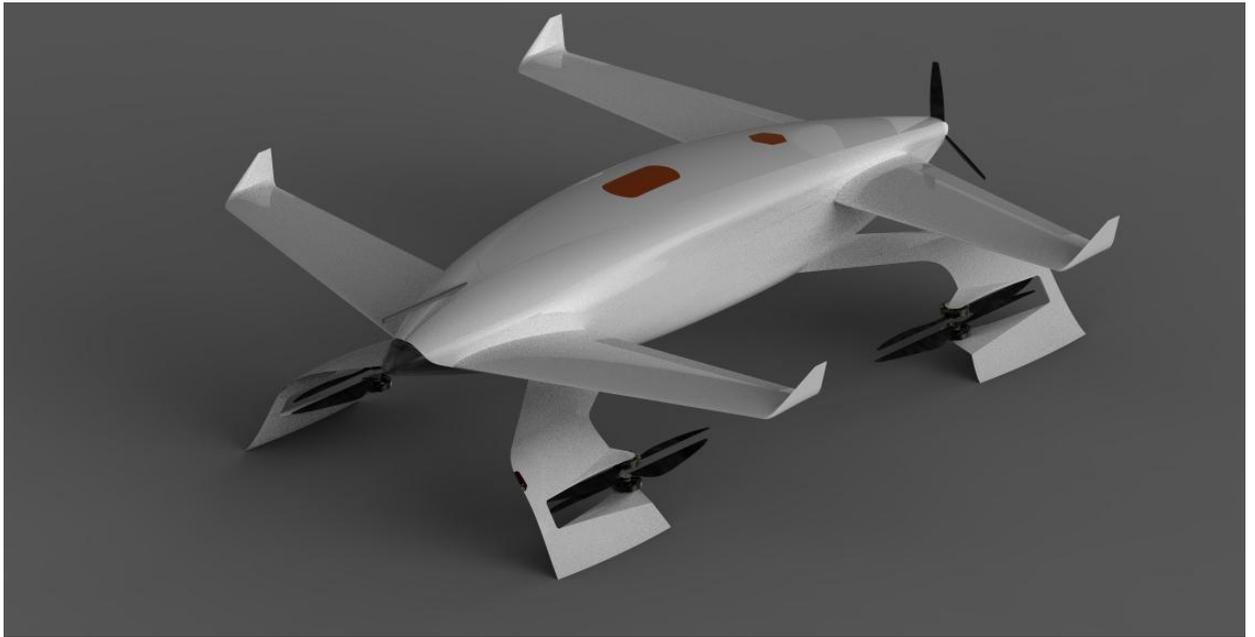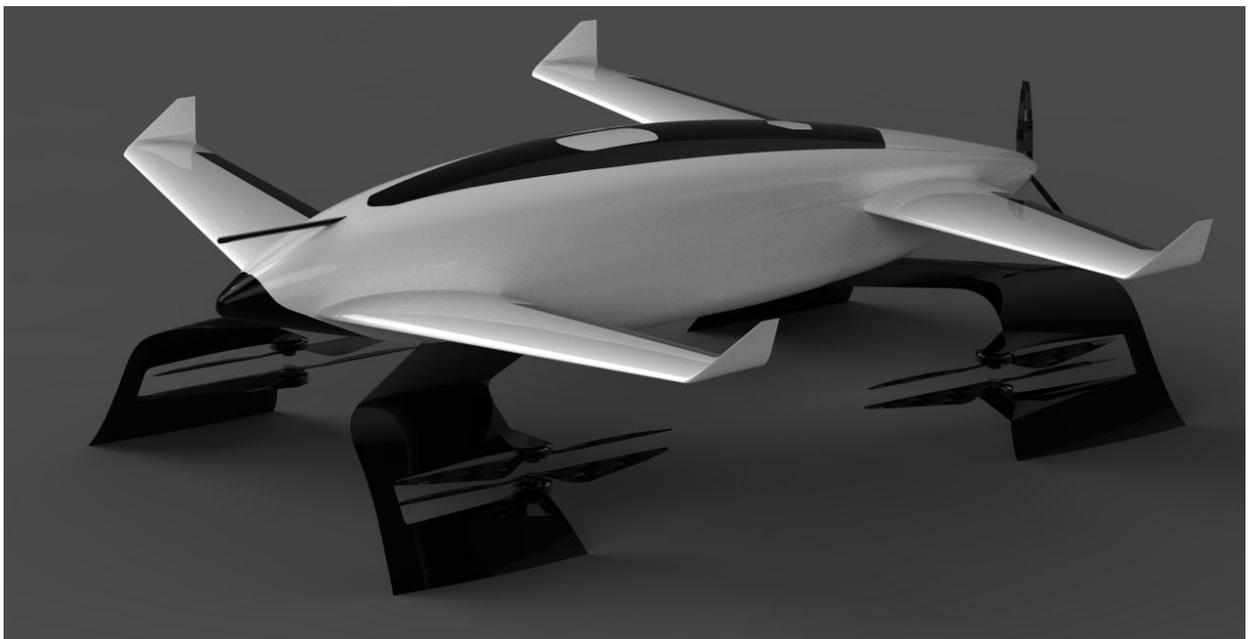# Twwing Cargo Drone

Twwing: **Tw**in **Wing**s

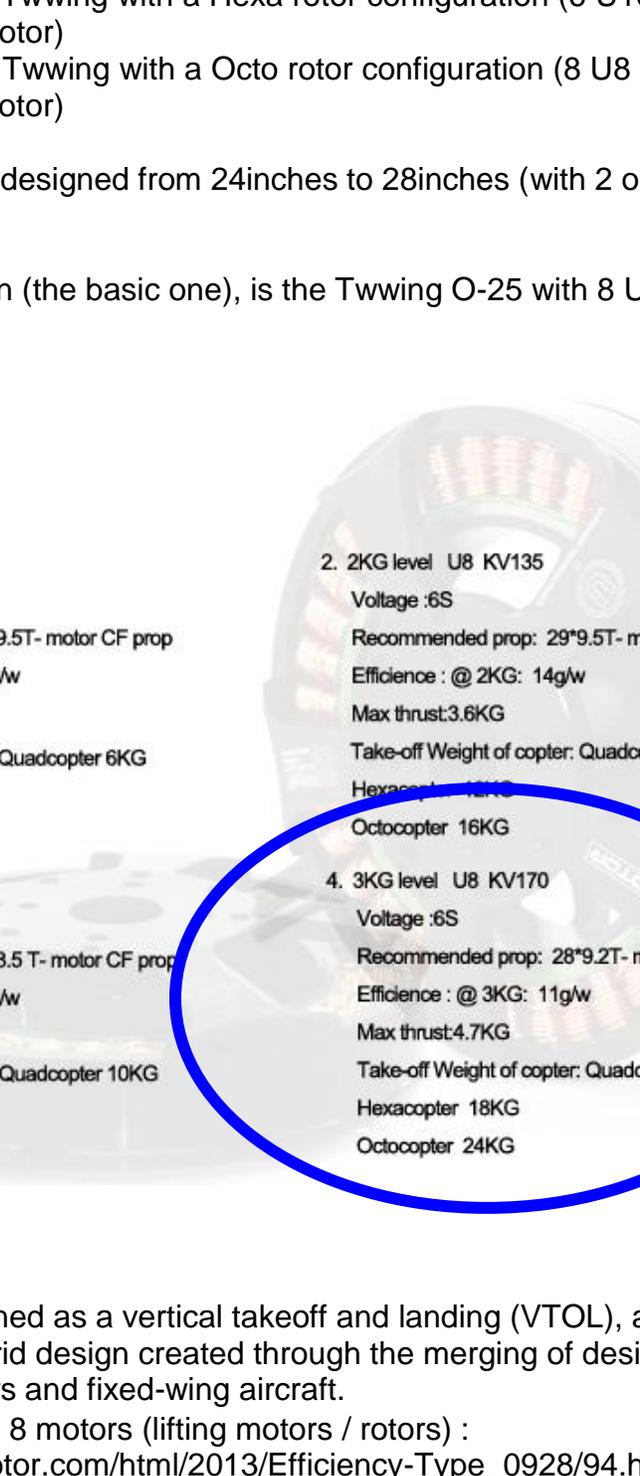**Showed on the figure the Twwing O-25 (octo configuration, 64mm propeller)**

Showed on the figure the Twwing O-28 (octo configuration, 71.5mm propeller)

Several options of the Drone can be available:

1. Twwing Q ➔ Twwing with a quad rotor configuration (4 U10 or 4 U11 Tigermotor motor)
2. Twwing H ➔ Twwing with a Hexa rotor configuration (6 U10 or 6 U11 Tigermotor motor)
3. Twwing O ➔ Twwing with a Octo rotor configuration (8 U8 or 8 U7 Tigermotor motor)

The propellers size can be designed from 24inches to 28inches (with 2 or 3 blades propeller)

An example of configuration (the basic one), is the Twwing O-25 with 8 U8 motors from tiger motor.


Efficience U8:

1. **1.5KG level   KV100**
   Voltage :6S
   Recommended prop: 29*9.5T- motor CF prop
   Efficience : @ 1.5KG: 17g/w
   Max thrust:2.6KG
   Take-off Weight of copter: Quadcopter 6KG
   Hexacopter 9KG
   Octocopter 12KG

2. **2KG level U8 KV135**
   Voltage :6S
   Recommended prop: 29*9.5T- motor CF prop
   Efficience : @ 2KG: 14g/w
   Max thrust:3.6KG
   Take-off Weight of copter: Quadcopter 8KG
   Hexacopter 12KG
   Octocopter 16KG

3. **2.5KG level U8 KV170**
   Voltage :6S
   Recommended prop: 26*8.5 T- motor CF prop
   Efficience : @ 2.5KG: 11g/w
   Max thrust:3.9KG
   Take-off Weight of copter: Quadcopter 10KG
   Hexacopter 15KG
   Octocopter 20KG

4. **3KG level U8 KV170**
   Voltage :6S
   Recommended prop: 28*9.2T- motor CF prop
   Efficience : @ 3KG: 11g/w
   Max thrust:4.7KG
   Take-off Weight of copter: Quadcopter 12KG
   Hexacopter 18KG
   Octocopter 24KG

- The aircraft is designed as a vertical takeoff and landing (VTOL), and efficient forward flight; a hybrid design created through the merging of design elements from both multi-rotors and fixed-wing aircraft.
- The aircraft includes 8 motors (lifting motors / rotors) : http://www.rctigermotor.com/html/2013/Efficiency-Type_0928/94.html

- For the pusher motor we use the neu motor 2215 2y for power and mass analysis
- Voltage : 6s to 12S
- For the wings structure the NACA 4412 is used for the two wings

Naca 4412 By Naca.exe D. LEDNICER
- T1_Re0.020_M0.00_N9.0
- T1_Re0.030_M0.00_N9.0
- T1_Re0.040_M0.00_N9.0
- T1_Re0.060_M0.00_N9.0
- T1_Re0.080_M0.00_N9.0
- T1_Re0.100_M0.00_N9.0
- T1_Re0.200_M0.00_N9.0
- T1_Re0.500_M0.00_N9.0
- T1_Re0.700_M0.00_N9.0
- T1_Re0.900_M0.00_N9.0
- T1_Re1.000_M0.00_N9.0

Twwing B1

Wing Span	=	2.410 m
xyProj. Span	=	2.401 m
Wing Area	=	0.723 m²
xyProj. Area	=	0.720 m²
Plane Mass	=	21.000 kg
Wing Load	=	29.157 kg/m²
Root Chord	=	0.400 m
MAC	=	0.311 m
TipTwist	=	0.000°
Aspect Ratio	=	8.033
Taper Ratio	=	2.000
Root-Tip Sweep =		9.424°
XNP = d(XCp.Cl)/dCl =		0.655 m
Mesh elements	=	3000

V =		16.05 m/s
Alpha =		10.000°
Beta =		0.000°
CL =		1.806
CD =		0.154
Efficiency =		0.979
CL/CD =		11.691
Cm =		0.455
Cl =		0.000
Cn =		-0.000
X_CP =		0.685 m
X_CG =		0.755 m

- The aircraft will operate in two flight modes, a hover mode for takeoff and landing, and a forward flight mode for efficient travel.
- One motor is used for forward thrust in the fixed-wing flight mode : diam from 0.4 to 0.45m
- The payload concept is modular - i.e. suitable for cargo transport, mounting sensors or other applications, 5 options are available for the payload system:
    1. Standard payload system, i.e., standard payload dropping
    2. Electric payload system, i.e., the payload is deposed on the ground via electromechanical arm, 1 axe in the z direction
    3. The same as option 2 + additional 2 axes gyro-stabilized payload system (for particular payload transportation).
    4. Dropping payload by wire
    5. Dropping payload by parachute system
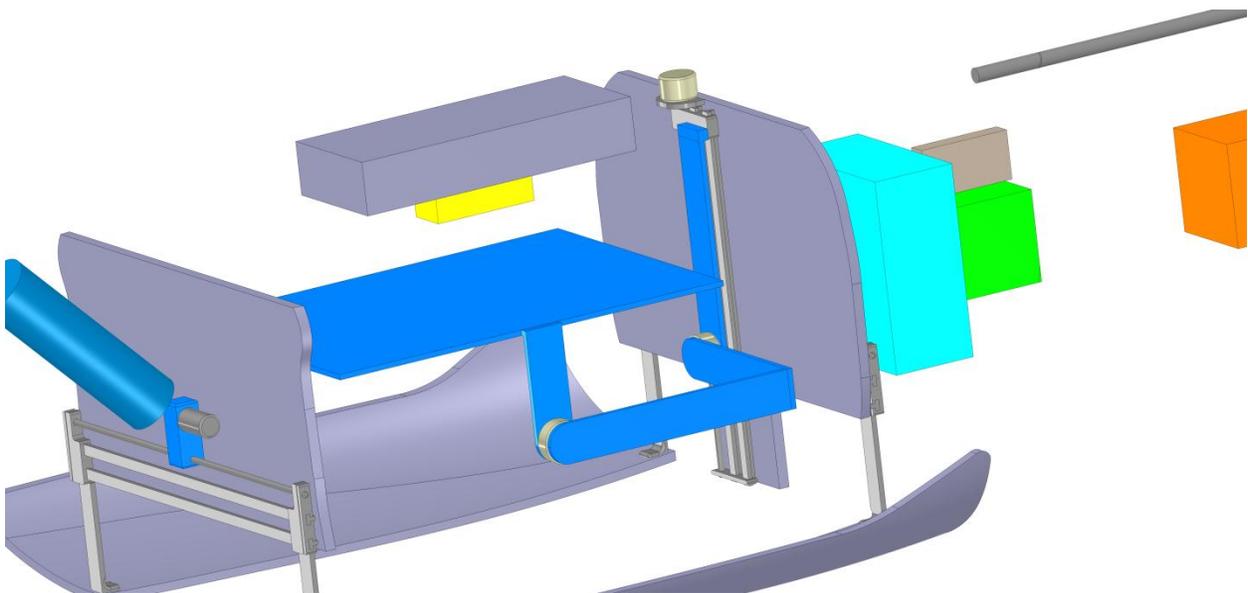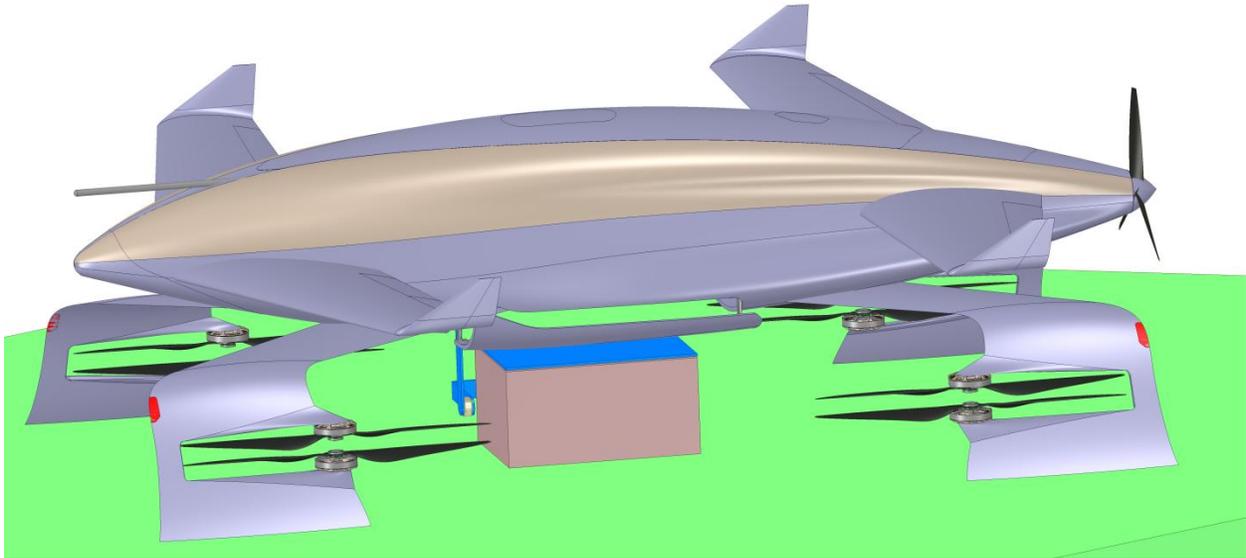
- Two Payload attachment system can be use:
    1. Mechanical servo attachment (standard)
    2. Magnetic attachment: best choice, a metallic disc will be attached to the payload and the drone will use several magnetic systems to attach the payload, the system can be used for multi-payload trasportation
- The aircraft is designed to weigh around 24 kg with a single, fixed and internal cargo bay that accepts a payload from 3 to 5 kg. A new technology for the airframe is used to reduce the weight of the structure and remove completely the chassis system for both the body and the wings.
- The aircraft is able to accommodate a payload dimension of 550 x 400 x 300 mm.
- The cargo is easily accessible from the bottom of the drone, two doors allow the manipulation to the payload.
- The cargo doors are latterly opening, this structure eliminates all the possible interactions with the payload and/or propellers, maximizing the space for a future automatic payload charging system.
- The cruise speed of the aircraft in forward flight is around 90km/h, the max speed is 150km/h
- The total power system weight less than 4.5 kg