

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Wingcopter 178 Heavylift (UAS, registration n/a)	
<b>No &amp; Type of Engines:</b>	4 Scorpion SII-4035 560 KV brushless DC motors	
<b>Year of Manufacture:</b>	2020 (Serial no: SN-0084)	
<b>Date &amp; Time (UTC):</b>	4 September 2020 at 1415 hrs	
<b>Location:</b>	Mayfield Farm, Ilsley Road, Compton, Newbury	
<b>Type of Flight:</b>	Training	
<b>Persons on Board:</b>	Crew - N/A	Passengers - N/A
<b>Injuries:</b>	Crew - N/A	Passengers - N/A
<b>Nature of Damage:</b>	Damaged beyond economical repair	
<b>Commander's Licence:</b>	Other	
<b>Commander's Age:</b>	24 years	
<b>Commander's Flying Experience:</b>	108 hours (of which 13 were on type) Last 90 days - 14 hours Last 28 days - 4 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

## Synopsis

Whilst the unmanned aircraft (UA) was climbing, in hover mode, one of the rear electronic speed controllers (ECSs) overheated causing a loss of control of its associated motor and propeller. Control of the aircraft was lost and it fell into a crop field, damaging it beyond economical repair. The manufacturer is looking to re-design the rear propellers to reduce the likelihood of the ESCs overheating.

## History of the flight

The Wingcopter 178 Heavylift, (Figure 1) is an unmanned electric Vertical Takeoff and Landing (eVTOL) aircraft with a maximum takeoff weight of 18 kg. It can take off and land vertically like many multicopter unmanned aircraft but can transition to wing-borne flight by rotating its two forward propellers to a horizontal position and folding its rear propellers to reduce drag. In 'fixed wing mode' the aircraft is capable of ranges of up to 75 miles and speeds up to 150 mph, dependent on payload. The aircraft has a 1.78 m wingspan and is 1.32 m long.

The UA was conducting a test flight to verify its performance at its maximum takeoff mass (MTOM), using an automated mission profile that it had successfully completed five times before.



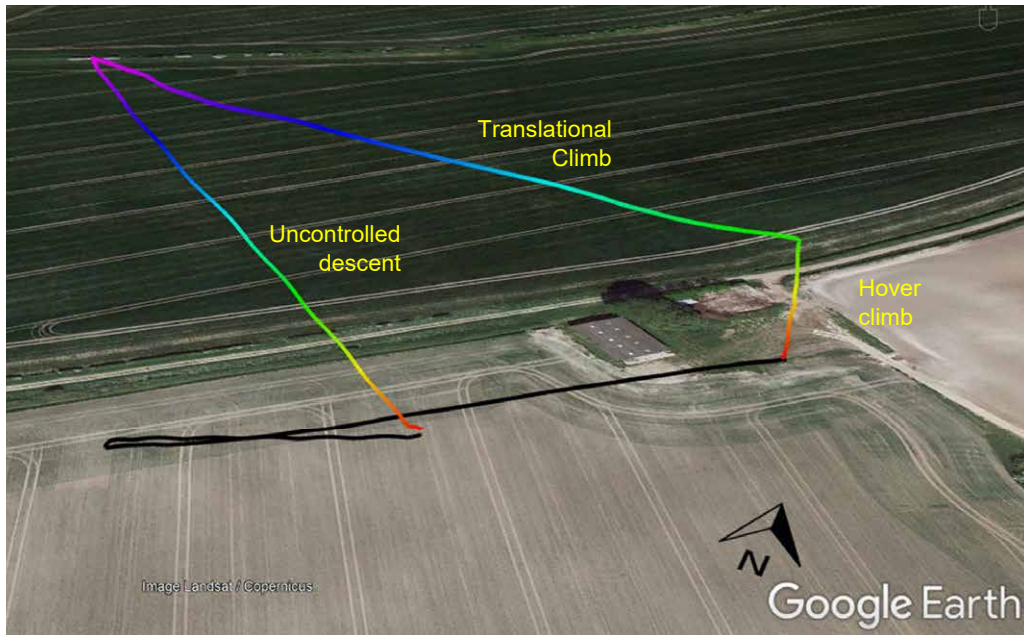
**Figure 1**

Wingcopter 178 Heavylift with propellers positioned in 'hover mode'

After conducting the pre-flight and mission checks the remote pilot (RP) armed the aircraft, confirmed that the motors had spooled up correctly and initiated the automatic flight by switching the radio control transmitter to 'mission' mode. The aircraft lifted off successfully and began to climb in 'hover mode' towards its target height of 110 m agl at which point the aircraft would transition to 'fixed wing mode'.

Recorded data from the aircraft shows that it initially climbed vertically to approximately 35 m agl before continuing a programmed translational climb in 'hover mode' to the south west (Figure 2). After 72 seconds, whilst approaching 100 m agl, and having travelled 188 m, the aircraft rolled and pitched to the right and became temporarily inverted. It righted itself, but was unable to maintain control, descending rapidly whilst spinning in a clockwise direction. The RP reported that it was evident that one of the motors had lost propulsion. He attempted to gain control of the aircraft by switching to manual control, but this was unsuccessful.

As the aircraft descended some thrust was still produced by the operating motors prolonging the descent. The UA travelled approximately 80 m downwind before striking the ground in a harvested crop field. There were no injuries, although the aircraft was destroyed.



**Figure 2**

Oblique view of the aircraft's flight profile  
© Google 2020, Image © Landsat / Copernicus

### Aircraft examination

Assessment of the aircraft by the operator, in conjunction with the manufacturer, identified that a rear ESC had overheated resulting in the loss of control of its associated motor. This issue had been previously identified by the manufacturer and a hover time limitation of 120 seconds, to prevent the overheating, had been imposed. It is considered that the ESC overheated due to the increased load produced as a result of the combination of the duration of the translational climb and operation close to MTOM.

The manufacturer is currently working on resolving this issue by introducing re-designed rear propellers to the aircraft type.