

## ACCIDENT

<b>Aircraft Type and Registration:</b>	DJI Phantom 3 Pro (UAS)	
<b>No &amp; Type of Engines:</b>	4 Electric motors	
<b>Year of Manufacture:</b>	Unknown	
<b>Date &amp; Time (UTC):</b>	22 May 2018 at 0830 hrs	
<b>Location:</b>	Railworld, Oundle Road, Peterborough	
<b>Type of Flight:</b>	Commercial activity	
<b>Persons on Board:</b>	Crew - None	Passengers - None
<b>Injuries:</b>	Crew - N/A	Passengers - N/A
<b>Nature of Damage:</b>	Motor mounting damaged and aircraft destroyed	
<b>Commander's Licence:</b>	Other	
<b>Commander's Age:</b>	50 years	
<b>Commander's Flying Experience:</b>	10 hours (of which n/k were on type) Last 90 days - n/k hours Last 28 days - n/k hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

## Synopsis

The unmanned aircraft took off and reached an estimated height of 10-15 ft when an unusual noise was heard. Shortly afterwards one of the motors detached from the structure and the aircraft impacted the ground and was destroyed. The structure showed signs of multiple cracking around the motor attachment points and it is probable that these cracks joined together and resulted in the motor detaching from the structure.

## History of the flight

The DJI Phantom 3 Pro is an unmanned aircraft (UA) with a maximum weight of 1.28 kg (Figure 1). With its flight controller, it forms an unmanned aircraft system (UAS). It was being flown to photograph a local tourist attraction using a camera mounted on a gimbal below the aircraft.

The pilot completed his pre-flight checks of inspecting the structure and propellers for signs of damage and proceeded with an uneventful takeoff. As the UA reached a height of approximately 10-15 ft the pilot heard an unusual sound which he took to be wind noise. Seconds later he heard the same noise and the UA descended rapidly before ground impact. During the impact the battery and camera separated from the UA and came to rest approximately two metres away. Upon inspection, one motor complete with mounting screws and propeller, was missing and despite a search of the area it was

not found. The UA was extensively damaged but there were no injuries or third-party damage.



**Figure 1**

DJI Phantom 3 Pro with gimbal mounted camera

### Aircraft examination

Examination of the structure around the motor attachment point indicated multiple cracks which had amalgamated and resulted in the attachment bosses detaching from the main structure (Figure 2).



Undamaged motor mount

**Figure 2**

Detail of damaged motor mounting with comparison to an undamaged mounting  
(Photo used with permission)

### Investigation of similar events

A poll<sup>1</sup> of over 1,000 users, taken in 2015 on the manufacturer's official forum, showed that 30% of respondents had an issue with structural cracking of their UA through normal flying and had not been the subject of an impact. It appears that these cracks are generally detected before the motor detaches and a variety of repairs and reinforcement methods are available in the on-line forums. One such reinforcement method is to fit aluminium strengthening plates to the exterior of the structure through the motor attachment screws (Figure 3). These are readily available from third party suppliers but are not an endorsed modification by the manufacturer. The manufacturer has a warranty and replacement scheme which covers any manufacturing defects.



**Figure 3**

Example of motor attachment reinforcement plate

In the published user manuals<sup>2</sup> for this UA, there are no specific structural inspections included in the pre-flight preparations. Inspections of every part are to be done '*after any crash or violent impact*'.

### AAIB comment

Good airworthiness practice suggests that operators of UAs should consider inspecting the critical areas of the UA structure at regular intervals (including the use of a suitable magnifying glass) to identify cracks which may lead to a structural failure and subsequent loss of the control (Figure 4).

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### Footnote

- <sup>1</sup> <https://forum.dji.com/thread-23532-1-1.html> [accessed March 2019]
- <sup>2</sup> Phantom 3 Professional quick start manual version 1.2 – 19 April 2017  
Phantom 3 Professional user manual version 1.8 – 06 June 2017



**Figure 4**  
Example of motor attachment cracking