.

**Resulting Parameters**  
 Wing Area:  Sq. Ft.  
 Wingspan:  Ft.  
 Aspect Ratio:   
 Taper Ratio:   
 C Sweep:  Deg.

Trailing Edge Thickness:  Inches

Actions ----->

**3D Wing View**

Y-Axis View Rotation (not AOA)

Z-Axis View Rotation  
 (Drag box with left mouse button to zoom)

**WING LAYOUT NAME**

**BUILD / ANALYZE**

NOTE: Stall is not predicted with this tool.

[Help](#) [Close](#)

My Airfoils (Long Term Storage)

<input type="text" value="AH 80-140"/> 	<b>PUSH TO STORE STORAGE-1</b>
<input type="text" value="this is v16 flipped upside down AH 80-140"/> 	<b>PUSH TO STORE STORAGE-2</b>

**INPUTS**

**ALTITUDE:**  
 (FEET)

**REF. LENGTH:**  
 (FEET)

**FLIGHT SPEED:**  
 (Feet Per Second)

**UNITS**

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

**SEND BACK REYNOLDS NUMBER**

**SEND BACK REYNOLDS NUMBER and SPEED**

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

**DENSITY:**  
 (Slugs Per Cubic Foot)

**PRESSURE:**  
 (Pounds Per Square Foot)  
 (Atmospheres)

**TEMPERATURE:**  
 (Degrees Fahrenheit)  
 (Degrees Rankine)

**SPEED OF SOUND:**  
 (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

**VISCOSITY:**  
 (lb-sec / Foot<sup>2</sup>)

**REYNOLDS NUMBER:**

**MACH NUMBER:**

**DYNAMIC PRESSURE (Q):**  
 (Pounds Per Square Foot)

**CRITICAL CP (where Sonic flow appears):**

**FRICTION COEFFICIENT (Assuming Laminar):**

**FRICTION COEFFICIENT (Assuming Turbulent):**

Flow Conditions | Wing Layout | **ANALYZE** | Stall Speeds / W/S | CFD Export/Slice | CAD Export | WING Imp/Exp

**Wing Analysis Options**

Assume elliptical lift degradation

Oswald Efficiency Factor:

**Root-Airfoil Angle Of Attack**


Degrees

**NOTE: Stall is not predicted with this tool.**

**BUILD / ANALYZE**

Drag RESULTS		Lift RESULTS		Moment RESULTS	
Frictional Drag:	<input type="text" value="36.31"/> Pounds	Total Lift Force (LBS):	<input type="text" value="3213.65"/>	Total Pitching Moment:	<input type="text" value="-959.24"/> FootPounds
Induced Drag:	<input type="text" value="200.98"/> Pounds	Total Lift Coefficient:	<input type="text" value="1.064"/>	Moment Coefficient:	<input type="text" value="-0.049"/>
TOTAL DRAG:	<input type="text" value="254.77"/> Pounds	L/D:	<input type="text" value="12.61"/>	<input checked="" type="radio"/> Referenced to Root Quarter Chord <input type="radio"/> Referenced to Root Nose <input type="radio"/> No Transfer (Debugging Only)	
Frictional Cd*S: <input type="text" value="3.44"/> Induced Cd*S: <input type="text" value="19.03"/> TOTAL Cd*S: <input type="text" value="24.12"/>					
Frictional Cd:	<input type="text" value="0.0120"/>				
Induced Cd:	<input type="text" value="0.0665"/>				
TOTAL Cd:	<input type="text" value="0.0843"/>				

**3D Wing View**



Y-Axis View Rotation (not AOA)


Z-Axis View Rotation  
 (Drag box with left mouse button to zoom)

**WING LAYOUT NAME**

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**

**My Airfoils (Long Term Storage)**



INPUTS

ALTITUDE:  (FEET)

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second)

[Help Convert](#)

[Help](#)

UNITS

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

SEND BACK REYNOLDS NUMBER

SEND BACK REYNOLDS NUMBER and SPEED

RESULTING ATMOSPHERIC AND PERFORMANCE VALUES

DENSITY:  (Slugs Per Cubic Foot)

PRESSURE:  (Pounds Per Square Foot)

(Atmospheres)

TEMPERATURE:  (Degrees Fahrenheit)

(Degrees Rankine)

SPEED OF SOUND:  (Feet Per Second)

(Miles Per Hour)

(Knots)

VISCOSITY:  (lb-sec / Foot^2)

REYNOLDS NUMBER:

MACH NUMBER:

DYNAMIC PRESSURE (Q):  (Pounds Per Square Foot)

CRITICAL CP (where Sonic flow appears):

FRICTION COEFFICIENT (Assuming Laminar):

FRICTION COEFFICIENT (Assuming Turbulent):

Airfoil Assignments

(Unless otherwise noted, all units are in feet.)

	Buttline: (span)	Chord:	Incidence:	C/4 Offset:
<input checked="" type="checkbox"/> Root Airfoil	<input type="text" value="0"/>	<input type="text" value="12"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input checked="" type="checkbox"/> Airfoil #1	<input type="text" value="2"/>	<input type="text" value="12"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #2	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #3	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #4	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #5	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Dihedral:  Degrees

Mean Aerodynamic Info:

Mean Chord:  Ft.

Span Location:  Ft.

Resulting Parameters

Wing Area:  Sq. Ft.

Wingspan:  Ft.

Aspect Ratio:

Taper Ratio:

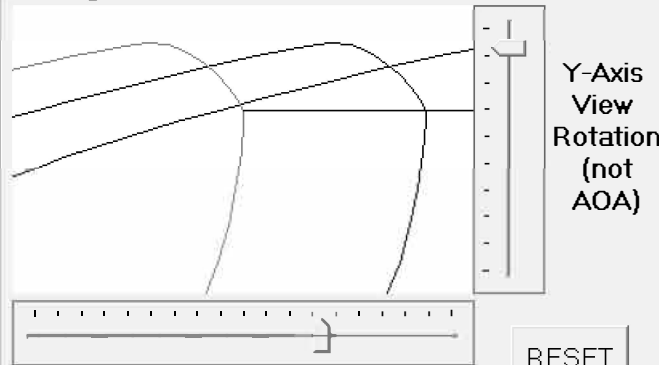
OC Sweep:  Deg.

Trailing Edge Thickness

Inches

Actions ----->

3D Wing View



(Drag box with left mouse button to zoom)

WING LAYOUT NAME

03-22 HeavyLift WING BODY

**BUILD / ANALYZE**

NOTE: Stall is not predicted with this tool.

[Help](#)

[Close](#)



**PUSH TO STORE STORAGE-1**



**PUSH TO STORE STORAGE-2**

INPUTS

ALTITUDE:  (FEET) Help

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second) Help Convert

UNITS

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

SEND BACK REYNOLDS NUMBER

SEND BACK REYNOLDS NUMBER and SPEED

RESULTING ATMOSPHERIC AND PERFORMANCE VALUES

DENSITY:  (Slugs Per Cubic Foot)

PRESSURE:  (Pounds Per Square Foot)  
 (Atmospheres)

TEMPERATURE:  (Degrees Fahrenheit)  
 (Degrees Rankine)

SPEED OF SOUND:  (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

VISCOSITY:  (lb-sec / Foot^2)

REYNOLDS NUMBER:

MACH NUMBER:

DYNAMIC PRESSURE (Q):  (Pounds Per Square Foot)

CRITICAL CP (where Sonic flow appears):

FRICTION COEFFICIENT (Assuming Laminar):

FRICTION COEFFICIENT (Assuming Turbulent):

- Flow Conditions
- Wing Layout
- ANALYZE
- Stall Speeds / W/S
- CFD Export/Slice
- CAD Export
- WING Imp/Exp

Atmospheric Conditions

Altitude:  Feet

Density:  Slugs/Cubic Foot

Temperature:  °F

Pressure:  Pounds/Square Foot

Dynamic Pressure:  PSF

Speed of Sound:  Feet Per Second

Viscosity:  (lb-sec / Ft^2)

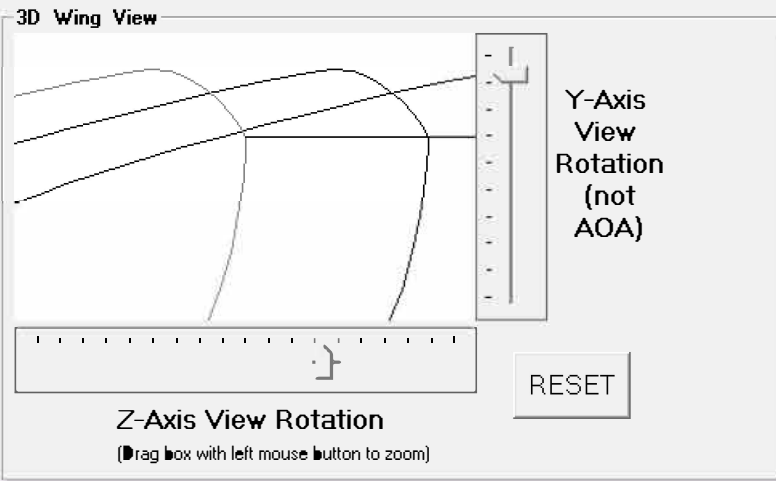
(Press the UPDATE button after changing ALTITUDE)

Root Airfoil Reynolds Number and Velocity

(Note: Based on root chordlength from Wing Layout)

Feet Per Second

Resulting MACH NUMBER:



WING LAYOUT NAME

NOTE: Stall is not predicted with this tool.

My Airfoils (Long Term Storage)

this is v16 flipped upside down AH 80-140

Standard Atmosphere Model

**INPUTS**

ALTITUDE:  (FEET) Help

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second) Help Convert

UNITS  
 FEET  
 METERS

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

DENSITY:  (Slugs Per Cubic Foot)

REYNOLDS NUMBER:

PRESSURE:  (Pounds Per Square Foot)  
 (Atmospheres)

MACH NUMBER:

TEMPERATURE:  (Degrees Fahrenheit)  
 (Degrees Rankine)

DYNAMIC PRESSURE (Q):  (Pounds Per Square Foot)

SPEED OF SOUND:  (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

CRITICAL CP (where Sonic flow appears):

FRICITION COEFFICIENT (Assuming Laminar):

FRICITION COEFFICIENT (Assuming Turbulent):

VISCOSITY:  (lb-sec / Foot^2)

**PUSH TO UPDATE ALL VALUES**

**SEND BACK REYNOLDS NUMBER**

**SEND BACK REYNOLDS NUMBER and SPEED**

WingCrafter(tm): Wing Layout & Preliminary Performance Tool

Flow Conditions | **Wing Layout** | ANALYZE | Stall Speeds / W/S | CFD Export/Slice | CAD Export | WING Imp/Exp

**Airfoil Assignments**  
 (Unless otherwise noted, all units are in feet.)

	Buttline: (span)	Chord:	Incidence:	C/4 Offset:
<input checked="" type="checkbox"/> Root Airfoil	<input type="text" value="0"/>	<input type="text" value="12"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input checked="" type="checkbox"/> Airfoil #1	<input type="text" value="2"/>	<input type="text" value="12"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #2	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #3	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #4	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #5	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Actions ----->

Dihedral:  Degrees

**Mean Aerodynamic Info:**  
 Mean Chord:  Ft.  
 Span Location:  Ft.

**Resulting Parameters**  
 Wing Area:  Sq. Ft.  
 Wingspan:  Ft.  
 Aspect Ratio:   
 Taper Ratio:   
 C Sweep:  Deg.

Trailing Edge Thickness:  Inches

**3D Wing View**

Y-Axis View Rotation (not AOA)

Z-Axis View Rotation  
 (Drag box with left mouse button to zoom)

WING LAYOUT NAME:

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**

My Airfoils (Long Term Storage)

INPUTS

ALTITUDE:  (FEET)

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second)

UNITS

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

RESULTING ATMOSPHERIC AND PERFORMANCE VALUES

DENSITY:  (Slugs Per Cubic Foot)

PRESSURE:  (Pounds Per Square Foot)

(Atmospheres)

TEMPERATURE:  (Degrees Fahrenheit)

(Degrees Rankine)

SPEED OF SOUND:  (Feet Per Second)

(Miles Per Hour)

(Knots)

VISCOSITY:  (lb-sec / Foot^2)

REYNOLDS NUMBER:

MACH NUMBER:

DYNAMIC PRESSURE (Q):  (Pounds Per Square Foot)

CRITICAL CP (where Sonic flow appears):

FRICITION COEFFICIENT (Assuming Laminar):

FRICITION COEFFICIENT (Assuming Turbulent):

- Flow Conditions
- Wing Layout
- ANALYZE**
- Stall Speeds / W/S
- CFD Export/Slice
- CAD Export
- WING Imp/Exp

Wing Analysis Options

Assume elliptical lift degradation

Oswald Efficiency Factor:

Root-Airfoil Angle Of Attack

Degrees

NOTE: Stall is not predicted with this tool.

Drag RESULTS

Frictional Drag:  Pounds

Induced Drag:  Pounds

TOTAL DRAG:  Pounds

---

Frictional Cd:

Induced Cd:

TOTAL Cd:

Frictional Cd\*S:

Induced Cd\*S:

TOTAL Cd\*S:

Lift RESULTS

Total Lift Force (LBS):

Total Lift Coefficient:

L/D:

Moment RESULTS

Total Pitching Moment:  FootPounds

Moment Coefficient:

Referenced to Root Quarter Chord

Referenced to Root Nose

No Transfer (Debugging Only)

3D Wing View

Y-Axis View Rotation (not AOA)

Z-Axis View Rotation (Drag box with left mouse button to zoom)

WING LAYOUT NAME

NOTE: Stall is not predicted with this tool.

AH 00-140

this is v16 flipped upside down AH 00



**INPUTS**

ALTITUDE:  (FEET)

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second)

**UNITS**

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

**SEND BACK REYNOLDS NUMBER**

**SEND BACK REYNOLDS NUMBER and SPEED**

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

**DENSITY:**  (Slugs Per Cubic Foot)

**PRESSURE:**  (Pounds Per Square Foot)  
 (Atmospheres)

**TEMPERATURE:**  (Degrees Fahrenheit)  
 (Degrees Rankine)

**SPEED OF SOUND:**  (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

**VISCOSITY:**  (lb-sec / Foot^2)

**REYNOLDS NUMBER:**

**MACH NUMBER:**

**DYNAMIC PRESSURE (Q):**  (Pounds Per Square Foot)

**CRITICAL CP (where Sonic flow appears):**

**FRICTION COEFFICIENT (Assuming Laminar):**

**FRICTION COEFFICIENT (Assuming Turbulent):**

Flow Conditions | **Wing Layout** | ANALYZE | Stall Speeds / W/S | CFD Export/Slice | CAD Export | WING Imp/Exp

**Airfoil Assignments**  
(Unless otherwise noted, all units are in feet.)

	Buttline: (span)	Chord:	Incidence:	C/4 Offset:
<input checked="" type="checkbox"/> Root Airfoil	<input type="text" value="0"/>	<input type="text" value="6.5"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input checked="" type="checkbox"/> Airfoil #1	<input type="text" value="22"/>	<input type="text" value="6.5"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #2	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
<input type="checkbox"/> Airfoil #3	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
<input type="checkbox"/> Airfoil #4	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
<input type="checkbox"/> Airfoil #5	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>

Dihedral:  Degrees

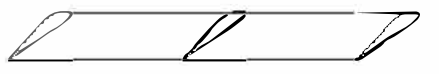
**Mean Aerodynamic Info:**  
Mean Chord:  Ft.  
Span Location:  Ft.

**Resulting Parameters**  
Wing Area:  Sq. Ft.  
Wingspan:  Ft.  
Aspect Ratio:   
Taper Ratio:   
C Sweep:  Deg.

Trailing Edge Thickness:  Inches

Actions ----->

**3D Wing View**



Y-Axis View Rotation (not AOA)

Z-Axis View Rotation  
(Drag box with left mouse button to zoom)

**WING LAYOUT NAME**

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**

**My Airfoils (Long Term Storage)**

**INPUTS**

**ALTITUDE:**  
 (FEET)

**REF. LENGTH:**  
 (FEET)

**FLIGHT SPEED:**  
 (Feet Per Second)

**UNITS**

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

**SEND BACK REYNOLDS NUMBER**

**SEND BACK REYNOLDS NUMBER and SPEED**

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

**DENSITY:**  
 (Slugs Per Cubic Foot)

**PRESSURE:**  
 (Pounds Per Square Foot)  
 (Atmospheres)

**TEMPERATURE:**  
 (Degrees Fahrenheit)  
 (Degrees Rankine)

**SPEED OF SOUND:**  
 (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

**VISCOSITY:**  
 (lb-sec / Foot<sup>2</sup>)

**REYNOLDS NUMBER:**

**MACH NUMBER:**

**DYNAMIC PRESSURE (Q):**  
 (Pounds Per Square Foot)

**CRITICAL CP (where Sonic flow appears):**

**FRICTION COEFFICIENT (Assuming Laminar):**

**FRICTION COEFFICIENT (Assuming Turbulent):**

- Flow Conditions
- Wing Layout
- ANALYZE
- Stall Speeds / W/S
- CFD Export/Slice
- CAD Export
- WING Imp/Exp

**Atmospheric Conditions**

Altitude:  Feet

Density:  Slugs/Cubic Foot

Temperature:  °F

Pressure:  Pounds/Square Foot

Dynamic Pressure:  PSF

Speed of Sound:  Feet Per Second

Viscosity:  (lb-sec / Ft<sup>2</sup>)

(Press the UPDATE button after changing ALTITUDE)

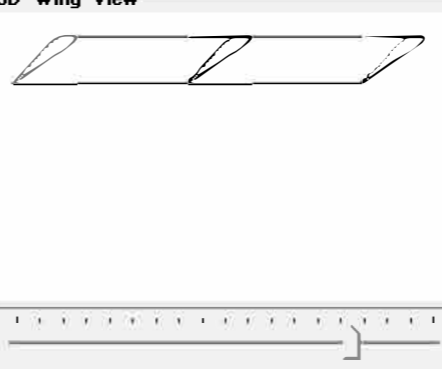
**Root Airfoil Reynolds Number and Velocity**

(Note: Based on root chordlength from Wing Layout)

Feet Per Second

Resulting MACH NUMBER:

**3D Wing View**



Y-Axis View Rotation (not AOA)



Z-Axis View Rotation

(Drag box with left mouse button to zoom)

**WING LAYOUT NAME**

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**



**INPUTS**

ALTITUDE:  (FEET) Help

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second) Help Convert

**UNITS**

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

SEND BACK REYNOLDS NUMBER

SEND BACK REYNOLDS NUMBER and SPEED

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

**DENSITY:**  (Slugs Per Cubic Foot)

**PRESSURE:**  (Pounds Per Square Foot)  
 (Atmospheres)

**TEMPERATURE:**  (Degrees Fahrenheit)  
 (Degrees Rankine)

**SPEED OF SOUND:**  (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

**VISCOSITY:**  (lb-sec / Foot^2)

**REYNOLDS NUMBER:**

**MACH NUMBER:**

**DYNAMIC PRESSURE (Q):**  (Pounds Per Square Foot)

**CRITICAL CP (where Sonic flow appears):**

**FRICITION COEFFICIENT (Assuming Laminar):**

**FRICITION COEFFICIENT (Assuming Turbulent):**

Flow Conditions | **Wing Layout** | ANALYZE | Stall Speeds / W/S | CFD Export/Slice | CAD Export | WING Imp/Exp

**Airfoil Assignments**  
(Unless otherwise noted, all units are in feet.)

	Buttline: (span)	Chord:	Incidence:	C/4 Offset:
<input checked="" type="checkbox"/> Root Airfoil	MyAirfoil_1: AH 80-140	6.5	0	0
<input checked="" type="checkbox"/> Airfoil #1	MyAirfoil_1: AH 80-140	22	6.5	0
<input type="checkbox"/> Airfoil #2	MyAirfoil_2: this is v16 flipped ups			
<input type="checkbox"/> Airfoil #3	MyAirfoil_2: this is v16 flipped ups			
<input type="checkbox"/> Airfoil #4	MyAirfoil_2: this is v16 flipped ups			
<input type="checkbox"/> Airfoil #5	MyAirfoil_1: AH 80-140			

Dihedral:  Degrees

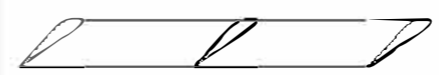
**Mean Aerodynamic Info:**  
Mean Chord:  Ft.  
Span Location:  Ft.

**Resulting Parameters**  
Wing Area:  Sq. Ft.  
Wingspan:  Ft.  
Aspect Ratio:   
Taper Ratio:   
C Sweep:  Deg.

Trailing Edge Thickness:  Inches

Actions -----> EVENLY EVENLY EVENLY Zeros

**3D Wing View**



Y-Axis View Rotation (not AOA)

Z-Axis View Rotation (Drag box with left mouse button to zoom)

RESET

**WING LAYOUT NAME**


BUILD / ANALYZE

NOTE: Stall is not predicted with this tool.


Help Close

My Airfoils (Long Term Storage)

PUSH TO STORE STORAGE-1



PUSH TO STORE STORAGE-2



**INPUTS**

**ALTITUDE:**  
 (FEET)

**REF. LENGTH:**  
 (FEET)

**FLIGHT SPEED:**  
 (Feet Per Second)

**UNITS**

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

**DENSITY:**  
 (Slugs Per Cubic Foot)

**PRESSURE:**  
 (Pounds Per Square Foot)  
 (Atmospheres)

**TEMPERATURE:**  
 (Degrees Fahrenheit)  
 (Degrees Rankine)

**SPEED OF SOUND:**  
 (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

**VISCOSITY:**  
 (lb-sec / Foot^2)

**REYNOLDS NUMBER:**

**MACH NUMBER:**

**DYNAMIC PRESSURE (Q):**  
 (Pounds Per Square Foot)

**CRITICAL CP (where Sonic flow appears):**

**FRICTION COEFFICIENT (Assuming Laminar):**

**FRICTION COEFFICIENT (Assuming Turbulent):**

- Flow Conditions
- Wing Layout
- ANALYZE**
- Stall Speeds / W/S
- CFD Export/Slice
- CAD Export
- WING Imp/Exp

**Wing Analysis Options**

Assume elliptical lift degradation

Oswald Efficiency Factor:

**Root-Airfoil Angle Of Attack**

Degrees

**NOTE: Stall is not predicted with this tool.**

**Drag RESULTS**

Frictional Drag:  Pounds

Induced Drag:  Pounds

**TOTAL DRAG:**  Pounds

---

Frictional Cd:

Induced Cd:

**TOTAL Cd:**

**Root-Airfoil Angle Of Attack**

Frictional Cd\*S:

Induced Cd\*S:

**TOTAL Cd\*S:**

**Lift RESULTS**

Total Lift Force (LBS):

Total Lift Coefficient:

L/D:

**Moment RESULTS**

Total Pitching Moment:  FootPounds

Moment Coefficient:

Referenced to Root Quarter Chord

Referenced to Root Nose

No Transfer (Debugging Only)

**3D Wing View**

Y-Axis View Rotation (not AOA)

Z-Axis View Rotation

(Drag box with left mouse button to zoom)

**WING LAYOUT NAME**

**NOTE: Stall is not predicted with this tool.**

Standard Atmosphere Model

**INPUTS**

ALTIMITUDE:  (FEET) Help

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second) Help Convert

**UNITS**

FEET  METERS

**PUSH TO UPDATE ALL VALUES**

**SEND BACK REYNOLDS NUMBER**

**SEND BACK REYNOLDS NUMBER and SPEED**

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

**DENSITY:**  (Slugs Per Cubic Foot)

**PRESSURE:**  (Pounds Per Square Foot)  
 (Atmospheres)

**TEMPERATURE:**  (Degrees Fahrenheit)  
 (Degrees Rankine)

**SPEED OF SOUND:**  (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

**VISCOSITY:**  (lb-sec / Foot<sup>2</sup>)

**REYNOLDS NUMBER:**

**MACH NUMBER:**

**DYNAMIC PRESSURE (Q):**  (Pounds Per Square Foot)

**CRITICAL CP (where Sonic flow appears):**

**FRICTION COEFFICIENT (Assuming Laminar):**

**FRICTION COEFFICIENT (Assuming Turbulent):**

WingCrafter(tm): Wing Layout & Preliminary Performance Tool

Flow Conditions | **Wing Layout** | ANALYZE | Stall Speeds / W/S | CFD Export/Slice | CAD Export | WING Imp/Exp

**Airfoil Assignments**  
(Unless otherwise noted, all units are in feet.)

	Buttline: (span)	Chord:	Incidence:	C/4 Offset:
<input checked="" type="checkbox"/> Root Airfoil	<input type="text" value="0"/>	<input type="text" value="12"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input checked="" type="checkbox"/> Airfoil #1	<input type="text" value="2"/>	<input type="text" value="12"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #2	<input type="text" value="MyAirfoil_2: this is v16 flipped ups"/>			
<input type="checkbox"/> Airfoil #3	<input type="text" value="MyAirfoil_2: this is v16 flipped ups"/>			
<input type="checkbox"/> Airfoil #4	<input type="text" value="MyAirfoil_2: this is v16 flipped ups"/>			
<input type="checkbox"/> Airfoil #5	<input type="text" value="MyAirfoil_1: AH 80-140"/>			

Actions ----->

**Dihedral:**  Degrees

**Mean Aerodynamic Info:**  
Mean Chord:  Ft.  
Span Location:  Ft.

**Resulting Parameters**  
Wing Area:  Sq. Ft.  
Wingspan:  Ft.  
Aspect Ratio:   
Taper Ratio:   
C Sweep:  Deg.

**Trailing Edge Thickness:**  Inches

**3D Wing View**

Y-Axis View Rotation (not AOA)

Z-Axis View Rotation (Drag box with left mouse button to zoom)

**WING LAYOUT NAME:**

**BUILD / ANALYZE**

**NOTE: Stall is not predicted with this tool.**

Help Close

My Airfoils (Long Term Storage)

INPUTS

ALTITUDE:  (FEET)

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second)

UNITS

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

RESULTING ATMOSPHERIC AND PERFORMANCE VALUES

DENSITY:  (Slugs Per Cubic Foot)

PRESSURE:  (Pounds Per Square Foot)

(Atmospheres)

TEMPERATURE:  (Degrees Fahrenheit)

(Degrees Rankine)

SPEED OF SOUND:  (Feet Per Second)

(Miles Per Hour)

(Knots)

VISCOSITY:  (lb-sec / Foot^2)

REYNOLDS NUMBER:

MACH NUMBER:

DYNAMIC PRESSURE (Q):  (Pounds Per Square Foot)

CRITICAL CP (where Sonic flow appears):

FRICTION COEFFICIENT (Assuming Laminar):

FRICTION COEFFICIENT (Assuming Turbulent):

Flow Conditions

Wing Layout

ANALYZE

Stall Speeds / W/S

CFD Export/Slice

CAD Export

WING Imp/Exp

Atmospheric Conditions

Altitude:  Feet

Density:  Slugs/Cubic Foot

Temperature:  °F

Pressure:  Pounds/Square Foot

Dynamic Pressure:  PSF

Speed of Sound:  Feet Per Second

Viscosity:  (lb-sec / Ft^2)

(Press the UPDATE button after changing ALTITUDE)

Root Airfoil Reynolds Number and Velocity

(Note: Based on root chordlength from Wing Layout)

Feet Per Second

Resulting MACH NUMBER:

3D Wing View



Y-Axis View Rotation (not AOA)

Z-Axis View Rotation

Z-Axis View Rotation

(Drag box with left mouse button to zoom)

WING LAYOUT NAME

NOTE: Stall is not predicted with this tool.

AH 00-140



this is v10 flipped upside down AH 00



Standard Atmosphere Model

**INPUTS**

ALTITUDE:  (FEET) Help

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second) Help Convert

UNITS  
 FEET  
 METERS

**RESULTING ATMOSPHERIC AND PERFORMANCE VALUES**

DENSITY:  (Slugs Per Cubic Foot)

PRESSURE:  (Pounds Per Square Foot)  
 (Atmospheres)

TEMPERATURE:  (Degrees Fahrenheit)  
 (Degrees Rankine)

SPEED OF SOUND:  (Feet Per Second)  
 (Miles Per Hour)  
 (Knots)

VISCOSITY:  (lb-sec / Foot^2)

REYNOLDS NUMBER:

MACH NUMBER:

DYNAMIC PRESSURE (Q):  (Pounds Per Square Foot)

CRITICAL CP (where Sonic flow appears):

FRICTION COEFFICIENT (Assuming Laminar):

FRICTION COEFFICIENT (Assuming Turbulent):

**PUSH TO UPDATE ALL VALUES**

SEND BACK REYNOLDS NUMBER

SEND BACK REYNOLDS NUMBER and SPEED

WingCrafter(tm): Wing Layout & Preliminary Performance Tool

Flow Conditions | **Wing Layout** | ANALYZE | Stall Speeds / W/S | CFD Export/Slice | CAD Export | WING Imp/E xp

**Airfoil Assignments**  
 (Unless otherwise noted, all units are in feet.)

	Buttline: (span)	Chord:	Incidence:	C/4 Offset:
<input checked="" type="checkbox"/> Root Airfoil	<input type="text" value="0"/>	<input type="text" value="12"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input checked="" type="checkbox"/> Airfoil #1	<input type="text" value="2"/>	<input type="text" value="12"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="checkbox"/> Airfoil #2	<input type="text" value="MyAirfoil_2: this is v16 flipped ups"/>			
<input type="checkbox"/> Airfoil #3	<input type="text" value="MyAirfoil_2: this is v16 flipped ups"/>			
<input type="checkbox"/> Airfoil #4	<input type="text" value="MyAirfoil_2: this is v16 flipped ups"/>			
<input type="checkbox"/> Airfoil #5	<input type="text" value="MyAirfoil_1: AH 80-140"/>			

Actions ----->

**Dihedral**  
 Degrees

**Mean Aerodynamic Info:**  
 Mean Chord:  Ft.  
 Span Location:  Ft.

**Resulting Parameters**  
 Wing Area:  Sq. Ft.  
 Wingspan:  Ft.  
 Aspect Ratio:   
 Taper Ratio:   
 Sweep:  Deg.

**Trailing Edge Thickness**  
 Inches

**3D Wing View**

Y-Axis View Rotation (not AOA)

Z-Axis View Rotation (Drag box with left mouse button to zoom)

WING LAYOUT NAME

**BUILD / ANALYZE**

NOTE: Stall is not predicted with this tool.

Help Close

My Airfoils (Long Term Storage)

INPUTS

ALTITUDE:  (FEET)

REF. LENGTH:  (FEET)

FLIGHT SPEED:  (Feet Per Second)

UNITS

FEET

METERS

**PUSH TO UPDATE ALL VALUES**

RESULTING ATMOSPHERIC AND PERFORMANCE VALUES

DENSITY:  (Slugs Per Cubic Foot)

PRESSURE:  (Pounds Per Square Foot)

(Atmospheres)

TEMPERATURE:  (Degrees Fahrenheit)

(Degrees Rankine)

SPEED OF SOUND:  (Feet Per Second)

(Miles Per Hour)

(Knots)

VISCOSITY:  (lb-sec / Foot^2)

REYNOLDS NUMBER:

MACH NUMBER:

DYNAMIC PRESSURE (Q):  (Pounds Per Square Foot)

CRITICAL CP (where Sonic flow appears):

FRICITION COEFFICIENT (Assuming Laminar):

FRICITION COEFFICIENT (Assuming Turbulent):

Wing Analysis Options

Assume elliptical lift degradation

Oswald Efficiency Factor:

Root-Airfoil Angle Of Attack

Degrees

NOTE: Stall is not predicted with this tool.

Drag RESULTS

Frictional Drag:  Pounds

Induced Drag:  Pounds

TOTAL DRAG:  Pounds

Frictional Cd:

Induced Cd:

TOTAL Cd:

Frictional Cd\*S

Induced Cd\*S

TOTAL Cd\*S

Lift RESULTS

Total Lift Force (LBS):

Total Lift Coefficient:

L/D:

Moment RESULTS

Total Pitching Moment:  FootPounds

Moment Coefficient:

Referenced to Root Quarter Chord

Referenced to Root Nose

No Transfer (Debugging Only)

3D Wing View

Y-Axis View Rotation (not AOA)

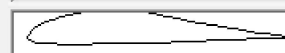
Z-Axis View Rotation

(Drag box with left mouse button to zoom)

WING LAYOUT NAME

NOTE: Stall is not predicted with this tool.

AH 00-140



this is v16 flipped upside down AH 00





DAT, DF & DXF Airfoil File Importer

**FILE OPERATIONS:**

no modifications of ah00140 by pg v3.dat  
 shrunk by one half ah00140 by pg v10.dat  
 v11 shrunk by one half ah00140 by pg.dat  
 v12 shrunk by one half ah00140 by pg.dat  
 v13 shrunk by one half ah00140 by pg.dat  
 v14 shrunk by one half ah00140 by pg.dat  
 v15 shrunk by one half ah00140 by pg.dat  
 v16 shrunk by one half ah00140 by pg.dat  
 v17 flipped upside down using v16 shrunk by o

**File Properties**

Raw Chordlength: 1.000  
 Raw Percent Thickness: 27.104%

**Number Of Points**

Upper	Lower	Total
0000	0000	71

Force Thickness? 12

**Import Fixes**

Force Thickness?

**Spline Options**

Use Raw Points  
 Use R-Spline  
 Use Alt-Spline  
 Alt Nose

**File Error Summary**

No duplicates found.

**Notes About Airfoil From Imported File**

this is v16 flipped upside down AH 00-136: v16 shrunk by one half ah00140 by pg.dat

-> Drag A Box With Left Mouse to ZOOM In  
 -> Hold SHIFT And Drag Left Mouse to PAN  
 -> RIGHT-CLICK Mouse To DELETE Point

v17 flipped upside down usin...

File Edit Format View Help

this is v16 flipped upside down AH 00-136: v16 shrunk by one half ah00140 by pg.dat

12.000000	-0.010500
11.975050	-0.074419
11.903500	-0.212540
11.783700	-0.361240
11.617410	-0.511253
11.405010	-0.666773
11.150690	-0.830751
10.854100	-0.996769
10.510430	-1.159511
10.146380	-1.324490
9.740939	-1.486965
9.305382	-1.633533
8.843212	-1.774715
8.358150	-1.905527
7.854102	-2.017770
7.335126	-2.122035
6.805399	-2.208562
6.269189	-2.279073
5.730811	-2.340101
5.194601	-2.379156
4.664874	-2.413596
4.145898	-2.427242
3.641050	-2.437337
3.156700	-2.427007
2.694618	-2.417165
2.259061	-2.351937
1.853624	-2.230100
1.481571	-2.061065
1.145890	-1.846442
0.849307	-1.591736
0.594187	-1.308770
0.382591	-1.004915
0.216223	-0.689592
0.096422	-0.377724
0.024154	-0.102690
0.000000	0.000000
0.024154	0.026470
0.096422	0.105699
0.216223	0.221410
0.382591	0.355412
0.594187	0.495004
0.849307	0.623340
1.145890	0.726457
1.481571	0.791065
1.853624	0.806005
2.259061	0.810047
2.694618	0.815664
3.156788	0.815404
3.641850	0.815131
4.145898	0.810573
4.664874	0.805213
5.194601	0.795004
5.730811	0.785651
6.269189	0.771250
6.805399	0.754767
7.335126	0.734737
7.854102	0.710022
8.358150	0.685052
8.843212	0.654446
9.305382	0.620020
9.740939	0.583145
10.146380	0.539036
10.510430	0.492576
10.854100	0.445650
11.150690	0.397145
11.405010	0.346404
11.617410	0.293219
11.783700	0.232477
11.903500	0.153771
11.975050	0.059369
12.000000	0.010500

Ln 1, C 100% Windows (CRLF) UTF-8

v17 flipped upside ...

File Edit Format View Help

1.853624	-2.230100
1.481571	-2.061065
1.145890	-1.846442
0.849307	-1.591736
0.594187	-1.308770
0.382591	-1.004915
0.216223	-0.689592
0.096422	-0.377724
0.024154	-0.102690
0.000000	0.000000
0.024154	0.026470
0.096422	0.105699
0.216223	0.221410
0.382591	0.355412
0.594187	0.495004
0.849307	0.623340
1.145890	0.726457
1.481571	0.791065
1.853624	0.806005
2.259061	0.810047
2.694618	0.815664
3.156788	0.815404
3.641850	0.815131
4.145898	0.810573
4.664874	0.805213
5.194601	0.795004
5.730811	0.785651
6.269189	0.771250
6.805399	0.754767
7.335126	0.734737
7.854102	0.710022
8.358150	0.685052
8.843212	0.654446
9.305382	0.620020
9.740939	0.583145
10.146380	0.539036
10.510430	0.492576
10.854100	0.445650
11.150690	0.397145
11.405010	0.346404
11.617410	0.293219
11.783700	0.232477
11.903500	0.153771
11.975050	0.059369
12.000000	0.010500

100% Windows (CRLF) UTF-8

Airfoil Construction Parameters (COMMON)

**Point Distribution**  
 Dense Endpoints

**Number Of Points**  
 71

**Thickness Increments**  
 1.00

**Coordinate Values**  
 X/C: 96.01% Y/C: 2.44%

**Construction Method**  
 Standard NACA

**Draw Elements**  
 Surface Points  
 Camber Lines

**Normalized Chordlength?**  
 Normalize to 1.0

**HELP**

My Airfoils (Long Term Storage)

AH 00-140  

 PUSH TO STORE STORAGE-1

this is v16 flipped upside down AH 00-136  

 PUSH TO STORE STORAGE-2

GOE 500 AIRFOIL  

 PUSH TO STORE STORAGE-3

PG-11-04-20-v1  

 PUSH TO STORE STORAGE-4

PG-11-04-20-v1  

 PUSH TO STORE STORAGE-5

new capture area

<--- EXPAND VIEW --->

Pump and Motor Calculations  
Level Flying at Altitude 9000 ft Engine @ 96.24%

Drone Wt

Drone 2100lbs + 89.4 gal fuel(600lbs) + 500lbs payload) = 3200 lbs

Altitude 9000ft Density 0.9334 Kg/m<sup>3</sup>

Prop: 1743 rpm, 32 m/sec, 28 kW, 576 N, 151 Nm

WING Considerations

2 WINGS: chord 6.5ft, length each 22ft, Airfoil AH 80-140

Airspeed 108 ft/sec, 32 m/sec, 73.6 mph Lift 3200 lbs

Angle of Attack (AOA) 9.4 deg, drag 254lbs, moment - 959lbs

1 BODY: Airspeed same as WINGS

AOA 6.594 deg, Lift 0.01lbs, drag 5lbs, moment +515lbs

Total drag = (254+5)= 259lbs= 1152 N

Plan use of 2 props for level flying, 1152÷2= 576 N per prop

PROP data: 1743 rpm, 31.95 m/s, 29kW, 616 N, 158 Nm

1743 rpm, 34.86 m/s, 24kW, 457 N, 131 Nm

By interpolation: 32m/s, 28 kW, 576 N, 151 Nm

$$\text{Motor } \frac{(151)(63)}{(59.8)(0.95)} = 167.4 \text{ Bar}$$

$$\text{Pump } \frac{(40)(167.4)}{(63)(0.95)} = 111.8 \text{ Nm}$$

$$\text{Motor } q = \frac{(59.8)(1743)}{(1000)(0.95)} = 110 \text{ L/min (2 props) } 110 \times 2 = 220 \text{ L/min}$$

# Pump and Motor Calculations

## Level Flying at Altitude 9000 ft Engine @ 96.24%

### Drone Wt

Drone 2100lbs + 89.4 gal fuel(600lbs) + 500lbs payload) = 3200 lbs

Altitude 9000ft Density 0.9334 Kg/m<sup>3</sup>

Prop: 1743 rpm, 32 m/sec, 28 kW, 576 N, 151 Nm

The configuration is that 3 pumps are connected to the main output shaft of the jet engine. At engine power setting of 100%, this output shaft turns at 6016 rpm. Two of the pumps are the F12-110 size, the third pump is the F12-40 size. The F12-110's are geared with 25:45 (ratio 0.53) for one, and 25:40 (ratio 0.60) for the other. The F12-40 pump is directly connected to the main output shaft.

The CPU controls which pumps are creating the pressurized fluid flow that goes to the hydraulic motors that spin the propellers. Also, the CPU individually and separately controls the specific fluid flow rate values for each motor-propeller unit.

For level flying at 9000ft altitude the engine is set to 96.24% power

$$(6016 \text{ rpm})(0.9624) = 5789.8 \text{ rpm}$$

$$\text{Pump } q = \frac{(40)(5789.8)(.95)}{1000} = 220 \text{ L/min} \quad \text{Pump } m = 111.8 \text{ Nm}$$

$$\text{Engine Power: } 5789.8 \text{ rpm @ } 111.8 \text{ Nm} = 67.7 \text{ kW} = 90.8 \text{ HP}$$

$$\text{Engine Specific Fuel Consumption (SFC)} = 0.7 \text{ lbs fuel/Hr-HP}$$

$$(90.8 \text{ HP}) \times (0.7 \text{ lbs fuel/Hr-HP}) = 63.56 \text{ lbs/hr} = \text{Fuel use level flying}$$