Company A: Technical writing assignment

Instructions

Write a detailed guide, how Company A VTLO (Vertical Take-off and Landing) approach is working and how the aircrafts take flight.

Summary

Company A develops, designs, and manufactures small unmanned aerial systems (sUAS) equipped with an electric vertical take-off and landing (eVTOL) system.

A contemporary variation of VTOL, eVTOL uses battery-generated electric power to hover, take off, and land vertically.

Company A' eVTOL fixed-wing s sUAS employ a unique patented swivel mechanism and transition technology, integrating the convenience of a multirotor copter with the efficient aerodynamics of airplanes.

Capabilities compared to VTOL and quadcopters

Company A' commercial and governmental sUAS differ from both conventional VTOLs and quadcopters: All models are eVTOL systems with a 3-rotor design (tricopter) and a fixed-wing system that leverages a patented tiltrotor mechanism.

Tricopters offer the same energy efficiency as quadcopters, supporting the extended range and endurance necessary for ISR (Intelligence, Surveillance, Reconnaissance) missions, border patrol operations, pipeline inspections, or large-scale mapping projects. Unlike their 4-rotor counterparts, they are more maneuverable and steady.

Company A' sUAS, meanwhile, are multi-functional machines capable of performance that neither typical VTOL quadcopter systems nor classic fixed-wing drones can match:

- ➔ Lightweight and easy to handle
- ➔ Allow heavier payloads
- ➔ Broader geographic coverage (up to 90 km/700 hectares in a single flight)
- ➔ Higher altitudes
- ➔ High endurance (90/180 minute flight time)
- ➔ Higher cruise speed (up to 20m/s)
- ➔ Reduced harm to the unit, the sensors, and the payload
- ➔ Extended life cycle
- ➔ Low noise emission
- ➔ Environmentally-friendly operation

Technical background

Technically speaking, these are an evolution of traditional proprotor-equipped convertiplanes that switch between flying modes (namely, a helicopter and fixed-wing aircraft in one system).

The hybrid functionality results in powered-lift sUAS that vertically take off and land while leveraging a fixed-wing during horizontal flight.

All Company A models employ the same set of spinning blades for both tasks (hence the name, proprotor): The rotor blades tilt vertically during takeoff, then pivot back to their stationary position and act as propeller blades.

In practice, the rotors are mounted on rotating shafts that handle both the lift and the propulsion. During takeoff, they angle to provide thrust upwards, lifting the aircraft. As the aircraft accelerates and reaches a predefined altitude, the rotors swivel, eventually positioned perpendicularly to the fuselage. In this mode, the wing handles the lift, and the rotors provide the thrust.

The controlled transition eliminates the need for runways, catapults, parachutes, or other gear while delivering speed and performance on par with standard fixed-wing aircraft.

Take-off and landing guide

1. Remove the fuselage from the box and follow the instructions to assemble the aircraft.

> ⚠ *After you remove the fuselage from the carrying box and place it in stationary mode, confirm that the front motors are tilted down; they will automatically tilt up (~90°) once the aircraft is armed.*

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1. Place the aircraft in the takeoff location with the nose facing into the wind.
2. Perform preflight checks and load the flight mission.
3. Press the **Arming** button to start the motors. All three motors tilt to a vertical position without manual intervention.

> ⚠ *When you use Software A to prepare a mission plan, you can define the angles of the transition cone, set the altitudes, and plan the descent circle, ensuring takeoff and landing occur at a safe distance from any obstacles (houses, forests, power lines, chimneys, wind turbines, etc.). Software A pops up visual alerts if it detects potential issues.*

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1. Press the **Takeoff** button; the aircraft climbs to the altitude set in the flight mission.
2. When it completes its ascend, it transitions into horizontal flight mode:
    1. The motors tilt back to propellers-mode;
    2. The aircraft accelerates, and
    3. Proceed toward the first waypoint.

The process is reversed during landing:

1. After the aircraft departs its last waypoint, it returns to the descent circle.
2. To reach the retransition altitude set in the flight mission, the aircraft stops in the air and switches to hovering mode (tilting the rotors back up).
3. It gradually descends and slows down.
4. As it approaches the landing site, it hovers above the ground, and you can land it.

Glossary

Name	Description
Convertiplanes	An aircraft that uses rotor power for vertical takeoff and landing and converts to fixed-wing lift during flight.
eVTOL	Electric vertical take-off and landing.
Powered-lift	An aircraft that takes off and lands vertically under engine power but uses a fix wing for horizontal flight.
Proprotor	A spinning airfoil that functions as an airplane-style propeller and a helicopter-style rotor.
Quadcopter	A type of multicopter that has four rotors.
Tiltrotor	An aircraft that generates lift and propulsion by way of one or more powered rotors mounted on rotating shafts.
VTOL	Vertical take-off and landing.