$$FS = 80 * \frac{\sqrt{W_{payload} * Bonus}}{T_{Flight}}$$

$$Bonus = 0.5 + (1.0 * N_L) + (0.4 * N_{Small})$$

Short take off

Max- speed

external payload carriage

internal payload carriage

rapid unloading of the payloads.

→ Maximum wing span 48"

→ Maximum of 4 cells

→ Gyroscope allowed

→ 450 watt power limiter

1 ounce = 0.0625 lbs

(L-Box) ⇒ 6 ounces = 0.375 lbs

2 Boxes ⇒ 12 ounces = 0.75 lbs → 340 grms

50 grms = 0.111 lbs

500 grms = 1.11 lbs

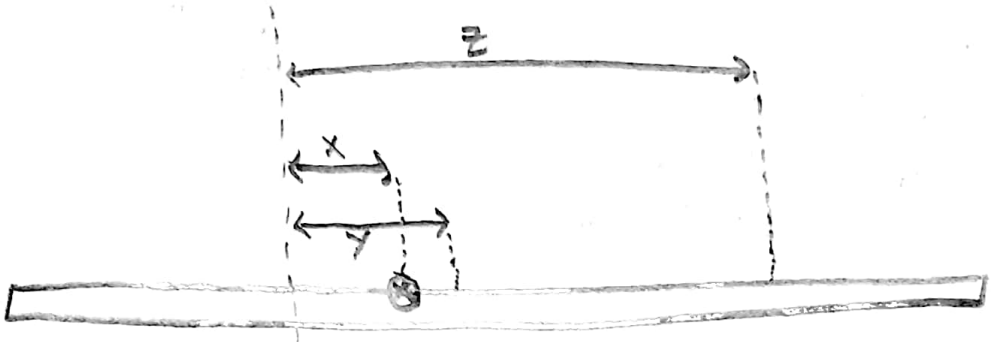
est. Payload plate = 500grms = 1.11 lbs

total payload weight = 1.86 lbs ≈ 844 grms

Propulsion system design

Structural Design

Weight Balance [28% to 35% Mean Aerodynamic chord]



M = original mass

m = mass to be added or removed

X = original C.G distance from datum

Y = Final C.G distance from the datum after adding or removing mass.

Z = distance from the datum that the mass is to be added or removed.

when adding mass : $(M+m)Y = MX + mz$

when removing mass : $(M-m)Y = MX - mz$

→ Shear Force and Bending moment along the semi-span of the wing to be calculated

→ Aerodynamic center to be calculated [geometric approach]
This allows us to find out where we should set the shear center for our idealized shear box.

→ Designing the idealized shear box

→ Shear center was intentionally designed to be at the location where the resultant shear force acts at the aerodynamic center location that was found earlier.
(* to avoid any twist on the wing)

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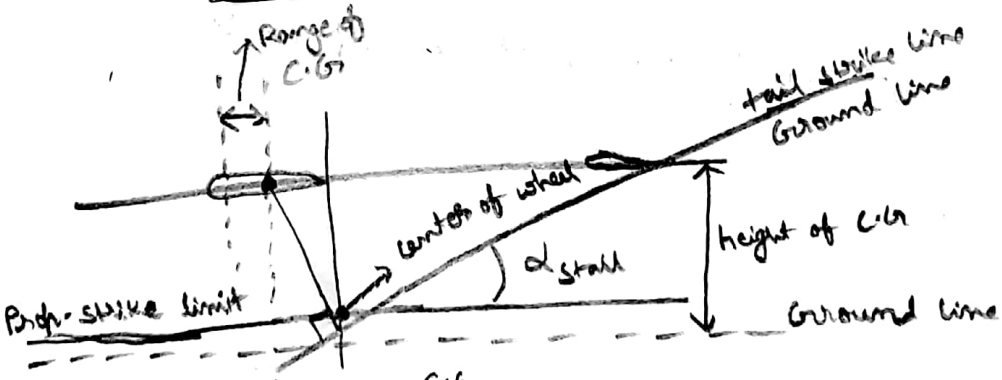
landing gear (tricycle).



→ Know the range of your C.G
→ Know the highest vertical C.G location at the aft CG limit
→ Draw the prop strike limit
→ Draw the tail strike line as well as ground line with the stall angle of attack.
→ Draw a line through the center of gravity normal to the tail strike line.

→ Starting from the intersection of normal line and tail-strike line draw the vertical line.

→ Now the intersection between vertical line and front strike limit is where the center of the wheel be placed.

→ To position the nose landing gear you should know that if too much nose side load can make the airplane harder to rotate for the lift off.

→ And too lighter load will make steering the aircraft harder.

So usually nose landing gear should be placed where it carries less than 20% of the aircraft weight when the CG is at the forward limit. And more than 10% of the aircraft weight on the CG is at the aft limit.