

Technical report

ULM-A-007/2021

Accident on 5 May 2021 involving a ZENAIR CH-701 aircraft, registration number EC-XSP, in the municipality of Robledillo de Mohernando (Guadalajara).

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Notice

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission (CIAIAC) regarding the circumstances of the accident and its causes and consequences.

In accordance with the provisions in Article 5.4.1 of Annex 13 of the International Civil Aviation Convention; and with articles 5.6 of Regulation (UE) nº 996/2010, of the European Parliament and the Council, of 20 October 2010; Article 15 of Law 21/2003 on Air Safety and articles 1 and 21.2 of Regulation 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future civil aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent from their reoccurrence. The investigation is not pointed to establish blame or liability whatsoever, and it's not prejudging the possible decision taken by the judicial authorities. Therefore, and according to above norms and regulations, the investigation was carried out using procedures not necessarily subject to the guarantees and rights usually used for the evidences in a judicial process.

Consequently, any use of this report for purposes other than that of preventing future accidents may lead to erroneous conclusions or interpretations.

This report was originally issued in Spanish. This English translation is provided for information purposes only.

CONTENTS

CONTENTS.....3

Abbreviations.....4

Synopsis5

1. FACTUAL INFORMATION6

 1.1. History of the flight 6

 1.2. Injuries to persons..... 6

 1.3. Damage to the aircraft 7

 1.4. Other damage 7

 1.5. Information about the personnel 7

 1.5.1. Information about the aircraft crew 7

 1.6. Information about the aircraft..... 7

 1.7. Meteorological information 8

 1.8. Aids to navigation..... 8

 1.9. Communications 8

 1.10. Information about the aerodrome 8

 1.11. Flight recorders 9

 1.12. Aircraft wreckage and impact information 11

 1.13. Medical and pathological information 12

 1.14. Fire..... 12

 1.15. Survival aspects 13

 1.16. Tests and research 13

 1.17. Organisational and management information 13

 1.18. Additional information 13

 1.18.1. Information on the aircraft’s Operating Manual 13

 1.19. Useful or effective investigation techniques 13

2. ANALYSIS..... 13

2.1 General aspects 13

Of the meteorological conditions..... 14

Of the wreckage 14

Of the operation..... 14

3. CONCLUSIONS 15

3.1 Confirmed findings 15

3.2 Causes/contributing factors 15

4. OPERATIONAL SAFETY RECOMMENDATIONS 16

Abbreviations

%	Per cent
°C	Degrees Celsius
AEMET	State Meteorological Agency
AESA	National Aviation Safety Agency
CV	Horsepower
ft	Feet
GPS	Global Positioning System
GS	Ground speed
h	Hours
hPa	Hectopascals
kg	Kilograms
km	Kilometres
km/h	Kilometres per hour
kt	Knots
LERM	Robledillo de Mohernando Aerodrome
LT	Local time
m	Metres
mm	Millimetres
m/s	Metres per second
MAF	Multi-axis fixed-wing
TULM	Ultralight aircraft pilot licence
ULM	Ultralight motorised aircraft
UTC	Coordinated Universal Time
VFR	Visual flight rules

Synopsis

Operator:	Private
Aircraft:	ZENAIR CH-701, EC-XSP
Date and time of accident:	5 May 2021, 12:25 LT ¹
Site of accident:	Municipality of Robledillo de Mohernando (Guadalajara).
Persons on board:	1 (serious)
Type of flight:	General aviation - Private
Flight rules:	VFR
Phase of flight:	Takeoff - Ascent to the aerodrome's traffic circuit

Date of approval: **25/05/2022**

Summary of incident:

On Wednesday, 5 May 2021, the ZENAIR CH-701 aircraft bearing the registration number EC-XSP suffered an accident while taking off from runway 01 at Robledillo de Mohernando Aerodrome (Guadalajara).

After taking off and flying around the aerodrome, the aircraft landed and then proceeded to take off once again. During the ascent, the aircraft's trajectory deviated to the left and it crashed into a field near the runway.

The pilot was seriously injured. The aircraft sustained significant damage.

The investigation has concluded that the accident was caused by a loss of control over the aircraft resulting from a stall at low altitude.

¹ Unless specified otherwise, all times referenced in this report are local. On the day of the accident, the local time was equivalent to UTC +2 hours.

1. FACTUAL INFORMATION

1.1. History of the flight

On Wednesday, 5 May 2021, the pilot of the ZENAIR CH-701 aircraft bearing the registration number EC-XSP travelled to Robledillo de Mohernando Aerodrome (Guadalajara) in order to carry out a local flight, originating and terminating at the same aerodrome and with only himself on board.

He had planned to begin the flight with a series of takeoffs and landings.

After the initial takeoff, the pilot made a short flight around the aerodrome and then landed on runway 01, with the intention of subsequently taking off again.

However, when he began this second ascent, the aircraft shifted to the left and began a downward trajectory, eventually impacting with the ground.

According to the pilot, the flight was carried out without flaps at all times. Although he was not able to specify the exact takeoff speed, he believed that it was an appropriate speed, given that he always flies “*with extra for safety*” and that his speed was more than 20 km/h above the speeds indicated in the aircraft’s flight manual. He also stated that just a few seconds passed between the takeoff and the commencement of the deviation in trajectory. When he tried to counteract the deviation by rolling the aircraft in the opposite direction, “*the lever moved freely, without offering any resistance*”, and he realised he no longer had any control over the aircraft.

The pilot was seriously injured. The aircraft sustained significant damage.

1.2. Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Total in the aircraft</i>	<i>Others</i>
Fatalities				
Serious	1		1	
Minor				
Unharmed				
TOTAL	1		1	

1.3. Damage to the aircraft

Virtually every part of the aircraft suffered significant damage, including damage to the right winglet, breakage and detachment of the left wing, breakage of two of the four propeller blades, deformation of the main landing gear, breakage and detachment of the nose landing gear, breakage and deformation of the nose, cabin and middle part of the fuselage.

1.4. Other damage

N/A

1.5. Information about the personnel

1.5.1. Information about the aircraft crew

The 64-year-old Spanish pilot had an ultralight pilot licence (TULM) for ultralight multi-axis fixed-wing aircraft (MAF), issued by the National Aviation Safety Agency (AESA) and valid until 30 June 2022. He also had a Class 2 medical certificate, valid until 20 May 2021.

He had 11 h of flying experience as a ULM pilot, of which 7 h were in the type of aircraft involved in the accident.

However, the pilot had extensive overall flying experience, as he had worked as a professional Commercial Air Transport Pilot.

1.6. Information about the aircraft

The amateur-built aircraft was a ZENAIR CH-701 with a maximum take-off weight of 450 kg. It was registered on 29 November 2019 and bore the serial number 17022-2829. It had a 100 CV BMW R1100S engine, which had accrued 8:45 h of operation; and a WOODCOMP four-blade fibre propeller, which had a diameter of 1.72 m and rotated anticlockwise as viewed from the cabin.

It had a Special Restricted Certificate of Airworthiness issued by AESA and valid until 18 November 2021.

The aircraft had accrued 5:25 h of flight time when it underwent the 100-hour/12-month type "A" scheduled check in November 2019, as per the maintenance programme approved by AESA. During this check, the aircraft was inspected along with the engine and propeller.

On the day of the accident, the aircraft had accrued 7:00 flight hours.

1.7. Meteorological information

According to the information provided by the State Meteorological Agency (AEMET), the weather conditions in the area at the time of the accident were characterised by little to no cloud, good visibility, temperatures around 20°C and light winds. There were no significant phenomena.

The weather station at Robledillo de Mohernando Aerodrome provided the following data:

MONTH	DAY	TIME	T (°C)	Humidity (%)	Dew point	Barometer (hPa)	Speed km/h	Gust km/h	Wind direction (degrees)
May	5	12:20:00	19.8	33	3.1	1013	2.2	3.3	161
May	5	12:30:00	21.1	30	2.8	1013	3.5	5.3	36
May	5	12:40:00	20.4	32	3.1	1013	6.1	7.2	135

1.8. Aids to navigation

N/A

1.9. Communications

N/A

1.10. Information about the aerodrome

Robledillo de Mohernando Aerodrome (LERM) is a restricted-use aerodrome located in the municipality of the same name, in the province of Guadalajara.

It has a fully paved runway designated 01-19, measuring 1000 m long by 18 m wide. It is also crossed by a grass runway to the north-east, which is only used in emergencies.

Its elevation is 3096 ft.

1.11. Flight recorders

The aircraft was not equipped with a conventional flight data recorder or a cockpit voice recorder. The applicable aeronautical regulations do not require the installation of any type of recorder on this type of aircraft.

However, the investigation did have access to the data stored on the portable GPS device that was fitted to the aircraft. This data made it possible to ascertain most of the aircraft's trajectory, both on land and in the air.

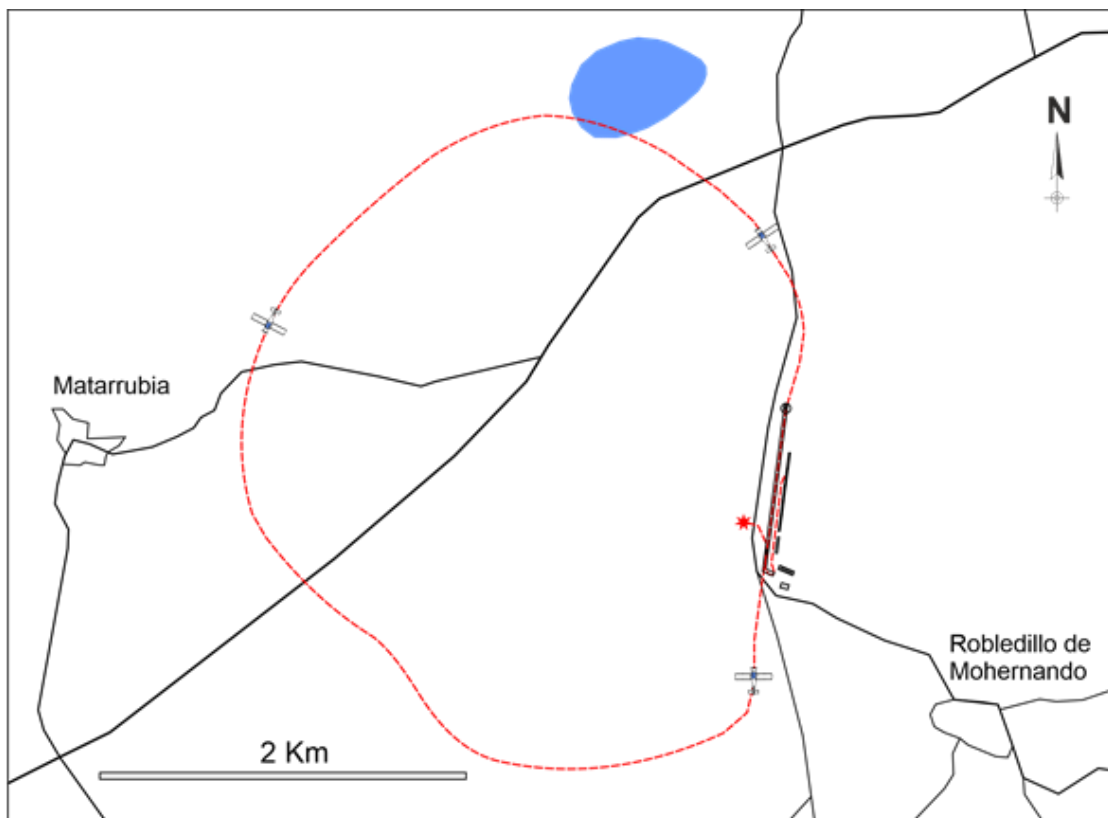


Fig. 1 - Diagram of the aircraft's trajectory

As indicated by the pilot, the diagram shows the initial taxi to runway 01, the subsequent takeoff and the flight around the western side of the aerodrome. The aircraft then returned to the start of the runway, touching down and then taking off again, before spinning off to the left and impacting with the ground.

From takeoff to impact, the total duration of the flight was 5 minutes and 15 seconds. During the first 3 minutes, the aircraft ascended 1411 ft above the ground, moving at speeds² ranging from 105 km/h at takeoff to 133 km/h while heading back towards the runway. During the remaining 2 minutes and 15 seconds, the aircraft descended at speeds not exceeding 126 km/h, reaching 100 km/h when touching down on the runway and slowing to 96 km/h immediately afterwards. Subsequently, the aircraft rose for barely a few metres before suddenly losing speed, turning sharply to the left and impacting with the ground. (Although three additional readings were recorded after takeoff, they are considered spurious, because even though they offer an idea as to what happened, they do not provide a precise record of the aircraft's altitude or speed during the moments immediately prior to the impact.)

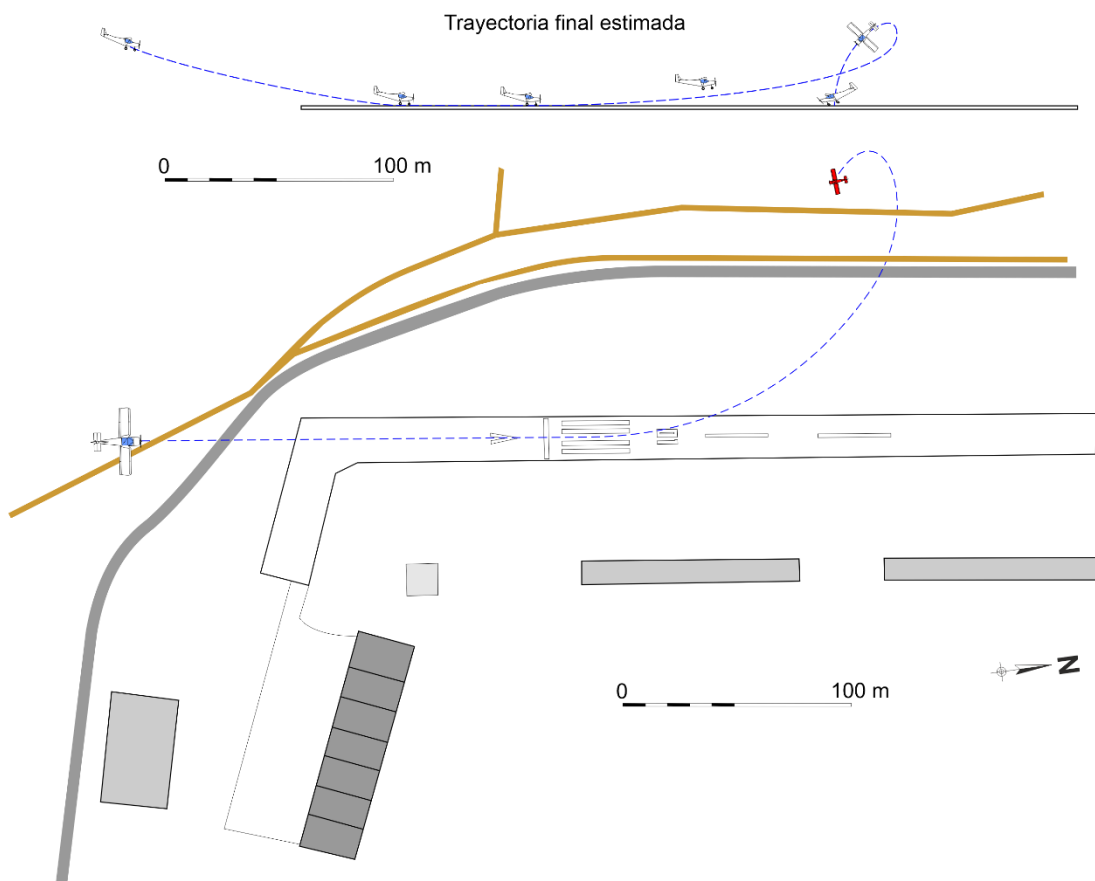


Fig. 2 - Diagram of the estimated final trajectory (ground plan and elevation)

² GS - ground speed.

1.12. Aircraft wreckage and impact information

The accident occurred during ascent after taking off for the second time from runway 01 at Robledillo de Mohernando Aerodrome.

The aircraft followed a downward trajectory (it is not possible to specify the precise height from which it descended) curving off to the left, eventually hitting the ground 130 m from the crosswise threshold bar in the direction of the runway centreline, 110 m from the latter.



Fig. 3 - Final position of the aircraft

The wreckage was concentrated around the point of impact. There was no sign of travel across the ground.

In general, the aircraft retained its original shape, with the following exceptions: the left wing, which was broken and pushed forward; and the nose landing gear, which was broken

and detached from the aircraft, having been pushed to the left and slightly back from its original position.



Fig. 4 - Position of the aircraft wreckage

The rest of the aircraft’s components remained in place, although they suffered significant damage: the right wingtip was crumpled and deformed; the main landing gear was deformed and the left anchor had become loose; the nose, cabin and middle part of the fuselage had suffered breakages and deformation.

Upon visual inspection it was confirmed that the aircraft’s controls remained intact, although it was not possible to determine their operability owing to the deformation caused by the impact.

Two of the propeller’s four blades were broken, while the other two remained intact.

1.13. Medical and pathological information

There is no evidence of any physiological factors or disabilities that may have affected the pilot’s actions.

1.14. Fire

No fire broke out.

1.15. Survival aspects

The harnesses and restraint systems worked adequately, and the cabin interior maintained its structural integrity.

1.16. Tests and research

N/A

1.17. Organisational and management information

N/A

1.18. Additional information

1.18.1. Information on the aircraft's Operating Manual

Section E-12 (Performances) of the aircraft's Operating Manual provides the following details (among others):

Takeoff speed without flaps: 60 km/h

Landing speed without flaps: 90 km/h

1.19. Useful or effective investigation techniques

N/A

2. ANALYSIS

2.1 General aspects

The pilot held the required licence and relevant medical certificates for the flight.

He only had 11 h of flying experience as a ULM pilot, of which 7 h were in the type of aircraft involved in the accident. As stated by the pilot himself, the reason for the flight was to gain experience and familiarise himself with the aircraft.

The aircraft had the correct documentation for the flight.

Of the meteorological conditions

The data recorded shows non-limiting meteorological conditions for the flight.

Of the wreckage

In view of the location of the wreckage, and according to the data recorded by the GPS, the aircraft touched down at the start of the runway and after taxiing for a short distance, it took off again, before descending in a curved trajectory towards the left and impacting with the ground 130 m from the threshold and 110 m from the runway centreline.

There were no signs that the aircraft had travelled across the ground, which indicates that it was carrying a significant amount of vertical speed when it made contact with the ground.

From direct observation of the aircraft's position on the ground, it can be concluded that the aircraft struck the ground with its propeller, the lower right section of its nose, and its landing gear (first with the nose landing gear, followed by the main landing gear), in such a way that its position was angled slightly downwards and its trajectory slightly oriented towards the right.

The deformation observed on both the nose landing gear and main landing gear is congruent with the above, insofar as the landing gear was bent backwards and to the left. The left wing had also become detached and was bent forwards.

Two of the propeller's four blades remained unbroken and in their original shape. The other two blades had impacted the ground and broken off as a result of backwards flexion. It can therefore be concluded that the aircraft was not under power at the moment it impacted with the ground.

Of the operation

The speeds recorded by the GPS exceed those indicated in the Operating Manual (takeoff without flaps at 60 km/h, landing at 90 km/h). This concurs with the pilot's statement that he always flies with an additional speed margin of no less than 20 km/h extra.

According to the pilot's statement, after he had touched down and just a few seconds after taking off, the aircraft's trajectory deviated to the left. He tried to correct the situation by rolling the aircraft in the opposite direction, but found that the lever offered no resistance whatsoever, meaning he no longer had any control over the aircraft.

This situation is consistent with the aircraft entering a stall immediately after taking off, which may have occurred due to low speed during the ascent, a steep angle of climb, or a combination of the two factors.

Viewed from within the cabin, the propeller spun to the left; consequently, the aircraft's reaction to an increase in power - as would have been the case at the moment of takeoff - would have been to roll and yaw to the right. However, the aircraft deviated to the left, indicating that there may not have been sufficient power applied to maintain an adequate takeoff speed; and in keeping with usual practice, the pilot may initially have attempted to correct this situation using his left foot.

This affirmation is supported by the condition of the propeller blades, which suggest a complete absence of applied power at the moment of impact.

The fact that - according to the pilot - he subsequently attempted to compensate by rolling the aircraft in the opposite direction (which would have achieved nothing, as he did not have control of the aircraft) would have been counter-productive, given that, at low speeds, such a move would have increased the resistance on the left wing and caused it to dip. Moreover, the lack of height attained after takeoff did not give the pilot time to react by lowering the nose to gain speed and stabilise the aircraft.

At the moment it struck the ground, the aircraft had adopted a less acute angle, which lessened the consequences of the impact.

3. CONCLUSIONS

3.1 Confirmed findings

There were no limiting meteorological conditions for the flight.

After taking off, the aircraft suddenly lost speed.

The aircraft entered a stall.

The aircraft did not gain sufficient height to allow the pilot to correct the situation.

3.2 Causes/contributing factors

The accident was caused by a loss of control over the aircraft resulting from a stall at low altitude.

4. OPERATIONAL SAFETY RECOMMENDATIONS

None