SERIOUS INCIDENT

Aircraft Type and Registration:	DJI Air 2S	
No & Type of Engines:	4 electric engines	
Year of Manufacture:	2021 (Serial no: 3TYDJ23 003L96S)	
Date & Time (UTC):	16 April 2022 at 1630 hrs	
Location:	Welfare Park, Huthwaite, Nottinghamshire	
Type of Flight:	Private	
Persons on Board:	Crew - N/A	Passengers - N/A
Injuries:	Crew - N/A	Passengers - N/A Other - 1 (Minor)
Nature of Damage:	Nil	
Commander's Licence:	Other	
Commander's Age:	45 years	
Commander's Flying Experience:	15 hours (of which 15 were on type) Last 90 days - 1 hour Last 28 days - 1 hour	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

While a DJI Air 2S (Air2S) unmanned aircraft (UA) was being flown in a low hover over a group of children one of them attempted to grab it and their hand touched the rotor blades. The aircraft became destabilised, briefly lost height and injured the child. The pilot reflected that he should not have been flying his aircraft so close to the children.

History of the flight

The incident pilot was flying his Air2S in Welfare Park, Huthwaite (Figure 1) when some children who were in the area "took an interest" in it. The pilot began flying the aircraft "a few feet above their heads" and they started to chase it. He then brought the UA to a GPS-stabilised hover, at which point a 3-year-old child "jumped up" and tried to catch it. The child managed to reach up and touch the rotor blades which destabilised the aircraft. The UA briefly lost height and its blades struck the child, making two significant cuts on their face as well as smaller cuts to their nose, chin and fingers. The facial cuts required hospital attention. After striking the child, the UA automatically re-established its hover and the pilot flew it away from the children. The child's injuries were assessed as minor.

Incident site

Welfare Park is a public recreation space within a residential area of Huthwaite, Sutton-in-Ashfield. At the time of the incident, the UA was being flown over open ground toward the northern end of the park (Figure 1). The closest dwellings were approximately 75 m from the incident site.

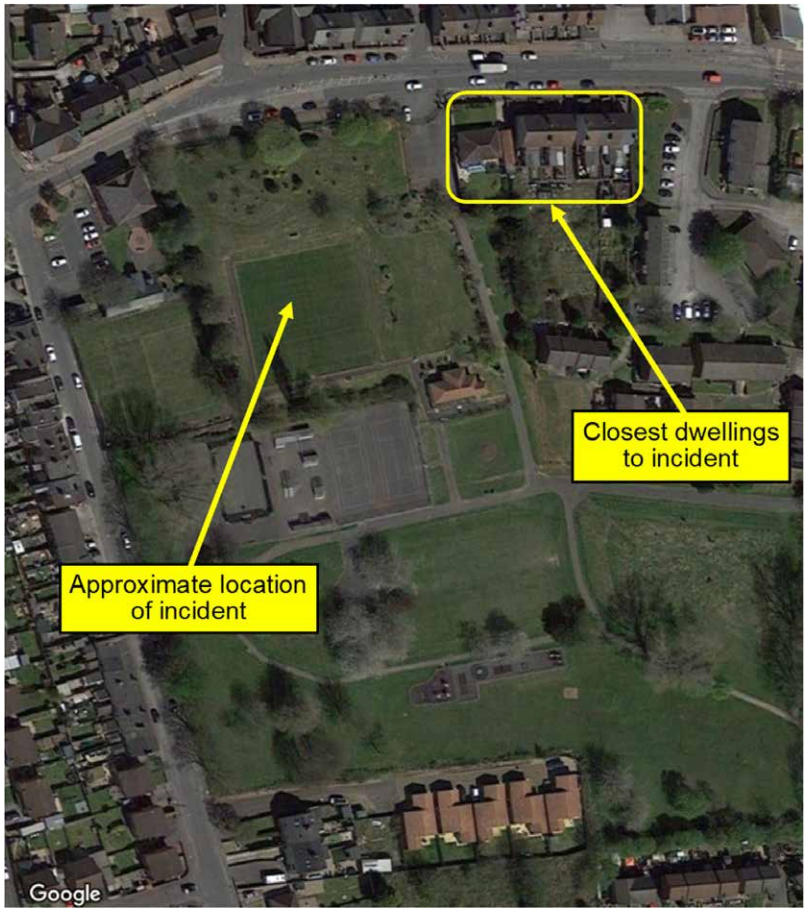

Figure 1

Welfare Park, Huthwaite, Sutton-in-Ashfield

(Satellite image ©2020 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, Map Data ©2022)

Regulations for UA operations

Basic regulation

Specific EU regulations covering unmanned aircraft system (UAS) operations were published in 2019 and transferred into UK law at the end of the EU exit transition period. This 'UAS Regulation Package' consisted of two separate, but interlinked regulations:

- *'Commission Implementing Regulation (IR) (EU) 2019/947 on the procedures and rules for the operation of unmanned aircraft*,' and,
- '*Commission Delegated Regulation (DR) (EU) 2019/945 on unmanned aircraft and on third country operators of unmanned aircraft systems*.'

As a result of the UK's exit from the European Union, both regulations have been amended and consolidated versions of each are published by the CAA as CAP1789A (IR) and CAP1789B (DR).

UK Air Navigation Order 2016

The Air Navigation Order 2016 (ANO) is described as regulating *'matters such as aviation safety standards and aircraft navigation'* and being '*wide-ranging, covering aircraft, air crew, passengers, cargo, air traffic services and aerodromes.*' Article 241 of the ANO requires that '*a person must not recklessly or negligently cause or permit an aircraft to endanger any person or property.'*

UK guidance for UAS operations

Detailed guidance for operating UASs in UK airspace is contained within the CAP722 document series which references the basic regulations and is published by the CAA. CAP722 is the lead document and CAPs 722A-E cover wider topics such as risk assessment methodology, training policy and a glossary of terms relating to UAS operations. The CAA's '*Drone and Model Aircraft Code*' website[1] contains further guidance for pilots and operators of UASs to help them '*fly safely and legally*.'

CAP722D definitions relevant to this incident were:

- Aircraft: '*any machine that can derive support in the atmosphere from the reactions of the air other than reactions of the air against the earth's surface*.'
- UA: '*any aircraft operating or designed to operate autonomously or to be piloted remotely without a pilot on board*.'
- UAS: '*a UA and the equipment to control it remotely*.'
  - ◊ A UAS comprises individual system elements consisting of the UA and any other elements necessary to enable flight, such as a Command Unit (CU), communication link and launch and recovery element. There may be multiple UAs, CUs or launch and recovery elements within a UAS.
- Remote pilot: 'a *natural person responsible for safely conducting the flight of* [a UA] *by operating its flight controls, either manually or, when the* [UA] *flies automatically, by monitoring its course and remaining able to intervene and change the course at any time*.'
  - ◊ Before flying any UA covered by the regulations, a remote pilot must obtain a 'flyer ID'[2] by passing the CAA's official theory test. The theory test includes questions on the regulations for UAS flying in the UK.

Footnote

1 The Drone and Model Aircraft Code | UK Civil Aviation Authority (caa.co.uk) (accessed 19 May 2022).
2 Getting what you need to fly | UK Civil Aviation Authority (caa.co.uk) (accessed 4 May 2022).

- ◊ The remote pilot is responsible for the safe and legal operation of any UA that they are flying.

- UAS operator: '*any legal or natural person operating or intending to operate one or more UAS*.' T*he UAS operator is responsible for the overall operation of the UAS, and most specifically the safety of that operation. This includes the conduct of any safety risk analysis of the intended operations*.'
  - ◊ The operator of a UAS must register with the CAA to obtain an 'operator ID' number which must be displayed on their aircraft.
  - ◊ The operator is responsible for ensuring that anyone who flies their UA has a flyer ID.
  - ◊ Provided they hold the correct CAA-issued IDs, an individual can act as both remote pilot and operator for the UA they are flying.
- Uninvolved persons: '*persons who are not participating in the UAS operation or who are not aware of the instructions and safety precautions given by the UAS operator*.'

UAS operational categories

UAS operations in the UK are regulated according to the perceived level of risk that the intended operation presents. Operations are deemed to fall within one of the following three broad categories:

- Open: operations presenting a low risk to third parties.
- Specific: operations requiring a CAA-issued operational authorisation because they present a greater risk than those in the Open category.
- Certified: operations that present an equivalent risk to that of manned aviation.

The remote pilot was operating under the auspices of the Open category at the time of the incident.

Open category

Flights in the Open category are restricted to Visual Line of Sight[3] operations of UA below 25 kg maximum takeoff mass. The category is divided into three operational subcategories, primarily based on the permitted proximity of a UA to uninvolved persons while in flight:

- A1 ('*fly over people*'): operations limited to UA posing a '*very low risk of harm*' due to their weight or construction.

Footnote

[3] Normally limited to a maximum distance of 400 ft (120 m) from the closest point of the surface of the earth and at a maximum range that allows to pilot to maintain visual contact and monitor the aircraft's flight path and manoeuvre it clear of anything that it might collide with.

- A2 (‘*fly close to people*’): remote pilots are required to gain an A2 Certificate of Competency (A2 CofC) to operate under the A2 subcategory regulations and must not fly their aircraft closer than 30 m horizontally[4] from uninvolved persons.
    - ◊ The A2 CofC qualification is primarily intended to assure an appropriate knowledge of the technical and operational mitigations for the risk of a person being struck by a UA.
- A3 (‘*fly far from people’*): separation from any uninvolved person must not be reduced below 50 m horizontally at any time and the UA must not be flown within 150 m horizontally of areas used for residential, commercial, industrial or recreational purposes.

Aircraft information

The Air2S was a commercially available UAS comprising a UA, with a nominal takeoff weight of 595 g, and a handheld remote control module. The system was required to be operated in accordance with UK regulations for UAS operations.

The Air2S aircraft was too heavy for the A1 Open subcategory but, subject to a remote pilot’s qualifications, could be flown in either the A2 or A3 Open subcategory.

Personnel

The incident pilot was also the operator of the UAS and was in possession of valid ‘flyer’ and ‘operator’ IDs issued by the CAA. He had not gained an A2 CofC qualification.

The children were not participating in the UAS operation and had not received any safety instructions from the incident pilot. The pilot reported being surprised when the child jumped up and reflected that, in hindsight, he should not have been flying his UA in the area.

Analysis

The Air2S UAS was covered by, and its operator responsible for compliance with, the UK regulations for UAS operations. The incident UAS’s operator was also acting as the remote pilot and was responsible for the safe operation of the aircraft, including compliance with the ANO, while it was in flight. As defined in CAP722D, in relation to the operation of the incident UAS, the injured child was an uninvolved person.

The incident pilot held the appropriate authorisations to fly the Air2S under the A3 Open category, which required a minimum horizontal separation of 50 m from uninvolved persons and 150 m from areas used for residential, commercial, industrial or recreational purposes. These required separation minima were not maintained.

Footnote

[4] 5 m if the UA is in the system’s ‘low-speed’ mode.

Conclusion

This incident occurred when a UA operated in the A3 Open category was flown closer to uninvolved persons than allowed for under the applicable regulations. Had the regulated horizontal separation minima been observed, the incident could not have occurred.