



ZEFHIR UAS

Introduction VTOL UAS project
For EURAVIA Hackathon 2024

DRONE MARKET PLAYERS



La categoria MTOW 500-1.000 kg al momento non è presidiata (vedi tabella allegata). Anche se il drone Airbus VSR700 è già stato presentato e presto sarà in commercio, ed è il vero concorrente di Zefhir D.

Nella tabella mancano questi 4, concorrenti diretti di Zefhir:

1. ALPIN TITRA turco (dronizzato sulla base dell'elicottero ultraleggero biposto CICARE' Heli Sport CH-7). TITRA ha comprato n° 10 piattaforme di elicottero CH-7 da dronizzare.
2. SHIEBEL austriaco, il nuovo CAMCOPTER S-300 diretto concorrente di ZEFHIR Drone.
3. KAMAN Kargo con turbina RR M250: <https://kaman.com/brands/kaman-air-vehicles/kargo/>
4. PHENIX Solutions Ultra 2XL con turbina RR M250: <https://www.phenixuas.com/>

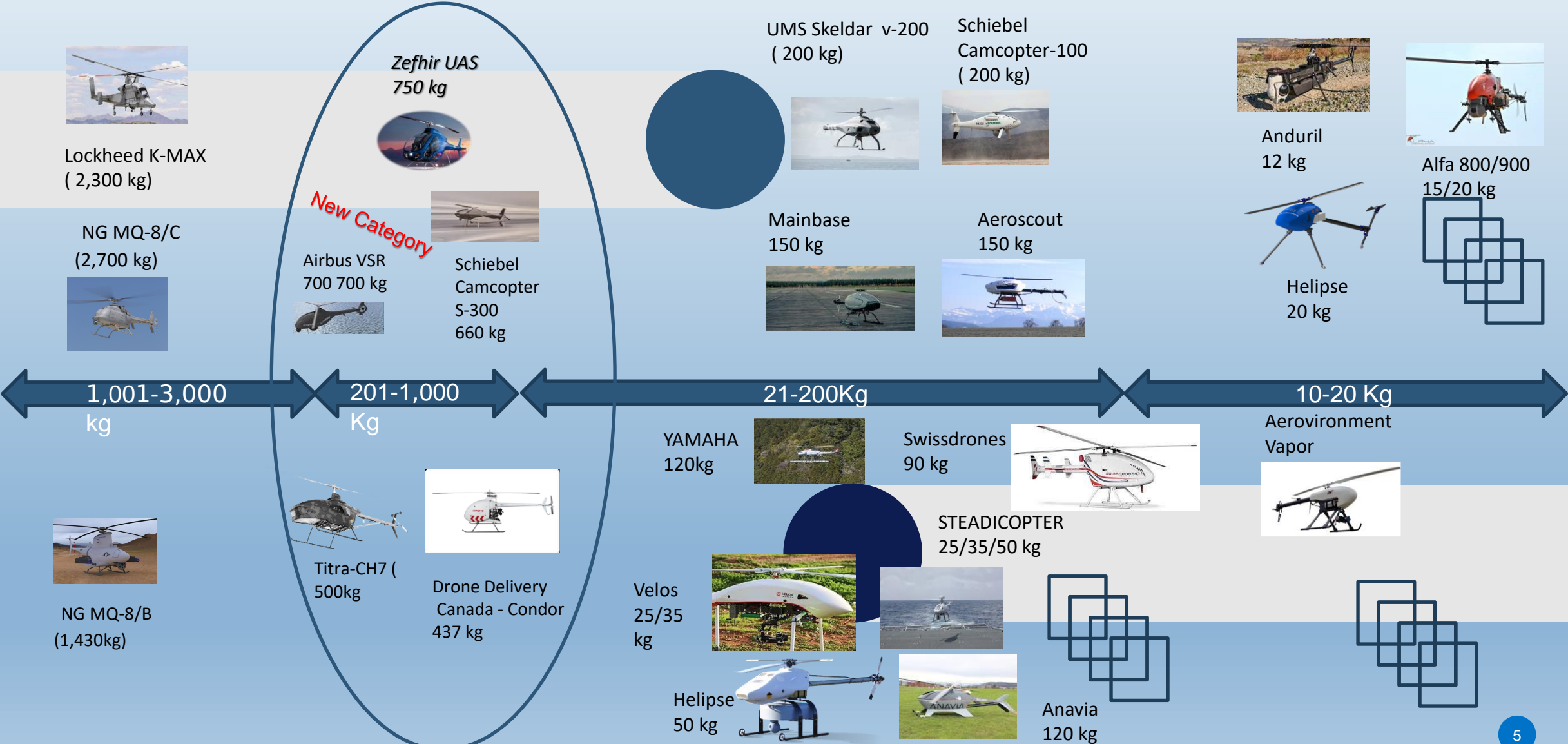
							
Manufacturer	SCHIEBEL	LEONARDO	UMS SKELDAR	北方工业 NORINCO	AIRBUS	NORTHROP GRUMMAN	CURTI AEROSPACE
Reliable Engine	Rotary engine	Rotary engine	2 stroke two cylinder	Rotax-914UL	Thielert Centurion 2.0	Turboshaft RR 250	Turboshaft PBS 100
Rotor	2 blades	2 blades	2 blades	2 blades	3 blades	4 blades	2 blades
Harsh environment	Medium	Medium	Low	Medium	High	High	High
MTOW	200 kg	205 kg	230 kg	450 kg	700 kg	1430 kg	750 kg
Payload	35 kg	35 kg	40 kg	50 to 100 kg	100 kg	150 kg	70 to 150 kg
Endurance (standard)	360 min (6 hrs)	360 min (6 hrs)	360 min (6 hrs)	4 to 6 hrs	8 hrs	7,5 hrs	4 to 6 hrs
Maximum speed	222 km/h	167 km/h	140 km/h	180 km/h	222 km/h	230 km/h	186 km/h
Fuel type	Heavy Fuel (JP-5, JP-8, Jet A-1)	Heavy Fuel (JP-5, JP-8, Jet A-1)	Gasoline 95 + 2 stroke oil	Gasoline	Heavy fuel (diesel)	jet A1 / JP5	jet A1 / JP5
Consumption	12 l / hr	10.5 l / hr	12 l / hr	25 l / hr	22 l / hr	80 l / hr	60 l / hr
Datalink range	200 km	93 km (185 km optional)	100 km	180 km	150 km	200 km	200 km
Price	2,000,000 €	not available yet	2,000,000 €	3,000,000 €	Estimated 5 000 000 €	14,000,000 €	Estimated 4 000 000 €

Our Goal

- Developing UAV COPTER demonstrator based on the Curti Zefhir manned platform
- With EO/IR payload
- With Parachute extra safety tool (in addition to autorotation)



VTOL UAV Market

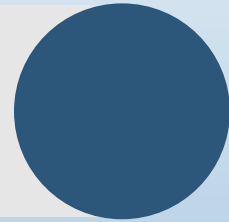


COMPETITION

Schiebel Camcopter S-300 (660 kg)



Lockheed K-MAX
(2,300 kg)



Airbus VSR700 (700 kg)



Based on Guimbal Cabri G2

DDC Condor (476 kg)



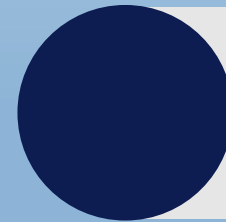
Based on Mosquito XE



NG MQ-8/B
(1,430 kg)



NG MQ-8/C
(2,700 kg)



Titra Alpin (500 kg)



Based on Helisport
CH7 Kompres

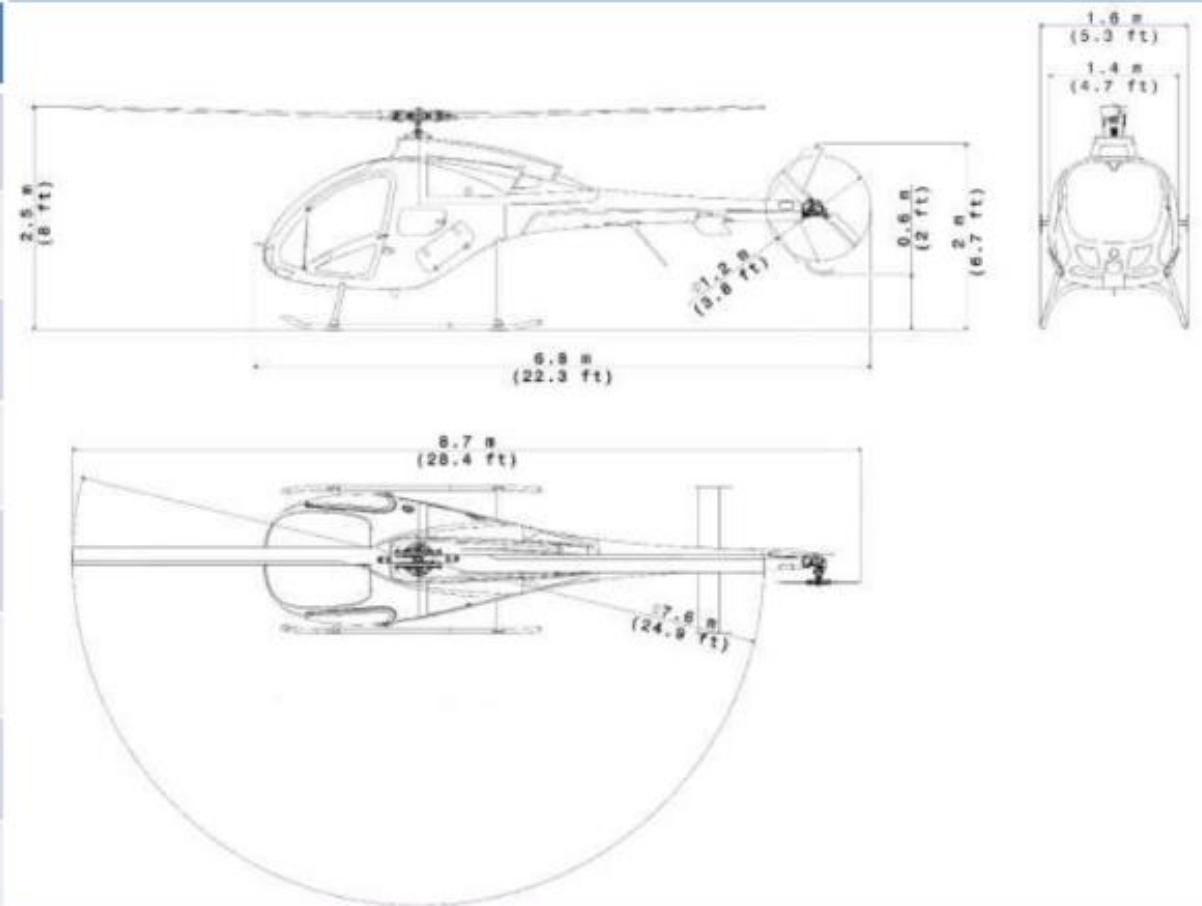
Zefhir Introduction

BASIC CHARACTERISTICS OF ZEFHIR HELICOPTER (*Green Aircraft*)



Main Performance

Maximum Take Off Weight	750 kg
Fuel Capacity (JET A1)	120 L (40 USG)
Maximum Level Speed @ 100% MCP (s.l. ISA)	185 km/h (100 KIAS)
Best Cruise Speed @ 85% MCP (s.l. ISA)	161 km/h (87 KIAS)
Max range @ 100 knots (10 min. reserve)	244 km (132 nm)
Max endurance @ 42 knots (10 min. reserve)	1h 48 min
V _{NE} (s.l. ISA)	189 km/h (102 KIAS)
OGE Hovering Ceiling (600 kg, ISA)	4000 m (13123 m)



Zefhir UAS Demonstrator - Main Performances

The UAS demonstrator will have the same flight and endurance performance of the manned Zefhir including:

Range : Up to 5 km with directional antenna (OMNI) Up to 30 km with tracking antenna

Endurance: according to present helicopter endurance.

MTOW: 750 kg

Flight: day/ night VTOL and flight missions fully automatically `with EO/IR camera

Payload : >150 kg

Before delivery to Curti: Successfully and fully tested in flight according to an agreed flight plan



UAV platform

Main Issues :

To plan:

the UAV system architecture (Block diagram)

UAV system detailed architecture (pin 2 pin chart)

- Platform:

- Adding payload & payload bracket
- Adding pilot camera & bracket
- Air Bag system development
- Avionics racks

- Avionic System:

- Connecting the existing telemetry (engine and helicopter) to the Autopilot
- Adding Mil-SDT Autopilot (+Redundancy)
- Adding Mil-SDT Servos (+Redundancy)
- Adding ADT (Air Data Link + Redundancy)
- Adding separate Harnesses for to the new avionics components
- Additional DC power supply and power supply management

- Backup

- Redundancy
- Electricity backup for emergency (Parachute, Autopilot, servo etc)

- Safety

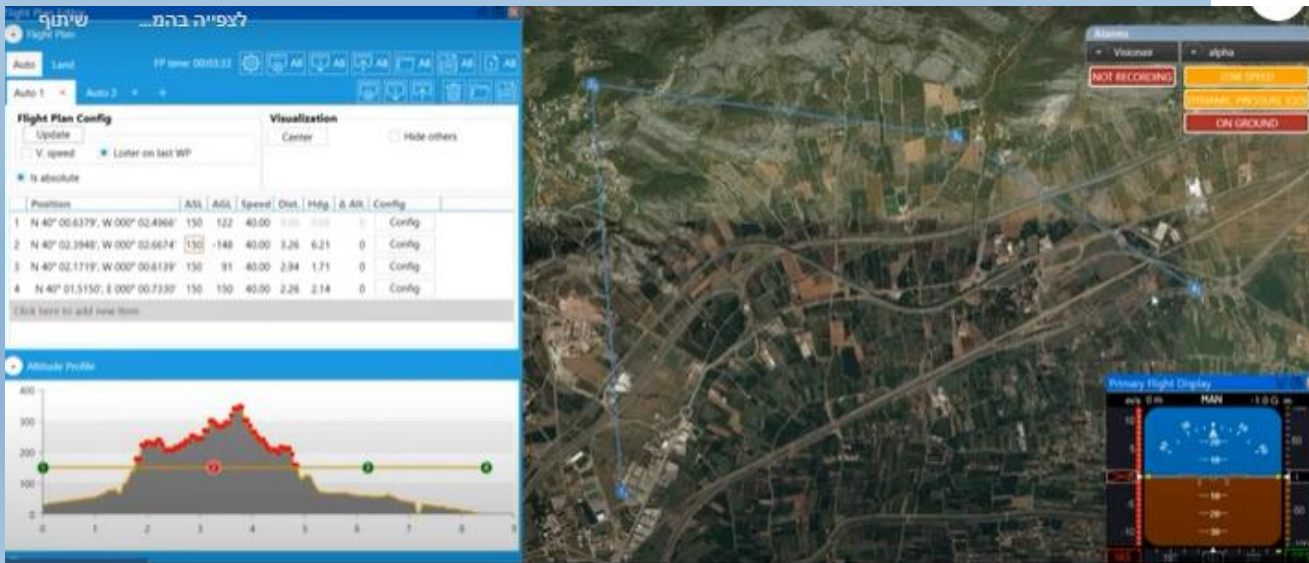
- IFF (Identification Friend or Foe or ADS -B)
- FTS (Flight Termination System only for test flights)
- Navigate without GPS
- Sense and avoid
- External switch for engine On/Off
- External switch for electricity power On/Off



To do only minimum changes for the first prototype

Ground System

- Plan the system architecture (Block diagram ,pin 2 pin chart)
- PGCS (Portable Ground Control Station)
- Remote control (RC)
- GDT (Ground Data Link)



Lab ,Team training

- Lab:
 - Avionic components intergratation
 - Inspection of Harnesses and electrical connections
 - Software QA through simulation
 - Flight simulation
 - White flights
- Team training
 - To train a the “Internal pilot” with the flight software/instruments flight (IFR flight/NLOS/BVLOS)
 - To train a the “External pilot” How to fly with the UAV with Futaba (VFR flight/ LOS)
 - It will be with smaller VTOL UAV and with the same software





"A person who has never made a mistake is a person who has never tried anything new"

THANK YOU!

