FRAME DETAILS

TYPE OF UAV

Quadcopter

REASONS

Quadcopter requires four motors to effectively generate the required thrust.

QUADCOPTER FUNCTIONAL REQUIREMENTS

- Carry a Load of 500g and Below (1 Pint of Blood = 495g)
- Weigh 800g (frame = 450g, Components = 350g)
- Weight 1.3Kg (Drone & Payload = 1.3kg)
- Recharge Backup Battery Using Oscillatory Motion of Motors & Solar Frame panels.
- Autonomous
- 4 Hours of Flight Time
- Remotely Stream live feeds via Camera
- 360 Camera View Via Servo Motor
- Flight Height of 10ft
- Switch between Power Sources During Functional Flight Mode.
- Take Pictures and Video then send to the Cloud.

COMPONENTS

- **Frame**
- Propeller
- Motor
- Electric Speed Controller
- Flight Controller
- Power (Battery)
- Transmitter & Reciever
- Camera

FRAME SIZE

There are 2 factors that determine frame size i) indoor ii) outdoor

- Indoor (Frame s Below 150mm)
- Outdoor (Frames Above 150mm)

The Drone would be used for Outdoor Activity

- 450mm – 500mm

- The Drone Functionality also determines the kind of frame, a payload Drone requires a Frame size greater than 150mm to house power engines to carry payload (Engine Upthrust power).

- The Frame Size has been Categorized to define other necessary components of the drone. The size of the frame will define the size of propeller and motor etc.

FRAME & COMPONENTS MATCHING TABLE

FRAME SIZE mm	PROPELLER SIZE (inch)	MOTOR SIZE	MOTOR KV	BATTERY (POWER) mAh
120mm or Smaller	3	1104 – 1105	4000 +	80-800
150	3-4	1306-1407	3000	600-900
180	4	1806 – 2204	2600	1000-1300
210	5	2204 – 2206	2300 – 2700	1000 – 1300
250	6	2204 – 2208	2000 – 2300	1300 – 1800
330 – 350	7 -8	2208 – 2212	1500 – 1600	2200 – 3200
450 – 500	9 – 10	2212 – 2216	800 – 1000	3300

WEIGHT

A stronger frame will have a bit more weight to it , smaller quadcopter below 100mm shouldn't weigh beyond 100g as going beyond is a bit excessive. However for a 210mm frame, 100 grams would be acceptable. Every frame has its owns way of minimizing impact damage, but the more efficient way to link strength and weight is to look at the thickness of the carbon.

FRAME SIZE	**THICKNESS**
100	2 – 4
100 – 180	3 – 4
200 – 280	5 – 6
300 – 380	7 – 8
400 – 480	9 – 10
500 – 580	11 – 12

The weight of the frame is also directly affected by the material, bigger wheelbase indicates larger and stronger frame. The Selected wheelbase size is 450 – 500mm and the stipulated weight considering the fact that material affects weight is 400g – 500 g.

SELECTED FRAME DETAILS

Frame Wheelbase	450mm – 500mm
Frame Weight	400g – 500g

LAYOUT

Performance characteristics of the drone depend on the frame cosmetic design. For the Reason the HX layout design was selected for its greater Aerodynamic feature.

- HX Design Layout.

ARMS

There are two primary types of frame arms in quadcopters.

- Solid Arm Baseplate Frame
- Separated Arm Frame

Considering the above stated functionality of the quadcopter the **Solid Arm Base Plate** duly matches it preference.

Reasons
The arm provides the frame with a stronger impact threshold as damage is spread through the Plates
They are less heavier compared to the separated frame arms which requires screws / bolts for attachment.

MATERIAL

REINFORCED PLASTIC
Reinforced Plastic is light weight , durable and impact resistance compared alongside other frame materials. This is the ideal material for a the proposed quadcopter with the above stated functionalities.

CARBON FIBER
Carbon Fiber is also light weight , gives good aerodynamics but it impedes Radio frequency.

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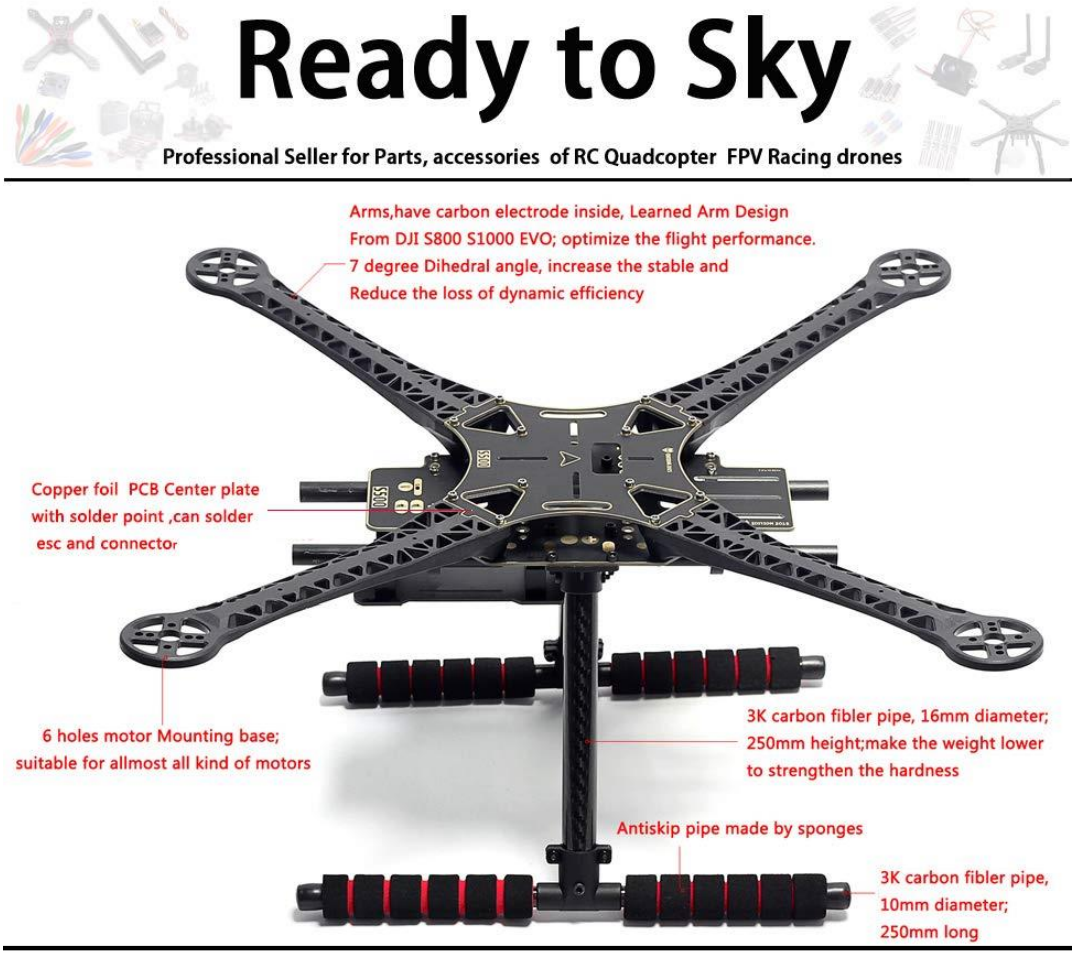
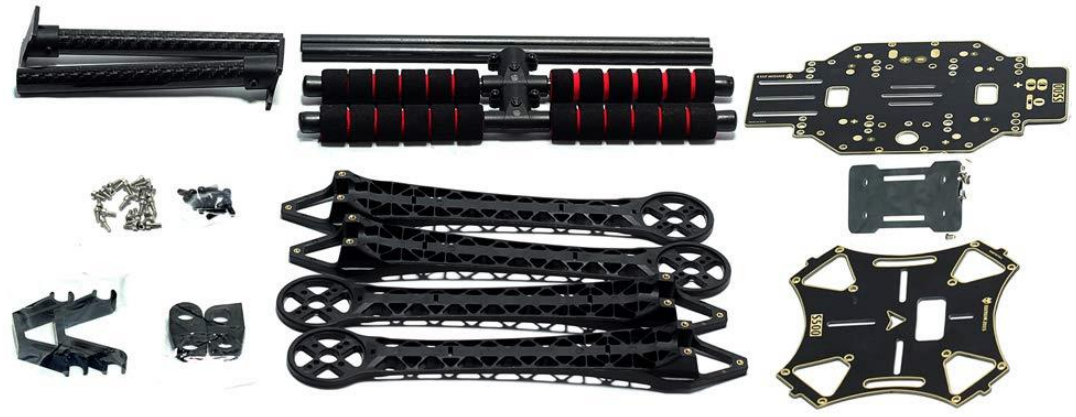
SELECTED PRI-MADE FRAME





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Matching table shows relationship between frame and components showed how frame size influences the components. Every premade frame has its configuration of components and below highlights configuration for the selected frame.

Specification & Suggested Configuration

-1.Wheelbase: 500mm

-2.Total weight with landing gear : 454g

-3.Motor suggest: 2212 - 2216 size brushless motor

-4.Prop suggest: 10"-12"

-5.Battery suggest: 3S-4S 2200mAh-5200mAh

-6.ESC suggest: 20A-40A