Accident to the TECNAM - P92 ECHO CLUB identified **73TH** on 28 July 2022 on Val Thorens mountain airstrip

Time	Around 09:30[1]
Operator	Private
Type of flight	Cross country
Persons on board	Pilot and one passenger
Consequences and damage	Pilot and passenger fatally injured, microlight destroyed
This is a courtesy translation by the BEA of the Final Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.	

Missed approach in mountains, collision with terrain during attempted break-away

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on communication recordings, photos taken by the passenger during the flight and the webcams at Val Thorens ski resort.

The pilot, accompanied by a passenger, took off at around 08:30 from Albertville aerodrome (Savoie) bound for Val Thorens mountain airstrip (Savoie). At approximately 09:15, after flying over the mountain airstrip, he flew outbound and then joined the left-hand base leg at an estimated altitude of around 8,530 ft.

A short time later, the microlight collided with the sloping terrain below the threshold of runway 10.

[1] Except where otherwise indicated, the times in this report are in local time.

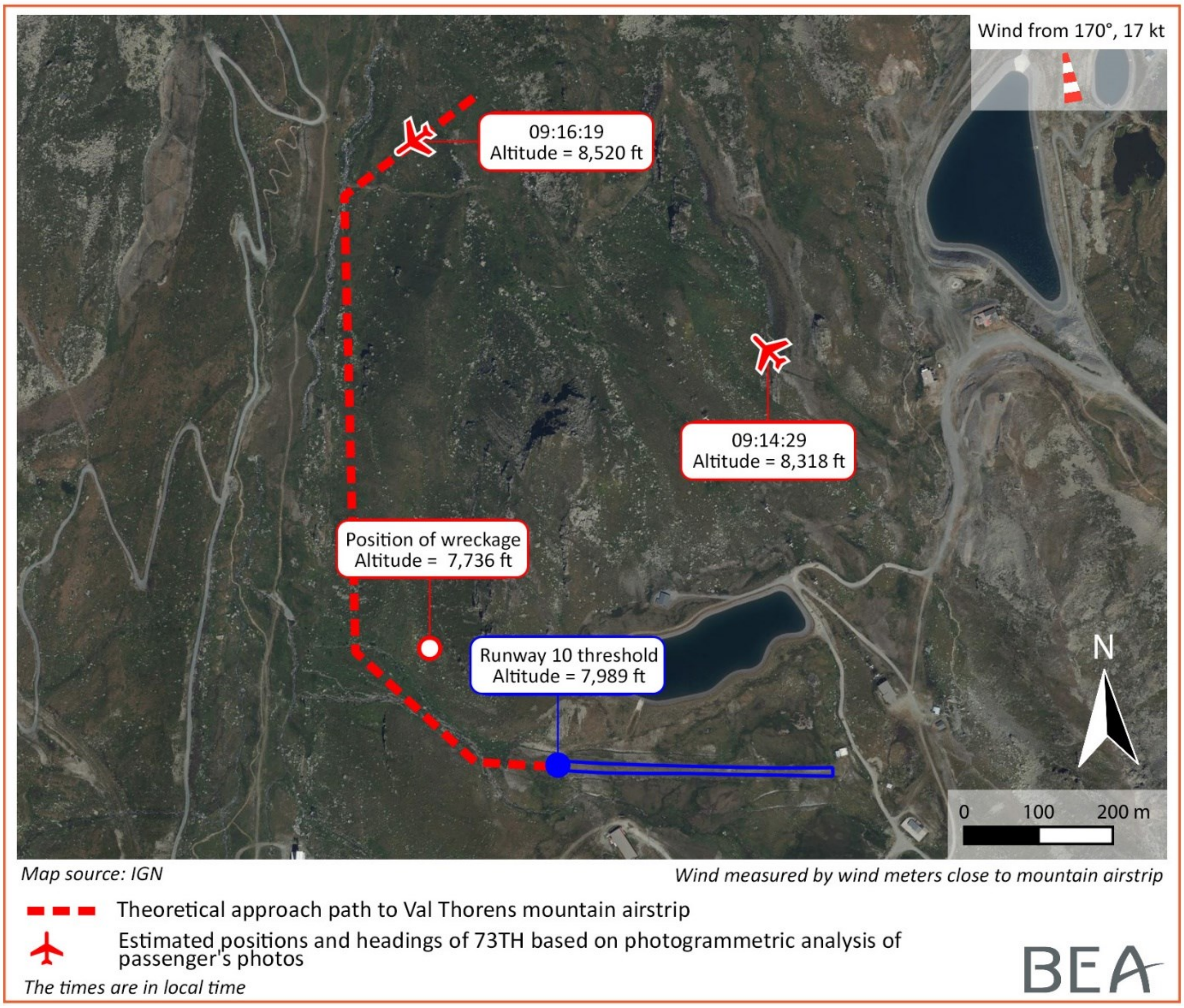

Figure 1: theoretical approach path and estimated positions of microlight based on photos taken by passenger

2 ADDITIONAL INFORMATION

2.1 Site and wreckage information

The microlight wreckage, which was complete, was situated on a mountain slope at an altitude of around 7,700 ft, with a gradient of approximately 15%, roughly 80 m below and 150 m from the threshold of runway 10 of the mountain airstrip.

The examination of the wreckage showed that the microlight collided with the ground on a westerly flight path, in the opposite direction to landing and probably with a high nose-down attitude and left bank. Debris was found over around 20 m upstream from the wreckage, all oriented on a 295° axis. The grass had been burnt by petrol on this axis. After the impact, the microlight slid down the slope and struck a rock making it nose over before coming to rest on its back.

The flaps were extended to the first detent corresponding to a deflection angle of 19°.

The examination of the wreckage on site and the detailed examination of the engine carried out on the BEA’s premises did not find a technical failure prior to the impact with the ground.

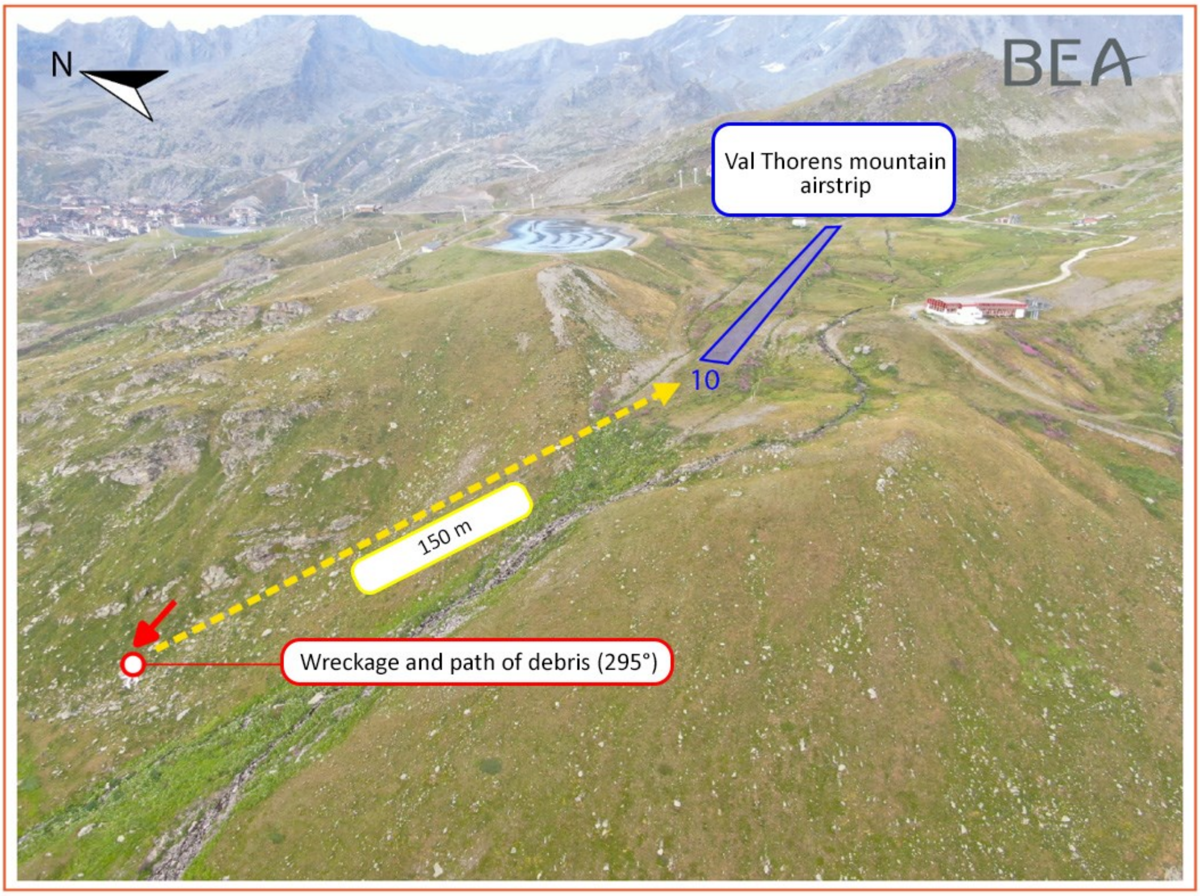

Figure 2: aerial view of the accident site (source: GTA)

2.2 Microlight information

73TH had been purchased new in 2018 by three co-owners, one of whom was the pilot.

The co-owners shared a joint pilot log book which also acted as an aircraft log book for the microlight. According to this document, the microlight had totalled 850 flight hours at the time of the accident.

It was equipped with a Rotax 912 UL 80-hp piston engine and was maintained by the Tecnam France maintenance workshop (Tecnam importer for France).

2.3 Pilot information

The 63-year-old pilot held a microlight pilot certificate obtained in 2005 along with a microlight instructor rating. His total experience since 2014 was estimated at 800 h, including around 400 h on 73TH. The log book showed that the pilot was very often on board the microlight even when he was not flying it.

He mainly flew in the mountains and was familiar with the numerous mountain airstrips in the northern Alps. The name “Val Thorens” appeared seven times in the log book, including two times in the two weeks preceding the accident.

The pilot had not, however, followed the mountain flight training programme given by the national mountain flight centre (PNVM) of the French microlight federation (FFPLUM). The co-owners indicated that he had been initiated in mountain flying around ten years previously by the instructor[2] who had given him the practical training for the microlight pilot certificate. Furthermore, the pilot regularly flew with pilots and instructors from the Albertville flying club.

He also held a valid aeroplane private pilot licence obtained in 2001 without a mountain rating and had logged more than 1,200 aeroplane flight hours.

2.4 Mountain airstrip information

Val Thorens mountain airstrip, situated at an altitude of 8,100 ft, has an unpaved runway 10/28 measuring 370 m x 15 m with an average gradient of 8%. Aircraft land on runway 10 and take off from runway 28. The "*BasULM*" airstrip information sheet indicates that the aerodrome circuit is flown from a left-hand base leg at an altitude of 8,300 ft and that a missed approach can be envisaged by breaking away to the left, on the north side. The version of 16 September 2019, in force at the time of the accident, did not give any recommendations relating to the aerology. The updated version of 2 March 2023 specifies that pilots are strongly advised not to use the airstrip when there are east, south or south-westerly winds.

The operator of the Val Thorens mountain airstrip, as well as mountain pilots and flight instructors familiar with the airstrip, confirmed that the aerology when there is a southerly wind is dangerous due to severe turbulence and downdrafts on final. They indicated that these are normally clearly felt during the approach reconnaissance phase. Generally speaking, a southerly wind - warm and dry - causes strong downdrafts and turbulence in the Alps, making mountain flying and in particular landings, dangerous and inadvisable when this wind is moderate or strong. The pilots contacted by the BEA who were flying on the day of the accident had decided not to land in the mountains.

2.5 Meteorological information

The webcam images from Val Thorens ski resort and the photos taken by the passenger showed sunny, cloudless weather at the time of the accident.

Data from the Val Thorens weather station, located at an altitude of around 2,300 m, indicated an outside air temperature of 14°C at the time of the accident. The wind meters[3] installed on the ski lift towers near the site of the accident recorded a wind from 170° of nearly 20 kt, which had been constant for several hours before the accident. The airstrip operator visited Val Thorens the morning of the day of the accident and reported a "strong" southerly wind.

Over the plains, Météo-France estimated light winds. The Albertville weather station indicated a light south-westerly to westerly wind of around 3 kt.

[2] This instructor did not hold an aeroplane pilot licence and did not therefore have the mountain rating.
[3] Values recorded every two minutes.

2.6 Specificities of mountain flight

2.6.1 Reconnaissance during a mountain approach

Every approach to a mountain airstrip begins with a reconnaissance phase, which gives the pilot an overall view of the environment. This phase determines the decision to land and take off, and is used to define all the parameters that will be used for these manoeuvres. It generally ends with a low pass during which the pilot reads the altimeter to determine the altitude he will use for the circuit, checks for low-level turbulence and examines the condition of the runway surface. If any parameter is missing, or if he has the slightest doubt, he should not begin the approach.

2.6.2 Degraded operational performance according to altitude and temperature

As the decrease in air density leads to a reduction in lift, temperature and altitude have an influence on aircraft performance.

Given that:

- a temperature change of 1°C relative to the ISA[4] is accompanied by a change in density altitude of 100 ft in the same direction;
- the true airspeed (Vp), relative to the indicated airspeed (Vi), increases by 1% for every 600 ft of altitude and by 1% for every 5°C increase relative to the ISA.

Thus, in the atmospheric conditions prevailing at the time of the accident (pressure altitude of 8,100 ft and outside air temperature of 14°C, corresponding to a deviation of 15°C from the ISA):

- the density altitude was 9,600 ft;
- the true airspeed was 17% higher than the indicated airspeed, i.e. a true speed of 117 km/h for an indicated airspeed of 100 km/h.

For a given Vi, the increase in Vp results, among other things, in an increase in the turn radius (for a given bank angle) or an increase in the bank angle (for a given turn radius).

Furthermore, the power output of a piston engine is proportional to the mass of the air-fuel mixture entering the cylinders, and therefore to the density of the ambient air. A naturally-aspirated piston engine loses around 10 % of its power per 3,000 ft of altitude.

2.7 Co-owner statements

The co-owners had regularly flown with the pilot from 2014. They indicated that he taught them the techniques and best practices for flying in the mountains. In particular, he frequently told them that a south wind is dangerous and not favourable for mountain landings. They added that the pilot did not hesitate to abort a flight or landing when conditions did not seem to him to be favourable. He also systematically consulted on-line mountain weather forecast sites when preparing his flights.

[4] International Standard Atmosphere

One of the co-owners explained that the pilot used to carry out mountain approaches by starting with a high reconnaissance at a height of around 1,000 ft, in order to observe the condition of the runway and its surroundings, as well as the windsock. This was followed by a low reconnaissance to confirm the condition of the airstrip, the aerology and assess the slope of the runway. Before flying an outbound leg, the pilot read the altitude at the runway threshold and added 300 ft to determine the runway circuit altitude. If the decision to land was taken, he would fly an outbound leg to join the base leg, and then carry out the final approach, generally with the flaps in the first detent. The approach was made while maintaining engine power at a speed of between 100 and 110 km/h at the VFE limit (maximum authorised speed with flaps extended).

About ten days before the accident, the pilot and one of the co-owners had flown to the Tignes and then Val Thorens mountain airstrips. Given the presence of an aeroplane in the circuit at Val Thorens which then landed on the runway, they decided to proceed directly to a low reconnaissance. The co-owner reported that the aerology was calm. They carried out two landings.

3 CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation.

Scenario

The pilot took off from Albertville where there was a light south-westerly to westerly wind, for a flight bound for Val Thorens mountain airstrip. There was a strong southerly wind in the mountains. Such a wind can cause violent downdrafts and turbulence on the lee side of the terrain. The pilot probably encountered these phenomena during the final approach to the airstrip and was forced to fly a missed approach. The microlight then collided with the terrain before the runway when the pilot tried to break away to the left facing the terrain.

The investigation was not able to determine how the pilot had prepared the flight, and in particular what weather information he had before taking off. It was not possible to obtain any information on the method and flight path used during the reconnaissance phase of the airstrip in preparation for landing.

Contributing factors

The following factors may have contributed to the collision with the terrain during the missed approach:

- probable insufficient consideration given to the aerological conditions during flight preparation, which did not allow the pilot to anticipate the variation in aerology between the plain and high altitude and thus to question the objective of the flight;
- insufficient assessment and/or consideration given to the aerological conditions in the vicinity of the mountain airstrip during the reconnaissance phase, which did not lead the pilot to renounce starting the approach;
- an attempted break-away facing the terrain in unfavourable aerological conditions and with degraded operational performance in high altitude and high temperature conditions.

Safety lessons

Mountain landing techniques

Landing on a mountain airstrip requires a special technique and must be considered carefully. The reconnaissance phase is essential. Each step of this phase must be carried out with precision, to enable the pilot to define all the parameters necessary for the landing before making a decision. If there is the slightest doubt, or if not all the parameters have been defined, the pilot should not hesitate to renounce starting the approach. Once the pilot has started the approach, his/her attention must be entirely focused on precisely maintaining flight parameters. Flying a missed approach, in the rare cases where it is possible, is a skilled and perilous manoeuvre because of the surrounding terrain and the degradation of aircraft performance with altitude.

Mountain flight training

In certified aviation, pilots are required to hold a mountain rating or, failing this, an access approval to use mountain airfields or mountain airstrips. These regulations do not apply to microlight pilots. However, the FFPLUM PNVM proposes a mountain flying training course to microlight pilots, enabling the latter to acquire knowledge of the rules and "good practices" associated with the use of this type of landing site.