

## Accident

<b>Aircraft Type and Registration:</b>	UAS DJI Mavic 2 Enterprise Advanced	
<b>No &amp; Type of Engines:</b>	4 Electric motors	
<b>Year of Manufacture:</b>	2021 (Serial no: 4GCCJ5RR0A0C41)	
<b>Date &amp; Time (UTC):</b>	9 February 2024 at 0255 hrs	
<b>Location:</b>	Weybridge, Surrey	
<b>Type of Flight:</b>	Emergency Services Operations	
<b>Persons on Board:</b>	Crew - None	Passengers - None
<b>Injuries:</b>	Crew - N/A	Passengers - N/A
<b>Nature of Damage:</b>	Damage to all four propellers, body, legs and battery pack.	
<b>Commander's Licence:</b>	Other	
<b>Commander's Age:</b>	33 years	
<b>Commander's Flying Experience:</b>	11 hours (of which 4 were on type) Last 90 days - 3 hours Last 28 days - 1 hour	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

## Synopsis

The UA lost power whilst being flown in an area that excluded the general public. This was likely due to the battery becoming detached in flight and it is possible that the battery was not fully latched in place. The same model of battery has been known to swell when it starts to deteriorate which can compromise its secure retention within the UA. Such swelling can be detected before flight by checking that the battery can sit firmly on a flat surface without rocking, and the operator has highlighted the need for such a check to its pilots.

## History of the flight

The flight was the fourth deployment of the UA and was conducted at night in the early hours. The pilot had completed the task and had positioned the UA for the descent when it appeared to lose power and then fell to the ground. The downloaded data abruptly stopped whilst the UA was in the air. Prior to the data loss, the recorded battery health and level of charge were sufficient for continued flight. The battery and UA came to rest some distance apart with the battery still indicating it was powered. The pilot believed they had installed the battery properly but could not be certain.

Both the battery and the UA suffered physical damage, but examination of the plastic battery latching mechanism on both items showed no signs of damage. This lack of damage could indicate that separation did not occur as a result of the impact with the ground.

An online search found examples where the same model of battery pack had swelled, and this had compromised the ability of the battery to be securely attached to the UA. An examination of the battery pack after the accident showed that the casing was split, probably as a result of the impact with the ground, but also that there was some evidence of swelling. However, it was not possible to determine whether this swelling was present prior to the accident.

If a battery has swollen and has a curved underside surface, this can impede or prevent secure retention of the battery by the latching mechanism.

### **Action taken by the operator**

Following this accident, the UAS operator advised all its pilots of the following:

*'The initial assessment is that the battery either was swollen and or the battery hadn't completely engaged in the locking mechanism during the build phase. The battery then disconnected and parted with the aircraft when the pilot commenced the landing phase.'*

*Please be reminded that with any drone, prior to flight, the battery is checked and you confirm this with a confidence test. (Push pull) and that you photograph or BWV [Body Worn Video] the completed build. Not only from the top but of any locking part and the side view. This should be completed each time you change a battery. NB – Although the locking buttons on the side of the battery should be protruding to indicate locked, as per the photos below if the battery is not sitting flush then even though the buttons are protruding, the battery is not secure.*

*Below is a photo of what we think happened. Which from looking down on the drone or at night could be missed if rushed.'*

This message to its pilots was accompanied by an instruction to report any battery issues to the appropriate person to arrange replacement.

Images from the operator's information notice are shown below (Figures 1 and 2).



**Figure 1**

Battery not properly secured, but with button positions that could indicate it was if viewed from above. (Used with permission).



**Figure 2**

Battery without swelling with a flat underside (left) compared with one with swelling evident (right). (Used with permission).

### **Civil Aviation Authority (CAA) monitoring and actions**

The CAA reported that battery failures (due to incorrect attachment, potential swelling, degraded performance from cold weather, incorrect storage etc) are a common feature of loss of control events for UAS operations but, following a review of trends, has not identified this particular model of UAS as requiring special attention. The CAA also reported the following:

*'The CAA has a number of actions previously taken and currently being worked on to address wider battery related issues with our operating community:*

- *The battery issues have previously been highlighted as a trend to the Recognised Assessment Entities (training school equivalents) for additional emphasis in training.*