

The AAM (Advanced Air Mobility) sector has seen rapid growth in past years. However, it's still in its early stages with many challenges to overcome, including *regulatory*, *public acceptance*, and *infrastructure development*, to name just a few.

Regulatory:

The FAA and EASA are not at all comfortable with the existing EVTOL “multicopter” projects, which are based on a group of electrically driven propellers: (Joby, Lilium, Archer, Ehang, Volocopter, etc.) These aircraft are intended to replace helicopters over short and medium distances thanks to the simplification of the rotor transmission system, but they are not capable of autorotation or landing safely in the event of a power failure. That's why the FAA and EASA are setting new certification requirements for this new category of aircraft, with extremely stringent reliability and safety requirements.

This certification problem is leading to high costs and delays in multi-copter development programmes.

Here comes the Sherpa II: a helicopter that will comply with the established certification specifications like the CS-27 and CS-VLR for helicopters, for which cost and delay are under control.

Public acceptance:

Noise: The Sherpa II has a low rotor tip speed of 180 m/s, which will guarantee silent operation. The twin engine H² and hybrid versions can fly safely over cities.

Infrastructure development: The Sherpa II does not require a dedicated platform for take-off and landing, and the battery of H² and hybrid versions is recharged in flight.

The Sherpa II is the evolution of the Sherpa I that was developed by Sagita in 2015.



Sherpa I 2015

The SHERPA II is a CS-27 certified light helicopter carrying two people at a long range cruise speed of 145 km/h, max speed 201 km/h.

The fuselage is a simple, lightweight aluminium monocoque structure.

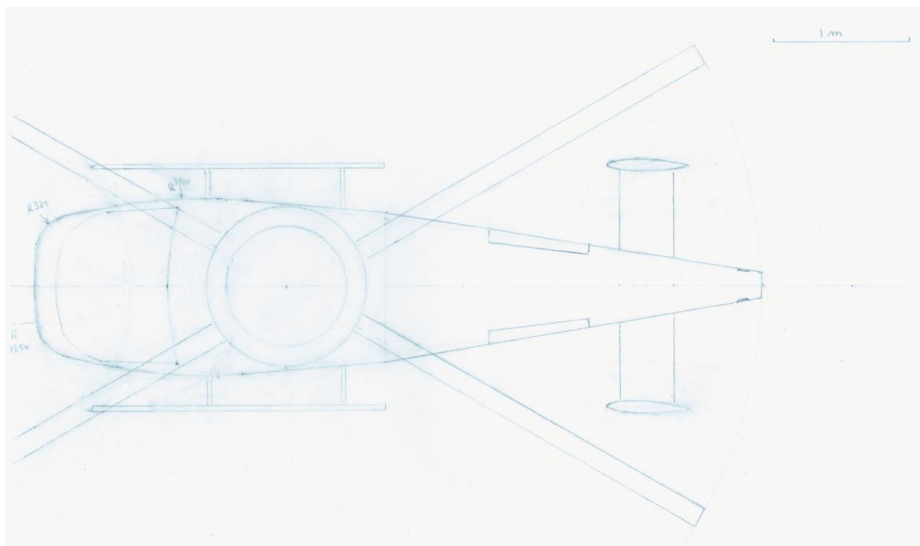
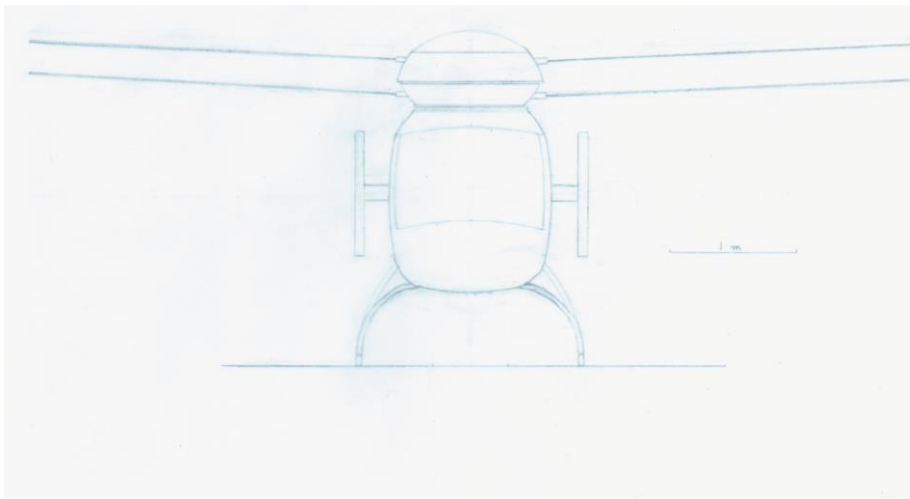
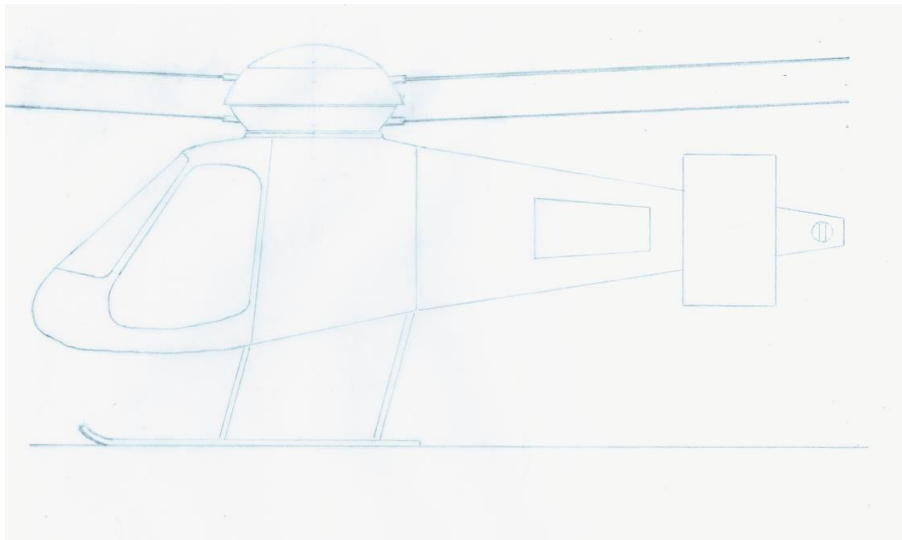
The rotor is 2 x two bladed for high performance and low weight.

Garage parking is easy thanks to a maximum width of 1.8 m.

Yaw control in hovering is achieved via lateral air jets: no tail rotor.

Automatic autorotation device in the event of engine failure for maximum safety.

2D External views of the Sherpa II:



Preliminary specifications and performance data

The Sherpa II can be motorised in several ways: Thermal engine (T), Electric motor (E), Hybrid thermal + electric twin engine (H), Hydrogen and fuel cell + electric motor (H²).

What these power plants have in common is that they drive a centrifugal compressor that acts as a gas generator for the counter-rotating turbines located in the rotor.

SPECIFICATIONS	Sherpa II T	Sherpa II E	Sherpa II H	Sherpa II H ²
General				
MTOW [kg]	578	575	669	798
Empty weight [kg]	305	403	380	579
Length [m]	5,35	5,35	5,35	5,35
Height [m]	2,65	2,65	2,65	2,65
Cabin width [m]	1,3	1,3	1,3	1,3
Payload [kg]	210	172	210	210
Fuel capacity [kg]	63	0	79	9
Battery 70% capacity [kWh]	0	29	10	10
Rotor diameter [m]	7,0	7,0	7,0	7,0
Effective rotor area [m²]	36,95	36,95	36,95	36,95
disk loading [N/m²]	154	153	178	212
Thermal Engine Max cont [kW]	105	0	105	150
Electric Motor Max cont [kW]	0	140	140	150
Performance (ISA sea level)				
Vh max speed [km/h]	203	201	201	180
Long Range Cruise speed [km/h]	149	143	143	130
Range [km]	596	75	592	234

The SHERPA II T and SHERPA II E with less than 600 kg MTOW can also be certified as CS-VLR light helicopters.

The more advanced version are SHERPA II H twin engine for Air Taxi applications on urban environment: The 14 kWh of battery power are sufficient for a silent take-off with the electric motor, or to ensure an 8-minute flight (20 km) in the event of a failure of the main combustion engine. This makes for a safe landing.

And the SHERPA II H² now in preliminary study stage.

The Sherpa II makes use of the pneumatic rotor drive developed by Sagita.

It will have a very clean environmental footprint, be silent, easy and comfortable to fly due to its vibration free engine and transmission.

The SHERPA II H is safe, twin engine aircraft also capable of autorotation in all circumstances in case of total power failure.

It is well suitable for urban air mobility and air taxi applications, in addition to the helicopter market.

THE COMPETITION

Sherpa II T

The Cabri G2 has 40% of the two seater market, despite his cost (about 400 000 € fully equipped)

The R22 is the best seller in his category, at a price of about 320 000 €.

They rival SHERPA II T in terms of size and installed power but not in price (270 000 €).

However in addition to CS-27 the Sherpa II T can also apply for CS-VLR (Very Light Rotorcraft) type approval.

Sherpa II E

The two seater EVTOLs in current development are competitors, however they lack the possibility of autorotation. The larger rotor disk of the Sherpa II E allows for a larger battery mass giving a good 25 minutes of endurance and a range of 64 km. The helicopter's classic configuration facilitates the certification process according to CS-27

Sherpa II H²

There is no H² powered rotorcraft presently on the market.

Sherpa II H

Hybrid EVTOLs are the competitors for good endurance applications.

See : <https://newatlas.com/tag/hybrid-evtols/> for a presentation.

ANNEX

Certification

“No one knows exactly when certification and regulations for eVTOLs will allow the aircraft to take flight commercially but history is not particularly encouraging. The AW609 civil tiltrotor has been undergoing test flights for two decades and still is not certified, though it may be getting close at long last. Theoretically, an air taxi service could be a reality by 2025 but, realistically, it may take much longer due to the technological and regulatory challenges that still exist today.”(VANCE HILDERMAN, CEO of AFuzion)