

REPORT

ULM A-005/2018

Accident involving a FLIGHT DESIGN CTSW, registration EC-LXE, in Gurrea de Gállego (Huesca, Spain) on 3 March 2018

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Foreword

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 object of the investigation, and its probable 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 5.5 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., 4. 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.

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ABBREVIATIONS

HP	Horsepower
kg	Kilograms
kg/l.....	Kilograms per liter
km/h	kilometers per hour
LT	Local time
m.	Meters
N.....	North
ULM.	Powered ultralight aircraft
VFR.....	Visual Flight Rules
W.....	West

SYNOPSIS

Owner and Operator:	Private
Aircraft:	Flight Design CTSW, registration EC-LXE
Date and time of accident:	3 March 2018 at 13:55 LT ¹
Site of accident:	Gurrea de Gállego (Huesca)
Persons on board:	1 pilot, minor injury; 1 passenger, serious injury
Type of flight:	General aviation – Private
Phase of flight:	Takeoff – initial climb
Flight rules	VFR
Date of approval:	27 th June 2018

Summary of accident

On Saturday, 3 March 2018, a Flight Design CTSW ultralight aircraft, registration EC-LXE, suffered an accident while taking off from the ULM airfield in Gurrea de Gállego (Huesca). On board were two occupants.

According to the information provided, the aircraft began to take off from runway 30 at the aerodrome, and during the initial climb, it crashed into a plot adjacent to the airfield, injuring both occupants.

The investigation has determined that the likely cause of the accident of aircraft EC-LXE was the loss of control of the aircraft following a stall that occurred during takeoff.

Contributing to the accident were starting the rotation with insufficient speed, exceeding the maximum weight per seat specified by the aircraft manufacturer, and gusting crosswinds.

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¹ All times in this report are local.

1. FACTUAL INFORMATION

1.1. History of the flight

On Saturday, 3 March 2018, a Flight Design CTSW ultralight aircraft, registration EC-LXE, suffered an accident at the ULM airfield in Gurrea de Gállego (Huesca). The aircraft had flown in that same day from Villanueva de Gállego (Huesca) with two occupants on board. At 13:55, in order to return to said locality, the pilot and passenger took off from runway 30.

Immediately after becoming airborne, the aircraft diverted to the right. The pilot was unable to control it and it lost altitude, impacting the ground some 100 m to the right of runway 30. According to eyewitnesses, at the time of the accident there was a gusting left crosswind, ranging in speed from 18 to 20 km/h.

After impact, the aircraft flipped over and came to a stop upside down. It sustained significant damage that affected the cockpit, engine and fuselage.

Both occupants were injured and taken to a hospital.

1.2. Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passenger</i>	<i>Total in the aircraft</i>	<i>Other</i>
Fatal				
Serious		1	1	
Minor	1		1	
None				
TOTAL	1	1	2	

1.3. Damage to aircraft

The aircraft sustained significant damage. Due to the impact, the cockpit disintegrated, the right wing and leg detached and there were fractures along the fuselage.

The engine mount also broke, causing the engine, as well as the propeller blades, to shift.

1.4. Other damage

There was no other damage.

1.5. Personnel information

The pilot, a 64-year old Spanish national, had an ultralight pilot license issued by Spain's National Aviation Safety Agency on 10 March 1994, along with fixed-wing multi-axis and fixed-wing multi-axis instructor ratings, both of which were valid until 31 October 2019.

He also had a class-2 medical certificate, issued on 24 November 2017 and valid for one year.

According to his statement, he had 2300 flight hours as an ultralight pilot at the time of the accident, of which approximately 1200 h had been on the accident aircraft.

1.6. Aircraft information

The Flight Design CTSW ultralight aircraft, registration EC-LXE, was a two-seat aircraft equipped with a 100-HP Rotax 912ULS engine and a three-blade propeller. Its empty weight was 298 kg, and its maximum takeoff weight, as per the Spanish regulation for certifying ultralight aircraft, was 450 kg. Its serial number was 06-07-16-AR, and it was registered in the National Aviation Safety Agency's Aircraft Registry on 8 May 2013, in the ultralight aircraft category.

The aircraft had a special restricted certificate of airworthiness in the private, aerial work (school) and normal categories, issued by the National Aviation Safety Agency on 26 June 2013.

At the time of the accident it had some 1200 flight hours. The last 100-h check had been carried out in June 2017.

that the maximum allowed takeoff weight is 600 kg, and the maximum weight per seat is 100 kg. The maximum crosswind allowed is 30 km/h.

According to information provided by the pilot, the approximate weights of the occupants and the fuel loaded into the aircraft were:

- Pilot: 80 kg
- Passenger: 110 kg
- Fuel: 29 kg²

² Fuel density: 0.72 kg/l

The approximate takeoff weight of the aircraft was thus about 517 kg, in excess of the maximum weight allowed by law, which in Spain is 450 kg for ULM aircraft.

1.7. Meteorological information

Based on data recorded by the station in Almudevar, located 15 km northeast of Gurrea de Gállego, the values of the weather parameters at the time of the accident were:

Wind: Direction: Southwest
 Average speed: 16 km/h
 Maximum speed: 26 km/h

Temperature: 15° C

Relative humidity: around 55%

There were numerous clouds, no precipitation and no convective phenomena.

1.8. Aids to navigation

Not applicable. The flight was conducted under visual flight rules.

1.9. Communications

Not applicable.

1.10. Aerodrome information

The ULM airfield of Gurrea de Gállego is located in the province of Huesca. It is a private facility with one 400-m long asphalt runway in a 12/30 orientation. The field is at an elevation of 340 m. Its geographic coordinates are 42° 02' 09" N 00° 44' 48" W.

1.11. Flight recorders

The aircraft was not equipped with a conventional flight data recorder or with a cockpit voice recorder. The relevant aviation regulation does not require this type of aircraft to carry any type of recorder.

1.12. Wreckage and impact information

The aircraft crashed in farmland next to the aerodrome, some 100 m to the right of runway 30. The impact caused an initial mark, made by the right wingtip, some 85 m away from the runway centerline. Eight meters north of this mark was another impact mark made by the bottom of the cabin. The aircraft came to a stop in an upside-down position 16 m north of this second impact mark.

The photograph in Figure 1 shows the aircraft at the crash site.



Figure 1. Final position of aircraft

The aircraft came to a stop in an upside-down position facing approximately northwest. Since it was leaking fuel, it was covered in foam by firefighters so as to prevent a potential fire.

1.13. Medical and pathological information

Both occupants were taken to a hospital. The pilot sprained his right knee, and the passenger was operated on for a fractured right forearm.

1.14. Fire

There was no fire in the aircraft or the surrounding area.

1.15. Survival aspects

Although the impact with the ground caused the front of the cabin to disintegrate, the impact was not severe enough to cause additional deformations to the aircraft's structure and endanger the lives of the occupants. The seatbelts were fully operational, and thus fulfilled their restraining purpose when the impact occurred.

1.16. Tests and research

1.16.1. Analysis of the aircraft wreckage

The aircraft was removed from the accident site and taken to the airfield for subsequent analysis.

The propeller blades had been fractured by the impact with the ground and the right wing had detached.

The engine mount was broken, which shifted the engine from its position and damaged multiple components. The control panel in the cockpit was also shifted and damaged.

Due to their condition, the continuity of the controls could not be verified. The aircraft was also equipped with a ballistic parachute, which did not detonate.

Figure 2 shows the condition of the aircraft after the accident, with the cockpit destroyed due to the impact with the ground, and the installed ballistic parachute system.



Figure 2. Final condition of aircraft and ballistic parachute

The throttle and mixture controls were set full forward. The images in Figure 3 show the positions of the levers in the cockpit, as well as the condition of the propeller blades.



Figure 3. Lever positions in cockpit and propeller blades

There were also fractures along the fuselage and on the surface of the horizontal stabilizer.

1.16.2. Pilot's statement

The pilot stated that they had arrived at the ULM field in Gurrea de Gállego that morning, landing on runway 30. They then had lunch, after which they returned to the aircraft in order to fly back to their departure airfield in Villanueva de Gállego.

He stated that he normally takes off at between 70 to 80 km/h. That day he took off a little earlier because he was concerned by the runway's short length and by the obstacles at the end of the runway. He took off with 15° flaps (flaps 1) and with the trim set to nose up, the same position he uses for landing (90-100 km/h).

He thinks he was overconfident on takeoff and did not consider how the wind direction and speed had changed. When they arrived, the wind was laminar and the landing on runway 30 was into the wind. On takeoff, the wind was gusting strongly and across the runway.

He recalls that the takeoff felt very short, that they were quickly airborne and that the airplane made an uncommanded right turn. He tried to correct the turn but he had no control and the airplane continued descending until it impacted the ground. He tried to lift the nose to avoid the impact but could not do so. The route he planned to take to return to the departure aerodrome required him to turn left after takeoff.

He also stated that if he had to repeat the takeoff, he would use more of the runway and take off at a higher speed.

He was flying with a passenger, whose weight he estimated to be approximately 110 kg. He weighs 80 kg and they were carrying about 40 liters of fuel.

1.16.3. Takeoff and impact with the ground

A video of the accident provided by eyewitnesses at the airfield was used to reconstruct the takeoff and impact sequence.

The aircraft taxied to the runway 30 threshold and, after lining up, the pilot immediately began the takeoff run. The aircraft rotated after traveling approximately 80 m from the threshold. As the aircraft climbed, it turned right and then lost altitude, eventually impacting in the plot next to the airfield.

Figure 4 contains five frames that show this sequence, from the start of the climb until just before the impact.



Figure 4. Initial climb and stall

The last frame shows how, just before impact, the aircraft was in a sharp right-bank attitude. The initial contact with the ground was with the right wing, with the airplane eventually coming to a stop in an upside-down position 24 m away from this initial impact mark.

1.17. Organizational and management information

Not applicable.

1.18.- Additional information

Not applicable.

1.19.- Useful or effective investigation techniques

Not applicable.

2. ANALYSIS

According to the information provided, the pilot started the takeoff run at 13:55 on runway 30 at the airfield in order to return to the town of Villanueva de Gállego. After going airborne, the aircraft turned right, losing what little altitude it had gained, and impacted a plot of land next to the airfield.

As for the weather conditions, according to eyewitnesses the wind speed at the time the airplane took off was about 20 km/h from 200-210°, meaning it was practically perpendicular to runway 30, from the left. The manufacturer's information indicates that the aircraft can operate with a crosswind of up to 30 km/h, meaning this factor is not deemed to be the main cause of the accident.

The pilot stated that the takeoff run was shorter than usual, since he was worried about the short length of the runway, which probably prompted him to start the rotation below the required speed. He also stated that although he tried to control the aircraft upon taking off, he did not have control of it.

The video recorded by the eyewitnesses allowed investigators to determine that the rotation was started after traveling about 70-80 m from the runway threshold. Immediately after starting the climb, the aircraft began an uncommanded right turn. This was caused by having taken off at a speed that was too low for the aircraft's weight, which resulted in insufficient aerodynamic control of the aircraft. This, in turn, caused the pilot to lose control of the aircraft. The wind conditions present at the airfield induced the aircraft to deviate, which resulted in the uncommanded turn to the right of runway 30.

When the aircraft turned right, influenced by the crosswind from an approximate direction of 200-210°, which then transitioned into a tailwind, the situation worsened, causing the stall that resulted in the airplane's impacting the ground with a right-bank attitude.

Another factor that contributed to the accident was the fact that the maximum allowable weight per seat was exceeded. According to the manufacturer's specifications, the maximum allowable weight per seat is 100 kg. Since one passenger's approximate weight was 110 kg, this limit was exceeded by about 10 kg, which in all likelihood also contributed to the involuntary alteration of the aircraft's heading after takeoff.

3. CONCLUSIONS

3.1. Findings

- The documentation for the aircraft and pilot was valid and in effect.
- There was nothing wrong with the aircraft prior to the accident.
- The takeoff weight was approximately 517 kg, in excess of the maximum authorized weight for ultralight aircraft.
- The passenger's approximate weight was 110 kg, in excess of the maximum weight per seat specified by the manufacturer.
- During takeoff, the wind speed was approximately 18-20 km/h from 200-210°.
- The pilot made a shorter and slower takeoff than required.
- During the initial climb, the pilot was unable to keep the aircraft from veering to the right and quickly losing altitude.
- The aircraft crashed to the ground on a field next to the aerodrome in a right-bank attitude, coming to rest upside down.
- Both occupants were injured and taken to a hospital.

3.2. Causes

The accident was caused by the pilot's loss of control of the aircraft, which stalled during takeoff.

Contributing to the accident was starting the rotation at an insufficient speed, the 10 kg in excess of the maximum weight per seat specified by the manufacturer, as well as the gusting crosswind, which contributed to deviating the aircraft from its flight path.

4. SAFETY RECOMMENDATIONS

None.