3/27/2023

Version 4 - MagnusCopter

* high torque, 12000 RPM motors, 2.3 mm shaft DC 6-12V

~90 grams

* Red capped

16g

$L = \rho 2\pi r b 2\pi r b s v$, where ρ = density of air, b = radius of cylinder, s = rev/sec

$\rho 4\pi^2 b^2 s v$

$4\rho\pi^2 = 0.093836$ | $\rho = 0.00237$ slugs/ft^3

Version 4

Structure Redesign w/ emphasis on Rigidity | Version 2 Airframe

Theoretical weight analysis — 48 grams (yes, really)

16g motor → 90 gram motor, +74 grams — −16g (motor)

4-5x heavier airframe, 160 grams ← = 32 × 5 (BeeTop)

→ keeping wheel from version 2 → 75 grams

* 160 + 90 + 75 ⇒ 325 grams not Bad!

+15% ⇒ 373 grams good

L = weight in pounds

* 373 grams = 0.822324 lb, 0.25' radius

→ $L = (0.093836) \cdot b^2 \cdot s \cdot v$ where b = radius in ft, s = rev/sec

* v = 7.09 ft/sec (CFM, Lasko brand 20" Box fan) v = speed of airflow in ft/sec

* $L = (0.093836)(0.25)^2(s)(7.09)$

→ we need to lift 0.822324 Lb, so... $s = \frac{L}{(0.093836)(b^2)(v)}$

$\frac{0.822324}{(0.093836)(0.25)^2(7.09)}$ = speed required to lift craft in rev/sec = 19.7764 rev/sec

$19.7764 \left(\frac{\text{rev}}{\text{sec}}\right)\left(\frac{60\text{s}}{1\text{MIN}}\right) \Rightarrow 1186.6$ rpm ok! = 10.11% of motor power