



How to look up component parameters

1. Find a Lithium Polymer (LiPo) battery with Voltage between 10 and 25 Volts and a C rating between 30 and 60.
 - a. Put a link to your battery and list out its values (mAh, C, V, Dimensions)
2. Find a brushless motor with a Kv rating between 200 to 700 and an internal stator size between 4000 and 7000.
 - a. Put a link to your motor and list out its values (Kv, stator size)

Apply Equations to your setup

3. Battery Parameters
 - a. What is the max current draw of your battery? [Amps]
 - b. How long could your battery last while under a load of 2 amps? [hours, minutes]
 - c. What is the power capacity of your battery? [Wh]
 - d. What is the energy density of your battery? [Wh/kg]
 - e. How many batteries would you have to put in series to get a voltage of above 50 volts? [#]
4. Motor Parameters
 - a. What is the maximum power of your motor? [W]
 - b. What is the maximum amp draw from your battery to this motor? [Amps]
 - c. What RPM is this motor most efficient? [RPM]
 - d. What torque can this motor produce at 20 amps? [Nm & lbf-ft]
5. Other Ways
 - a. How would you go about *physically* testing the efficiency of your motor/battery setup?
 - b. What function does the ESC do in the propulsion circuit?

Flight Performance

Last year's plane had the following specs:

15 [lbs] gross takeoff weight

0.28 [Cl] Coefficient of Lift

0.03822 [Cd] Coefficient of Drag

0.46 [m²] Wing Area

0.956 [kg/m³] Air Density (Tucson, AZ)

6. What is the minimum airspeed to fly? Aka, what is the V_{stall}? [m/s]
7. How much thrust is required in steady level flight? [N & lbf]
8. In a banked turn of 10 degrees, what is the n-loading? [g's]
9. In a 2.5-g banked turn, what is the angular velocity of the aircraft? [deg/s]
10. For takeoff, we assume a 80amp draw gives us 4 lbf of thrust. Assuming constant acceleration and negligible air resistance at low speeds, what is the takeoff distance of our aircraft?



Varying Parameters

11. As Power Capacity rises, what typically happens to the weight? What does this imply about the energy density?
12. You may have noticed that LiPo batteries are sorted by their “S” value. This value indicates their voltage. How much is one “S” of voltage?