ACCIDENT

Aircraft Type and Registration:	DJI Matrice M300
No & Type of Engines:	4 DJI electric motors
Year of Manufacture:	2020 (Serial no: 1W93J6H000M007)
Date & Time (UTC):	21 November 2021 at 2251 hrs
Location:	Blacon, Chester
Type of Flight:	Commercial Operations (UAS)
Persons on Board:	Crew - None Passengers - None
Injuries:	Crew - N/A Passengers - N/A
Nature of Damage:	UA damaged beyond economic repair
Commander's Licence:	Other
Commander's Age:	27 years
Commander's Flying Experience:	35 hours (of which 26 were on type) Last 90 days - 22 hours Last 28 days - 5 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and enquiries made by the AAIB

Synopsis

The UAS was prepared for flight to carry out an aerial search. Just after launch and prior to airborne safety checks, a "cutting noise" was heard coming from the UAS. It then lost control and dropped to the ground and was severely damaged. This was caused by one of the motor arms folding during flight which appeared not to have been correctly locked in place.

History of the flight

The UAS was prepared for flight to carry out an aerial search. Just after launch and prior to airborne safety checks, a "cutting noise" was heard coming from the UAS. The UAS moved to the left, yawed to the right and gained altitude in a spiralling motion and then dropped to the ground. The UAS structure, battery, propellers and camera were severely damaged when it hit the ground.

Cause

Examination by the operator found evidence that the front and rear right side propellor blades had intermeshed and collided with each other. This was caused by the right rear motor arm not being fully secured and folding forwards during the early stage of the flight. This led to an asymmetry of thrust and loss of control.

AAIB observation

There are previous reports of this type of UAS losing control because one of the motor carrier arms was not fully secure and it folded during flight. In this and the previous case in this Bulletin, the DJI Matrice 300 (AAIB-27593), it resulted in catastrophic damage to the UAS.

When the arms are extended during preparation for flight, they are each locked in place by a 'twist to lock' collar. To prepare for flight the collar is slid along each arm towards the main body of the UAS to a position where it encloses the hinge mechanism. The collar is then rotated clockwise which engages and tightens on a threaded section and the collar 'clicks' into a locked position. This action ensures the arm is held rigidly. There is a small alignment placard on each arm to show that the collar is locked.

However, the arm, hinge and collar assemblies on these commercial grade UAS are of high quality and are manufactured to close tolerances. As a result, when the collar is slid into its initial position to surround the hinge, it immediately holds the arm rigidly in the extended position even though the collar has not been rotated and locked. It is therefore possible to assume the arm is held correctly but the collar is not locked. If the UAS is launched in this condition the vibration in the arm caused by the motor and propeller, although slight, causes the collar to move outwards, releasing the hinge. A combination of procession and thrust from the rotating propeller then causes the arm to fold.