

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A - 176/CENIPA/2018

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PP-MRT
MODEL:	PZL-106BT-601
DATE:	27NOV2018



NOTICE

According to Law n  7565, dated 19 December 1986, the Aeronautical Accident Investigation and Prevention System – SIPAER – is responsible for the planning, guidance, coordination, and execution of the investigation and prevention activities of aeronautical accidents.

The elaboration of this Final Report was conducted by taking into account the contributing factors and hypotheses raised. Therefore, the report is a technical document reflecting the result obtained by SIPAER regarding the circumstances that contributed or may have contributed to triggering this occurrence.

The document does not focus on quantifying the degree of contribution of the different factors, including the individual, psychosocial or organizational variables that conditioned the human performance and interacted to create a scenario favorable to the accident.

The exclusive objective of this work is to recommend the study and the adoption of provisions of preventative nature, and the decision as to whether they should be applied belongs to the President, Director, Chief, or the one corresponding to the highest level in the hierarchy of the organization to which they are being forwarded.

This Report does not resort to any proof production procedure for the determination of civil or criminal liability, and is under Appendix 2, Annex 13 to the 1944 Chicago Convention, which was incorporated into the Brazilian legal system by Decree n  21713, dated 27 August 1946.

Thus, it is worth highlighting the importance of protecting the persons who provide information regarding an aeronautical accident. The utilization of this report for punitive purposes maculates the principle of “non-self-incrimination” derived from the “right to remain silent” sheltered by the Federal Constitution.

Consequently, using this report for any purpose other than preventing future accidents may induce erroneous interpretations and conclusions.

N.B.: This English version of the report has been written and published by the CENIPA with the intention of making it easier to be read by English speaking people. Taking into account the nuances of a foreign language, no matter how accurate this translation may be, readers are advised that the original Portuguese version is the work of reference.

SYNOPSIS

This is the Final Report of the 27NOV2018 accident with the PZL-106BT-601 aircraft model, registration PP-MRT. The accident was classified as “[LOC-I] Loss of Control in Flight and [LALT] Low Altitude Operation”.

While flying to apply pesticides in a corn field, the aircraft crashed into the ground.

It was found that there was a loss of control of the plane during the application pass.

The aircraft had substantial damage.

The pilot left unharmed.

An Accredited Representative of the State Commission on Aircraft Accident Investigation (SCAAI) - Poland, (State where the aircraft was manufactured/designed) was designated for participation in the investigation.

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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

AEHC	Hydrated Ethyl Alcohol Fuel
ANAC	Brazil's National Civil Aviation Agency
AvGAS	Aviation Gasoline
CA	Airworthiness Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CIV	Pilot's Flight Logbook
CMA	Aeronautical Medical Certificate
COA	Agricultural Operator Certificate
DECEA	Airspace Control Department
IAM	Annual Maintenance Inspection
INMET	National Institute of Meteorology
MNTE	Airplane Single-Engine Land Rating
OM	Maintenance Organization
PAGA	Agricultural Pilot Rating
PCM	Commercial Pilot License - Airplane
PIC	Pilot in Command
PMD	Maximum Takeoff Weight
PPR	Private Pilot License – Airplane category
PSO-BR	Brazilian Program for Civil Aviation Operational Safety
QAV-1	Aviation Kerosene
RBAC	Brazilian Civil Aviation Regulation
RBHA	Brazilian Aeronautical Certification Regulation
SAE-AG	Public Specialized Air Service Aircraft Registration Category - Aerial-Agricultural
SCAAI	State Commission on Aircraft Accident Investigation
SIPAER	Aeronautical Accident Investigation and Prevention System
UTC	Universal Time Coordinated

1. FACTUAL INFORMATION.

Aircraft	Model: PZL-106BT-601	Operator: <i>Precisão Aeroagrícola Ltd. - EPP</i>
	Registration: PP-MRT	
Occurrence	Manufacturer: Pzl Okecie	Type(s): "[LOC-I] Loss of Control in Flight and [LALT] Low Altitude Operation" Subtype(s): NIL
	Date/time: 27NOV2018 - 1040 UTC	
	Location: Santa Maria Farm	
	Lat. 17°26'10"S Long. 048°40'13"W Municipality – State: Caldas Novas - GO	

1.1 History of the flight.

The aircraft took off from the landing area for aerial agricultural use of Santa Maria Farm, Caldas Novas - GO, to perform a flight for pesticide spraying in a cornfield with a pilot on board.

During the seventh flight of the day, after making a reversal turn and starting a new pass for the pesticide application, the pilot lost control of the aircraft. The aircraft crashed into the ground in the middle of the cornfield.

The aircraft had substantial damage, and the pilot left unharmed.



Figure 1 - Image of the aircraft after coming to a complete stop.

1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	1	-	-

1.3 Damage to the aircraft.

The aircraft had substantial damage to its entire structure.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Flight Hours	Pilot
Total	7.000:00
Total in the last 30 days	35:40
Total in the last 24 hours	02:20
In this type of aircraft	50:00
In this type in the last 30 days	35:40
In this type in the last 24 hours	02:20

N.B.: The data related to the flown hours were obtained through information provided by the pilot.

1.5.2 Personnel training.

The PIC took the PPR course at Carazinho Aeroclub - RS, in 2001.

1.5.3 Category of licenses and validity of certificates.

The PIC had a PCM License and valid MNTE and PAGA Ratings.

1.5.4 Qualification and flight experience.

The pilot's CIV records did not show the performance of flights on the PP-MRT in the three months before this accident but contained information on the operation of an EMB-202A Ipanema aircraft from the same crashed aircraft operator.

He declared that he flew, among others, the following aircraft models: EMB 201/202A Ipanema, Trusch 52R and AT-502B Air Tractor.

The pilot was qualified and had experience to perform the flight.

1.5.5 Validity of medical certificate.

The pilot had a valid CMA.

1.6 Aircraft information.

The aircraft, serial number 11980260, was manufactured by Pzl-Okecie in 1998 and was registered in the SAE-AG category.

The aircraft's CA had been suspended since 05FEV2018. The aircraft had an overdue IAM since 06JAN2018.

The last aircraft inspections, the "100 hours, 300 hours and 900 hours" types, were performed on 05JAN2017 by the OM WAS - Work Aviation Service, in Sorocaba - SP, being with 8 hours and 30 minutes flown after the inspection.

1.7 Meteorological information.

According to the PIC report, information from weather charts and satellite images of the region, conditions were favorable for the visual flight.

The INMET automatic station, located in Morrinhos - GO, 31 NM away from the accident site, brought the following information (Table 1):

Hora (UTC)	Precipitação total (mm)	Pressão atmosférica (hPa)	Temperatura do ar - bulbo seco, (°C)	Umidade relativa do ar (%)	VENTO		
					Direção	Rajada máxima (m/s)	Velocidade (m/s)
06:00	0	928,1	19,6	83	115°	2,8	0,6
07:00	0	928,3	18,6	88	210°	1,6	0,9
08:00	0	928,6	18,3	88	108°	1,9	1,4
09:00	0	929,5	18,4	89	185°	2,1	0,5
10:00	0	929,8	21,7	80	118°	2,0	1,0
11:00	0	930,2	22,7	72	073°	7,3	4,2

Table 1 - Atmospheric data from the automatic station in Morrinhos - GO. Source: INMET.

Based on data from the INMET, it was observed that in the period that comprised the time of the accident, there was no precipitation, the atmospheric pressure was about 930 hPa, the temperature was 22°C and the wind varied from 118° to 073° with intensity from 1.0 to 4.2 m/s (1.9 to 8.1 kt) with a maximum gust of 7.3 m/s (14.2 kt).

1.8 Aids to navigation.

Nil.

1.9 Communications.

Nil.

1.10 Aerodrome information.

The occurrence took place out of the Aerodrome.

1.11 Flight recorders.

Neither required nor installed.

1.12 Wreckage and impact information.

The plane collided with the ground in a pitch down attitude, with an inclination of 45° to the right.

After the first impact, the aircraft turned about 180° to the right. There was no evidence of previous impacts. The wreckage was of the concentrated type.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

The PIC stated that the night before the accident, he had 8 hours of sleep.

There was no evidence that physiological or disabling weightings affected the crewmember's performance.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

Nil.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

The pilot was equipped with a helmet, flight suit, and gloves that helped minimize his injuries.

Despite the extensive damage to the aircraft fuselage, the cabin remained relatively undamaged.

The pilot abandoned the aircraft from the right side (Figure 2).



Figure 2 - Detail of the fuselage and cabin damage.

1.16 Tests and research.

Nil.

1.17 Organizational and management information.

Nil.

1.18 Operational information.

It was a pesticide application flight that should meet the requirements established in the RBAC No. 137, Amendment No. 00, which dealt with Certification and Operational Requirements: Aerial Agricultural Operations.

According to the pilot's report, during the seventh flight of the day, after performing a reversal turn and starting a new pass for the pesticide application, there was a loss of control of the aircraft.

According to him, the plane would have been subjected to a strong tail/right crosswind at the moment of the accident.

Afterward, there was a collision against the ground, in the middle of the plantation.

From the observation of the area and the reports collected, the investigators prepared a sketch of the occurrence. The information gathered indicated that, at the moment of loss

of control, the airplane should have been in stable flight over the plantation with a magnetic heading of 330° (Figure 3).

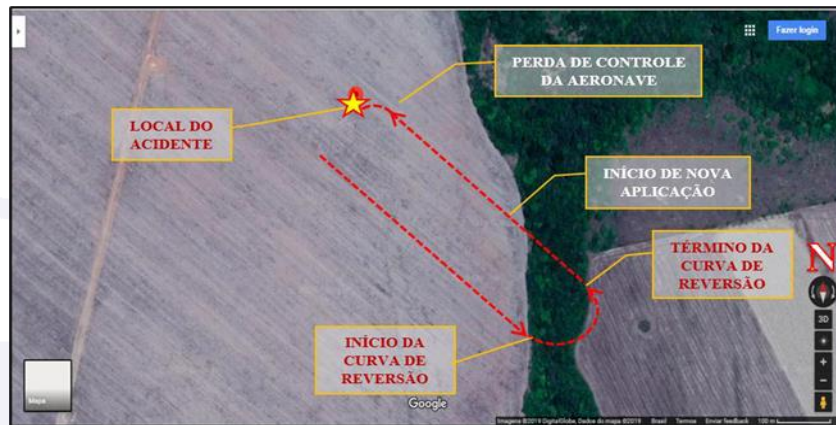


Figure 3 - Sketch of the occurrence.

In the application axis, the terrain profile was uphill with a maximum slope of 5.8% at about 210 m from the point of impact.



Figure 4 - Vertical section of the terrain on the application axis. Source: Google Earth.

The PIC reported that he observed no abnormalities in the operation of the aircraft and its systems.

According to information provided by the pilot, the basic empty weight of the aircraft was 2,080 kg. It is estimated that there were 430 kg of QAV-1 in the wings, 1,000 kg of pesticide in the hopper. The weight of the crewmember and equipment totaled 120 kg, making a total of 3,630 kg.

According to the manufacturer's data, the aircraft's PMD was 3,500 kg, so the aircraft was operating with an excess of 130 kg at the time of the accident.

1.19 Additional information.

The RBAC 137 had, in its section 137.103 Requirements for Agricultural Aircraft, letter (a), number (2), the following requirement:

137.103 Requirements for agricultural aircraft

(a) The COA holder must possess one or more aircraft that:

[...]

(2) hold a valid Certificate of Airworthiness (CA) issued by the ANAC,

(2) Have a valid Airworthiness Certificate (CA) issued by the ANAC, final or provisional, certifying its airworthiness condition;

Additionally, the RBHA No. 91, which dealt with the General Operating Rules for Civil Aircraft, specified in its section 91.7 - Airworthiness of Civil Aircraft, letter (a), as follows:

91.7 - Airworthiness of Civil Aircraft

(a) No person may operate a civil aircraft unless it is in an airworthy condition.

A search of the aeronautical occurrence database of the CENIPA showed that on 20DEC2019, another aircraft (PT-UAA) of that company was involved in an accident.

The Final Report regarding the investigation of this occurrence recorded that the aircraft was using AEHC at the time of this accident, and that the plane, model EMB 201A, was certified to operate with AvGas.

There was no record with the ANAC, nor were technical records presented to the investigators about the conversion of their engine to use ethanol.

In its conclusions, the aforementioned report pointed to inadequate managerial supervision by the operator as a likely contributing factor.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

It was a pesticide application flight that should meet the requirements established in the RBAC 137.

The aircraft had its CA suspended since 05FEB2018, due to the IAM's lack of proof of completion.

Nevertheless, considering the PIC's report that he did not observe any abnormality in the operation of the aircraft and its systems, the hypothesis that an equipment failure contributed to this accident was assessed as unlikely.

In this context, the operation of the aircraft with its AC suspended, characterized an inadequate supervision, by the organization's management, of the planning and execution activities at the administrative and technical levels. It allowed the aircraft to be used without records of an adequate verification of its airworthiness condition, which could contribute to the existence of unidentified latent risks.

This lack of oversight by the company was also observed in a subsequent accident, occurred on 20DEC2019 with the PT-UAA. It was found, according to the Final Report released, that the aircraft used AEHC without having a certification to operate with that fuel or a technical documentation to prove the conversion of its engine to use AEHC.

Regarding the accident, the pilot reported that the flight was proceeding normally until, during the spraying passage, a gust of wind destabilized the aircraft and resulted in loss of control.

Data from the automatic weather station in Morrinhos - GO, recorded that the wind ranged from 118° to 073° with an intensity of 1.0 to 4.2 m/s (1.9 to 8.1 kt). Such conditions represented weak wind with variable right cross direction, with a slight tail component relative to the application axis. However, in the hour before the accident, there was an increase in wind gust intensity, which reached a maximum of 7.3 m/s (14.2 kt).

Another factor to be considered concerns the application axis, whose terrain profile was steep, with a maximum slope of 5.8% at about 210 m from the point of impact. This terrain condition, although not considered critical, could require an action on the controls to correct the height in relation to the plantation and maintain the aircraft's speed.

It must also be considered that the aircraft was operating overweight at the time of the accident, a condition that affects its maneuverability and can increase the response time to flight commands.

Thus, considering that the aircraft was operating overweight on a steep terrain and it may have been subjected to a tailwind gust; such conditions may have required the pilot to act assertively on the commands for which he was not prepared.

Thus, the separation with the plantation may have been reduced to the point that it was no longer possible to avoid the collision of the aircraft against the ground.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilot had a valid CMA;
- b) the pilot had valid MNTE and PAGA Ratings;
- c) the pilot was qualified and experienced for the flight
- d) the aircraft had its CA suspended since 05FEB2018;
- e) no abnormalities were observed in the operation of the aircraft and its systems;
- f) the aircraft was 130 kg overweight at the time of the accident;
- g) the terrain was steep with a maximum slope of 5.8% about 210 m from the point of impact;
- h) in the hour before the accident, there was an increase in wind gust intensity, which reached a maximum of 7.3 m/s (14.2 kt);
- i) during the seventh flight of the day, after making a reversal turn and starting a new pass for the pesticide application, the pilot lost control of the aircraft;
- j) the aircraft crashed into the ground in a pitch down attitude, with a 45° tilt to the right;
- k) the aircraft had substantial damage; and
- l) the pilot left unharmed.

3.2 Contributing factors.

- **Control skills – undetermined.**

Considering that the aircraft was operating with excess weight, on uphill terrain and that it may have been subjected to a gust of tailwind; such conditions may have required the pilot to act assertively at the controls for which he was not prepared.

- **Piloting judgment – undetermined.**

Given the weight of the aircraft, the steepness of the terrain and the tailwind, there may have been an inadequate assessment of the aircraft's performance under the conditions presented.

4. SAFETY RECOMMENDATION.

A proposal of an accident investigation authority based on information derived from an investigation made intending to prevent accidents or incidents and which in no case has the purpose of creating a presumption of blame or liability for an accident or incident. In addition to safety recommendations arising from accident and incident investigations, safety recommendations may result from diverse sources, including safety studies.

In consonance with Law n°7565/1986, recommendations are made solely for the benefit of the air activity operational safety, and shall be treated as established in the NSCA 3-13 "Protocols for the Investigation of Civil Aviation Aeronautical Occurrences conducted by the Brazilian State".

Recommendations issued at the publication of this report:**To Brazil's National Civil Aviation Agency (ANAC):****A-176/CENIPA/2018 - 01****Issued on 12/05/2022**

Act with *Precisão Aeroagrícola* Ltd., in the sense that that operator demonstrates its managerial supervision mechanisms meet the requirements established in the applicable regulations, particularly regarding the airworthiness conditions of its aircraft released for flight.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On December 5th, 2022.

