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Safety Investigation Report

Ref. AAIU-2021-09-25-01
Issue date: 02 June 2025
Status: Final

Scope: Limited

As per ICAO Annex 13 and EU regulation EU 996/2010, decisions regarding whether to conduct a civil aviation safety investigation, and the extent of an investigation, are based on many factors, including the level of safety benefit expected to be drawn from such an investigation.
For this occurrence, a limited-scope, fact-gathering investigation and analysis was conducted in order to produce a short summary report. The investigation mainly focussed on the actions and conditions directly relating to the occurrence and might not cover all aspects of the aircraft operation and/or possible underlying safety factors due to the expected safety benefit of it and/or the extent of evidence/resources available.

SYNOPSYS

Occurrence class	Accident
Occurrence category	Controlled flight into or toward terrain (CFIT)
Date and time[1]	Saturday 25 September 2021 17:08 UTC
Location	On runway 22 of the airfield of Moorsele (EBMO)
Aircraft	Cessna 208B Super Cargomaster
Aircraft category	Fixed wing - Small aeroplane (MTOW ≤ 5700 kg)
Location of departure	Airfield of Moorsele (EBMO)
Planned destination	EBMO
Type of operation	Non-commercial - Specialized Operations - Parachute drop
Phase of flight	Approach
Injuries	Minor
Aircraft damage	Substantial

What happened

The Cessna 208B Super Cargomaster skydiving plane suffered an accident on landing at the aerodrome of Moorsele. The aircraft had just completed the 18th leg of the day while it impacted ground short of runway 22. The pilot, who was the only occupant, only suffered minor injuries.

[1] All time data in this report are indicated in UTC, unless otherwise specified

1. THE OCCURRENCE

In the morning of 25th of September 2021, the pilot took-off with a Cessna 208B Super Cargomaster, for a day of paradrop flights at Moorsele aerodrome (EBMO). Due to the dense fog at the aerodrome, the flights started two hours later than planned, around 8:45 UTC.

The paradrop flights consistently followed the same procedure: The aircraft climbed north of the airfield, reaching a pressure altitude exceeding 13000 feet for a brief duration. Once the parachutists had exited the aircraft, the aircraft would then swiftly descend to land back on the airfield, ready to transport the next group of parachutists. A paradrop flight took about 15 to 20 minutes. On that day, the pilot flew more than 6 hours and performed 18 parachute drop flights in total. After every 4 to 5 flights, the aircraft landed to refuel while the pilot took a short break. The pilot did not use supplemental oxygen, because only having spent a brief duration above 13000 feet.

Table 1: Overview of the flight & break times and altitudes[2]

	UTC Time	Total flight time	Total break time	Max altitude (ft)
Leg 1	8:45 - 9:05	1:05		12950
Leg 2	9:05 - 9:25			12750
Leg 3	9:25 - 9:50			13475
Break	9:50 - 10:15		+- 00:25	
Leg 4	10:15 - 10:35	1:30		12700
Leg 5	10:35 - 10:55			13075
Leg 6	10:55 - 11:20			13100
Leg 7	11:20 - 11:45			13550
Break	11:45 - 12:15		+- 30:00	
Leg 8	12:15 - 12:35	1:50		13050
Leg 9	12:35 - 13:00			13000
Leg 10	13:00 - 13:22			13300
Leg 11	13:22 - 13:42			13375
Leg 12	13:42 - 14:05			13500
Break	14:05 - 14:35		+- 30:00	
Leg 13	14:35 - 14:55	1:45		13325
Leg 14	14:55 - 15:15			13075
Leg 15	15:15 - 15:35			13300
Leg 16	15:35 - 15:55			13475
Leg 17	15:55 - 16:20			13500
Break	16:20 - 16:50		+- 30:00	
Leg 18	16:50 - 17:08	00:18		13100

[2] Times and altitudes are based on data retrieved from online flight tracker FlightRadar24. As the records started and ended as from the moment the aircraft was above certain altitude, these times are derived and to be considered approximate. However, they give a good representation of the schedule of that day.
Altitudes are indicated in pressure altitude. The reference pressure used is 1013,4 millibars.

According to the appointed safety responsible of the parachutist club, “a normal pick-up procedure at EBMO depends on the runway in use. Upon landing on runway 22, the aircraft performs a 180 degree turn and returns on the taxiway located on the southern side of the runway. Approximately 50 meters before the threshold, the aircraft picks-up the next group of parachutists and will then line-up at the threshold of runway 22, ready for its next flight. This is an unwritten procedure, yet it is well-known and consequently applied among paradrop pilots”.

On that day, runway 22 was used for takeoffs and landings, which was in the morning upon request from the skydivers, according to the pilot.
The wind was calm, remaining below 5 kt, but it changed direction over the course of the day, moving from 200 to 120 degrees at the time of the accident.

Each flight proceeded uneventful until the final landing phase following the eighteenth drop.

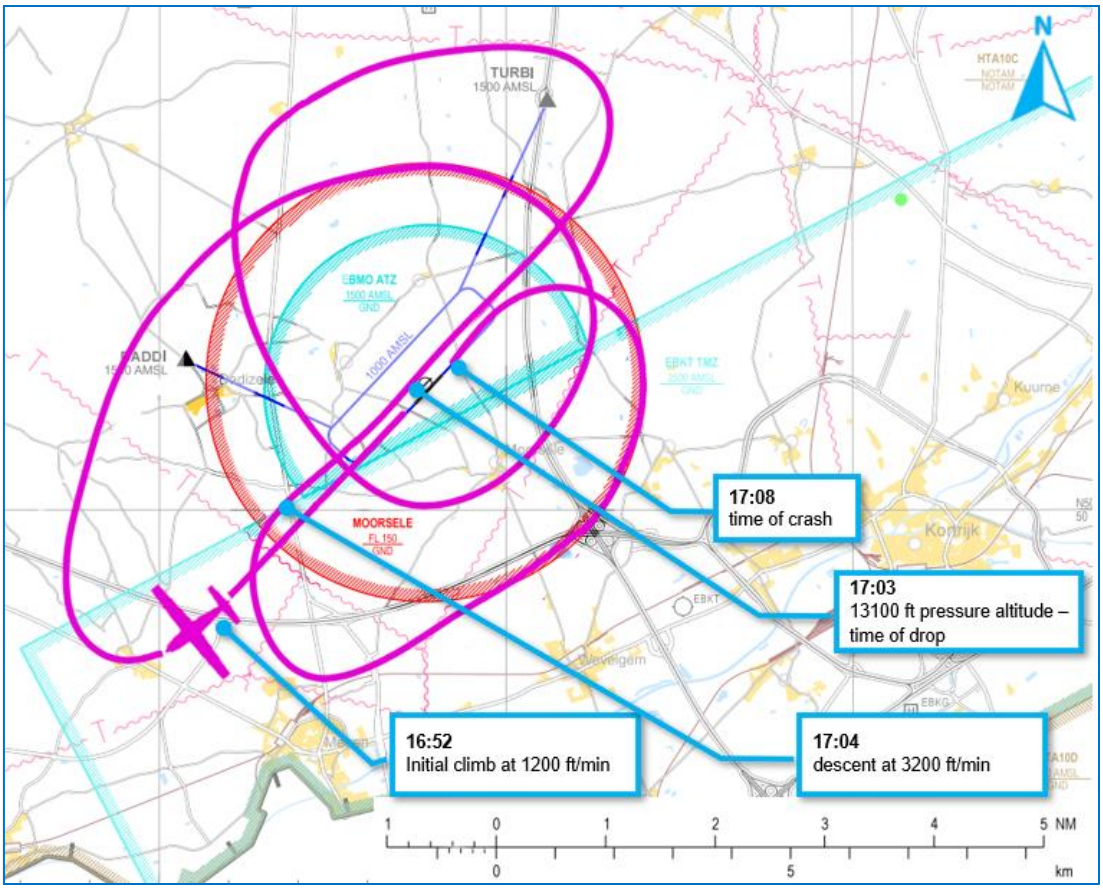

Figure 1 : the flight path of leg 18, based on online flight tracker ADS-B-recordings

<u>The pilot’s account:</u>

“The paradrops proceeded uneventful until the eighteenth drop which was the second to last flight for the day. It was just after 17:00 UTC, as nightfall was beginning to set in. The descent and the approach after the drop went without any problems. In final approach, visibility was severely hampered by the low-lying sun.
I started the approach at an airspeed of 80 kt and had set the flaps.

When rounding the aircraft just before touch down, my visibility was compromised by the sunlight. The sun was just a head of me on the right-hand side. This likely led to a brief period of disorientation, during which I may have overcompensated by pulling back the throttle and the yoke. Subsequently, I felt the airplane lose altitude abruptly and crash.

I wore sunglasses and made use of the on-board sun shade.

I realized, as the day progressed, that the sun was coming more and more into my field of vision, reducing visibility during the approach. In retrospect, it might have been better to alter the direction of the runway (to runway 04) towards the end of the day. The conditions were calm with minimal wind, and there was no other air traffic. However, I never thought of effectively changing tracks. But in hindsight I think I should have. In fact, it is easier to take off and land from the other direction. (since the skydivers don't have to walk as far from the hangar, ed.)*"*

The aircraft caught fire after impact, but the fire was promptly extinguished by people on the aerodrome that witnessed the crash. After the crash landing the pilot shut off the engine, disconnected the fuel supply and battery, and vacated the aircraft himself.

There were no witnesses who saw the impact itself, but the impact was heard whereupon witnesses saw the plane skidding.

Figure 2 : The aircraft at its final position

The pilot later declared in an interview that he recently had changed jobs and has been working as a commercial pilot on a part-time basis for the past few weeks. As a flight instructor he had been teaching in the days leading up to the accident.
He said that the cumulative effect of these flying activities could left him feeling a bit fatigued.

2. CONTEXTUAL INFORMATION

2.1 Damage

The aircraft sustained noticeable damage to the nose and right main landing gear, propeller and engine compartment.

2.2 Personnel information

Table 2 : General pilot data

Age	54 years
License	CPL(A), that first was issued in 2018
Medical certificate	Class 1 medical certificate with a VML limitation; which requires a correction for defective distant, intermediate, and near vision

The pilot was certified with a Cessna Single Engine Turbine (SET) type rating, which authorized to fly with the Cessna 208B Super Cargomaster. Additionally, the pilot held a Flight Instructor certificate (FI(A)).

Table 3 :Flying experience pilot

Total hours	1448 flight hours
Total on type	+- 150 flight hours
Last 90 days:	+- 150 flight hours
Last 30 days:	+- 50 flight hours (6:10 on type)
Last week:	+- 25 flight hours (6:10 on type)

The last paradrop operations with the same Cessna 208 were performed on the Sunday before, when he performed 16 drops in 6:10 flight hours at EBMO. He did not fly the day before the accident.

2.3 Aircraft information

Table 4: Aircraft data

Model:	Cessna 208B
Year of built:	2000
Serial number	208B0834
MTOW:	3968,9 kg (8750 lbs.)
Registration:	Belgian
Airworthiness:	Valid EASA Certificate of Airworthiness (CofA)
Total hours:	8241:48 flight hours on 24th of June 2021

Engine type	Turboprop Garret TPE331-12JR-702TT
Engine manufacturer and model	Honeywell International, Inc.
Propeller type	HC-B4TN-5QL/LT10891N
Propeller manufacturer and model	Hartzell Propeller, Inc.

The aircraft was reportedly in good technical condition before the flight.
No evidence suggested that the aircraft's technical condition contributed to the accident.

2.4 Meteorological information

At Lille Airport (LFQQ) in France, the nearest airport to EBMO, located approximately 30 kilometres to the south, meteorological information is updated every 30 minutes with a METAR weather report.

On the 25th of September 2021, the weather conditions at LFQQ evolved as follows:

- The wind direction shifted from 200 to 120 degrees at 17:00 UTC.
- The wind speed remained calm, below 5 kts, and was recorded as 3 kts at 17:00.
- The day began with a dense fog which lifted around 7:00. From then, the sky cleared and remained CAVOK[3] for the rest of the day.
- The QNH was recorded as 1016 hPa, but decreased to 1013 hPa at 17:00.
- At 17:00, the temperature was 21°C and dewpoint was 13°C,
  and no significant changes in the weather were expected in the next two hours.

The METAR report for Lille airport (LFQQ) published shortly before the accident, at 17:00:

LFQQ 251700Z AUTO 12003KT CAVOK 21/13 Q1013 NOSIG=

At the time of the accident, the sun was positioned at an altitude of 4,17 degrees above the horizon with an azimuth of 263,28 degrees at EBMO.

That day, the sun set at 17:38:57 UTC.

[3] CAVOK is an abbreviation for Ceiling And Visibility OK, indicating no cloud below 5000 ft (1500 m) or the highest minimum sector altitude and no cumulonimbus or towering cumulus at any level, a visibility of 10 km or more and no significant weather change.

2.5 Aerodrome information

The accident occurred at Moorsele Aerodrome (EBMO), an uncontrolled aerodrome that features a bidirectional grass runway, runway 04/22, measuring 670 meters in length and 30 meters in width. A taxiway is located at the southern side of the runway.

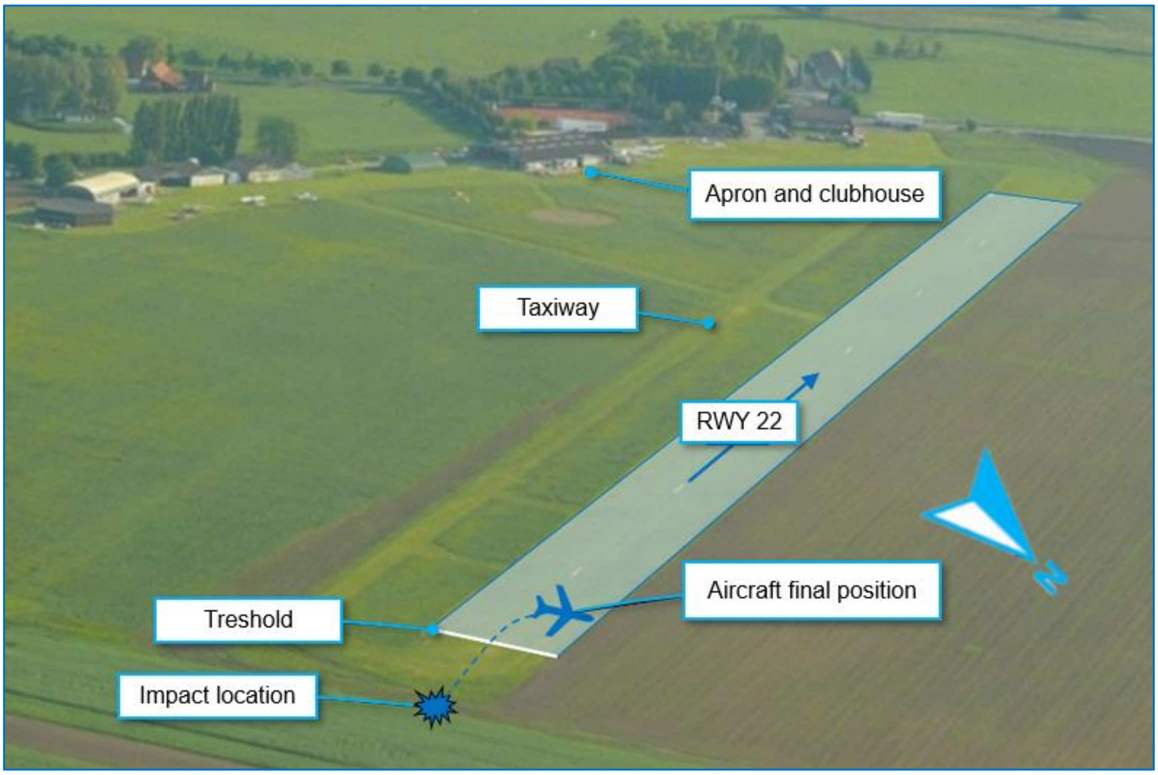

Figure 3 : An aerial view of runway 22 at Moorsele aerodrome (source EBMO aeroclub), indicating the accident location.

EBMO hosts a variety of activities, including general aviation and ULM. However, the aerodrome is primarily used for parachuting activities.

All traffic circuit patterns are located north of the airfield and procedures are in place for arrival and departure on Runway's 04 and 22. The airfield is surrounded by an Air Traffic Zone (ATZ) to avoid potential conflicts between aircraft and descending parachutists.

2.6 Recorded data

There is a webcam with a view on the signal square. In the distant background, the end of the runway can be seen, but unfortunately these images are not recorded.
The aircraft held both a GPS and a FLARM but no recordings could be retrieved from these devices for this flight.
ADSB-recordings were retrieved from online flight trackers but the last point was in downwind runway 22.

2.7 Wreckage and impact information

The aircraft crash landed in an agriculture field, at 61,2 meters ahead of the threshold of runway 22 at Moorsele aerodrome (EBMO). The aircraft came to a stop 25,4 meters past the threshold, positioned perpendicular to the runway-axis with its nose directed towards the North. The crash landing left some ground markings on the runway surface.

Upon impact, the right landing gear collapsed. Damage was also observed to the propeller and engine compartment.

Figure 4 : impact markings

2.8 Fire

The aircraft immediately caught fire at the engine compartment. Thanks to the firefighting equipment available at the aerodrome, this fire could be quickly extinguished.

2.9 Survival aspects

The pilot sustained minor facial injuries during impact. He wore a 4-point upper restraint (shoulder harness), but due to his large stature and the safety parachute he was wearing, he was seated closer to the control panel. He was able to vacate the aircraft himself.

Upon the crash, the public emergency and rescue services were immediately notified.

2.10 Organizational information

2.10.1 Overview of the Belgian skydive activities

The Royal Belgian Aeroclub is the federation of all Belgian Air Sports federations. The Skydiving federation consists of two regional organisations :

- the *Fédération Wallonne des Clubs de Parachutisme* (FWCP)
- the *Vlaams Verbond van Paraclubs* (VVP)

Both clubs under the skydive federation VVP (of which the involved aeroclub Skydive Flanders is part), are operating under Part-NCO.
All three operators of the second Belgian skydive federation, FWCP are operating under Part-SPO.

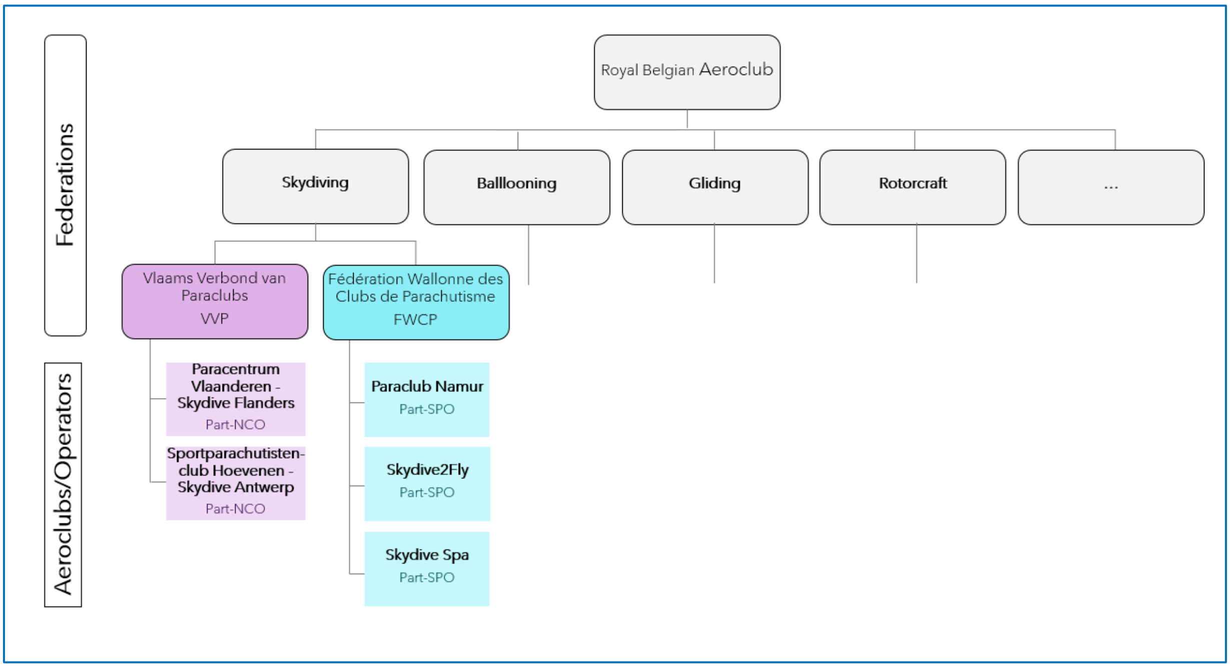

Figure 5 : organizational chart of the skydive federations and aeroclubs/operations in 2025. Skydive2Fly was not yet operational during the time of the accident.

2.10.2 The operator

The skydiving activities were conducted under the umbrella of *Skydive Flanders (Paracentrum Vlaanderen – PCV)*, a non-profit organisation which is considered as an aeroclub. The club was operating under part-SPO rules before but since 2020, the activities are housed under part-NCO (see subchapter 2.10.3.1 if this report) as it could demonstrate that the total number of jumps for non-members does not exceed 10% of the total jumps performed during the current calendar year by the aeroclub (see next chapter 2.10.3 'Rules for paradrop operations' of this report).

The club operates from 3 different airfields/drop zones in Flanders: Moorsele (EBMO), Diest/Schaffen (EBDT)and Genk/Zwartberg (EBZW). At the time of the accident the aircraft fleet consisted of 3 aircraft.

The club previously drafted operations manual (OM) under the Part-SPO regulations. In their OM part A, a.o. the following was stated about duty limitation:
The active duty of the Pilot-In-Command 12 hours with a maximum of 6.5 flight hours per day in total. After a duty of maximum 2.0 consecutives flight hours , the Pilot-In-Command must take a rest of 15 minutes.

2.10.3 Regulation for paradrop operations

2.10.3.1 Part-NCO

The operation of skydiving is covered by the EU Regulation (EU) 965/2012 (Air Operations) and may be conducted in accordance with Annex VII (Part-NCO, Non-commercial operations with other-than complex motor-powered aircraft) of that regulation if :

- it involves, of course, operations with other-than complex motor-powered aircraft[4], and
- it is performed by a training organisation having its principal place of business in a Member State and being referred to in Article 10a of Regulation (EU) No 1178/2011,
- or it is performed by an organisation created with the aim of promoting aerial sport or leisure aviation, on the condition that the aircraft is operated by the organisation on the basis of ownership or dry lease, that the flight does not generate profits distributed outside of the organisation, and that whenever non-members of the organisation are involved, such flights represent only a marginal activity of the organisation.

An '*organisation created with the aim of promoting aerial sport or leisure aviation'* is further defined in the regulation as 'a non-profit organisation, established under applicable national law for the sole purpose of gathering persons sharing the same interest in general aviation to fly for pleasure or to conduct parachute jumping. The organisation should have aircraft available.'

In Belgium, the so-called 'aeroclubs', including skydiving clubs are to be considered as such organisations as per definition in BCAA Circular OPS-NCO-01.
This circular further specifies what is understood under "marginal activity" concerning parachute operations in Belgium: the total number of jumps for non-members of the aeroclub does not exceed 10% of the total jumps performed during the current calendar year by the aeroclub.

[4] other-than complex motor-powered aircraft' means for an aeroplane that is not a plane:

- with a maximum certificated take-off mass exceeding 5700 kg, or
- certificated for a maximum passenger seating configuration of more than nineteen, or
- certificated for operation with a minimum crew of at least two pilots, or
- equipped with (a) turbojet engine(s) or more than one turboprop engine

NCO.SPEC.105 requires the pilot-in-command to conduct a risk assessment of the operation in order to set up a checklist detailing the operational tasks and taking into account any mitigating actions deemed necessary to alleviate the potential dangers. The accompanying guidance material shows examples of template forms for risk assessment, hazards identification and listing mitigating measures, assisting in the development of checklists.

NCO.SPEC.105 Checklist

Regulation (EU) No 379/2014

(a) Before commencing a specialised operation, the pilot-in-command shall conduct a risk assessment, assessing the complexity of the activity to determine the hazards and associated risks inherent in the operation and establish mitigating measures.

(b) A specialised operation shall be performed in accordance with a checklist. Based on the risk assessment, the pilot-in-command shall establish such checklist appropriate to the specialised activity and aircraft used, taking account of any section of this subpart.

(c) The checklist that is relevant to the duties of the pilot-in-command, crew members and task specialists shall be readily accessible on each flight.

(d) The checklist shall be regularly reviewed and updated, as appropriate.

NCO.SPEC.110 defines the responsibilities and authority of the PIC:

NCO.SPEC.110 Pilot-in-command responsibilities and authority

Regulation (EU) 2016/1119

Whenever crew members or task specialists are involved in the operation, the pilot-in-command shall

(a) ensure compliance of crew members and task specialists with NCO.SPEC.115 and NCO.SPEC.120;

(b) not commence a flight if any crew member or task specialist is incapacitated from performing duties by any cause such as injury, sickness, fatigue or the effects of any psychoactive substance;

(c) not continue a flight beyond the nearest weather-permissible aerodrome or operating site when any crew member or task specialist's capacity to perform duties is significantly reduced from causes such as fatigue, sickness or lack of oxygen;

(d) ensure that crew members and task specialists comply with the laws, regulations and procedures of those States where operations are conducted;

(e) ensure that all crew members and task specialists are able to communicate with each other in a common language; and

(f) ensure that task specialists and crew members use supplemental oxygen continuously whenever he/she determines that at the altitude of the intended flight the lack of oxygen might result in impairment of the faculties of crew members or harmfully affect task specialists. If the pilot-in-command cannot determine how the lack of oxygen might affect the occupants on board, he/she shall ensure that task specialists and crew members use supplemental oxygen continuously whenever the cabin altitude exceeds 10 000 ft for a period of more than 30 minutes and whenever the cabin altitude exceeds 13 000 ft.

NCO.SPEC.125 states it's the PIC's task to perform a safety briefing before take-off:

NCO.SPEC.125 Safety briefing

Regulation (EU) No 379/2014

(a) Before take-off, the pilot-in-command shall brief task specialists on:

  (1) emergency equipment and procedures;

  (2) operational procedures associated with the specialised task before each flight or series of flights.

(b) The briefing referred to in (a)(2) may not be required if task specialists have been instructed on the operational procedures before the start of the operating season in that calendar year.

In addition to the general requirements of Part-NCO, skydiving operations need to comply with the specific requirements (NCO.SPEC.PAR) of the Subpart E of this regulation. Rule NCO.SPEC.PAR.100 goes deeper into what specifically needs to be included in the checklist regarding the parachute operations.

NCO.SPEC.PAR.100 Checklist

Regulation (EU) No 379/2014

The checklist for PAR shall contain:

(a) normal, abnormal and emergency procedures;

(b) relevant performance data;

(c) required equipment;

(d) any limitations; and

(e) responsibilities and duties of the pilot-in-command, and, if applicable, crew members and task specialists.

Under Part-NCO no specific requirements or responsibilities are required for the clubs/organisations.

2.10.3.2 <u>Part-SPO</u>

If one of the three conditions of Part-NCO (as stated in the beginning of previous paragraph 2.10.3.1 of this report) is not fulfilled, skydive operations will fall under Part-SPO (Specialized Operations) regulations. In addition, if conducting commercial specialised operations or engaged in non-commercial specialised operations using a complex motor-powered aircraft, operators will also need to comply with Annex III (Part-ORO Organisation Requirements). The latter imposes an extensive list of obligations to the operator regarding the content of manuals and having a management system, including a safety policy and the post of safety manager.

SPO.OP.135 states it's is to the operator to ensure that a safety briefing is given before take-off:

SPO.OP.135 Safety briefing

Regulation (EU) No 379/2014

(a) The operator shall ensure that, prior to take-off task specialists are given a briefing on:

(1) emergency equipment and procedures;

(2) operational procedures associated with the specialised task before each flight or series of flights

(b) The briefing referred to in (a)(2) may be replaced by an initial and recurrent training programme. In such case the operator shall also define recency requirements.

SPO.OP.195 Use of supplemental oxygen

Regulation (EU) No 379/2014

(a) The operator shall ensure that task specialists and crew members use supplemental oxygen continuously whenever the cabin altitude exceeds 10 000 ft for a period of more than 30 minutes and whenever the cabin altitude exceeds 13 000 ft, unless otherwise approved by the competent authority and in accordance with SOPs.

(b) Notwithstanding (a) and except for parachute operations, short excursions of a specified duration above 13 000 ft without using supplemental oxygen on other-than complex aeroplanes and helicopters may be undertaken with a prior approval of the competent authority based on the consideration of the following:

(1) the duration of the excursion above 13 000 ft is not more than 10 minutes or, if needed for a longer period, the time strictly necessary to the accomplishment of the specialised task;

(2) the flight is not conducted above 16 000 ft;

(3) the safety briefing in accordance with SPO.OP.135 includes adequate information to crew members and tasks specialists on the effects of hypoxia;

(4) SOPs for the concerned operation reflecting (1), (2) and (3);

(5) the previous experience of the operator in conducting operations above 13 000 ft without using supplemental oxygen;

(6) the individual experience of crew members and task specialists and their physiological adaptation to high altitudes; and

(7) the altitude of the base where the operator is established or the operations are conducted from.

SPO.OP.230 requires the operator to establish standard operating procedures (SOP):

SPO.OP.230 Standard operating procedures

Regulation (EU) No 379/2014

(a) Before commencing a specialised operation, the operator shall conduct a risk assessment, assessing the complexity of the activity to determine the hazards and associated risks inherent in the operation and establish mitigating measures.

(b) Based on the risk assessment, the operator shall establish standard operating procedures (SOP) appropriate to the specialised activity and aircraft used taking account of the requirements of subpart E. The SOP shall be part of the operations manual or a separate document. SOP shall be regularly reviewed and updated, as appropriate.

(c) The operator shall ensure that specialised operations are performed in accordance with SOP.

Furthermore in section 3 it is elaborated what the SOP for parachute operations shall specifically contain:

SPO.SPEC.PAR.100 Standard operating procedures

Regulation (EU) No 379/2014

The standard operating procedures for PAR shall specify:

(a) the equipment to be carried, including its operating limitations and appropriate entries in the MEL, as applicable;

(b) crew composition and experience requirements of crew members and task specialists;

(c) the relevant training for crew members and task specialists to perform their task and the qualification and nomination of persons providing such training to the crew members and task specialists;

(d) responsibilities and duties of crew members and task specialists;

(e) performance criteria necessary to be met to conduct parachute operations;

(f) normal, abnormal and emergency procedures.

2.10.3.3 Flight time and duty limitations.

Article 8, paragraph 4 of regulation (EU) No 965/2012 (Air Operations) states that Non-commercial operations, including non-commercial specialised operations, with complex motor-powered aeroplanes and helicopters, as well as commercial specialised operations with aeroplanes, helicopters and sailplanes shall comply as regards flight time limitations, with the requirements specified in the national law of the Member State in which the operator has its principal place of business, or, where the operator has no principal place of business, the place where the operator is established or resides.

There is no national flight time limitation legislation in Belgium.

2.11 Additional information

2.11.1 Previous accidents and safety recommendations/actions regarding parachute drop activities

2.11.1.1 Accident in Belgium in 2013

Following a major fatal accident (Safety investigation report reference AAIU-2013-21) during a skydiving flight at Gelbressée on 19 October 2013, the AAIU issued a safety recommendation to the Belgian Civil Aviation Authority (BCAA) to increase the safety of the flight operations during parachute dropping activities.

Safety recommendation 2014-P-2:

AAIU recommends BCAA to review the regulatory requirements pertaining to the activity of parachute droppings in order to increase the safety of this activity to an acceptable level, as well as adapting the level of oversight. AAIU would suggest considering the following: Requirement for written procedures for the performance of the parachute dropping flights, Requirement for a dedicated person in charge of the safety of the flights and requirements for a minimum experience for the pilots involved in the activity.

The BCAA reacted positively to the recommendation in a response letter dated 01 April 2014, stating that the decision was taken to apply the new Part-SPO regulation in April 2015, 2 years before the final date for implementation instead of upgrading the national regulation.

The BCAA prepared a set of operating procedures, based on EASA Part-SPO Regulation, for the purpose of helping the parachute clubs to develop a Procedure Manual. The purpose was to draft the framework of the organization desired for such activities.

However following EASA's proportionate approach to the regulation of general aviation across Europe, most parachute clubs in the meantime fall again under Part-NCO rules, as described in paragraph 2.10.3 of this report.

2.11.1.2 Accident in Finland in 2014

On 20 April 2014 an accident occurred at Jämijärvi aerodrome, Finland, when a Comp Air 8 aircraft, carrying skydivers crashed into the woods. In addition to the pilot there were ten skydivers on board. The pilot and two skydivers managed to bail out of the aircraft. Eight skydivers died in the collision with the ground. The flight was conducted under national regulations.

As a result of the subsequent investigation with reference L2014-02, the Finnish Safety Investigation Authority (hereafter Finnish SIA), issued five recommendations amongst the 2 following:

FI.SIA-2015-0011:

It is recommended to EASA to prepare specified theoretical knowledge and flight training requirements for pilots-in-command in skydiving operations.

FI.SIA-2015-0012:

It is recommended that the Finnish Transport Safety Authority (TRAFICOM), in conjunction with the recreational aviation safety project, ensure that the Finnish Aeronautical Association prepares generic guidelines for skydiving operations, around which associations build a training programme and proficiency checks for jump pilots.

As a result of the latter recommendation, the Parachuting Committee of the Finnish Aeronautical Association prepared a G*uideline for parachuting flight operations* – Model for skydive operations.

2.11.1.3 Accident in Sweden in 2021

On 8 July 2021, an accident occurred with a DHC-2 during paradrop operations in Örebro, Sweden. After take-off, the aircraft climbed to an altitude of 400 to 500 feet above ground before changing course 180 degrees to the left. The aircraft turned around quickly in a descending turn with a high bank angle. During the final phase, the aircraft dived steeply and then slightly levelled off before impact. All nine persons on board sustained fatal injuries.
The flight was operated under Part-NCO regulations.

In January 2023, the Swedish Investigation Authority (hereafter Swedish SIA) SHK published their final report with reference SHK 2023:03e.

One of the conclusions in this report:

"According to the Part-NCO, the pilot shall conduct a risk assessment to identify existing risks and take compensatory measures before each flight. No risk analysis has been presented for the current flight. After the accident, the Swedish Transport Agency carried out an oversight on a pilot in another skydiving club. That pilot was also unable to present a risk analysis. The inspection also revealed that the pilot expected the SFF[5] to produce a risk analysis for the flight operations in connection with parachute operations. There are therefore reasons to doubt that risk analysis are carried out regularly before each flight, which in turn may indicate that pilots do not have sufficient knowledge of the regulations in this regard."

…..

[5] SFF: Swedish parachute association

"Overall, the SHK is of the opinion that the oversight activities carried out has not been sufficient to identify deficiencies in the non-commercial flight operations (Part-NCO) within parachute operations. It cannot be ruled out that the deficiencies identified in terms of oversight also occur in other member states. EASA is therefore recommended to take measures to ensure that the oversight of non-commercial specialized aviation activities within parachute operations is conducted in such a way and to such an extent that it has an effect on compliance with the regulatory framework and thus has a safety enhancing effect."

….

"In summary, there have been several safety procedural drifts in the operation which have resulted in a reduced safety margin. Each individual hazard may not alone entail any immediate risk of an accident, but when they all coincided at the same time, the conditions for the accident were created.

In retrospect, appropriate risk assessments could probably have identified these latent hazards and prevented safety drifts from occurring. However, it can be questioned whether the pilots who carry out flights in connection with skydiving have sufficient tools and resources through their training to carry out such a risk assessment."

With support of SFF, take measures to ensure that appropriate risk assessment is carried out by pilots according to checklist and applied during flights in relation to parachute operations

SHK states that the existing organizational order and the distribution of roles create an uncertainty which can lead to the pilot relying on the routines that the parachute club imparted meets the requirements set out in the regulations for non-commercial flight operations (Part-NCO). It can also be difficult for an individual pilot to question working methods and routines when other pilots have already accepted them.

Amongst others the following safety recommendations were issued:

SHK 2023:03 R1:

EASA is recommended to consider introducing formal training leading to a rating for pilots in parachute operations where the rating is maintained through refresher training.

SHK 2023:03 R2:

EASA is recommended to take measures to ensure that the oversight of non-commercial specialized aviation activities within parachute operations is conducted in such a way and to such an extent that it has an effect on compliance with the regulatory framework and thus has a safety-enhancing effect

SHK 2023:03 R4:

The Swedish Transport Agency is recommended to, with support of SFF, take measures to ensure that appropriate risk assessment is carried out by pilots according to checklist and applied during flights in relation to parachute operations

2.11.2 Actions by EASA

In Appendix 2 *Advanced statistics* of EASA's annual safety review 2023, the following can be read:
"Another safety issue that was added to the portfolio two years ago is parachute operations. In recent years, accidents (21 in the past five years) have occurred causing multiple fatalities. The operation of the aircraft for parachute dropping is somewhat different from normal flying. Parachute operations are conducted both under SPO rules and NCO rules. In this review, all the parachute operation accidents are concatenated into one issue, irrelevant of the operation type. Most of them, however, occurred under NCO."

The safety issue mentioned above was named SI-4023 'Risks associated with parachute operations' and was introduced in the European Plan for Aviation Safety (EPAS) 2021-2025.

As part of increasing flight safety, a safety promotion task has been created (SPT.0121). A special workshop was organized on 25 February 2021. At the same time, a dedicated safety promotion section for skydiving was launched on EASA's general aviation website. The workshop was about improving the safety of skydiving. Some measures that was suggested were the creation of a European coordinated Parachute Federation and the dissemination of an indicative operational manual for Parachute Clubs. Austro Control gave a presentation on Human factors in Parachute dropping operations and identified a.o. the following common factors:

- Time pressure or specific requests to the PIC
- Target: Reduce flight time to minimum to maximise "income" & reduce costs
- Aircraft Operation is a „side" effect of skydiving
- Skydivers are motivated/drilled for the jump and not for the flight
- Aerial Work = High workload (Airspace, VFR- look out, COM, Weather…)
- Sensitive payload calculation – CG determination • Stability and Control reduced due to CG shift

The Finnish TRAFICOM presented the Operations Manual for parachuting flight operations which was the result of the accident back in 2014. During this presentation they also highlighted that skydivers generally perceive parachuting risks to concern the jump itself, but knowledge of flight operations related to parachuting and the risks involved is low.

During December 2021, a Sunny Swift was published by EASA promoting the development of an operational manual for parachute clubs.

EASA has further performed a Safety Issue Assessment (SIA) related to the parachute operations. It concludes that the several actions in the past are not sufficient and that the safety risk SI-4023 needs to be mitigated further. It recognizes that most parachute flights in EU are non-commercial in nature and operated under part-NCO rules.

Therefore, a Best Intervention Strategy (BIS) of parachute operations process was initiated and a survey for parachute activities has been launched in April 2025.

The intent of the survey is to seek information from the relevant stakeholders on the preferred option of intervention in relation to parachute activities. A summary of the intervention options:

- Intervention strategy 1 – No rule change, only safety promotion task (SPT) and survey with national competent authorities (NCAs)
- Intervention strategy 2 – Light management system and declaration for parachute NCO operations complemented with SPT.
- Intervention strategy 3 – SPO for all parachute operations complemented with SPT.

Once the results of the survey are known, the subsequent actions could be followed accordingly.

Next to that, EASA organized an online workshop titled 'Risk with Parachute Operations' on May 6, 2025. The workshop included a Q&A session focused on safety issues related to intervention strategies.

2.11.3 International published guidelines on pilot restrictions in parachute drop operations

Although the regulation didn't specify any guidelines or standard operating procedures (SOP's) for clubs, some umbrella organisations in other countries published some guidelines/rules concerning the human factors and restrictions of the pilot in paradrop operations.

2.11.3.1 UK

The British Parachute Association (BPA), also trading as British skydiving has 2 documents that cover the flight time limitation and the pilot fatigue aspect.
The BPA *Operating Manual*, describing the whole skydive operation, requires pilots to have a break from the aircraft of at least 30 minutes after four hours of flying and restricts pilots to a maximum of eight hours flying in any one day.
The BPA *Jump Pilots Manual* is the reference guide for jump pilots. In Section 14, Human Factors, a whole chapter is dedicated to fatigue:

Parachute flying can place demands on pilots' stamina which they will not necessarily have encountered in their previous flying career. On a busy day at many parachutes centres pilots may find themselves having to fly in excess of twenty flights spread over a twelve-hour day. This can be very tiring given the demands on performance and concentration already required by this kind of flying. It is, therefore essential that pilots come to the job each day in a fit state to carry it out. Hangovers and lack of sleep the previous night are factors which can prove particularly dangerous in these work situations.
Club SOPs should contain procedures for monitoring pilot flight times to ensure that the limits are not exceeded. The pilot will also be expected to keep the relevant drop zone organising staff

appraised in advance of when a break will be required, so that other tasks (like refuelling) can be organised around it.

A pilot will not be popular, however, if he suddenly announces without warning that the jump programme must stop for thirty minutes. It is important, therefore, to anticipate breaks well in advance. At drop zones where two pilots are on hand to fly, none of this is a problem, but for the single duty pilot it often can be.

The same problems also apply to the eight-hour limit, of course, but here the problems can be compounded by the pressures on the pilot to keep things moving and not close the day's activities down. This can be a difficult situation for the pilot cope with when persuasive influences encourage pilots to break the rules. Pilots must remember, however, that they are placing themselves and other people in danger when they continue to fly in a fatigued state, however capable they think they feel. They must also remember that after the accident, it will be themselves personally who are called upon to explain why they broke the rules and not anyone else who simply persuaded them to.

The trick is to give plenty of advanced warning so that those who are responsible for organising the jump programme can plan their manifesting well in advance of a shutdown and also to resist pressure to break the rules.
With regard to breaks it is also wise to organise in advance how they will be taken.

2.11.3.2 Finland

The Parachuting Committee of the Finnish Aeronautical Association made the *Operations Manual for parachuting flight operations – Guide for skydiving clubs*, which was issued as a result of the parachute drop accident in 2014.
In this example manual there's also a chapter dedicated to pilot's capacity and rest period:

Special attention must be paid to the pilot's capacity already when planning flight shifts. All-day shifts must be avoided, and it must be ensured that the pilot has adequate breaks and gets sufficient amounts of food and drink during their shift.

The following matters must be agreed on by the club's organisation and brought to the attention of skydivers in particular. In other words, these matters should be stated in the skydivers' instructions as far as the skydivers are concerned.
- *The parachuting activities are planned in accordance with the number of skydivers and the aircraft's refuelling and inspections.*
- *At the start of the day, each pilot informs the manifest, the director of jumping activities, the ground person or other responsible person of their need for breaks.*
- *In order to maintain the safety of parachuting flight operations, the pilot must be provided with sufficient rest periods. The significance of rest is emphasised if the pilot is not experienced in parachuting flight operations, at the start of the season and when operating in unfamiliar conditions.*

- *To ensure that the pilot receives sufficient rest, refuelling should be performed by, for example, skydivers or designated refuelling personnel. This ensures that the pilot's break is not used up by refuelling the aircraft so that they get to eat, drink and rest.*
- *If more than one of the club's pilots are present, it is advisable to stagger the activities so that one pilot does not perform all flights.*
- *Having an on-call substitute pilot is beneficial in situations where the need to change pilot arises unexpectedly.*

2.11.4 Hazard of low-lying sun

Meteoplaza, a Dutch private meteorological service, published an awareness campaign for the hazard of low-lying sun in road traffic. They defined a low-lying sun as the position of the sun between 2° and 12,5° above the horizon. This is typically the period from 15 minutes to 1 hour after sunrise and 1 hour to 15 minutes before sunset.
Some of their tips are also applicable for aviation:

- Make sure the windshield is clean
- Use the sun visor
- Wear sunglasses (preferably polarised)

2.11.5 Background on fatigue

The International Civil Aviation Organization (ICAO) has defined fatigue as a physiological state of reduced mental or physical performance capability resulting from sleep loss, extended wakefulness, circadian phase, and/or workload (mental and/or physical activity) that can impair a person's alertness and ability to perform safety related operational duties.

There are three types of fatigue: transient, cumulative, and circadian.

Research shows that the accumulation of "sleep debt", e.g. by having an hour less of sleep for several consecutive days needs a series of days with more-than-usual sleep for a person to fully recover from cumulative fatigue.

Some common symptoms of fatigue include:

- Measurable reduction in speed and accuracy of performance,
- Lapses of attention and vigilance,
- Delayed reactions,
- Impaired logical reasoning and decision-making, including a reduced ability to assess risk or appreciate consequences of actions,
- Reduced situational awareness, and
- Low motivation.

Some factors that contribute to fatigue:

- Circadian adaptation, i.e. adjustment of the body internal clock (e.g. due to the shift pattern, jet lag, etc.);
- Length of previous rest period;
- Time on duty;
- Time being awake prior to duty (duties that start in the evening are more likely to cause fatigue than those beginning at e.g. 8 a.m.);
- Sleep/nap opportunities (during the duty but also at layover destinations);
- Physical conditions (temperature, airlessness, noise, comfort, etc.) ;
- Workload (high or low);
- Emotional stress (in family life or at work);

- Lifestyle (including sleeping, eating, drinking and smoking habits) and fitness; and,
- Health.

Anticipation:

Adopt personal strategies which are likely to decrease the effects of fatigue such as the following:
- Planning activities, meals, rest and sleep patterns during off-duty periods;
- Making the most of permitted rest breaks, including naps;
- Advising colleagues if one detects feeling drowsy;
- Alerting colleagues if they appear to be becoming drowsy.

The FAA Advisory Circular AC 120-100 *Basics of Aviation Fatigue* states that there's in general a roughly constant reaction time and lapses during the first 16 hours of the day/ After about 16 hours of continuous wakefulness, most adults begin to notice reductions in the speed of performance and in alertness levels. However, a prior history of insufficient sleep quantity and quality can magnify the changes in behaviour and alertness.

The NASA Technical Memorandum *Principles and Guidelines for Duty and Rest Scheduling in Commercial aviation* recommends that cumulative duty per 24 hours is limited to 14 hours.

Some relevant definitions regarding the duty time of a pilot:
- Duty: Any task a crew member is required by the operator to perform, including flight time, administrative work, training, airport, standby reserve.
- Duty period: A period which starts when a flight or cabin crew member is required by an operator to report for or to commence a duty and ends when that person is free from all duties (including pre-and post-flight duty).
- Flight duty period: A period which commences when a flight or cabin crew member is required to report for duty that includes a flight or a series of flights and which finishes when the aeroplane finally comes to rest and the engines are shut down at the end of the last flight on which he is a crew member.
- Rest (or off-duty) period: A continuous and defined period of time, subsequent to and/or prior to duty, during which personnel are free of all duties. This not the same as a break during a duty period.

Joint responsibility for fatigue

In a commercial (aviation) context, it is a general accepted principle that preventing fatigue is a joint responsibility; It is the responsibility of both the airline and the pilot. The airline provides an expanded opportunity for rest. And the pilot has the responsibility to take advantage of that window and get the rest he or she needs. Pilots need to examine their lives at work and at home and consider activities and commutes which could contribute to fatigue. Pilots are going to have to sign a release before every segment, saying they are fit for duty. And if a pilot is fatigued, the airline must remove him or her and allow the pilot to rest.

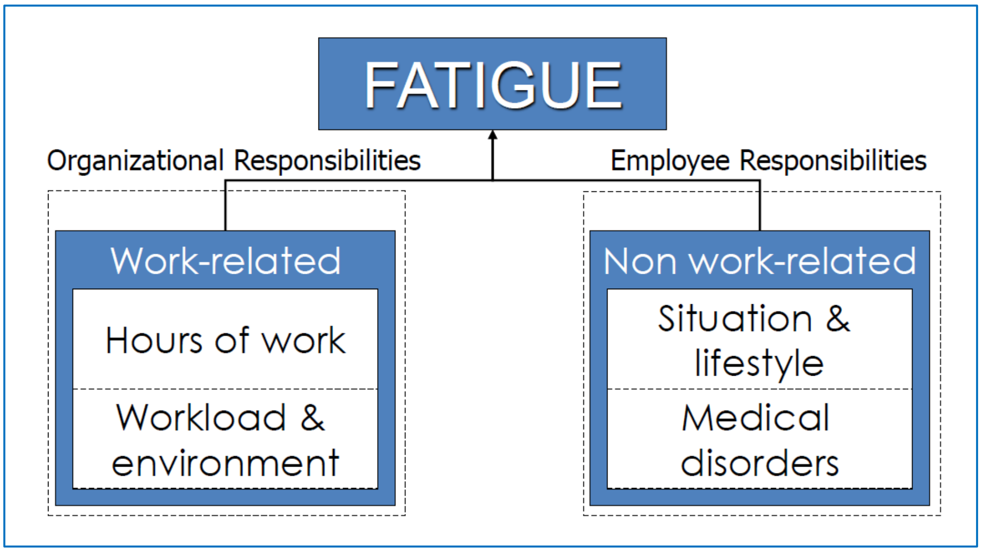

Figure 6 : Fatigue is a joint responsibility

3. ANALYSIS

3.1 Direct factors

Although there are no flight data records neither video images of the incident, the damage to the aircraft and the ground markings indicate a (slight) nose-down attitude of the aircraft at impact.
Additionally, the fact that witnesses heard an impact suggests that the aircraft first hit the ground with its nose/propeller and did not simply land on its gear. Therefore, either no adequate flare was performed at all, or there was an excessive flare followed by a stall. This last scenario is also what the pilot seems to confirm from his recollections ("I felt the airplane lose altitude abruptly").

The aircraft was airworthy and there were no technical conditions found that could have contributed to this final attitude and impact.

The weather was stable, and the wind was calm. Around Moorsele Airport, the terrain is flat, and near the final approach to runway 22, there is no significant variation in vegetation (such as forests or bodies of water) that could lead to the formation of convective currents. Therefore, a significant downdraft (whether thermal or orographic) that could explain a sudden descent of the aircraft can be excluded.

The pilot declared himself that it happened due to being blinded by the low position of the sun, even though he made use of the sun shade on the windshield and wore sunglasses.
At the time of the accident, there was indeed a low sun; 4.17 degrees above the horizon with an azimuth of 263.28 degrees, so at +- 40 degrees to the right as seen from the cockpit.

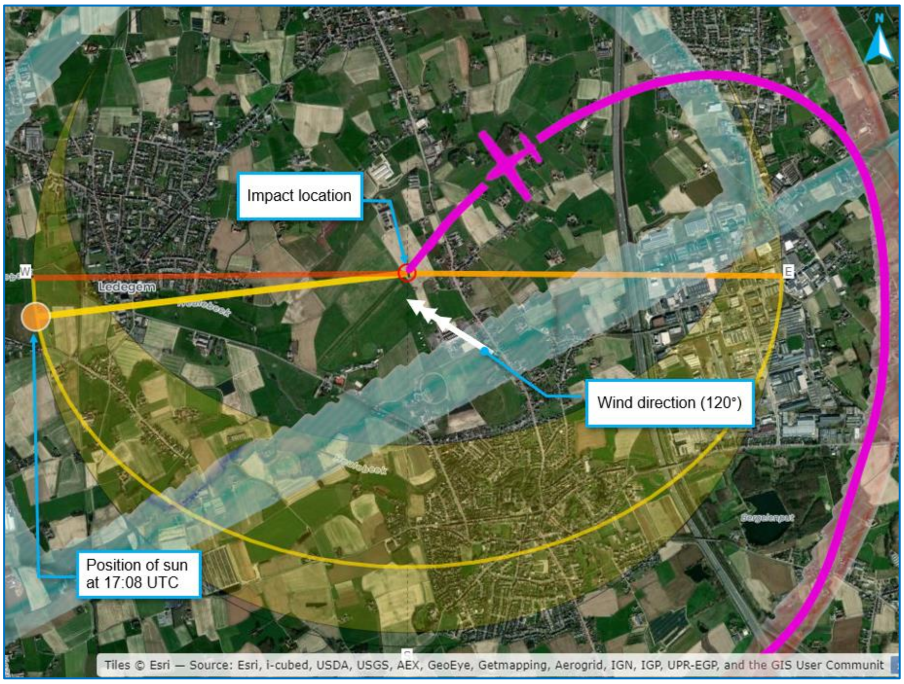

Figure 7 : reconstruction of the last phase of the flight indicating the position of the sun and the direction of the wind

3.2 Underlying factors

3.2.1 Environmental factors

Like explained in chapter 2.11.4 of this report, a low-lying sun is defined as the position of the sun between 2° and 12,5° above the horizon. So, it can be said that the risk is the greatest as from one hour before sunset. And as the sun goes down in the west, this is particularly risky with west-east orientated runways, which are common in Belgium due to the dominating south-westerly and westerly winds. Pilots should take this hazard into account when planning to land during this period of the day.

3.2.2 Human factors: Decision making and risk management

As seen on Figure 5 and also as the pilot declared, the low sun had been in sight for some time (first base leg, then in final). So it was not that this suddenly happened on a final turn-out. The pilot also stated afterwards that he should have taken this into account and that perhaps he should have simply landed along the other side (runway 04). Not only for the sun, but also for wind conditions, as this was more favourable. The initial direction of runway 22 was never challenged during the day.
This indicates that the decision making could have been better, and that there may have been a lack of judgement and risk management.
A thorough risk assessment, as required per NCO.SPEC.105, could not be provided either.

3.2.3 Human factors: Fatigue

Currently no flight time limitations (FTL) for paradrop operations are adopted.
However, it appears that the practices - at least that day - were in line with international adopted guidelines;

- The pilot did not fly more than 8 hours in total (about 6.5) and,
- Blocks of not more than 2 hours and,
- He took several breaks of about 30 minutes between the legs and,
- He was exempted from the refuelling of the aircraft.

The pilot was at least awake for 13 hours, whereas 16 hours is commonly agreed as the maximum, and duty time (counted from arrival on the aerodrome and the preflight operations and breaks included) was about 11 hours. 14 hours of duty time is recommended as the maximum (NASA Technical memorandum).
On the other hand, there's no doubt that 11 hours of duty can be considered as demanding. Especially because of the nature of the flights; 18 legs and thus landings (although an excess of twenty flights is not uncommon according to the British Parachute Association) with dropping of the parachutists at a designated location. It's no question that this imposed a high cognitive workload. And although several breaks were taken, they were always limited to half an hour long. In some organizations, the principle of a gradual increase in breaks is applied; blocks of decreasing flight time followed by blocks of increasing rest time.

Moreover the flights were conducted at high altitude (some of them above the allowed limit of 13000 ft AMSL (up to 13500 ft)) without an oxygen supply, which demands physical exertion from the human body.
So this could have led to a certain degree of transient fatigue at the end of the day, which might have resulted in reduced attention and distraction, and ultimately disoriented the pilot for a brief duration during landing, notwithstanding the accident happened right after a break.

Additionally, the cumulative effect of his flying activities in the days leading up to the accident might have played a role, even though he had no night shifts and did not cross time zones. He also did no fly the day before the accident. That being said, since these flying activities were for a different organization and the paradrop was outside his professional duties, the pilot had full control over managing his cumulative fatigue.
Although the paradrop did not occur in a commercial context but was executed for an organization, the AAIU is convinced that the principle of joint responsibility regarding fatigue should also be applied here. The pilot is responsible for the accumulated fatigue, but for flight assignments commissioned by an organization, this should be framed and managed by the organization.

3.2.4 Organisational factors

Although the accident did not initially appear to occur during a flight phase directly linked to the paradrop operations (no task specialists were on board), and it could theoretically happen on any flight, the AAIU is convinced that there is an indirect link: namely, the flying "commissioned' by a club, and the specific operations and their duration immediately preceding the incident.

The international adopted guidelines regarding flight hours were not exceeded (see previous paragraph 3.2.3), but nonetheless it is remarkable that the club apparently ignores their own rules they once had established for a Part-SPO recognition. In their former Part-SPO Operations Manual, 6.5 flight hours per day in total were given as a maximum, whereas this accident happened almost exactly after 6.5 hours of flying, and still another series of drops were planned afterwards.

The pilot also afterwards declared that no definite planning is possible at the beginning of the day, this depends on the number of jumps : skydivers decide themselves if they take another jump or not and so the exact number of drops is not known at the beginning of the day. Having no advanced arrangement on this and the non-scheduling of a stand-by pilot aren't examples of good practice with respect to flight safety. We refer also to The Finnish Operational Manual Guide (as introduced in chapter 2.11.3.2 of this report) which advices to have advanced arrangements and to stagger activities between pilots where possible.

It could not be determined with certainty whether the (lack of) written procedures of the club in question were a contributing factor in this incident, and the pilot also certainly did not indicate anything in that direction. But it emerged that AAIU's recommendation 2014-P-2 is not fully addressed anymore since only the paradrop activities in the southern region of Belgium (clubs under the umbrella of the Fédération Wallonne des Clubs de Parachutisme (FWCP)) are still operating under Part-SPO.

All clubs of the federation VVP are operating under Part-NCO. Nevertheless, there are still some conditions attached to Part-NCO, and it appears that these were not met, as no proper risk analyses or checklists could be presented.

3.3 Risks and regulation for paradrop operations

Following the AAIU's recommendation 2014-P-2 issued back in 2014, all paradrop activities were placed under Part-SPO by the BCAA. However, in 2020, Skydive Flanders applied to have the activities placed under the lighter Part-NCO regulations. They were able to do this because they could demonstrate that less than 10% of their drops involved non-members.

This is according to EASA's proportionality principle but means that far fewer conditions are imposed on organizations, such as written procedures and management roles, and it is mainly up to the individual pilot to make risk assessments under Part-NCO rules.

Just to give an idea: Part-SPO rules consist of 264 pages applicable to paradrop operations (and that's even without taking Part-ORO into account), compared to 129 pages for Part-NCO.

AAIU Belgium acknowledges that the Part-SPO regulations with the associated Part-NCO obligations may be administratively too burdensome for small clubs. Although we should mention that Skydive Flanders is certainly not smaller than the Walloon clubs.

On the other hand, Part-NCO is not tailored to most paradrop activities. Too much is placed on the shoulders of the individual pilot within a context where quite a lot is demanded of the pilot, and where flight operations are considered more of a side effect of skydiving (see also Austro Control presentation during the 2021 EASA workshop, paragraph 2.11.2 of this report). A risk survey by the Finnish authorities in 2014 also showed that skydivers generally perceive parachuting risks to concern the jump itself, but knowledge of flight operations related to parachuting and the risks involved is low. However, flying in paradrop operations means a high cognitive workload and a lot of pressure.

In EASA's annual safety review of 2023 it is stated that parachute operations still hold a high risk and that most of the accidents occurred under NCO.

Because of that risk, EASA already promotes the development of an Operations Manual, but in practice, not every club fully develops this, if at all.

The investigation SHK 2023:03e from the Swedish SIA also expressed that there reasons to doubt that risk analysis are carried out regularly before each flight.

Therefore, AAIU Belgium remains of the opinion that even for non-commercial activities with non-complex aircraft, better regulatory framework should be provided. And that perhaps something between the current Part-NCO (SPEC.PAR) and Part-SPO (SPEC.PAR) should be drafted; similar to a DTO (Declared Training Organization) in flight training compared to ATO

(Approved Training Organization) regulations. How this should be worked out in detail, we leave to the regulator. But just like with a DTO, there should be at least a safety policy provided by an operator (and not by the individual PIC), and a flight safety representative responsible for drawing up a risk assessment, operations manual, and safety policy for non-commercial paradrop activities should be appointed. This representative should preferably also be involved as a pilot in the paradrop organizations. All of the above aligns with the current draft of EASA's Intervention Strategy 2, which includes a light management system and declaration for parachute NCO operations, complemented by safety promotion.

Having a flight safety representative would also be in line with AAIU's original recommendation 2014-P-2, which mentions the requirement for a dedicated person in charge of the safety of the flights.

3.4 Oversight

Adapting the level of oversight was also an aspect in the aforementioned AAIU's safety recommendation 2014-P-2 to the BCAA. For Part-SPO organizations, there is currently a good system of audits, but for paradrop organizations under Part-NCO, the oversight by the BCAA is non-existent. This is, according to them, because there are no specific rules for the clubs. There is nothing to be approved. However, this oversight could currently also be carried out through spot checks of the existence of risk assessments and checklists of individual pilots. If findings emerge from these, it will also trigger clubs to provide more guidance and SOPs themselves, as it is in their own interest.

We refer also to the report SHK 2023:03e of Swedish SIA (chapter 2.11.1.3 of this report) , who had a similar finding and stated that oversight activities carried out had not been sufficient to identify deficiencies in the non-commercial flight operations (Part-NCO) within parachute operations.

The Swedish Transport Agency has reprioritized and added personnel resources to the operation in order to be able to carry out oversight inspections to all parachute clubs in Sweden. The Swedish Transport Agency intended to carry out visits to all parachute clubs before the season starts in the spring of 2023.

Due to these corrective actions, the Swedish SIA didn't make a safety recommendation to the Swedish Transport Agency but did issue the following safety recommendation SHK 2023:03 R2 to EASA:

Take measures to ensure that the oversight of non-commercial specialized aviation activities within parachute operations is conducted in such a way and to such an extent that it has an effect on compliance with the regulatory framework and thus has a safety-enhancing effect.

4. FINDINGS

4.1 Findings as to causes and contributing factors

- The aircraft crash-landed short of runway 22 due to a misjudgement.
- The pilot's forward visibility was impaired by the low lying sun.

4.2 Findings as to factors that increase(d) risk

- Cumulative fatigue
- Limited written SOP's regarding flight time, duration of breaks and cabin altitude limitations and flight risk management.
- Lack of oversight
- Current regulations not in proportion with the risk in non-commercial paradrop operations
- Currently no flight time and duty time limitations legislation exist for paradrop operations

4.3 Other findings

- Positive factor: thanks to firefighting equipment available at the aerodrome, the imminent fire could rapidly be extinguished.

5. SAFETY ACTIONS AND RECOMMENDATIONS

*A **safety issue** is a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organization or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.*

*A **safety action:** the steps taken or proposed to be taken by an organization or agency on its own initiative in response to a safety issue.*

*A **safety recommendation** is a proposal by the safety investigation authority in response to a safety issue and based on information derived from an investigation and/or study. It's aimed to improve the safety of an organisation and/or system and therefor always addressed to an organisation and/or agency, never to a specific individual. The sole purpose of a safety recommendation is the prevention of accidents or incidents and the reduction of the consequences of such occurrences. It, in no case has the purpose of creating a presumption of blame or liability for an accident or incident. Neither does it reflect the level of contribution to a specific accident or incident.*

*A **safety message:** An awareness which brings to attention the existence of a safety factor and the lessons learned. AAIU can distribute a safety message to a community (of pilots, instructors, examiners, ATC officers), an organization or an industry sector for it to consider a safety factor and take action where it believes it appropriate. There is no requirement for a formal response to a safety message.*

5.1 Safety issue: Deficient risk management concerning flight procedures in parachute operations

Safety message towards pilots involved in parachute operations:

Before each flight/leg, it's crucial to conduct a thorough risk assessment to account for variable conditions such as wind patterns, sunlight, and accumulating fatigue, and to implement strategies to mitigate these risks as effectively as possible.

The hazard of the low-lying sun is greatest as from about one hour before sunset, especially on west orientated runways. Pilots could anticipate this by making use of mitigating resources like sun visors and polarized sunglasses. If mitigation is considered as not sufficient, the risk should be eliminated by considering landing on another runway, keeping in mind other traffic and wind conditions, or shift the leg/landing towards an earlier or later time slot.

About the fatigue and rest breaks, we retake the advice given in the BPA Jump Pilots manual: Pilots must remember that they are placing themselves and other people in danger when they continue to fly in a fatigued state. They must also remember that after the accident, it will be themselves personally who are called upon to explain why they broke the rules and not anyone else who simply persuaded them to. Pilots should be aware that they themselves are the ultimate, operational, safety barrier in this kind of operations. It's up to them to assess if this barrier is still fully effective and not compromised by e.g. a fatigued state.

With regard to breaks it is wise to organise in advance how and when they will be taken, so that those who are responsible for organising the jump programme can plan their manifesting well in advance of a shutdown.

It is also reminded that one should not exceed the limit of 13000 feet cabin pressure altitude without the continuous use of supplemental oxygen.

Although PART.NCO specifies that all decisions are ultimately the responsibility of the pilot-in-command, the AAIU believes that incorporating these elements into shared SOPs with all involved parties (loadmasters, task specialists (skydivers), etc.) will foster a supportive culture.

This peer support can assist the pilot in performing his duties and making final decisions, even if they are unpopular, to ensure flight safety.

Therefore the following same safety recommendation:

Safety recommendation BE-2025-01:

It is recommended that Paracentrum Vlaanderen – Skydive Flanders, appoints one pilot as a permanent flight safety representative who ensures that, based on a risk assessment, they have written Standard Operating Procedures (SOPs) including a checklist, in accordance with NCO.SPEC.105 and NCO.SPEC.PAR.100. In addition to the minimum items specified in these regulations, the following should also be included:

- Flight and Duty Time Limitations: Establish a maximum number of flight and duty hours per day.
- Break Agreements: Ensure there is an advanced agreement on when breaks will be scheduled during a jump day before the first jump and consider progressive duration of breaks.
- Cabin Altitude Limits: Define the maximum allowed cabin altitude without supplemental oxygen.
- Operational Risks: Include a comprehensive list of operational risks and there controls, such as:
    - Human factors and fatigue
    - Runway in use
    - Timing of operations
    - Changes in environmental conditions (considering low-sun conditions and weather changes)

5.2 Safety issue: Lack of oversight

Although there are already requirements under part-NCO for conducting a risk assessment and having a checklist, it appears that there is currently no monitoring of this.

Therefore:

Safety recommendation BE-2025-02: It is recommended that the Belgian Civil Aviation Authority (BCAA) takes measures to ensure that the oversight of non-commercial parachute operations is conducted in such a way and to such an extent that it has an effect on compliance with the current regulatory framework and thus has a safety-enhancing effect.

5.3 Safety issue: Current regulations not in proportion with the risk in non-commercial paradrop operations

As elaborated in chapter 3.3 of this report , Part-NCO is not tailored to most paradrop activities. Current EU regulations do not place any requirements on these organisations pertaining to flight operations, e.g. operations manual, preparing checklists, instructions to proper operations, training of pilots or risk management. Instead, it is the individual pilot-in-command that is responsible for ensuring that necessary checklists are prepared and used (NCO.SPEC.105). The pilot-in-command also must conduct extensive risk management that is similar to the requirements of an approved air operator organisation. Under the current regulations, the legal responsibility for the operation is assigned to a pilot-in-command that does not have de facto the operational control for the operation, while the flying clubs that exercise the operational control has no legal responsibility for the safety of that operation. Too much is placed on the shoulders of the individual pilot within a context where quite a lot is demanded of the pilot, and where flight operations are considered more of a side effect of skydiving. However, flying in paradrop operations means a high cognitive workload and a lot of pressure.

Safety action:

EASA has launched a survey on the Best Intervention Strategy (BIS) for parachute activities in April 2025. The intent of the survey is to seek information from the relevant stakeholders on the preferred option of intervention in relation to parachute activities. A summary of the intervention options:

- Intervention strategy 1 – No rule change, only safety promotion task (SPT) and survey with national competent authorities (NCAs)
- Intervention strategy 2 – Light management system and declaration for parachute NCO operations complemented with SPT.
- Intervention strategy 3 – SPO for all parachute operations complemented with SPT.

The intervention strategy 2 considers the safety issue may be mitigated by introducing proportionate requirements for a light management system and a declaration for NCO when performing parachute operations in order to address pre-flight planning and preparation (similar to rules on Declared Training Organisations, Sailplanes and Balloons). This will ensure:

1. The acknowledgement of operators on their responsibilities under the applicable safety regulations
2. The necessary approvals from the relevant operators
3. The existence of an operator is communicated to the competent authority.
4. The competent authority to fulfil its oversight responsibilities effectively.

Developing measures to address these issues are aiming at enhancing the safety of parachuting operations under NCO rules and addressing the current regulatory gaps that place undue responsibility on individual pilots without adequate support or oversight from the responsible organisations.

AAIU Belgium believes that Intervention Strategy 2 would be the best approach to address the risks outlined in this investigation report and to address the intent of the previous AAIU's safety recommendation 2014-P-2, originally addressed to the BCAA (See investigation report AAIU-2013-21). It is therefore advised that EASA takes this investigation report into consideration when determining the final intervention strategy.

AAIU Belgium has no further safety recommendations regarding this safety issue.

5.4 Safety issue: No flight time limitations determined for specialized operations

Article 8, paragraph 4 of regulation (EU) No 965/2012 (Air Operations) states that Non-commercial operations, including non-commercial specialised operations, with complex motor-powered aeroplanes and helicopters, as well as commercial specialised operations with aeroplanes, helicopters and sailplanes shall comply as regards flight time limitations, with the requirements specified in the national law of the Member State in which the operator has its principal place of business, or, where the operator has no principal place of business, the place where the operator is established or resides.

As feedback during this investigation, EASA indicated that they do not have the mandate to regularize flight time limitations, nor do they have any intention to do so.
In other words, it remains the responsibility of the national competent authorities (NCA).

Therefore:

Safety recommendation BE-2025-03:

It is recommended that the Belgian Civil Aviation Authority (BCAA) urgently establishes flight time limitations (FTL) for specialized operations, especially for commercial flights and complex-powered aircraft.
Operators under Part-NCO can then subsequently be encouraged to base their practices on these regulations until further regulation has been developed.

ABOUT THIS REPORT

General	
What?	Safety investigation reports are a technical document that reflects the views of the investigation team on the circumstances that led to the accident or serious incident and is conducted in accordance with Annex 13 to the Convention on International Civil Aviation and Regulation (EU) No 996/2010.
Objective	**The sole objective of safety investigations is the determination of the causes, and to define safety recommendations in order to prevent future accidents and incidents. It is not the purpose of this investigation to apportion blame or liability.** In particular, Article 17-3 of Regulation (EU) 996/2010 stipulates that the safety recommendations made in this report do not constitute any suspicion of guilt or responsibility.
Investigation authority	The Air Accident Investigation Unit of Belgium (AAIU for the rest of this publication). It is the Belgian permanent national civil aviation safety investigation authority as defined in Article 4 of Regulation (EU) No 996/2010 and established in accordance with the Royal Decree of 26 December 2022. This unit is part of the Federal Public Service Mobility and Transport and is functionally independent from the Belgian Civil Aviation Authority and other interested parties.
This investigation	
Investigation initiation	AAIU was notified of the occurrence by Skeyes ACC at 20:21 UTC. Due to the nature of the event there was no deployment of the AAIU on the day itself.
Scope	For this occurrence, a limited-scope, fact-gathering investigation and analysis was conducted in order to produce a short summary report. The investigation mainly focussed on the actions and conditions directly relating to the occurrence and might not cover all aspects of the aircraft operation and/or possible underlying safety factors due to the expected safety benefit of it and/or the extent of evidence/resources available.