

Technical report

A-023/2020

Accident involving a TECNAM P2002-JF aircraft operated by BAA Training, registration LY-FTC, at Lleida-Alguaire Airport (Lleida, SPAIN) on 9 July 2020

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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 regarding the circumstances of the accident object of the investigation, its probable causes and its 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 (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010; Article 15 of Law 21/2003 on Air Safety; and Articles 1, 4 and 21.2 of RD 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent their recurrence. The investigation is not intended to attribute any blame or liability, nor to prejudge any decisions that may be taken by the judicial authorities. Therefore, and according to the laws detailed above, the investigation was carried out using procedures not necessarily subject to the guarantees and rights by which evidence should be governed in a judicial process.

Consequently, the use of this report for any purpose other than the prevention of future accidents may lead to erroneous conclusions or interpretations.

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ABBREVIATIONS

° ' "	Sexagesimal degrees, minutes and seconds
°C	Degrees Celsius
AGL	Above ground level
ATO	Approved Training Organisation
ATPL (A)	Airline Transport Pilot License (aircraft)
CAVOK	Clouds and visibility OK (visibility 10 km or more, no cloud below 5,000 feet, absence of cumulonimbus and towering cumulus and no significant meteorological phenomena)
CPL (A)	Commercial Pilot License (aircraft)
FI	Flight Instructor
ft	Feet
GPS	Global Positioning System
h	Time
hPa	Hectopascal
ICAO	International Civil Aviation Organisation
IR	Instrument Rating
KCAS	Knots-Calibrated Airspeed
kg	Kilogramme
KIAS	Knots-Indicated Airspeed
km	Kilometre
kt	Knot
l	Litre
LEDA	ICAO code for Lleida-Alguaire Airport
LDG	Landing
m	Metre
MEP	Multi-engine piston rating
METAR	Aviation routine weather report (in aeronautical meteorological code)
MHz	Megahertz
PPL (A)	Private Pilot License (aircraft)
QNH	Altimeter setting to obtain elevation above sea level when on the ground
SEP	Single-engine piston rating
TAS	True Airspeed
TO	Take off
UTC	Universal Time Coordinated
V _{app}	Approach speed
VFR	Visual Flight Rules

Synopsis

Aircraft Owner and Operator:	BAA Training
Aircraft:	Tecnam P2002-JF, registration LY-FTC
Date and time of incident:	9 July 2020: 14:35 h ¹
Site of accident:	Lleida-Alguaire Airport (Lleida)
Persons on board:	1, unharmed
Type of flight:	General Aviation - Instruction - Solo
Phase of flight:	Landing - Landing roll-out
Flight rules:	VFR
Date of approval:	24 March 2021

Summary of incident:

On Thursday, 9 July 2020, at 14:35 local time, the Tecnam P2002-JF aircraft, registration LY-FTC, experienced the collapse of its landing gear nose leg when landing on runway 13 at Lleida-Alguaire Airport (Lleida) on a solo instruction flight.

After taking off from Lleida-Alguaire Airport and completing a one-hour and fifty-minute training flight, the student returned to the same airport to land on runway 13. When all three wheels had made contact with the runway and the aircraft was decelerating, the student lost lateral control. The aircraft turned sharply to the left and, in doing so, its nose gear leg collapsed and the tip of its right wing impacted the runway. The propeller struck the asphalt and the aircraft dragged on for a few more metres until it came to a halt while still on the runway, resting on the underside of its nose and the main landing gear wheels.

The student pilot was unharmed, but the aircraft sustained significant damage.

The investigation has determined the accident was caused by a loss of control initiated by asymmetrical braking during the aircraft's on-ground deceleration manoeuvre.

No operational safety recommendations are proposed.

¹ Local time. UTC can be calculated by subtracting 2 h from the local time. Unless otherwise indicated, all times in this report are expressed in local time

1. FACTUAL INFORMATION

1.1. History of the flight

At 12:45 on Thursday, 9 July 2020, the Tecnam P2002-JF aircraft, registration LY-FTC, took off from Lleida-Alguaire Airport for a flight with an estimated duration of less than two hours. The aircraft was flown by a student pilot who was carrying out a solo training flight, maintaining radio contact with his instructor on the ground at Lleida airport.

The student flew to Huesca Airport, where he performed 2 landings and take-offs without incident and then continued the flight to Lleida. Upon arrival at Lleida Airport, he was cleared to perform a landing and take-off on runway 13 (which he did without incident), and after completing an aerodrome circuit, he configured the aircraft for the final landing and end of the flight with flaps at 15°. After being cleared by the control tower, he made the approach and landed on runway 13 without problems at 14:35 h. When the student pilot proceeded to apply the brakes to slow down, he lost control of the aircraft and veered sharply to the left, causing the right wing to hit the asphalt several times and the nose wheel to collapse. The aircraft slid along the runway resting on its nose and main landing gear wheels, leaving three discontinuous contact tracks made by the tip of the right wing on the asphalt. It finally stopped on the runway with its longitudinal axis at about 135° to it.

The student pilot was unharmed and was able to exit the aircraft without assistance. The aircraft sustained significant damage.



Fig. 1: Lateral view of the aircraft after the accident

1.2. Injuries to persons

<i>Injuries</i>	Crew	Passengers	Total in the aircraft	Others
Fatalities				
Serious				
Minor				
None	1		1	
TOTAL	1		1	

1.3. Damage to the aircraft

The following damage was noted during the post-incident aircraft inspection:

- Propeller
- Damage to engine
- Lower engine cowling
- Nose gear leg broken
- Engine mount
- Right wingtip



Figs. 2 & 3: Damage to the front of the aircraft and the tip of the right wing

1.4. Other damage

There was no further damage.

1.5. Personnel information

The 30-year-old student pilot was enrolled on the integrated airline transport pilot programme (ATPL(A)). His class 1 medical certificate was valid until 09 November 2020.

His flying experience comprised 42:46 flight hours, all of which had been in the type of aircraft involved in the accident.

The incident occurred on the student's 153rd landing. There is no mention of the student having any difficulties with landings in his training records.

1.6. Aircraft information

The aircraft with registration LY-FTC is a Tecnam P2002-JF single-engine, low-wing aircraft with a fixed-pitch, two-bladed propeller, tricycle landing gear and a maximum take-off weight of 620 kg. It has a ROTAX 912 S2 engine. It was manufactured in 2018 with serial number 332. At the time of the incident, the airframe and engine had accumulated 1,305:31 h of operation.

Its registration certificate was issued by the Civil Aviation Authority of the Republic of Lithuania on 7 August 2018. Its Airworthiness Review Certificate was issued by the same authority on 15 July 2019 and was valid until 22 July 2020.

The aircraft's most recent maintenance overhaul was a 100-hour inspection when it had 1,272:29 flight hours, performed on 3 March 2020. The overhaul was carried out in accordance with the approved maintenance programme. On the date of the accident, it had 20 hours to go until the next 50-hour inspection, which was already scheduled three days later.

Its unladen weight and balance were checked and certified by the manufacturer on 15 June 2018. During the accident flight, the weight (and balance) remained within the limits established by the manufacturer at all times.

The aircraft's brake system was fully operational before the accident, and no evidence of failure or malfunction was found after the accident either.

1.7. Meteorological information

At around 14:35 h on the day of the accident, the meteorological conditions at Lleida-Alguaire Airport were virtually calm wind (the METAR indicated a 3 kt wind speed at 14:30 h and 2 kt at 15:00 h). The conditions were CAVOK, temperature 32°C, dew point 13°C and QNH 1,017 hPa.

METAR LEDA 091230Z 35003KT CAVOK 32/13 Q1017=

METAR LEDA 091300Z 20002KT CAVOK 34/14 Q1017=

Section 1.9 contains the meteorological information provided by the Lleida-Alguaire Airport control tower to the pilot of the LY-FTC aircraft.

1.8. Aids to navigation

N/A.

1.9. Communications

The communications of interest between the LY-FTC aircraft and the control tower are summarised below:

At 14:32 h, the control tower informed the student pilot he was clear to land on runway 13 and that the wind was calm. The student acknowledged correctly.

At 14:35 h, the student pilot declared MAYDAY, reporting that he remained on the runway.

1.10. Aerodrome information

The Lleida-Alguaire Aerodrome (LEDA) is located 16 km to the northwest of Lleida. It has a 2,500 m long and 61 m wide paved runway designated 13 - 31 and an elevation of 1,152 ft.

It is a controlled aerodrome, and it uses the 121.625 MHz frequency for communications with aircraft when taxiing and the 121.325 MHz frequency for communications with the aerodrome control tower.

1.11. Flight recorders

The aircraft was not equipped with a flight data recorder or a cockpit voice recorder, as the aeronautical regulations in force do not require any recorders on such aircraft.

1.12. Aircraft wreckage and impact information

The aircraft landed on runway 13 at Lleida-Alguaire Airport. After its nose wheel collapsed, it slid along the asphalt before coming to a halt while still on the runway. In its final position, it was orientated at approximately 355° , with 13.4 m between the propeller cone and the edge of the runway.

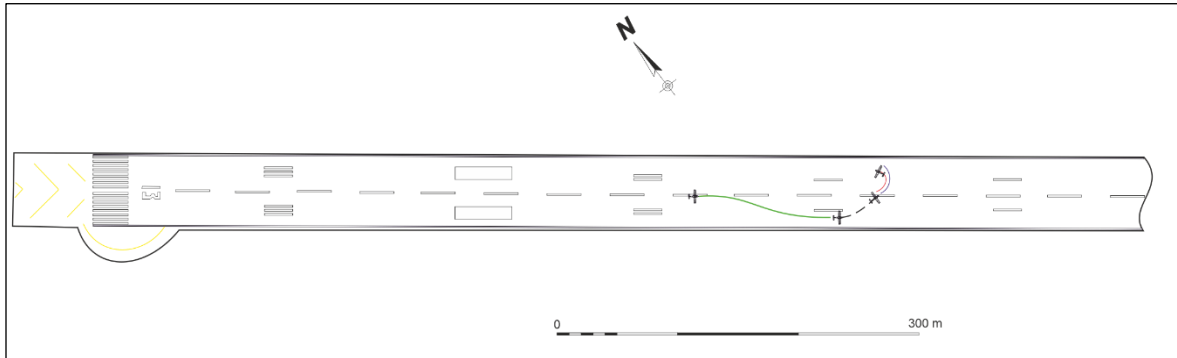


Fig. 4: General sketch

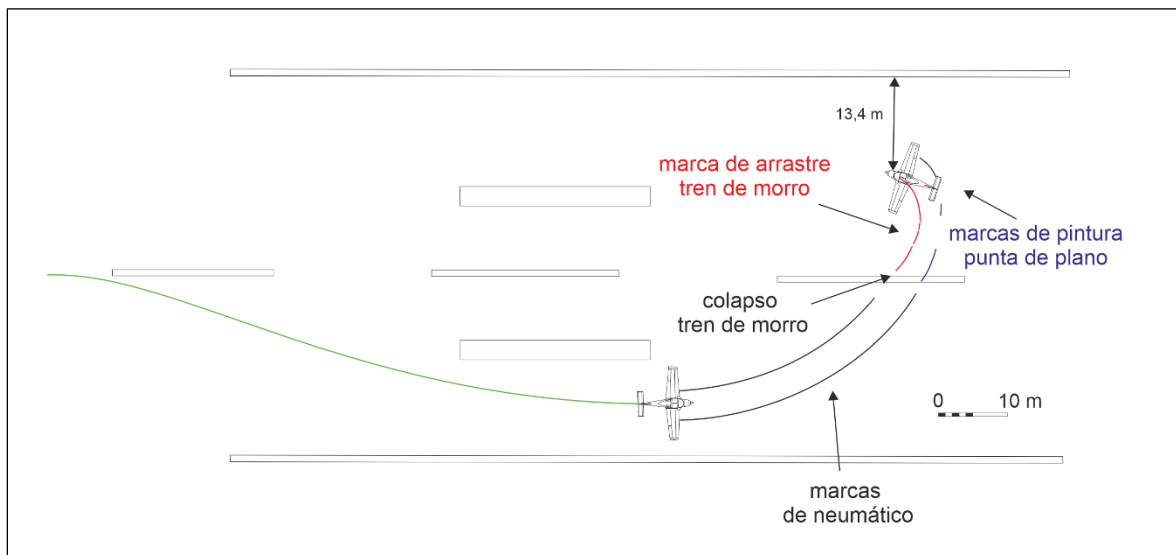


Fig. 5: Detailed sketch

Taking into account the pilot's statement and the marks the aircraft left on the runway, it appears it initially veered to the right after the brakes were applied but then made a sharp left turn that caused the tip of the right wing to hit the runway several times and the nose gear leg to collapse.

The aircraft slid along the runway before coming to a complete stop. The sketch in figure 5 shows the marks left on the runway by the tyres, the right wingtip, and the nose gear as it slid along the ground.

Both the pilot's testimony and the evidence found at the accident site suggest that the loss of control occurred after the three landing gear wheels had made contact with the ground and travelled about 50 m (according to the pilot's estimate) before applying the brakes.

As a result of sliding along the runway, the aircraft sustained damage to its propeller, engine, lower engine cowling, nose gear leg, engine mount and right wingtip.

The pilot was uninjured.

1.13. Medical and pathological information

N/A.

1.14. Fire

There was no fire.

1.15. Survival aspects

The pilot was wearing his safety belt, which restrained him effectively.

1.16. Tests and research

Student pilot's statement

The accident flight was to be a solo flight, lasting approximately 2 hours, in which he was to fly to Huesca Airport, perform two landings and take-offs, and then return to Lleida Airport. He planned the flight himself and met with his instructor for additional instructions. When he arrived at the aircraft, he used the checklist to inspect the exterior and, once he had confirmed everything was in order, started the flight after obtaining clearance.

The flight passed without incident. He carried out the two landings and take-offs at Huesca Airport and returned to end the flight in Lleida. He was in radio contact with his instructor at all times and the aircraft's flight performance was completely normal, as on previous occasions.

On returning to Lleida Airport, he landed and took off again without incident; then, he completed an aerodrome circuit and landed for the last time (to end the flight).

After all three wheels had touched down on the final landing, he felt his ground speed was high. He reacted by applying the brakes and subsequently lost control of the aircraft. The aircraft made an abrupt left turn, the tip of the right wing hit the runway, and the nose gear leg collapsed, causing its nose to drop onto the runway.

Asked in detail about the landing, he stated that he carried it out with no issues and the flaps² in a TO configuration (15°). He touched down, feeling that all three wheels were secure on the runway, and, after travelling about 50 m braked with both feet. The aircraft immediately veered to the left. He added that he must have braked asymmetrically, but it all happened in a very short space of time and, although he remembers taking his feet off the brakes afterwards, he was unable to regain control. He indicated that on other occasions, he had allowed the aircraft to decelerate on its own for longer before applying the brakes, but this time he applied them earlier.

He confirmed that the runway at Lleida Airport runway was in perfect condition with nothing to compromise the landing and that he had clearance to land from the tower.

After coming to a halt on the runway, he radioed to notify control of the accident and disconnected the engine and electrical system. The airport firefighters immediately arrived to assist him.

Asked about the seat belt, he confirmed that he was wearing it correctly at the time of the accident.

He exited the aircraft without assistance and did not require any medical attention.

Instructor's statement

On the day of the accident, he met with the student for 30 minutes an hour before the flight to review the flight plan and necessary documentation.

He accompanied the student to the aircraft. The student then carried out the pre-flight inspection and refuelled with 47 litres of fuel.

The flight in question was to be flown by the student alone and consisted of flying to Huesca and returning to Lleida. He, as the instructor, would follow the flight from the ground, maintaining radio contact with the pilot and monitoring the aircraft's position on a GPS-based tracking system.

At no time did the student mention anything out of the ordinary.

² The flaps are electrically operated and range from 0° (retracted) to 40° (fully deployed). There are no fixed intermediate positions. The norm is 15° for take-off (TO) and landing, although the latter can also be carried out with a greater flap draft of up to 40° (LDG).

He didn't see the accident. In his opinion, it could have been caused by excessively early and abrupt asymmetrical braking. He and the student had flown together the day before, and everything had been perfect, both during the flight and the landing.

1.17. Organisational and management information

The BAA Training flight school has authorisation number LT.ATO.004, issued by the Civil Aviation Authority of the Republic of Lithuania on 14 September 2017. The same authority issued its most recent approval as a training school on 7 February 2020.

According to the school's operations manual (based on the aircraft's flight manual), the standard landing checklist includes:

On final (approximately 500 ft AGL)

1. Flaps - Full or as needed
2. Maintain V_{app} , with that being:
 - Flap 0° – 70 kt
 - Flaps TO – 65 kt
 - Flaps LDG – 60 kt
3. With clearance to land - final checks:
 - Stabilised approach
 - Fuel pump ON
 - Carburettor heater OFF
 - Flaps set
 - LDG lights ON
4. Flare (begin 1 metre above the ground)
5. Gradually reduce power, increase the nose-up pitch until landing and maintain wind correction and directional control of the aircraft. Once on the ground, keep the nose wheel in the air.

In addition, the school's abbreviated checklist establishes the following for the final approach segment:

FINAL M	
1.	SPEED V_{app} (UP 70 / TO 65/ LDG 60)
2.	FUEL PUMP ON
3.	CARB HEAT OFF
4.	FLAPS FULL (or as needed)
5.	LANDING LIGHT ON
6.	PARKING BREAK RELEASED

With regard to braking, both the aircraft flight manual and the school's operation manual state that the brakes should always be applied "as required/as needed" by pressing down on the upper part of the pedals.

In addition, an analysis of all BAA Training incidents at Lleida-Alguaire Airport between 1 January 2019 and the date of the accident found none related to landings.

1.18. Additional information

1.18.1 Student's previous experience landing with flaps retracted

According to the course syllabus that the student was following, the flight missions numbered as ATPL 1.9, 1.11 and 2.1 (which he had already completed on 30 November and 01 December 2019 and 8-9 February 2020) included landings with flaps at 0° (referred to in the syllabus as "flapless landings"). He carried out 25 landings at Lleida-Alguaire Airport during these flights, although we can't confirm that all 25 were "flapless" because it's not noted in the records.

In these flapless landings, the approach speed is 70 KIAS, which is 5 kt higher than the aircraft's speed during the accident landing.

According to the Aircraft Flight Manual (Section 5 Performances, page 5-4), 70 KIAS without flaps is equivalent to 72 KCAS.

1.18.2 Landing distance

Based on the information provided in the aircraft flight manual, in the conditions present at the time of landing, flying over the runway threshold at 50 ft with an approach speed of 65 KIAS should see the aircraft come to a complete stop 320 m from it.

1.18.3 Ground speed

The pilot stated that on landing, he thought his ground speed was high, adding that this might have precipitated his use of the brakes. We calculated the aircraft's ground speed at the time of landing to assess this possibility.

Given the aircraft's indicated airspeed on approach (65 KIAS) and the meteorological conditions (32°C, no wind, QNH 1,017 hPa and an airfield elevation of 1,152 ft), the following calculations were made:

- According to the aircraft flight manual (Section 5 Performances, page 5-4), 65 KIAS with 15° flaps is equivalent to 68 KCAS.
- Taking into account the QNH and airport elevation, the pressure altitude was 1,040 ft.

- The corresponding density altitude would be about 3,215 ft (according to the standard atmosphere graph in the aircraft flight manual, Section 5 Performances, page 5-5)
- This density altitude gives us a true speed (TAS) of 71.3 kt, which would also be the ground speed in the absence of wind.

1.19. Useful or effective investigation techniques

N/A.

2. ANALYSIS

On Thursday, 9 July 2020, the Tecnam P2002-JF aircraft, registration LY-FTC, took off from Lleida-Alguaire Airport with a student as pilot-in-command, for a training flight with an estimated duration of slightly less than two hours. The flight plan was to fly to Huesca Airport, where he was to carry out two landings and take-offs without a stopover, and then return to Lleida-Alguaire Airport. On returning to Lleida-Alguaire Airport at the end of the flight, the student pilot landed and took off again without stopping on runway 13. He then joined the right-hand traffic pattern to carry out what would be the last landing and final stop of the flight.

There were no limiting meteorological conditions for the flight. A failure of the aircraft's ground brakes has also been ruled out.

The student pilot obtained the necessary authorisations from the control tower and configured the aircraft with TO flaps (15°) for the final approach and landing, which took place at 14:35 h, after 1 hour and 50 minutes of flight.

According to the statements provided by the pilot and the instructor and based on the evidence found, the aircraft initially made contact with the runway without incident. However, when the student decided to apply brakes to decelerate the aircraft on the ground, he did so abruptly, rather than applying pressure gradually and symmetrically.

There was an almost immediate loss of control with a left turn in which the tip of the right wing made contact with the asphalt on several occasions, and the nose leg collapsed. The aircraft slid to a stop on the runway, ending up with its propeller cone 13.4 m from the edge and orientated at 355° (in other words, it turned 135° to the left on the ground).

It was the fourth landing the student had made that day, the previous three having passed without incident. Furthermore, there is no evidence to suggest the student had any difficulties with landings, and he had already carried out 152 landings in the same type of aircraft.

According to the pilot, although the loss of control during the accident landing occurred quickly and everything happened in a very short space of time, he does remember having applied the brakes earlier than on other occasions and acknowledged that he probably applied them asymmetrically.

The pilot also stated that on landing, he thought his ground speed was high, adding that this might have precipitated his use of the brakes. Given this possibility, the following should be considered:

- a) The Lleida-Alguaire Airport runway is much longer (2,500 m) than the minimum length required to land the type of aircraft involved (320 m), so there was no need to act hastily on the brakes, nor to act suddenly and/or apply excessive pressure. Both of which can lead to asymmetrical braking.

- b) The aircraft's ground speed (estimated to be about 71.3 kt) was 6.3 kt higher than that indicated on the anemometer. Although the pilot's perception of "high speed" is subjective and cannot be assessed, we can conclude that the ground speed was not unusual for landing that type of aircraft with flaps at 15° (even more so when landing on a runway with more than 1,000 ft of elevation on a hot day).

Additionally, the student pilot had previous experience of performing flapless landings with an indicated approach speed of 70 KIAS (which equals a calibrated speed of 72 KCAS) as he had practised the manoeuvre in 4 different sessions. In the absence of wind, this calibrated speed would be equal (at this airport) to a ground speed of around 75 kt, so it was not the first time the student landed with a ground speed in the region of 70 kt or higher.

The student was unharmed because the safety harness did its job and prevented him from being thrown against the interior of the cabin.

We have concluded that the on-ground loss of control of the aircraft during the deceleration phase was the result of pilot error, because the student pilot failed to apply the brakes gradually and symmetrically.

3. CONCLUSIONS

3.1. Findings

- The student pilot, instructor and the aircraft had the required documentation for the flight.
- There were no limiting meteorological conditions for the flight.
- During the landing, the student pilot did not perform the braking manoeuvre correctly.

3.2. Causes/contributing factors

The investigation has determined the accident was caused by a loss of control initiated by asymmetrical braking during the aircraft's on-ground deceleration manoeuvre.

4. OPERATIONAL SAFETY RECOMMENDATIONS

None.