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Wing Aerodynamics for Maximum-Weight Configuration

This set of calculations are for the maximum weight configuration of 9.788 RTF weight. This includes the optional telemetry system (6.0oz) and a second 2S3.3AH LiPO battery with cable (7.5oz). These add 13.5oz (0.844_lb).

Useful wing area: 12.4" chord x (120"-4" fuse -4" skids) = 12.4 x 112" = 1388.8 sq-in. wetted (0.8960m^2)
Reynolds number is approx 250k for 12.4" chord and ~25.72MPH
From Airtools.com for Clark YH airfoil, and ajtools.com for lift calculations:
http://www.ajdesigner.com/phpwinglift/wing_lift_equation_surface_velocity.php

Alpha	Cl	Cd	L/D	Velocity to lift 9.778_lb (MPH)	(m/s)	
-3	0	.02	0	infinite		
0	.4	.02	20	31.50	14.08	
1	.5	.017	34	28.18	12.60	
2	.6	.015	40	25.72	11.50	<-- Operate here at 2 degree AOA at ~25.72MPH
3	.7	.016	42	23.81	10.65	
4	.8	.018	44	22.28	9.96	
5	.9	.019	46	21.00	9.39	
6	.95	.02	47	20.44	9.14	
7	1.07	.021	51	19.26	8.61	
8	1.10	.023	48	19.00	8.49	Near stall AOA! 19.25MPH

Airspeed Equations from AJDesigner.com

Lift (in Newtons) = 1/2 (Cl * Air Density(in Kg/Cu-M) * $V(M/s)^2$ * Area(sq-meters)
where Air density is $1.225 kg/M^3$
and:
Velocity in meters per second = SQRT [(2 * Lift in Newtons)/(Cl * Air density in Kg/ M^3 * Area in sq meters)]

Finite Aspect Ratio Lift Over Drag

Cd = Cd(zero lift) + [Cl^2 / (3.1415 * Aspect Ratio * e)]
For rectangular wing, e=0.70 per https://www.grc.nasa.gov/www/k-12/airplane/induced.html
From airtools.com, pick airfoil and then find its Cd(zero lift) and its Cl at the operating angle of attack.
For the Clark-YH airfoil, Cd(zero lift) is .012 and Cl = .6 at 2 degrees AOA.
Aspect Ratio is 120"/12.4" = 9.68
So, Cd(finite aspect ratio) = .012 + ($.6^2$ / (3.1415 * 9.68 * 0.7) = .012 + 0.0169 = .0289
Now compute the actual wing's Lift / Drag:
Cl /Cd(finite span) = .6 / .0289 = 20.76 = The Wing's Finite-Span Lift/Drag Ratio

Wing Drag (in Newtons) = 1/2 (Cdfar * Air Density(in Kg/Cu-M) * $V(M/s)^2$ * Area(sq-meters)
= .5 (.0289 * 1.225 * 11.50 * 11.50 * 0.896) = 2.098 Newtons
Wing Drag = 2.098N = 0.472 pounds-force for finite span wing at 25.72MPH