**ACCIDENT**

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| **Aircraft Type and Registration:** | Evolve Dynamics Sky Mantis (UAS, registration n/a) |
| **No & Type of Engines:** | 4 electric motors |
| **Year of Manufacture:** | 2019 (Serial no: ED/SM68-00212) |
| **Date & Time (UTC):** | 7 February 2019 at 1022 hrs |
| **Location:** | Nailsea Fire Station, Somerset |
| **Type of Flight:** | Commercial Operations |
| **Persons on Board:** | Crew - N/A Passengers - N/A |
| **Injuries:** | Crew - N/A Passengers - N/A |
| **Nature of Damage:** | Aircraft destroyed |
| **Commander's Licence:** | Other |
| **Commander's Age:** | 27 years |
| **Commander's Flying Experience:** | 7 hours (of which 4 were on type)<br>Last 90 days - 5 hours<br>Last 28 days - 2 hours |
| **Information Source:** | Aircraft Accident Report Form submitted by the pilot and subseqeunt AAIB enquires |

## Synopsis

During a demonstration flight, the UAS dropped to the ground from a height of 50 m when the electric motors stopped, despite the battery being fully charged. The UAS struck the ground and was destroyed in the subsequent post-impact fire. The UAS manufacturer determined that the loss of power was caused by the battery not being fully locked in place. It has updated the operations manual and intends to install sensors to prevent the aircraft from operating if the battery is not correctly locked in place.

## History of the flight

The Evolve Dynamics Sky Mantis is an all-weather long endurance quadcopter UAS, which is still under development. It has a maximum takeoff mass of 6.9 kg and a 60-minute endurance (Figure 1).

The pilot, who works for the UAS manufacturer, was operating the UAS on a demonstration flight. It was the first flight of the day and prior to taking off, the battery level indication had indicated a 100 % state of charge and a voltage of 25.2 V. The UAS took off at maximum takeoff mass and indicating an available flight time of 60 minutes. The pilot climbed the UAS to a height of 50 m where it maintained a stable hover. It had been flying for approximately 5 minutes when the pilot initiated a control input to rotate the UAS about its yaw axis. Whilst yawing, the UAS appeared to suffer a complete power failure; all four electric motors stopped and the UAS began descending rapidly. There were no associated warnings

displayed on the controller and the UAS did not respond to any control inputs by the pilot. It entered autorotation at approximately 10 - 15 m above the ground, but this was insufficient to arrest the rate of descent and it struck the ground hard. The onboard battery ignited and the UAS was destroyed in the ensuing fire.

**Figure 1**
Evolve Dynamics Sky Mantis

### Investigation by the UAS manufacturer

The UAS manufacturer undertook an internal investigation to determine the cause of the power loss. It identified that the battery had not been fully locked in place during the accident flight and vibration had caused it to lose contact with the electrical connections, leading to the loss of power.

### Safety action

The manufacturer has since updated the Sky Mantis Operations Manual to include an instruction to check that the battery is locked in place and will include this requirement in customer training. It also intends to install sensors in the battery lock mechanism which will prevent the aircraft from being able to fly if the battery is not correctly locked in place.