



Accident to the ROBIN – HR 100/250 TR registered F-HRDM

on 12 June 2021
at Wambrechies (Nord)

⁽¹⁾ Except where
otherwise indicated,
times in this
report are local.

Time	Around 11:35 ⁽¹⁾
Operator	Private
Type of flight	Cross-country
Persons on board	Pilot and two passengers
Consequences and damage	Pilot and passengers fatally injured, aeroplane destroyed

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in May 2022. As accurate as the translation may be, the original text in French is the work of reference.

Problem in cabin at take-off, turn-around, loss of control in turn, collision with ground, fire

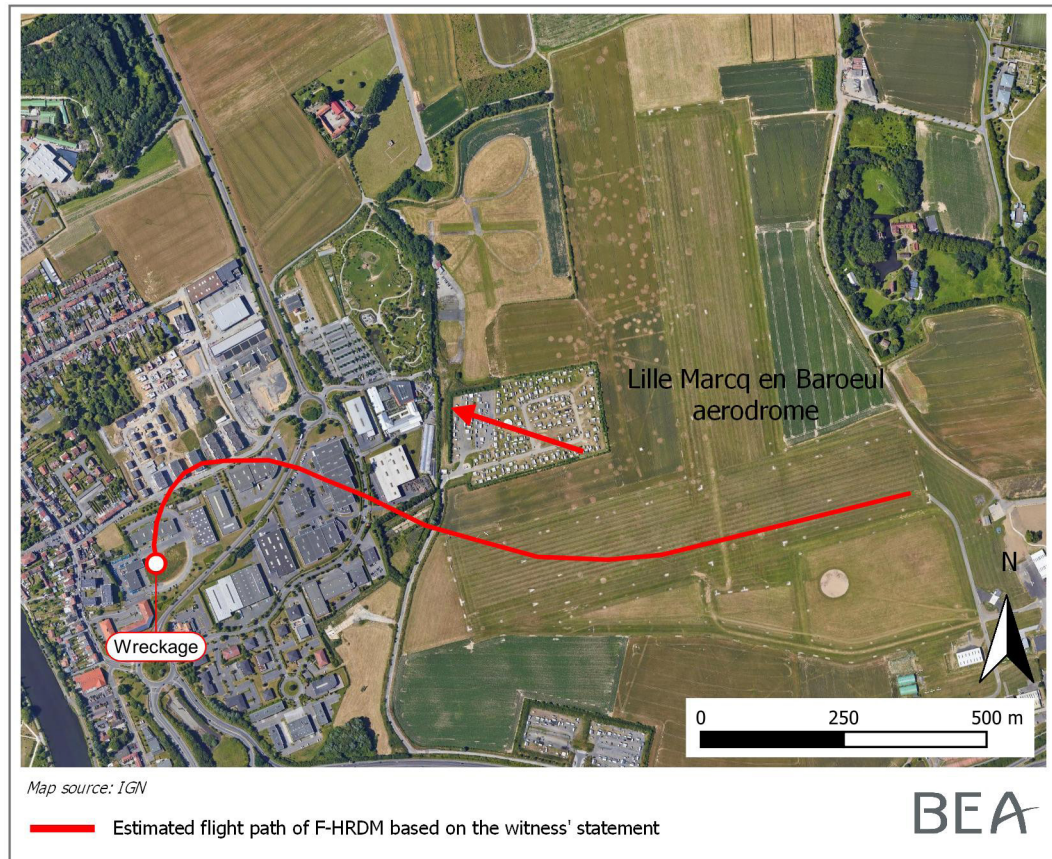
1 - HISTORY OF THE FLIGHT

Note: the following information is principally based on statements.

The day before the accident, the pilot, his partner and a friend performed a flight between Béziers-Vias airport (Hérault) and Lille - Marcq-en-Barœul aerodrome (Nord). On arrival, they refuelled and spent the night near the aerodrome.

On the day of the accident, after loading the luggage into the aeroplane's hold, they took off at 11:30 from runway 25 bound for Antwerp (Belgium). Shortly after take-off, the pilot announced over the frequency that he was going to land on the reciprocal QFU due to a problem⁽²⁾ in the cabin. The pilot initially made a right turn followed by a left turn, at a height of around 300 ft, with a bank angle of around 45° according to a witness on the ground. The pilot lost control of the aeroplane during the turn. The aeroplane collided with the ground a few seconds later and caught fire.

⁽²⁾ Some witnesses
in flight at the
time indicated that
the pilot reported
"smoke" in the cabin;
the witnesses on
the ground heard
"problem" in the
cabin. See [para. 2.6](#).



Source: BEA

Figure 1: flight path of F-HRDM

2.1 Meteorological information

The METAR report at 11:30 for Lille-Lesquin airport, located at a distance of approximately 7 NM, indicated wind from 280° varying between 240° and 310°, at 8 kt.

The meteorological conditions estimated by Météo-France at the time of the event were as follows:

- visibility greater than 10 km;
- scattered clouds (SCT) at a height of 1,500 ft and broken clouds (BKN) at a height of 3,000 ft;
- temperature of 19 °C.

2.2 Aerodrome information

Lille - Marcq-en-Barœul aerodrome has four intersecting runways: two adjacent runways 07/25, one for aeroplanes and the other for gliders, and two adjacent runways 17/35 with a similar configuration. Runways 07/25 measure 838 m long and 50 m wide (for the aeroplane runway), and 838 m long and 80 m wide (for the glider runway). Runways 17/35 measure 850 m long and 50 m wide (for the aeroplane runway), and 850 m long and 80 m wide (for the glider runway).

The take-off distance available on runway 25 is 709 m.

An industrial site and then the Wambrechies city centre are located on the axis of runway 25. The configuration is not conducive to a forced landing in the event of a major failure. The north side of the aerodrome offers options for landing in areas clear of obstacles.

2.3 Site and wreckage information

The accident site was located 1,300 m from the threshold of runway 25 and 170 m to the right of the runway axis.

The wreckage was not dispersed and was almost entirely burned. The aeroplane collided with the ground with a steep left bank angle and a nose-down attitude.

The flight control linkages were continuous. Neither the flap and landing gear configurations nor the trim positions could be determined due to the damage.

Several indications found on the propulsion system showed that the engine was transmitting torque to the propeller at the time of the collision with the ground. The power output could not be estimated.

Many electronic devices (phones, tablets, and an e-reader) were found in the debris. Some of them were destroyed by the fire. According to the specialists contacted, it is not possible to distinguish damage due to a fire outside the device from damage due to internal deterioration of these systems.

The observations made on the canopy and the side windows of the aeroplane were unable to determine whether there was abnormal heating or smoke in the cabin prior to the impact with the ground. The facts clearly established on some components showed that the damage was a result of the impact with the ground and of the fire on the ground.

2.4 Aeroplane information

The pilot co-owned the aeroplane, which was based at Béziers-Vias airport.

2.4.1 Main characteristics for take-off

The flight manual specifies that the take-off rotation occurs at approximately 110-120 km/h, with flaps extended at 12°. Once the flaps are retracted, the climb speed is 170 km/h.

The stall speeds at the maximum weight of 1,400 kg⁽³⁾ are as follows:

- flaps retracted: 132.5 km/h;
- flaps extended at 12°: 120 km/h.

In a turn, the stall speed increases:

- by approximately 10 % with a 30° bank angle;
- by approximately 20 % with a 45° bank angle;
- by approximately 40 % with a 60° bank angle.

According to the aeroplane's flight manual, under the conditions of the day, with flaps at 12°, full throttle and the propeller set to full low pitch, the take-off performance was as follows:

- run distance = 380 m;
- total distance after flying through 50 ft = 500 m.

2.4.2 Hold door

The hold door was located on the left side of the fuselage and opened upwards.

The second co-owner of the aeroplane explained that one year earlier, the aeroplane's hold door had opened in flight and had generated some aerodynamic noise. He indicated

⁽³⁾ On the day of the accident, the weight of the aeroplane was estimated to be around 1,250 kg.

that this door could open if it was not locked with the key, which the co-owners had been endeavouring to do since this incident.

No part of the hold door was found on the wreckage. This was probably destroyed by the fire. It was therefore not possible to check whether this door had been locked with the key.

2.5 Pilot and front seat passenger information

The pilot and the passenger in the front seat were members of the same flying club at Béziers Vias airport.

2.5.1 Pilot

The 62-year-old pilot held a Private Pilot Licence - Aeroplanes (PPL(A)) issued in 1997. He had logged approximately 770 flight hours, 13 h of which as pilot-in-command and 5 h of which in dual flight in the previous three months. He had co-owned the aeroplane since 2016.

The friend of the pilot who had put him up for the night, stated that the pilot had already flown to Lille - Marcq-en-Barœul aerodrome about 10 years ago.

2.5.2 Passenger in front seat

The 29-year-old passenger in the front seat held a Commercial Pilot Licence - Aeroplanes (CPL(A)) issued in December 2019. He held an Instrument Rating/Multi Engine (IR/ME), as well as a Flight Instructor (FI) rating issued in November 2020. He had logged approximately 400 flight hours. He was an instructor at the flying club.

2.5.3 Autopsies and post-mortem medical examinations

The autopsies and toxicological analyses performed on the three victims showed no evidence of respiratory activity in an area of fire. The hypothesis of incapacitating smoke in the cabin between take-off and collision with the ground seems unlikely.

Furthermore, no lithium was found in the blood analyses of the occupants. There is no biological evidence to support the hypothesis of smoke coming from an electronic device equipped with a lithium battery.

2.6 Statements

2.6.1 Ground witnesses

Witnesses on the ground, including an instructor, stated that the aeroplane had a good climb gradient. The instructor was listening to the frequency at the flying club and heard the pilot report a problem in the cabin. They added that they did not see smoke or objects coming out of the aeroplane. No emergency or "Mayday" messages were made.

2.6.2 Instructor and student-pilot on board a glider

The instructor and the student-pilot on board a glider returning from a local flight explained that they heard the pilot report smoke in the cabin. They kept sight of the aeroplane's path in order to anticipate the best place for their landing. They considered the possibility that the people on board the aeroplane would have to evacuate the aeroplane in the middle of the runway because of a fire.

2.6.3 Instructors from a training organisation who had flown with the pilot and the passenger instructor

The pilot had recently contacted a training organisation in order to obtain the instructor rating. In May 2021, he completed a first assessment flight, and the assessor advised him to undertake refresher training. Another assessor from the same organisation gave him the same advice after a second assessment flight. The assessors stated that the pilot still had to enhance his theoretical knowledge, accuracy in his flying practices and the briefing contents. They stated that in the context of managing an unexpected event during a flight with a high workload, the pilot was not meeting expectations.

The instructors stated that the passenger, who was an instructor trained within their organisation, had a good level of flying proficiency.

They added that it is very important to delineate the roles of the different persons on board before take-off. This is especially true on board an aeroplane where the pilot is the owner and one of the passengers is a commercial pilot and instructor.

The instructors also indicated that turn-arounds after take-off are sometimes performed, for example when the QFU changes. In this case, a turn is made before the 180° turn to align on final.

2.7 Thermal runaway of a device with lithium battery

Most pilots and passengers carry smartphones or tablets with them, sometimes as an aid for flight management. Such devices are equipped with lithium batteries. If damaged, and potentially in the event of severe overheating, these batteries can transit into a thermal runaway reaction, catch fire and release smoke, consisting of acidic gases.

Even if they have never encountered such a phenomenon, some training organisations have equipped their aircraft with gloves and containment bags to limit the damage that could be caused.



Source: ENAC

Figure 2: equipment on board aircraft

At the end of 2020, the ENAC, in partnership with the DSAC, published a video on the risk associated with lithium batteries in light aeroplanes⁽⁴⁾.

2.8 Before take-off briefing

The information listed during the take-off briefing is stored in the short-term memory. This memory directly and rapidly provides the information necessary for immediate action.

The before take-off briefing usually includes the actions to be taken, in particular:

- if take-off is rejected before rotation;
- if an engine failure occurs after take-off, with a forced landing anticipated more or less on the runway axis.

The occurrence of a minor incident during the initial climb is also discussed. The ENAC VFR Instructor's Guide specifies that if an event requiring the aircraft to land occurs during this phase (visual warning, powerplant anomaly, airspeed indicator failure, vibrations, etc.), the procedure is to fly the aerodrome circuit described during the departure briefing while adjusting flight management according to the failure detected.

A door opening or smoke may fall into the "minor incident" category of this classification.

The before take-off briefing should ideally take into account the specific conditions of the site and of the day, such as the aerodrome and its environment.

The main specificities of the accident flight were:

- an aerodrome with an environment on the axis of runway 25 not conducive to a forced landing;
- an aerodrome with intersecting runways, which allows the pilot to fly a shortened runway circuit by landing on the intersecting runway;
- the presence on board of two pilots with different profiles.

Threat and Error Management (TEM) has been introduced into training for several years. For this flight, in addition to the environment, the specificity relating to the front seat occupants could have constituted a threat, with best practices giving rise to the identification of a countermeasure before the flight.

3 - CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation. They are not intended to apportion blame or liability.

Scenario

Shortly after take-off, the pilot reported over the frequency that he was going to land on the reciprocal QFU due to a problem in the cabin. During the turn-around, the pilot lost control of the aeroplane while making a steep banked turn in the initial climb phase, which offers few safety margins.

The investigation was unable to identify the problem reported over the frequency:

- The hold door may have opened during the take-off run on the grass runway. Nevertheless, this type of event does not require an immediate landing.
- The appearance of incapacitating smoke on board seems unlikely due to the results of the autopsies and analyses performed on the victims. However, an inappropriate reaction to sudden damage to an electronic device or accessory cannot be ruled out.

The investigation was unable to determine the reasons which led the pilot or the passenger instructor to want to land as quickly as possible by means of a turn-around after take-off rather than by making a low-height aerodrome circuit “*adapted*” to the circumstances and environment.

The investigation could not determine whether a take-off briefing had been given and, if so, whether it had taken into account:

- the specificities related to the configuration of the runways and the environment of the aerodrome;
- the division of roles between the pilot and the passenger instructor, who had different profiles.

Safety lessons

Flight management with two pilots⁽⁵⁾ – see [para. 2.8 Before take-off briefing](#)

On board an aircraft, the main statuses that exist for the occupants are: pilot-in-command, instructor, student-pilot or passenger. If the flight is not an instruction flight, the usual configuration is pilot-in-command/passenger. It is therefore important to clarify the role of each person before departure. The pilot-in-command must make any decisions, and must especially decide who is at the controls in a particular situation.

Minor and major failure⁽⁶⁾ – see [para. 2.8 Before take-off briefing](#)

When a failure occurs during the initial climb, the pilot must, despite the surprise effect and stress, quickly decide on an action plan:

- he can make a forced landing ahead of the aircraft, in particular in the case of a major failure, which prevents the climb and even level flight from being held;
- he can perform a runway circuit adapted to the environment and circumstances, especially in the case of a minor failure. This assumes that the available power allows level flight to be held with a sufficient margin.

In the latter case, the pilot must be aware that the situation may deteriorate at any time. He will therefore be obliged to amend his action plan.

Maintaining the proper speed according to the selected bank angles will allow the pilot to maintain control during manoeuvres.

⁽⁵⁾ [Accident to the Schempp Hirth Janus B registered F-CFAJ on 02 August 2019 at Val-des-Prés](#)

⁽⁶⁾ [Accident to the Ekolot Topaz identified 70HZ on 21 February 2021 at Saint-Florentin - Chéu](#)