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AVIACIÓN **C**IVIL

Report
ULM A-001/2019

Accident on the 18th of January 2019, involving an ALPI PIONEER 300 aircraft, registration I-9318, in the municipality of Usagre (Badajoz)

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COMISIÓN DE INVESTIGACIÓN DE ACCIDENTES E INCIDENTES DE AVIACIÓN CIVIL

Tel.: +34 91 597 89 63
Fax: +34 91 463 55 35
E-mail: ciaiac@mitma.es
http://www.ciaiac.es
C/ Fruela, 6
28011 Madrid (España)

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 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.

Contents

Abreviations

° ' "	Sexagesimal degree(s), minute(s) and second(s)
ºC	Degree(s) Celsius
AEMET	Spain's State Meteorological Agency
AENA	Spanish Airports and Air Navigation
AESA	Agencia Estatal de Seguridad Aérea
ATS	Air Traffic Service
h	Hour(s)
HP	Horsepower
hPa	Hectopascal
ICAO	International Civil Aviation Organization
IFR	Instrumental Flight Rules
kg	Kilogram(s)
km	Kilometre(s)
km/h	Kilometre(s)/hour
kt	Knot(s)
l, l/h	Litre(s), Litre(s)/hour
LAPL	Light Aircraft Pilot License
LEAL	ICAO code for Alicante Airport
LEBZ	ICAO code for Badajoz Airport
LEMU	ICAO code for Mutxamel Aerodrome (Alicante)
LPEV	ICAO code for Évora Airport (Portugal)
m	Metre(s)
mm	Millimetre(s)
m/s	Metre(s)/second
m^2	Metre(s) squared
METAR	Aviation routine weather report
MTOW	Maximum Take-Off Weight
n/s	Series number
rpm	Revolutions per minute
TAF	Terminal Aerodrome Forecast
UTC	Universal Time Coordinated
VFR-VMC	Visual Flight Rules-Flight Visual Meteorological Conditions

Synopsis

Owner and operator:	Private
Aircraft:	ALPI PIONEER 300, registration I-9318, s/n: 5
Date and time of accident:	Friday the 18th of January 2019, 12.30 local time
Accident site:	Municipality of Usagre (Badajoz)
Persons on board:	1 pilot and 1 passenger, unharmed
Type of flight:	General Aviation - Private
Phase of flight:	En route - cruising
Flight rules:	VFR-VMC
Date of approval:	29 de enero de 2020

Summary of accident

On Friday the 18th of January 2019, the ALPI PIONEER 300 aircraft, registration I-9318, was involved in an accident on a private estate in the municipality of Usagre, situated in the province of Badajoz.

The aircraft was en route from the Mutxamel – Alicante Aerodrome (LEMU) to Évora Airport – Portugal (LPEV), when, while flying over Usagre, it suffered an engine stoppage that forced the pilot to make an emergency landing in a grass field.

The pilot and passenger were unharmed and able to exit the aircraft unassisted.

The aircraft incurred damage that prevented them from resuming the flight.

The investigation has determined the cause of the accident as the carrying out of an off-field emergency landing on uneven terrain as a result of an engine stoppage during the flight, possibly due to a lack of fuel because of an inadequate management of the fuel tanks.

The following contributing factors have been considered:

- The unevenness of the terrain and the thickness of the grass which made landing precision difficult and damaged the main landing gear.
- The possible lack of fuel produced by insufficient fuel tank management that may have caused the engine to stall.

No operational safety recommendations are proposed.

1. FACTUAL INFORMATION

1.1. History of the flight

On Friday the 18th of January 2019, the ALPI PIONEER 300 aircraft, registration I-9318, took off from Mutxamel Aerodrome (Alicante) bound for Évora in Portugal, with one pilot and one passenger on board.

The owner of the aircraft had just put it through a maintenance inspection at the aircraft's manufacturer, located in Italy. On the day of the accident, the aircraft was being transferred from the manufacturer's facilities in Italy to the location designated by the owner in Portugal.

The transfer began on 01/16/2019 flying about 10 hours and traveling about 2000 km to the Mutxamel aerodrome (Alicante) in several stages, landing in Mutxamel the day before the event,at 15:35 h local time, with two people on board. They refuelled with 41 litres of fuel, and the pilot rented a hangar where he parked the aircraft until the following morning. At approximately 9:30 h local time on the day of the event, the pilot and his companion arrived at the aerodrome where they added another 18 litres of fuel to the tank. At 10:00 h local time they departed for Évora Airport (Portugal).

At around 12:30 local time, the pilot of the I-9318 aircraft contacted the controller at the Mutxamel Aerodrome tower, indicating that they had been forced to make a forced landing somewhere in the province of Badajoz, within the municipality of Usagre, in the direction of Valencia de las Torres. He reported that both he and his companion were fine but that the aircraft had sustained damage that prevented them from resuming flight.

Photograph 1. Aircraft at the accident site

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Other
Fatal				
Serious				
Minor				
None	1	1		
TOTAL	1	1		

1.3. Damage to the aircraft

The aircraft suffered damage to its main landing gear.

1.4. Other damage

Although the emergency landing took place on a private estate in the municipality of Usagre, there was no third-party damage.

1.5. Personnel information

1.5.1. Pilot

The 73-year-old German pilot had a sport pilot license issued by the German authorities on the 21/09/2011, which licensed him to fly ultralight aircraft until 07/04/2020.

He had a class 2 medical certificate valid until 29/01/2020 and a LAPL valid until 29/01/2021.

He had a total of 25,300 flying hours in various types of aircraft, including B737/B757/B767, Lear Jet, Citation, Caravelle, etc. His experience included commercial and airline flights, single and multi-engine aircraft as well as flying in both VFR and IFR modes. He had 195 flying hours in the type of aircraft involved in the accident.

The pilot was familiar with the aircraft involved since he had previously flown it from Portugal to the manufacturer in Italy in September 2018, in addition to making a previous flight just before the delivery of the aircraft for its transfer.

The flight immediately prior to the accident was made with the aircraft of the event on the 17/01/2019, from the Torreilles ultralight field in Perpignan (France) to Mutxamel Aerodrome (Alicante).

1.5.2. Passenger

The passenger accompanying the pilot during the flight was a 65-year-old who was also a German national. According to the pilot, he did not have a pilot's license and simply wanted to join him on the trip.

1.6. Aircraft information

1.6.1. General information

The ALPI PIONEER P300 is an Italian-made single-engine ultralight aircraft (ALPI AVIATION). It has a cantilever low-wing, two seats and fixed tricycle landing gear.

Dimensions:

- Wingspan: 7.55 m
- Wing surface: 10 m^2
- Length: 6.25 m

Weights:

- Empty weight: 285 kg
- MTOW: 450 kg
- Maximum luggage load: 20 kg

Photograph 2. Aircraft before the accident

Performance:

- Cruising speed at 75% power: 220 km/h
- Stall speed: 72 km/h
- Range at 75% power: 900 km

Power plant:

- ROTAX 912 ULS engine, s/n: 6779095
- Year of manufacture: 2011
- Four cylinders
- Four-stroke
- Maximum power: 100 hp
- 5500 rpm at full power
- Fuel consumption at 75% power: 18.5 l/h

Propeller:

- SR 3000/2W, s/n: 07121 dated 12/2011.
- Variable pitch, tractor
- two-bladed
- made from composite materials

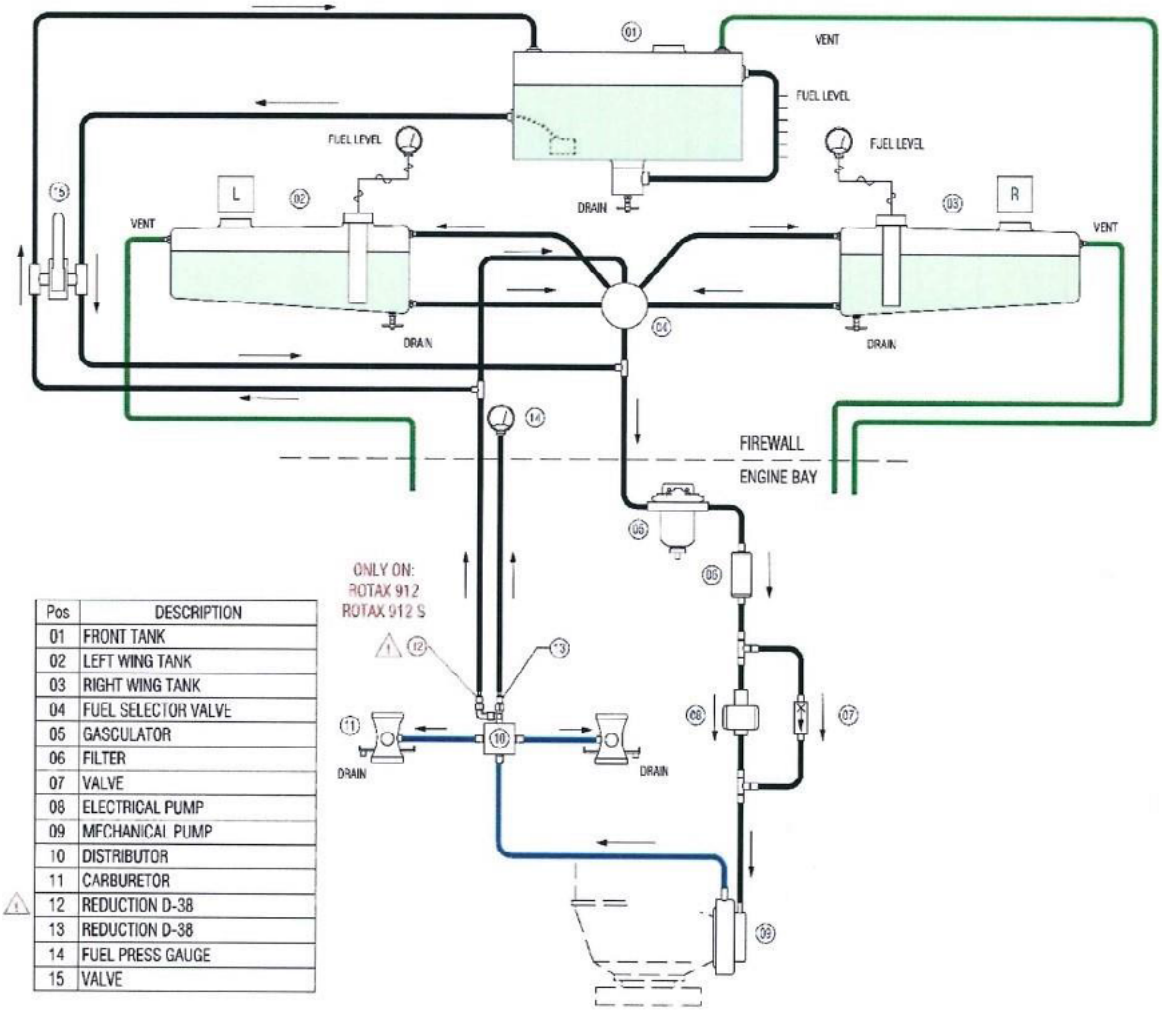
Fuel:

- AVGAS 100LL
- Fuel capacity: 80 litres.
- The aircraft was refuelled with 59 litres of AVGAS 100LL at Mutxamel Aerodrome (Alicante).

The owner of the aircraft confirmed that it had two fuel tanks on the wings and that, before selling it to the owner, the manufacturer had modified the aircraft to add an extra tank between the two previously mentioned. He did not have any documentation to indicate the design of the modification.

According to the information from the aircraft manufacturer, it is not a modification, but this aircraft is equipped with an extra central fuel tank like other aircraft they manufacture.

A selector valve allows the fuel supply from one of the selected wing tanks, and another valve from the central tank (see Figure 1).



Pos	DESCRIPTION
01	FRONT TANK
02	LEFT WING TANK
03	RIGHT WING TANK
04	FUEL SELECTOR VALVE
05	GASCULATOR
06	FILTER
07	VALVE
08	ELECTRICAL PUMP
09	MECHANICAL PUMP
10	DISTRIBUTOR
11	CARBURETOR
12	REDUCTION D-38
13	REDUCTION D-38
14	FUEL PRESS GAUGE
15	VALVE

Figura 1. Esquema del sistema de combustible

The selection of one of the tanks implies the exclusion of the non-selected one.

The fuel level checking system was carried out by means of transparent pipes installed between the bottom of the tanks and the cabin, where communicating vessels showed the amount of fuel available.

1.6.2. Maintenance records

According to its owner, the aircraft was acquired new in 2008 with series number: 5, and very few flying hours, although he could not specify the exact amount. The aircraft's logbook has not been provided, so this information cannot be verified.

The accident occurred while the aircraft was returning to its base following a maintenance overhaul by its manufacturer in Italy. We have been able to verify the scope of the inspection from invoices provided by the owner and the information/documentation provided by the manufacturer.

The maintenance checks carried out on the aircraft were the 200 h airframe inspection, the five-year engine inspection and the five-year ballistic parachute inspection. Furthermore, the fuel lines were replaced, and the engine wiring was partially renewed because was damaged by rats. All the checks and repairs were dated 20/12/2018, and were performed according to the manufacturers protocols.

On 01/15/2019 the aircraft was tested in flight and subsequently it flown from the aircraft manufacturer's facilities to the Al Casale (Italy) airfield, some 30 km away without incident. A second flight was made on the same day including two take-offs and landings at Al Casale airfield with a manufacturer's pilot and the pilot in command of the accident with satisfactory results.

According to its logbook, the engine was manufactured in 2011, and the manufacturer noted that, at the time of the previously mentioned five-year inspection performed on the 20/12/2018, it had accrued 120 flying hours.

The propeller had undergone a previous inspection on the 29/10/2018, which included a penetrating liquids test as well as a balancing, and was valid for up to 300 flying hours or until December 2021.

1.6.3. Airworthiness status

The Italian-registered aircraft did not have an airworthiness certificate in accordance with ICAO Annex 8, because the Italian authorities do not require or issue these certificates for ultralight aircraft.This means that the aircraft cannot fly in states other than the one of registration without prior permission.

There is no record in AESA's records that permission to fly, in Spain, had been requested on the date of the accident.

It has an Aero Club D'Italia identification certificate that states the aircraft's Italian registration date as 21/05/2008.

1.7. Meteorological information

1.7.1. General conditions

At mid and high levels, there was a ridge, which moved rapidly during the hours before the accident, from the north-west of the peninsula to the south and the western Mediterranean, where it was situated the time of the accident. At low levels, there was an extensive anticyclone centered to the south of the Azores and extending to the Canary Islands (strong trade winds) and the west of the peninsula.

1.7.2. Conditions at the accident site

There were no limiting conditions for this type of flight.

1.8. Aids to navigation

The flight was operating under visual flight rules.

1.9. Communications

There were no radio communications during the flight.
At around 12:30 local time, the pilot of the aircraft contacted the controller at the Mutxamel Aerodrome tower (Alicante) to say that he had been forced to make an off-airfield forced landing somewhere in the province of Badajoz and that, although they were unharmed, the aircraft was damaged.

1.10. Aerodrome information

Not applicable.

1.11. Flight recorders

The aircraft was not equipped with a flight data recorder or a cockpit voice recorder, as current aeronautical regulations do not require this type of aircraft to carry them.

1.12. Wreckage and impact information

The emergency landing took place on a private estate in the municipality of Usagre, around 50 m from the road between Usagre and Valencia de las Torres, in Badajoz province.

Photograph 3. Damage to the main landing gear

The only damage identified after the emergency landing was to the main landing gear, which was deformed and inoperative.

1.13. Medical and pathological information

Not applicable.

1.14. Fire

Not applicable.

1.15. Survival aspects

The structure of the aircraft retained its shape, and there was no damage to the cabin, which meant the occupants were able to evacuate the aircraft without issue.

1.16. Tests and research

1.16.1. Statements

1.16.1.1. Pilot information

On the day of the accident, the pilot arrived at Mutxamel Aerodrome (Alicante), refuelled the aircraft and carried out the pre-flight inspection without incident. He calculated the load sheet and completed the flight plan.

He and another German national, who had decided to join him on the aircraft's transfer flight, took off at 10:00 h bound for Évora (Portugal).

The expected flight duration was three and a half hours.

The flight was proceeding normally until, as they were flying over Usagre, the engine began to fail and then stalled. He tried to restart the engine without success. He then decided to make an emergency landing on a nearby grass field.

The pilot made contact with Mutxamel Aerodrome to notify them of the accident, and inform them that he would be unable to resume the flight due to the damage the aircraft had sustained.

1.16.1.2. Aircraft owner testimony

According to the owner's testimony, he barely knew the pilot. He had agreed with the aircraft's Italian manufacturer that after carrying out a major maintenance overhaul, they would transfer it back to its base in Portugal, and it was during this transfer that the accident occurred.

The owner immediately travelled to the accident site, where he found the central fuel tank empty. The wing tanks did contain some fuel, but he was unable to determine the amount.

According to his statement, because of the way the return fuel line is assembled, if the central tank is empty and its valve is inadvertently left open, the aircraft cannot fly. He also stated that he found the valve of the central tank closed.

He spoke with the pilot, who told him that as he was descending the engine cut out and he was unable to restart it.

They disassembled some of the engine components, such as the carburetors. Personnel from the manufacturer who had carried out the maintenance then helped them to disassemble the aircraft and remove it from the area.

1.16.2. Related reports/communications

1.16.2.1. Report from the airport operations department

AENA, as the airport operator, reported, via the operations department at Alicante Airport (LEAL), that at 11:30 UTC (12:30 local time), the Mutxamel Aerodrome (LEMU) informed them that the I-9318 aircraft that had taken off from their airfield at 09:04 UTC bound for the Portuguese ÉVORA Aerodrome (LPEV) had made an emergency landing on a private estate in the municipality of Usagre (Portugal).

The flight plan established Évora in Portugal (LPEV) as the destination, with an expected flight time of 3 hours and 14 minutes.

After contacting the pilot-in-command, he had confirmed that there were no injuries and they did not require any type of assistance. He had also explained that the damage to the aircraft meant that he was unable to take off again, but he did not confirm the significance of the damage.

They informed the 112 emergency response service and the ATS offices at Badajoz Airport.

1.16.3. Tests/Inspections

The pilot and his companion returned to their home country, making communications and testimonies difficult. Problems contacting the pilot were further exacerbated by the illness he suffered after returning from Spain.

The owner of the aircraft went to the accident site. He accessed the engine and disassembled some of its components, including the carburetors.

The aircraft was disassembled and removed, impeding its inspection, so it has not been possible to verify the information provided by the pilot or the owner.

The owner provided a video of the carburetor disassembly, which showed a small amount of fuel in the float bowl. The floats and the float bowl itself appeared to be in good condition with no evidence of impurities or dirt particles.

This type of aircraft has two 40-litre fuel tanks. The owner says that this particular aircraft also had a central tank which directly fed the engine, but this has not been confirmed either by sight or with documentation.

According to information from the aircraft manufacturer, this aircraft was manufactured equipped with one fuel tank per wing and one central extra tank, as indicated in section 1.6.1.

During the test flight at the manufacturer, prior to the departure from Italy, the pilot was instructed on how the fuel system must be managed.

If the selected tank is emptied, the engine will stop. Restarting it in flight requires selecting one of the other available tanks, switching on the secondary electric pump, and closing the empty tank selector.

The aircraft was found in the place of the accident with the central and left tanks empty, and about 25 liters of fuel were found in the right tank. The central tank fuel valve was found closed, and the fuel selector of the wing tanks was selected on the right one.

The aircraft arrived at Mutxamel Aerodrome (Alicante), after a flight of about 3.25 hours, travelling around 700 km from the Torreilles ultralight field, in Perpignan (France). The fuel consumption was in line with the engine specification of 18.5 l/h at a cruising speed of 220 km/h.

These statistics coincide with those of the flight between Mutxamel and the accident site; a distance of approximately 500 km was covered in 2.5 hours of flight, consuming 46.25 l of fuel.

The total refueling at Mutxamel was 59 l, which would allow 3.18 hours of flight with normal fuel consumption and cruising speed, which makes the flight between Mutxamel and Évora feasible.

After the accident, according to the aircraft owner's instructions, the aircraft was transported by truck to the manufacturer in Italy, where it was inspected. In particular, the operation of the fuel system was checked and found to be correct:

- a minimum amount of dirt and 2 drops of water were found inside the gascolator,
- the fuel pumps, both electrical and mechanical, were efficient,
- the carburetor was clean, without fuel, and free of dirt and water.

As after the accident the fuel tank on the right wing was found selected, it was checked whether the fuel supply to the engine from this tank was correct by performing the following test:

1- Keeping the tank in the closed position and switching on the electric pump, it was verified that the engine did not start,
2- When selecting the right tank, the fuel pressure increased after approximately 10" and the engine started normally,
3- After a few minutes of warm-up, the engine was put at 5000 rpm for about 10' and the engine continued to run regularly without giving any sign of dysfunction,
4- Finally, the central tank was opened and after about 40", the fuel pressure started to drop and caused the engine to malfunction until it stopped

On the other hand, the aircraft manufacturer confirmed that the aircraft owner replaced the engine from the original configuration.

1.17. Organisational and management information

Not applicable.

1.18. Additional information

Not applicable.

1.19. Useful or effective investigation techniques

Not applicable.

2. ANALYSIS

2.1. Analysis of the meteorological conditions

The meteorological conditions in the Usagre area (Badajoz) around the time of the accident (12:30 local time) were, given the different variables, suitable for the flight: low humidity, light winds, medium to high cloud levels and no precipitation. There were no adverse conditions that could have contributed to the accident.

2.2. Analysis of the flight and operational aspects

The aircraft took off from the Mutxamel Aerodrome (Alicante) bound for Évora (Portugal) after refuelling with 59 l of fuel. The pilot carried out the pre-flight inspection and did not detect any anomalies in the aircraft. The flight passed without incident until, while the aircraft was flying over the municipality of Usagre in Badajoz, the engine stalled and the pilot was unable to restart it.

He decided to make an emergency landing, gliding over a field of grass, on to which he made a controlled approach and touchdown. There was no injury to the occupants and only minor damage to the aircraft, whose main landing gear sustained damage.

The analysis of the aircraft's position at the accident site shows the touchdown was controlled, with level flight until ground contact, and delaying the nose landing gear's final ground contact, as evidenced by its undamaged condition after the accident. The main landing gear may have been deformed as a result of miscalculating the aircraft's height above the grass, as it would have been difficult to judge its length and any unevenness in the terrain accurately.

The pilot had extensive flight experience in different types of aircraft, particularly in the type of aircraft involved in the accident. Furthermore, he had previously flown the route between the manufacturer in Italy and Mutxamel on several occasions without incident, so he had prior experience of operating the aircraft during several hours of flight.

However, although it can't be confirmed, mismanagement of the fuel tanks may have resulted in insufficient fuel supply to the engine, causing it to stall and making it impossible to restart, since the inspection of the aircraft carried out by the manufacturer after the accident did not find any inoperative systems

2.3. Analysis of the aircraft's maintenance

The aircraft's scant maintenance log has prevented a comprehensive analysis of its operational condition.

Presumably, according to the information provided by the owner and the aircraft manufacturer in Italy, the 200-hour airframe inspection could ensure its satisfactory condition.

The engine and propeller had also undergone detailed inspections. Moreover, the flight from the manufacturer to Mutxamel (Alicante) passed without incident, so, on those routes, the aircraft was operating correctly with no evident issues.

3. CONCLUSIONS

3.1. Findings

- The pilot had a valid and in-force German ultralight pilot's license.
- His class 2 and LAPL medical certificate and LAPL were valid and in force.
- The pilot had 25,300 flying hours in different types of aircraft and 195 hours in the aircraft involved in the event.
- The Portugal-based owner had commissioned the manufacturer to transfer the aircraft from Italy to its base. This transfer involved several stopovers.
- The aircraft did not have an airworthiness certificate.
- The aircraft was built in 2008 and did not have a logbook.
- The engine was built in 2011 and had a total of 120 flying hours.
- The aircraft's last maintenance overhaul was performed by the aircraft manufacturer in Italy and comprised a 200-hour airframe inspection and a 5-year engine inspection, carried out on the 20/12/2018.
- There were no limiting meteorological conditions for visual flying.
- The aircraft refueled 59 l at Mutxamel aerodrome (Alicante).
- The damage analysis of the aircraft revealed that the pilot executed a controlled and level emergency landing.
- The pilot said the engine stalled and he was unable to restart it.
- The aircraft's main landing gear was visibly deformed.
- Some engine parts were disassembled, preventing verification of its condition.
- The manipulation of the aircraft at the accident site impeded verification of its operational condition.

3.2. Causes/contributing factors

The investigation has determined the cause of the accident as the carrying out of an off-field emergency landing on uneven terrain as a result of an engine stoppage during the flight, possibly due to a lack of fuel because of an inadequate management of the fuel tanks.

The following contributing factors have been considered:

- The unevenness of the terrain and the thickness of the grass which made landing precision difficult and damaged the main landing gear.
- The possible lack of fuel produced by insufficient fuel tank management that may have caused the engine to stall.

4. OPERATIONAL SAFETY RECOMMENDATIONS

No operational safety recommendations are proposed.