

Mini-Bee description

Hybrid Tilt Copter

TRL1 (basic definition)



Agenda

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- Mini-Bee description
 - Flight transition
 - SWOT analysis
- Technical description
 - Weight overview
 - State of the art
 - Actions



Mini-Bee description

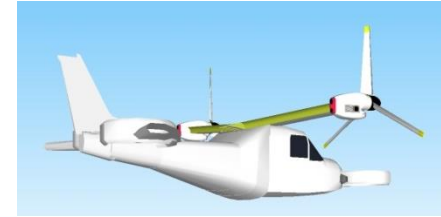
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- Project state : TRL1
 - Hybrid tilt quadcopter
- Characteristics :
 - VTOL capacity
 - Two tilt standard engines for light aviation
 - Electric quadcopter
 - Energy :
 - Fuel tanks
 - Batteries
 - Wings
 - Regular high wing configuration for tilt rotor



Flight transition

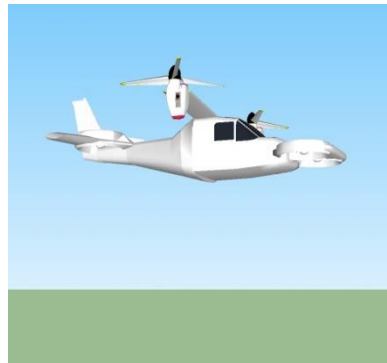
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Cruise flight



Tilt transition



Vertical take-off



Ground

SWOT analysis

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Strengths

- VTOL capacities
- Speed of an aircraft
- Quadcopter back-up in case of engine failure
- Energy optimisation : additionnal electric power during take-off and landing phases

Weakness

- New configuration
- Project at low TRL
- Aerodynamic
- Weight of batteries
- Project implementation

Opportunities

- Cost reduction :
 - Overall flight cost reduction
 - Low maintenance cost of the electric quadcopter
- New design space: tilt, quadcopter
 - Weight / VTOL
- In flight and ground batteries charger
- Project investment

Threats

- All electric helicopter
- All electric aircraft
- Tilt rotor (bi and quadri)



Technical description

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Two engines for tilt rotor : 460 hp



Proposed engines : SMA SR305-230
230 hp, 195 kg, Jet A, ECU, variable blade pitch

4 vertical propellers for electric quadcopter,



Proposed electric engine : Sicme Motori, 65 kWh, 101 hp , 25 kg
(cf. Pioneer 300 Alpi Aviation)

Batteries

Series of battery lithium-polymer (eg : Koram Electravia 7,5 kWh * 4)

Aircraft characteristics

4 seats, VTOL, cruise speed 300 km/h, MTOW 2320 kg, Fuel capacity 400L,



Weight overview

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• Utile load (passengers *4)	400 kg
• Structure & avionics	800 kg
• Engines	
• 2 * SMA : 400 kg	500 kg
• Quadcopter :100kg	
• Energies	
• Fuel : 320 kg (jet A 0.8 kg/L)	620 kg
• Batteries : 300 kg (75kg * 4)	
Total	2320 kg



State of the art

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- R44 – Helicopter
 - 4 seats, 1133 kg
 - 117kts (216 km/h), 350 Nm (650 km)
- Cessna 182 - Plane
 - 4 seats, MTOW 1411 kg
 - 145 kt (268 km/h), 927 Nm (1720 km)
- Cessna 310/320 - Plane
 - 6 seats, MTOW 2300 kg
 - Twin engines
 - 192 kt (355 km/h), 1070 Nm (2000 km)



Actions on Mini-Bee

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- Launch Mini-Bee TRL1 project :
 - Assess technical configuration
 - Evaluate market opportunities
 - Estimate production, flight and maintenance costs
 - Define partnership for TRL1 and TRL2
 - Draw project financial path





Mini-Bee (TRL1)
Tilt propeller engines
Quadri electric copter
General aviation