SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-57

LIMITED ACCIDENT INVESTIGATION REPORT

Reference Number	CA18/2/3/10019								
Classification	Accident		**Date**	2 July 2021		**Time**	0930Z		
Type of Operation	Private (Part 94)								
Location									
Place of Departure	Syringa Sands Airstrip, Limpopo Province		Place of Intended Landing	Eagles Creek Aerodrome, Gauteng Province					
Place of Occurrence	Syringa Sands Airstrip, Limpopo Province								
GPS Co-ordinates	Latitude	24º 29' 19.47" S	Longitude	027º 48' 24.60" E		Elevation	4 750ft		
Aircraft Information									
Registration	ZU-EPT								
Model/Make	Tecnam P-2004 Bravo								
Damage to Aircraft	Substantial		Total Aircraft Hours	950.1					
Pilot-in-command									
Licence Valid	Yes		Gender	Male		Age	30		
Licence Type	National Pilot Licence (NPL)								
Total Hours on Type	168.2		Total Flying Hours	201.4					
People On-board	1 + 1	Injuries	0	Fatalities	0	Other (on ground)	0		

What Happened

On Friday, 2 July 2021 at about 0930Z, a pilot and a passenger on-board a Tecnam P-2004 Bravo aircraft with registration ZU-EPT departed a grass runway at Syringa Sands Airstrip, Limpopo province, on a private flight with the intention to land at Eagles Creek Aerodrome, Gauteng province. Visual Meteorological Conditions (VMC) prevailed on the day. No flight plan was filed.

According to the pilot, the pre-take-off checks were carried out in accordance with (IAW) the flight manual checklist before take-off. Runway (RWY) 07, with a length of 650 metres (m), was elected for take-off. The aircraft accelerated normally, and flaps were set for take-off at 15 degrees (°). At approximately 60 knots (kt), the pilot rotated. The total weight of the aircraft was calculated to be 579 kilograms (kg) for the flight.

The pilot stated that after becoming airborne, he felt the aircraft's left-wing drop. As he was not sure what caused the occurrence, he decided to reject take-off and to land the aircraft back on the remaining runway.

Figure 1: An aerial view of the accident site. (Source: Google Earth)

During landing, the pilot instructed the passenger to assume brace position; the aircraft overran the runway surface and came to a stop in a wetland in an upright position, about 120m from the end of RWY 07. The aircraft sustained substantial damage to its left wing as well as upper and bottom fuselage (due to the rugged thick grass terrain the aircraft skidded over on its path), and all three landing gears broke off.

Figure 2: A collage showing post-impact damage to aircraft. (Source: Pilot)

The pilot and the passenger disembarked the aircraft unaided and uninjured.

The flight was conducted under Visual Flight Rules (VFR) by day. The accident occurred at Global Positioning System (GPS) co-ordinates determined to be 24°29'19.47" South, 027°48'24.60" East at an elevation of 4 750 feet (ft).

During the investigation, the pilot stated that he had assumed that the left-wing drop immediately after lift-off was due to a crosswind because, according to the Windy App that was used to obtain the wind conditions prior to take-off, the wind direction was from the north at between 06kt and 08kt. The pilot further stated that he was monitoring the airspeed indicator for it to reach 60kt (the white arch before rotating).

According to the Airplane Flying Handbook Chapter 5 of the FAA-H-8083-3B:

Normal Take-off:
A normal take-off is one in which the airplane is headed into the wind; there are times that a take-off with a tail wind is necessary. However, the pilot must consult the POH/AFM to ensure the aircraft is approved for a take-off with a tail wind and that there is sufficient performance and runway length for the take-off. Also, the take-off surfaces are firm and of sufficient length to permit the airplane to gradually accelerate to normal lift-off and climb-out speed, and there are no obstructions along the take-off path.

For take-off, use the rudder pedals in most general aviation airplanes to steer the airplane's nose wheel onto the runway centreline to align the airplane and nose wheel with the runway. After releasing the brakes, advance the throttle smoothly and continuously to take-off power. An abrupt application of power may cause the airplane to yaw sharply to the left because of the torque effects of the engine and propeller. This is most apparent in high horsepower engines. As the airplane starts to roll forward, assure both feet are on the rudder pedals so that the toes or balls of the feet are on the rudder portions, not on the brake. At all times, monitor the engine instruments for indications of a malfunction during the take-off roll.

As the airplane gains speed, the elevator control tends to assume a neutral position if the airplane is correctly trimmed. At the same time, the rudder pedals are used to keep the nose of the airplane pointed down the runway and parallel to the centreline. The effects of engine torque and P-factor at the initial speeds tend to pull the nose to the left. The pilot must use whatever rudder pressure is needed to correct for these effects or winds. Use aileron controls into any crosswind to keep the airplane centred on the runway centreline. The pilot should avoid using the brakes for steering purposes as this will slow acceleration, lengthen the take-off distance, and possibly result in severe swerving.

Lift-Off:
Since a good take-off depends on the proper take-off attitude, it is important to know how this attitude appears and how it is attained. The ideal take-off attitude requires only minimum pitch adjustments shortly after the airplane lifts off to attain the speed for the best rate of climb (VY).

As the airplane leaves the ground, the pilot must keep the wings in a level attitude and hold the proper pitch attitude. Outside visual scans must be intensified at this critical point to attain/maintain proper airplane pitch and bank attitude. Due to the minimum airspeed, the flight controls are not as responsive, requiring more control movement to achieve an expected response. A novice pilot often tends to fixate on the airplane's pitch attitude and/or the airspeed indicator and neglect bank control of the airplane. Torque from the engine tends to impart a rolling force that is most evident as the landing gear is leaving the surface.

Some of the common errors in the performance of normal take-offs and departure climbs are:
- *Inadequate compensation for torque/P-factor during initial climb resulting in a sideslip.*
- *Limiting scan to areas directly ahead of the airplane (pitch attitude and direction), causing a wing (usually the left) to drop immediately after lift-off.*

- *Overcorrecting for left turning tendency.*
- *Relying solely on the airspeed indicator rather than developing an understanding of visual references and tracking clues of airplane airspeed and controllability during acceleration and lift-off.*
- *Failure to attain proper lift-off attitude.*
- *Overcontrol of elevators during initial climb-out and lack of elevator trimming.*
- *Limiting scan to areas directly ahead of the airplane (pitch attitude and direction), causing a wing (usually the left) to drop immediately after lift-off.*

Direction of rotation of the engine:

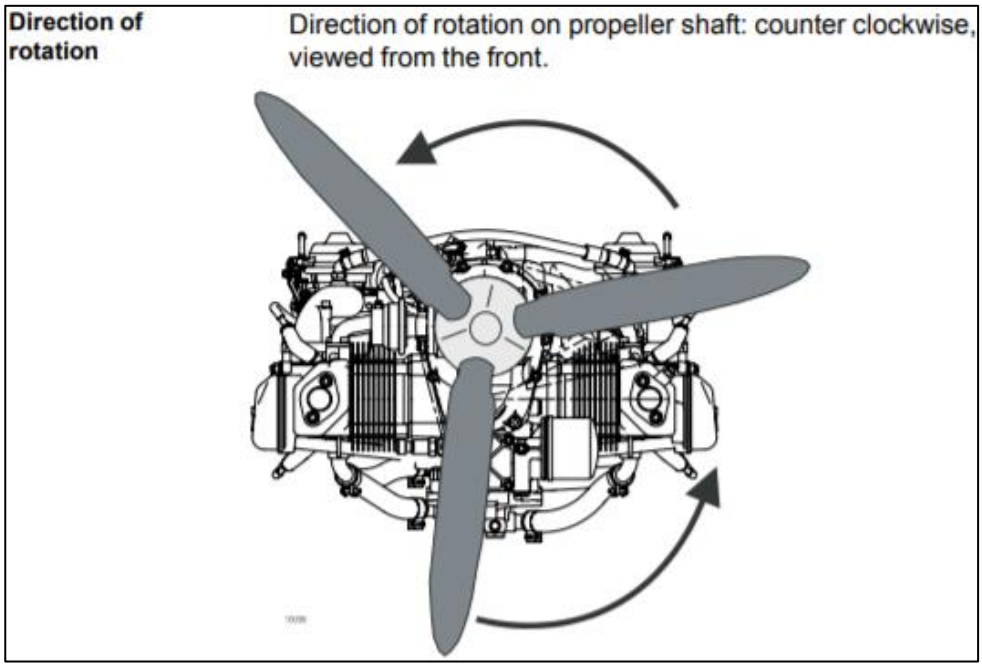

Figure 3: Normal direction of engine/propeller rotation viewed from the front.
(Source: Rotax Operators Manual)

What was found:

- The pilot stated that there were no warning signs before or during the accident.
- The pilot had total flying hours of 201.4 on all aircraft types endorsed on his licence, with 168.2 of those flying hours on the aircraft type being flown on the day of the accident.
- The investigation did not find records of technical defects with the airframe, engine or major components of the aircraft in the logbooks or defect reports.
- There was enough fuel available (full tanks with 100 litres) and there were no pre-existing mechanical faults with the carburettor recorded in the flight folio and defect logs prior to the accident.
- The approved maximum take-off weight (MTOW) of the aircraft is 600kg. This means the aircraft was operated with a total weight of 21kg from its total maximum allowable take-off weight and therefore, was within limits.
- According to the Pilot's Operating Handbook (POH), the take-off distance that would have been required on the day of the accident would have been about 500m, this was determined using the aircraft's weight of 579kg, outside air temperature (OAT) of 20 degrees Celsius (°C) at a pressure altitude of 4750ft.

According to the pilot, the roll for take-off on the day of the accident was initiated at the threshold of RWY 07, with 650m available for take-off. The aircraft had enough runway length for take-off.

- The rotation speed (Vr) for the aircraft is 48kt; the pilot reported that rotation speed was 60kt. The pilot further stated that during the take-off roll, he was monitoring the airspeed indicator to reach the white arch, which is 60kt, before lift-off. Therefore, the possibility of an early rotation was ruled out.
- According to the pilot's reported weather conditions, the wind components that would have been prevalent at the time of the accident would have been a crosswind of 9.85kt with a slight tailwind of 1.74kt. However, according to the South African Weather Service (SAWS) reported weather conditions, the wind components that would have been prevalent at the time of the accident would have been a headwind of 3.38kt with a crosswind of 0.91kt.

  The wind conditions at the time of take-off were within limits detailed in the flight manual of the aircraft. According to the SAWS weather report, there was no crosswind component that could have caused the aircraft to dip to the left as the pilot had reported.
- According to the approved person (AP) who carried out the teardown inspection of the engine on 12 July 2021, there were no pre-impact mechanical failures and the findings showed that the engine was in good condition at the time of the accident.

Probable cause:
The pilot lost control of the aircraft after rotation and the left-wing dipped after lift-off due to inadequate compensation for the left turning tendency (torque/P-factor) during the initial climb.

Contributing factor:
Improper handling of the aircraft after rotation due to the pilot relying solely on the airspeed indicator before lift-off. As a result, the left-wing dipped and the pilot misinterpreted this as engine power loss, which led to the pilot rejecting take-off.

Safety Action

None.

Safety Message

None.

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and ***not to apportion blame or liability****.*

About this Report

Decisions regarding whether to investigate, and the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, no investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this brief report. The report has been compiled using information supplied in the initial notification, as well as follow-up information to bring awareness of potential safety issues to the

industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar accident.

This report provides an opportunity to share safety message/s in the absence of an investigation.

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Disclaimer

This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa