

Approximate calculations for the VTOL delivery plane with a 4 kg payload

Estimated chassis weight 5 kg
 Will use 4 * 120mm EDF's purchased from Xtreme Hobby in Brisbane

Running spec per EDF			
44 Volts at	80 Amps =	3520 Watts	
EDF with ESC	Estimated thrust each		5.7 kg or ~ 55.86 N
EDF Mass each			1.01 kg
ESC Mass each			0.066 kg
Mass together			1.076 kg

Total power plant spec			
4	*	kg EDF's in 4.304 tilt quad format	= 22.8 kg or ~ 223.44 N of thrust
Flight power at 100%		14080 Watts 320 Amps running at	1.6 g/w thrust ratio 44 Volts

Flight distance estimation calculations			
Flight at	50.00% Power =	7040 Watts 160 Amps	(A gross over estimation)
Most EDF jets (according to RC groups) do around		160 kph	
For a	1 hour flight	remove a bit for VTOL actions say	50 km range
Say a	22.2 V battery pack		
From	Banggood.com		
rated at	5.2 Ah		
weight	1.56 kg for	2 packs in series to make	44.4 Volts
To make it fly VTOL with		4 of payload we need to keep everything under	18.8 kg
With	5 battery pack(s)		
total fly time	17.104 kg base plane weight with	1.696 kg to spare.	
	9.75 minutes of flight		
	Probably a touch more if VTOL is kept to a minimum		
Best distance in	9.75 minutes is	26 km one way or	11.8 km'ish return trip with VTOL

Safety margin			
So say	30.00% safety margin		
	8.3 Km round trip flight range with a	4 kg payload	NB: We should be able to get higher airspeed then this though.

Cost	Units	\$ each	Totals
120mm EDF and ESC	4	579	2316
Lipo 6S 5.2Ah	5	248	1240
Flight controller	1	70	70
Long range TX and VTX equip	1	400	400
Airframe	1	800	800
Total cost			4826

Mass table	
	KG
Chassis	5.0
Batteries	7.8
EDF's and ESC's	4.3
Payload	4.0
Total mass	21.1
Total thrust for VTOL	22.8
Spare thrust	1.7

Vertical Acceleration	
Spare thrust in Newtons	16.6 N
Acceleration	0.79 m/s

Horizontal Acceleration	
Thrust in Newtons	223.4 N
Acceleration	10.59 m/s