Federal Public Service
Mobility and Transport
Air Accident Investigation Unit

Air Accident Investigation Unit
(Belgium)
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1210 Brussels

Safety Investigation Report

Ref. AAIU-2017-14
Issue date: 02 October 2018
Status: Final

Classification:	Accident	**Type of operation:**	Specialized Operations – Photography (filming)
Level of investigation:	Standard	**Phase:**	Taxi
Date and time:	31 March 2017 at 17:00 UTC	**Operator:**	Heli Service Belgium
Location:	Heliport Sint-Pieters-Leeuw - EBSW	**Persons on board:**	1
Aircraft:	Eurocopter AS355F2 msn 5187	**Aircraft damage:**	Substantially
Occurrence category:	Ground collision	**Injuries:**	None

Abstract

An helicopter returned to its base after a filming mission. The pilot set the helicopter on parking stand 3, then decided to move the helicopter to another stand 1. Arriving at this final helicopter stand, the pilot initiated a counter-clockwise rotation and the tail rotor hit a container.

The helicopter was damaged and the pilot climbed out, uninjured.

Cause

The accident was caused by the inadequate positioning of the helicopter upon the initiation of a 180 degree-turn around its axis.

Contributing factors:

- Pilot fatigue.
- Visibility of the helicopter stand ground marking.
- Lack of procedures regarding the taxi between helicopter stands.

1. FACTUAL INFORMATION

1.1 History of the flight

The helicopter returned to its home base after a 12-hour filming mission for a television program. The mission involved 12 hours low flying with two pilots. Reaching the home base, the pilot flying had accumulated 5:54 FH on the day. The pilot stated he was not tired, nor stressed.

The initial intention of the pilot was to park the helicopter on the helicopter stand 1, in front of the hangar. However, as another helicopter in the hangar was scheduled for a flight early the next day, the pilot decided to move to the helicopter stand 3.

The pilot brought the helicopter to a hover, moved laterally towards the helicopter stand 2, then moved to the helicopter stand 3. Arrived at helicopter stand 3, not realising the helicopter was not centered above the stand marking, he wanted to position the helicopter into the wind and initiated a counter-clockwise rotation.

The pilot suddenly felt that the tail hit an obstacle, the helicopter turned to the right somewhat, then violently to the left, as the tail rotor failed. The pilot reaction was to lower the collective controls and land immediately.
The helicopter landed on the grass behind stand 3 and did not roll over. The tail boom was damaged, the tail rotor blades were severed, the right skid was broken as well as the camera installation installed on the helicopter for filming. There was no injury.

The tailskid hit a container standing on the side of the hangar. The tail rotor strike the roof of the container as well.

The container was already there for many years and was well known from the pilot.

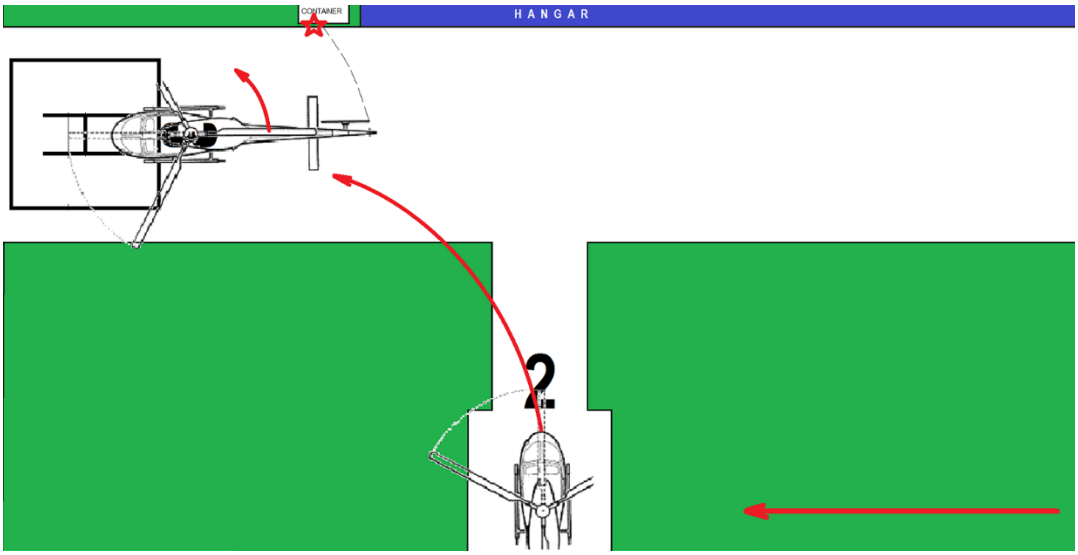

Figure 1: sketch of the last moments of the flight path

1.2 Damage

The tail rotor blades were severed, the vertical fin is deformed, the tail boom is deformed. The yellow main rotor blade is damaged by impact with a tail rotor blade.

Figure 2: Damage to helicopter

Figure 3: Damage to the container

1.3 Pilot information

Age:	63 years	**License:**	CPL(H), first issued in 1992
Nationality:	Belgian	**Ratings:**	AS350/EC130, AS355, Bell 206, R22, R44, FI(H), TRI(H), FE(H), FIE(H), TRE(H)
Flight experience:	Total flight hours: 10696 FH On type: AS355: 2376 FH AS350/EC130: 561 FH Proficiency check on AS355: last performed on 01 March 2017 The pilot is also the Safety and Compliance Monitoring Manager of the company		

1.4 Aircraft information

Type	Helicopter – light utility	**Certificate of Airworthiness:**	Issued 19 February 2009 by BCAA
Manufacturer:	Aérospatiale (now Airbus Helicopters)	**Airworthiness Review Certificate:**	Valid up to 22 February 2018
Model:	AS355F2 Ecureuil 2	**Number, type and model of engine(s):**	2 turboshaft Allison 250-C20F, 313 kW (420 shp) each
Built year:	1982	**Crew:**	1
Serial number:	5187	**Capacity:**	6
Empty weight	1305 kg	**Length:**	12.94 m
Maximum take-off weight:	2540 kg	**Rotor diameter:**	10.69 m
Airworthiness:	EASA Aircraft	**Height:**	3.14 m
State of registry:	Belgium	**Disc area:**	89.75 m²

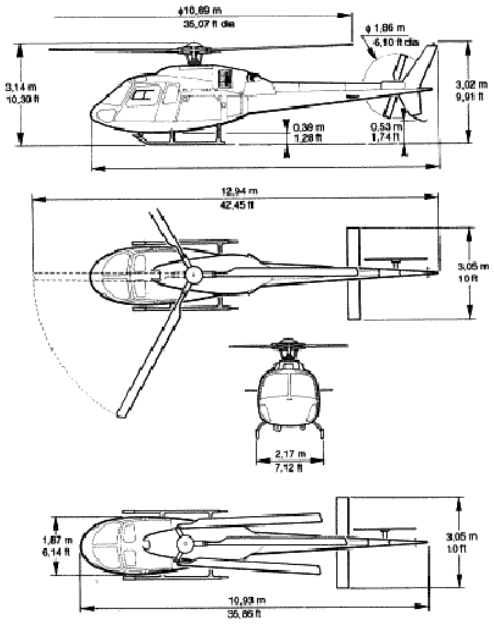

Figure 4:helicopter lay-out and dimensions

1.5 Meteorological information

METAR EBBR – 18:20 – 18:50 UTC

Wind: 190 degrees – 6-8 knots
Visibility : 10 + km

Clouds: Few at 4000 ft

Temperature: 15 °C – Dew point: 9°C

QNH: 1013 hPa

Sunset was at 18:12 UTC

1.6 Airfield information

The heliport of Sint-Pieters-Leeuw (EBSW) is a national heliport operated by Heli Service Belgium (HSB) in Halle, Belgium. It is located in an uncontrolled airspace below Brussels TMA One. The distance to the city of Brussels is about 7 NM and 2 NM from the city of Halle.

The heliport is PPR – Prior Permission Required.

Location: 50° 45' 52" N – 004° 13' 13"E.

Heli Service Belgium is providing various services to customers including air taxi, air surveillance of pipelines, aerial photography and filming, medevac, flight training, helicopter maintenance, etc. At the time of the incident HSB was holding an

- Air Operator Certificate
- An Aerial Work Certificate
- A Maintenance Approval Certificate
- An authorization to operate a heliport

Figure 5: aerial view of the heliport (source: Google Earth)

The Heliport handbook describes the obstacles, communication, landing and take-off procedures, entry and exit points, noise abatement procedures, etc..
However the handbook does not describe procedure related to the taxi of helicopters from the FATO to the parking area.

An old (1999) drawing defines the taxiway from the FATO to the helicopter stand places 1, 2 and 3.

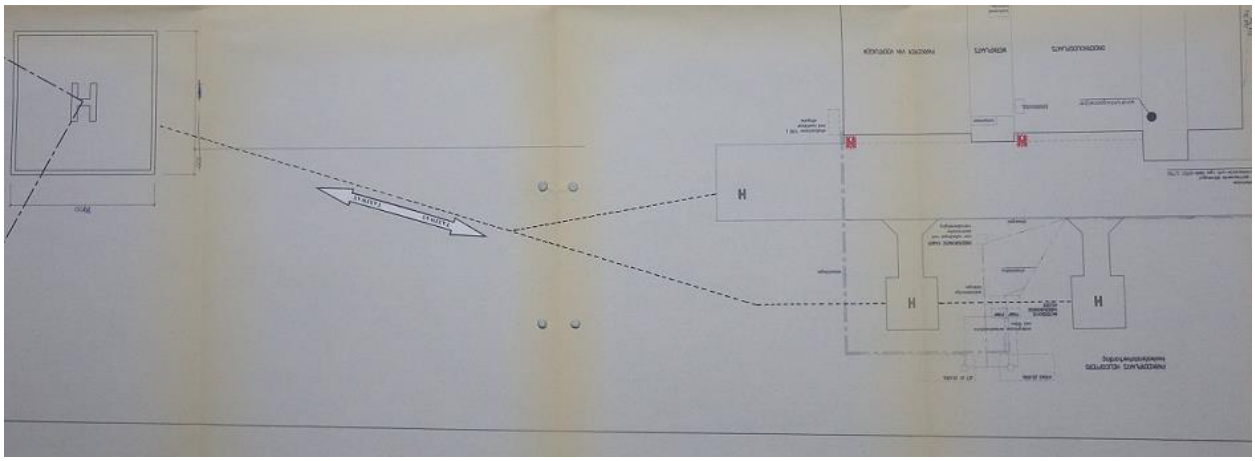

Figure 6: FATO-TLOF and helicopter stand

1.7 Operating procedures

2. SCHEDULED HOURS OF HELIPORT OPERATION

The Heliport notified operating hours are as follows:

- From Monday to Friday 0800 – 1700 (Local time).
- Saturday 0800 – 1600 (Local time).
- The Heliport is closed at Sunday and Public Holidays.

All flights require prior permission and bookings may be made on:

- Telephone number : 00 32 (0)2 361 21 21
- Fax number : 00 32 (0)2 360 27 70

3. SPECIAL OPENINGS OF THE HELIPORT

Given sufficient notice, consideration will be given to flights outside normal hours, which are subject to additional fees. The minimum notice required for such an application is as follows (all times local):

- For early openings by 1630 (Local) on the previous normal working day.
- For late extensions before 1500 (Local) on the same day.

Figure 7: extract from the heliport handbook

1.8 Rules and regulation

ICAO Annex 14 Vol 2. defines the requirements for helicopter stands of international heliports.

Helicopter stands
(…)
3.1.52 A helicopter stand intended to be used by helicopters turning in a hover shall be of sufficient size to contain a circle of diameter of at least 1.2 D of the largest helicopter the stand is intended to serve.
(…)
3.1.54 Where a helicopter stand is intended to be used for turning, the minimum dimension of the stand and protection area shall be not less than 2 D.
3.1.55 Where a helicopter stand is intended to be used for turning, it shall be surrounded by a protection area which extends for a distance of 0.4 D from the edge of the helicopter stand.

5.2.17 Helicopter stand markings

Application
5.2.17.1 A helicopter stand perimeter marking shall be provided on a helicopter stand designed for turning. If a helicopter stand perimeter marking is not practicable, a central zone perimeter marking shall be provided instead if the perimeter of the central zone is not self-evident.
(…)
Location
5.2.17.4 A helicopter stand perimeter marking on a helicopter stand designed for turning or, a central zone perimeter marking, shall be concentric with the central zone of the stand.

5.2.17.6 Alignment lines and lead-in/lead-out lines shall be located as shown in Figure

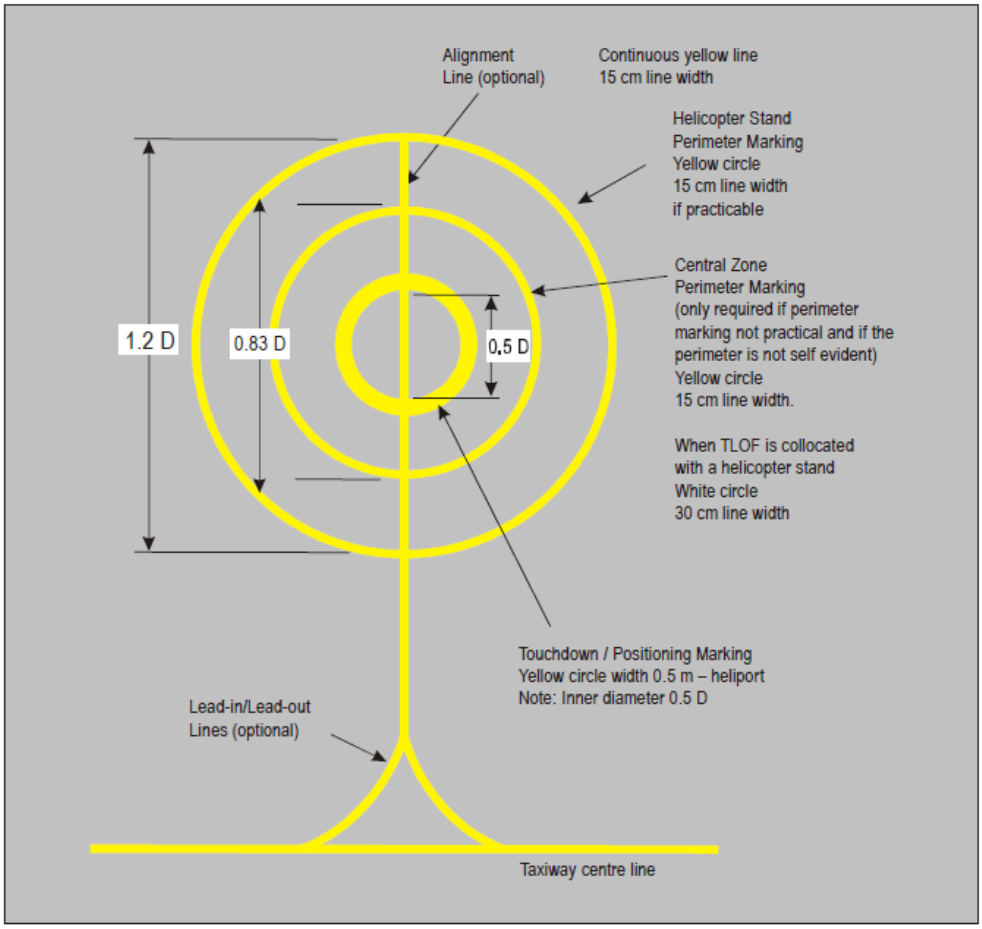

Figure 8: helicopter stand markings and dimensions

The BCAA Circular CIR-GDF02-P identifies the requirements for a permanent heliport.

It defines the following, regarding the helicopter stands and air taxiways;

- The helicopter stand for an helicopter will be of sufficient size as to contain a circle of a diameter at least equal to 1.2 times the overall length of the helicopter.

2.4.6. *Parkeerplaats*	**2.4.6. *Poste de stationnnement***
De parkeerplaats voor een helikopter moet voldoende groot zijn om een cirkel te omvatten met een diameter van 1.2 maal de grootste lengte van de helikopter.	Le poste de stationnement d'hélicoptère sera de taille suffisante pour contenir un cercle de diamètre au moins égal à 1.2 fois la longueur hors tout de l'hélicoptère.

Figure 9

- The external limits of a helicopter stand shall be materialized by a 0.5 m wide yellow line.

4.3. Markering van het landings– en startareaal (TLOF) en van de parkeerplaatsen	***4.3. Marquage de l'aire de prise de contact et d'envol (TLOF) et des postes de stationnements***
• De buitenste rand van een parkeerplaats zal omlijnd zijn door een gele lijn met een breedte van 0,5 m.	• la limite extérieure d'un poste de stationnement sera matérialisée par une ligne jaune de 0,5 m de largeur.

Figure 10

- The width of an air taxiway shall be at least 2 times the width of the landing gear of the helicopter for which it's intended to serve.

2.4.2. *Luchttaxiweg*	**2.4.2. *Voies de circulation en translation dans l'effet de sol***
De breedte van een luchttaxiweg bedraagt ten minste twee maal de breedte van het onderstel van de helikopter waarvoor ze bestemd is, en de ondergrond moet in staat zijn de helikopter te dragen bij motorpech. Het oppervlak mag geen oneffenheden vertonen die de structuur van de helikopter zouden kunnen beschadigen en moet permanent grondeffect verzekeren. De langshelling van een luchttaxiweg bedraagt maximum 7 %.	La largeur d'une voie de circulation en translation dans l'effet de sol sera de minimum deux fois la largeur du train d'atterissage de l'hélicoptère auquel elle est destinée. Le sol sous-jacent devra être à même à supporter le poids de l'hélicoptère en cas de panne moteur. La surface du sol sous-jacent ne peut présenter d'inégalités de nature à endommager la structure des hélicoptères et assurera l'effet de sol. La pente longitudinale d'une voie de circulation en translation dans l'effet de sol est de maximum

Figure 11

2. ANALYSIS

2.1 Human factors

The pilot was duly qualified, had extensive experience on the type of helicopter and knowledge of the surroundings and location of obstacles. The pilot claims he was not fatigued after the 6 hours flying of the day, nor in a particular stress situation (such as hurrying to end the day). He tended to put the cause of the accident to distraction, fatality.

The pilot stated that, for him, the major source of stress comes from his administrative duties. The pilot is also the safety and compliance monitoring manager for the helicopter company, a very small organization with many certificated activities (Air Operator, Maintenance Organisation, Flight school, Airfield). The amount of administrative work required to maintain the certificates is huge. The organization was recently audited by the BCAA and there are regulatory changes (Specialized Operations – Part SPO) upcoming.

The tasks required to maintain compliance with the regulation and procedures are felt mainly as a burden without much added value and a source of chronic stress. Another source of chronic stress is the relation with neighbours caused by the noise of the helicopters.

Flying activities for the pilot is considered relaxing; focusing on the flight allows the pilot to take some distance from the desk activities.

Nevertheless, it is possible that the attention of the pilot remained focused during the flight and that his attention partially shifted to the administrative tasks awaiting him after the flight. This may have been combined with actual fatigue, although not felt by the pilot.

2.2 Procedures

Within the company and in particular for the pilot, being also the compliance and safety manager, flight safety is considered mainly ensured by the experience of individual pilots without having a need for a support from a structured organization, by means of procedures.

In the heliport handbook, there is little or no information available on the heliport lay-out, the air taxiway from the FATO-TLOF and the helicopter stands, each pilot selects the most adequate way to move the helicopter in the parking area, either with a cart or with hover taxi.

The heliport handbook does not identify whether helicopters are allowed to turn above the helicopter stands.

2.3 Ground references

The helicopter was above an air taxiway but not centered above the ground reference of the parking stand when it started to turn around. The requirement for air taxiway width is to be 2 times the width of the landing gear of the helicopter for which it's intended to serve. There is no requirement to be able to turn the helicopter around its axis on an air taxiway, whereas such a requirement does exist for a parking stand.

The ground reference of the helicopter stand, indicated by a white painted square with a center "H" was visible during the day, but the white paint was somewhat faded. The ground reference is important in this event, as it would give the pilot a crucial information about the position of the helicopter at the moment of turning the helicopter into position.

During a surveillance audit performed in November 2015, the BCAA notified that the parking markings needed to be brought in conformity with the prevailing regulation (CIR-GDF02P). This would eventually require the painting of new ground markings. No action was performed by the company since the audit finding.

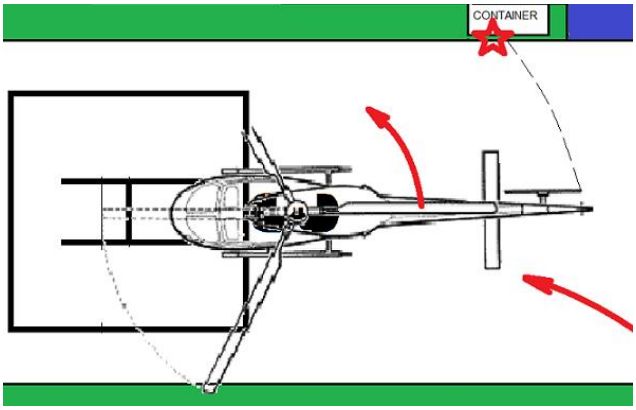

Figure 12: initial position of the helicopter

3. CONCLUSIONS

Cause

The accident was caused by the inadequate positioning of the helicopter upon the initiation of a 180 degree-turn around its axis.

Contributing factors:

- Pilot fatigue.
- Visibility of the helicopter stand ground marking.
- Lack of procedures regarding the taxi between helicopter stands.

4. SAFETY ACTIONS AND RECOMMENDATIONS

Safety recommendation BE-2018-0007

It is recommended that HSB reviews the Heliport handbook and the configuration of the existing helicopter parking area in order to:

- Include clear instructions related to taxi operations from the FATO/TLOF to helicopter stands and between helicopter stands.
- Adapt the marking of the helicopter stands to give a clear and visible reference to the pilot in order to ensure an adequate clearance with respect to the surroundings buildings and obstacles. The prescriptions of ICAO Annex 14 give adequate indications. Nevertheless, the markings must be compliant with CIR-GDF-02-P.