Schweizerische Eidgenossenschaft
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Swiss Transportation Safety Investigation Board STSB

Aviation Division

Summary Report

A summary investigation, in accordance with article 45 of the Ordinance on the Safety Investigation of Transport Incidents (OSITI), was carried out with regards to the following accident or serious incident. This report was prepared to ensure that lessons can be learned from the incident in question.

Aircraft	Airbus A320-214			G-EZPA
Main operator	EasyJet Airline Company Ltd, Hangar 89, London Luton Airport, Luton, LU2 9PF			
Main owner	EasyJet Airline Company Ltd, Hangar 89, London Luton Airport, Luton, LU2 9PF			
Pilot	Dutch citizen, born 1980			
Licence	Airline transport pilot licence aeroplane (ATPL(A)) according European Aviation Safety Agency (EASA), issued by the UK Civil Aviation Authority (CAA)			
Flying hours	**Total**	7780 h	**During the last 90 days**	171:15 h
	On the incident type	6500 h	**During the last 90 days**	171:15 h
Co-pilot	French citizen, born 1979			
Licence	EASA APTL(A), issued by the CAA (UK)			
Flying hours	**Total**	4270 h	**During the last 90 days**	184:36 h
	On the incident type	1050 h	**During the last 90 days**	184:36 h
Location	3.4 NM south-south-east of Basel Airport (LFSB)			
Coordinates	N 47° 32’ 39.57’’ / E 7° 33’ 44.67’’ (WGS)		**Altitude**	approximately 2100 ft AMSL[1]
Date and time	14 July 2016, 18:38 UTC			
Type of operation	Scheduled flight			
Flight rules	Instrument flight rules (IFR)			
Flight phase	Approach			
Incident type	Near collision with drone			
Point of departure	Amsterdam (EHAM)			
Destination	Basel (LFSB)			

Injuries to persons	**Crew**	**Passengers**	**Third parties**
Minor	0	0	0
None	6	169	n/a

Damage to aircraft	Not damaged
Third-party damage	None

[1] AMSL: above mean sea level

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History of the serious incident

The incident concerned a scheduled flight from Amsterdam (EHAM) to Basel (LFSB) with flight number EZY 1045 and radio call sign 'Easy Six Five Tango Mike' with 169 passengers and 6 crew members on board.

After an uneventful flight, the aircraft was making a stabilised ILS[2] approach to runway 33 when, at approximately 2100 ft AMSL and a distance of approximately 3.4 NM from the runway threshold – i.e. roughly level with Basel's Schützenmatte stadium – the flight crew spotted a drone directly in the line of approach. The pilot assessed this to be a white drone with red lights, which was stationary or moving forwards at a slow speed, at a vertical distance of approximately 10 metres. In the remaining few seconds, the flight crew did not have time to avoid the flying object. The pilot immediately reported the near collision to the airport controller at Basel Airport.

The flight crew continued with the approach and the aircraft landed without incident.

The occurrence of drones, measures to be taken and measures already in effect

A similar near collision occurred at Basel Airport on 10th March 2016 when an airliner narrowly avoided a drone during its final approach to runway 15.

In Switzerland, the number of reported incidents involving remotely piloted aircraft systems (RPAS[3]) remained relatively stable between 2010 and 2013, with around 5 incidents per year (see Chart 1). The incidents were concentrated in the control zones (CTR) of Bern (LSZB) and Grenchen (LSZG) regional airports; with the exception of 2 cases, their severity was rated as 'low'. In the following years, the number and severity of incidents of this kind have increased considerably. In 2014, 5 of a total of 15 incidents were rated as 'major' and were clustered around Zurich Airport (LSZH). In 2015, 6 of 22 incidents were rated as 'high'; and in 2016, 12 of 28 incidents were rated as 'high' up until 23rd August. As many as 22 of the 28 incidents have been registered since the introduction of the reporting portal on 1 April 2016.

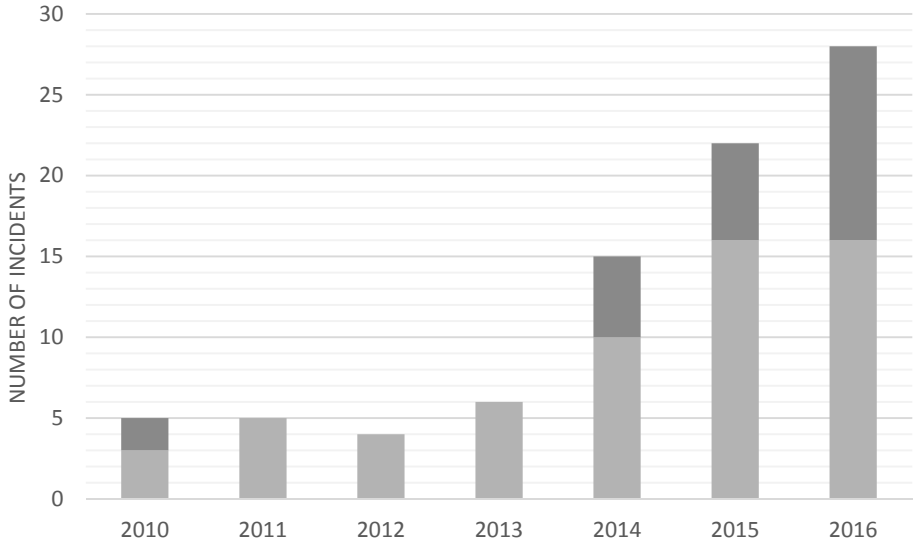

Chart 1: The number of near collisions involving RPAS from 2010 until 23 August 2016 rated as 'low' severity (light grey), and 'major' or 'high' severity (dark grey)

The Federal Office of Civil Aviation (FOCA) estimates that in Switzerland alone, around 20 000 drones are already in private and commercial use.

[2] ILS: instrument landing system

[3] The term RPAS was introduced by the *International Civil Aviation Organisation* (ICAO)

Incidents involving drones of this kind do not just occur in Switzerland: in August 2016, a near collision took place when a Lufthansa airliner passed a drone at a distance of just a few metres at an altitude of approximately 1700 m AMSL during its landing approach to Munich Airport (EDDM). Quadcopters, i.e. drones which have four rotors, can reach an altitude of approximately 2500 m AMSL, despite decreasing air density. Hamburg Airport has also recorded a high number of airproxes between airliners and drones over the last two years.

With regard to handling RPAS, particularly concerning those for private use, there are growing calls for specific requirements, such as proposals for a drone licence or compulsory registration. As a minimum requirement, drone purchasers should also receive an instruction leaflet to make them aware of the rights, obligations and risks regarding the operation of drones. Calls for an obligatory transponder or the fitting of flashing LEDs, which are also visible using night-vision goggles, aim to improve the visibility of these aircraft, which are very difficult to perceive with the naked eye.

Apart from general weight restrictions and areas of universal flight restrictions such as nuclear power stations, general prohibitions are already in force in the form of restrictions to altitude and proximity around airports and heliports, violation of which is heavily fined. If necessary, these spatial operating restrictions could be tightened using suitable technological measures such as geofencing[4]. Prerequisite is an *unmanned traffic management system* (UTM) that needs to be provided. The FOCA and Skyguide are active parties involved in international intentions for a coordinated set-up; first systems abroad are already or will be in a trial period in 2017.

The Swiss legal framework regarding the operation of RPAS weighing less than 150 kg is outlined in the DETEC Ordinance on Special Category Aircraft (OSCA); in accordance with this, permission is not required for the operation of RPAS weighing up to 30 kg, if direct visual contact is maintained at all times. Permission from FOCA is required for the use of technical aids such as video glasses[5], unless a second person is supervising the flight and is able to take control of the aircraft at any time, if necessary. For the operation of RPAS weighing more than 500 g, liability cover of at least 1 million Swiss francs must be in place for all possible damages. Furthermore, RPAS must not be operated within 5 km of an airfield or airport runway and, within a CTR, higher than 150 m above the ground. Responsibility for further provisions on the operation of RPAS regarding the reduction of the environmental impact and endangerment of persons and objects on the ground lies with the cantons.

FOCA actively raises awareness amongst drone owners regarding the general framework for operation via its website and social media channels. FOCA equally endeavours to make the remaining stakeholders in Switzerland aware of drone-related issues through proactive communication at regular meetings; as regards law enforcement, awareness is also proactively raised through knowledge sharing with the police.

On an international level, FOCA is actively involved in European committees as well as groups of experts, for the standardisation and further development of technology, which is necessary to enable the remote identification of flying drones and their pilots.

The European Aviation Safety Agency (EASA) is preparing a new regulation on RPAS weighing more than 150 kg, which fall into its jurisdiction. The intention is to gradually standardise different legislations in the EU member states up to 2028, taking into consideration the specifications of the International Civil Aviation Organisation (ICAO). Until then, member states are

[4] Geofencing: invented word formed from ‘geographic’ and ‘fence’ that describes the automatic triggering of an action by passing an imaginary boundary on the ground or in the air. This action may be, for example, triggering an alarm via text or email. Geofencing, for example, is used to help ensure that rental vehicles are not driven abroad.

[5] Video glasses are glasses consisting of a frame, two tiny screens, headphones or earphones, and usually additional screens, which allow video information to be viewed, unaffected by external visual stimuli.

asked to take into account the recommendations made by the JARUS[6] group of experts for their legislation. FOCA is actively represented both in the EASA committees and the JARUS group of experts.

On 29 August 2016, the new regulations of the American Federal Aviation Administration (FAA) concerning the commercial operation of small unmanned aircraft systems (SUAS) weighing up to 55 lb came into force. Operation requires either a remote pilot airman certificate with the relevant SUAS rating, or a person supervising who possesses this certificate. Up to a maximum altitude of 400 ft above ground, daytime operation requires a direct line of sight. Reporting to air traffic control is also required for operation in class B, C, D and E airspaces. Stipulations include giving right of way to manned aircraft.

In the first edition of the Manual on Remotely Piloted Aircraft Systems (RPAS) of 2015, ICAO provides an international regulatory framework through standards and recommended practices (SARP), with supporting procedures for air navigation services and guidance material for type certification and airworthiness approvals as well responsibilities of RPAS operators, to underpin operation throughout the world in a safe and harmonized manner comparable to that of manned operation.

In this manual, ICAO recommends a RPAS operator certificate comparable to the air operator certificate (AOC) for a commercial air transport operator and calls for the state of operator to establish a system for both the certification and the continued surveillance of the RPAS operator to ensure that the required standards of operations are maintained. Unlike manned aviation with multiple types of licences, a single remote pilot licence which covers all types of scenarios is expected to be developed, including annotations with ratings, limitations and endorsements, as appropriate. Class ratings also must address the remote pilot station(s) (RPS) and its interaction with the RPA. These considerations require a new approach for licensing including medical assessment for remote pilots as well as competencies for RPA observers.

Conclusions

Given that remotely piloted aircraft systems (RPAS) can predominantly only be detected visually and not by collision warning devices, it is just a matter of time before a collision with a commercial aircraft at low altitude occurs, especially in light of the increasing number of drones in use. Above all, multicopters can cause considerable damage to an aircraft's engine or even set it on fire due to their large size.

Targeted measures must therefore be implemented relentlessly and quickly. From the perspective of aviation safety, these specifically include measures that make it possible for unmanned aircraft to be detected, both by those directly affected and by third parties such as air traffic control (detect and avoid).

Payerne, 20 December 2016 Swiss Transportation Safety Investigation Board

[6] JARUS: joint authorities for rulemaking on unmanned systems