LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10482					
Classification	Accident	**Date**	23 August 2024		**Time**	0820Z
Type of Operation	Training (Part 141)					
Location						
Place of Departure	Rhino Park Airfield, Gauteng Province		Place of Intended Landing		Rhino Park Airfield, Gauteng Province	
Place of Occurrence	During the take-off roll on Runway 09 at Rhino Park Airfield					
GPS Co-ordinates	Latitude	25° 50' 03.0" S	Longitude	028° 32' 22.0" E	Elevation	4770 ft
Aircraft Information						
Registration	ZU-SEL					
Make; Model; S/N	Shadow Lite CC; Jabiru J230 (Serial Number: 828)					
Damage to Aircraft	Substantial			Total Aircraft Hours	431.1	
Pilot-in-command						
Licence Type	Student Pilot Licence (SPL)		Gender	Male	Age	44
Licence Valid	Yes	Total Hours	70	Total Hours on Type		68.2
Total Hours 30 Days	14.2		Total Flying on Type Past 90 Days		24.2	
People On-board	1+0	**Injuries** 0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On Friday morning, 23 August 2024, a student pilot on-board a Jabiru J230 aircraft with registration ZU-SEL intended to engage in a solo navigational training flight from Rhino Park Airfield in Gauteng province to Witbank Aerodrome (FAWI) and Secunda Airfield (FASC) in Mpumalanga province, before returning to Rhino Park Airfield when the accident occurred. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 141 of the Civil Aviation Regulations 2011 as amended.

The student pilot stated that he conducted a pre-flight inspection and, thereafter, taxied on Runway 09 to position the aircraft for take-off. Upon reaching the threshold of Runway 09, he advanced the throttle and released the parking brake to begin the take-off roll. The aircraft accelerated; however, it encountered a significant left crosswind. As the aircraft's ground speed increased and reached 50 knots (kts) and began rotating, it encountered a leftward drift. The student pilot applied the right rudder to prevent the aircraft from drifting but was unsuccessful. The deviation continued as the aircraft drifted to the left and the student pilot lost control.

As the aircraft veered off to the left towards the edge of the taxiway, the nose wheel impacted the concrete edge of the taxiway and the nose landing gear strut collapsed which caused the propeller to impact the ground. The student pilot closed the throttle and applied the toe brakes as the aircraft rolled over the paved taxiway; it came to a stop approximately 30 metres (m) from the edge of the runway.

The nose gear, propeller spinner and propeller blades were substantially damaged. The student pilot was not injured.

The accident occurred at Rhino Park Airfield at Global Positioning System (GPS) co-ordinates determined to be 25°49'57.95"South 028°32'28.97"East, at a field elevation of 3189 feet (ft).

Figure 1: Aerial view of the accident site (Source: Google Earth Maps)

According to the Pilot's Operating Handbook (POH), the aircraft's maximum demonstrated crosswind component is 14 kts. The crosswind component at the time of the accident was calculated to be 11 kts, which was within the aircraft's demonstrated limit.

Crosswind Calculations (Source: crosswind circuit/ aviation.govt.nz)

The crosswind component is equal to the speed (V) of the wind multiplied by the sine of the angular difference.
Angular difference (θ=RWY09-Wind direction) = (90-40) °=50°
(XWC = V × Sinθ): XWC=Crosswind component; Wind Speed(V)=12 kts

XWC=12x Sin50°=11.34 kts

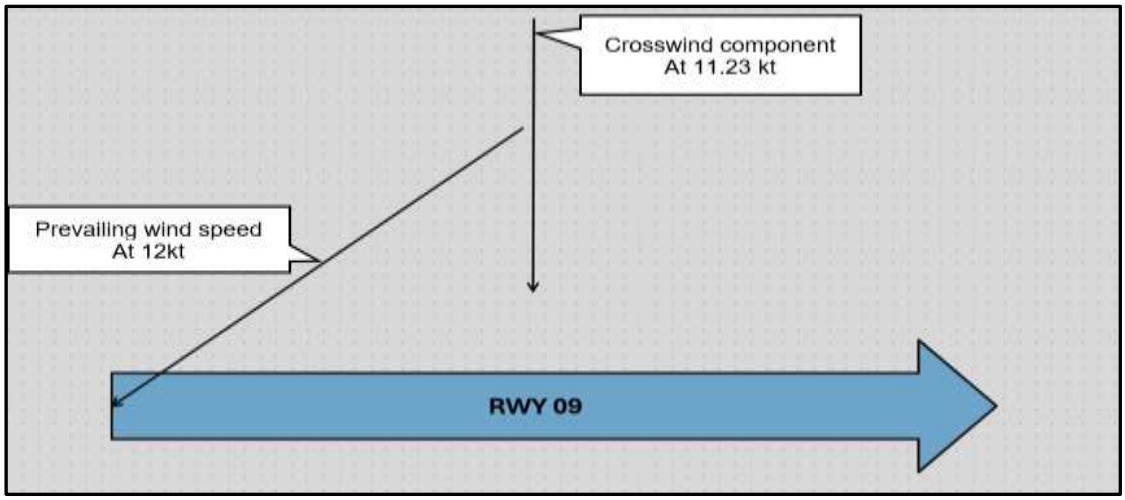

Figure 2: Crosswind component illustration.

The crosswind component was within the acceptable limit (below 14 knots).

Figure 3: The collapsed nose landing gear strut after impact with the concrete edge of the taxiway. (Source: Operator)

Figure 4: The damaged propeller spinner and blade tips. (Source: Operator)

Crosswind Take-off Procedure (Source: J230 POH)

Normal take-off checks.....COMPLETE
Aileron.....POINT FULLY TOWARDS WIND.
Normal take-off procedure..... APPLY
Aileron.....EASE AS REQUIRED as speed increases
Nose wheel .....ON GROUND to maintain directional control until approximately 45 KIAS. Rotate & climb..... CARRY OUT. Avoid aggressive pitch input until the aircraft is clear of ground effect.

Crosswind Take-off Hazards and Techniques: (Source: FAA-H-8083-3a-3of7) (Source: https://skybrary.aero/articles/cross-wind-takeoff-hazards-and-techniques)

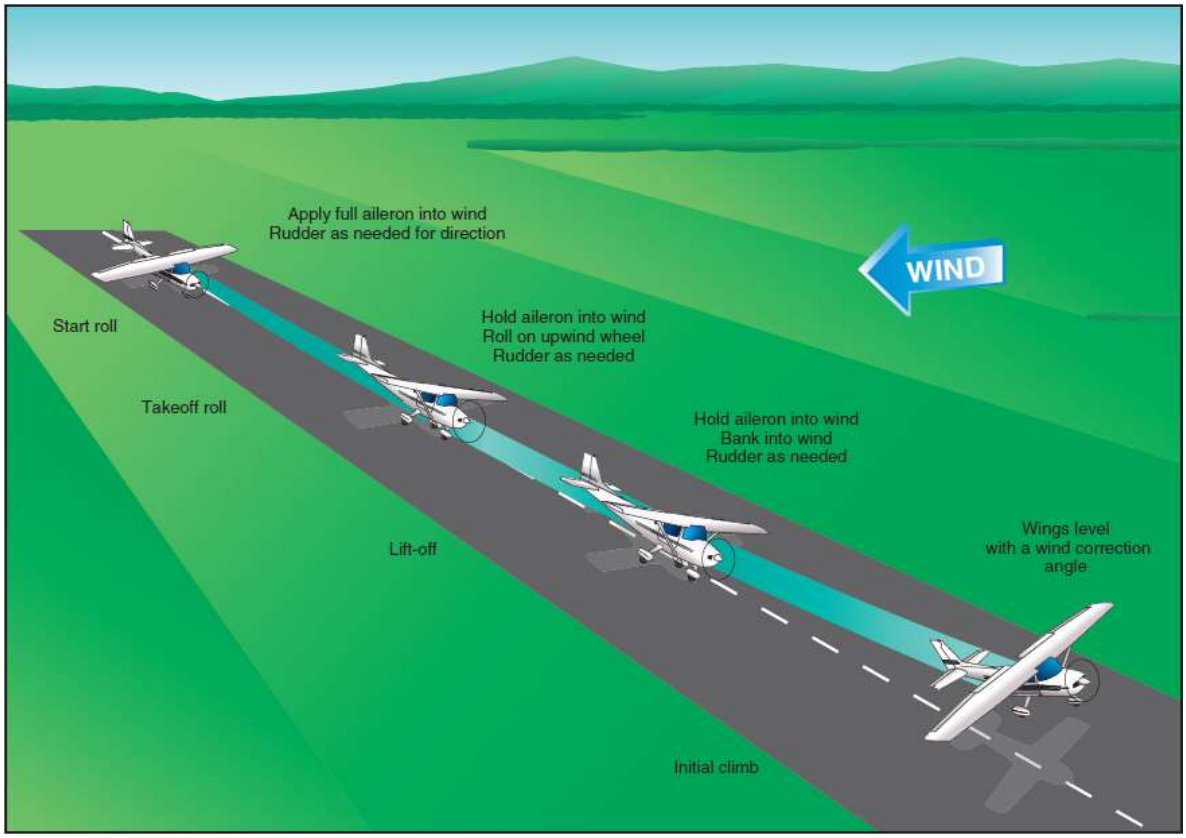

Figure 5: Illustration of crosswind take-off. (Source: FAA-H-8083-3a-3of7)

The following are some of the common techniques for aircraft with tricycle undercarriage: Single engine (etc):

The crosswind will affect the airplane during take-off as much as it does in taxiing. With this in mind, it can be seen that the technique for crosswind correction during take-offs closely parallels the crosswind correction techniques used in taxing. If a crosswind is indicated, the FULL aileron should be held into the wind as the take-off roll is started. This control position should be maintained while the airplane is accelerating and until the ailerons start becoming sufficiently effective for manoeuvring the airplane about its longitudinal axis. Normally, this will require applying downwind rudder pressure, since on the ground the airplane will tend to ***weathervane*** *into the wind. When take-off power is applied, torque or P-factor*

(asymmetric propeller loading) that yaws the airplane to the left may be sufficient to counteract the weathervane tendency caused by a crosswind from the right. On the other hand, it may also aggravate the tendency to. swerve left when the wind is from the left. In any case, whatever rudder pressure is required to keep the airplane rolling straight down the runway should be applied. As the forward speed of the airplane increases and the crosswind becomes more of a relative headwind, the mechanical holding of full aileron into the wind should be reduced. It is when increasing pressure is being felt on the aileron control that the ailerons are becoming more effective. As the aileron's effectiveness increases and the ***crosswind component*** *of the relative wind becomes less effective, it will be necessary to gradually reduce the aileron pressure. The crosswind component effect does not completely vanish, so some aileron pressure will have to be maintained throughout the take-off roll to keep the crosswind from raising the upwind wing. If the upwind wing rises, thus exposing more surface to the crosswind, a "skipping" action may result*.

Student Pilot's Experience

The student pilot had a total of 70 hours but had not yet attained a Private Pilot Licence (PPL). According to Part 61.02.7 (1) the recommended timeframe for student pilots to go on solo flights is after completing 30 hours of dual flight training. The student pilot was recommended for his solo flight at 34 hours. However, at the time of the accident, the student pilot had 70 hours with a Student Pilot Licence (SPL). The student pilot had not shown a satisfactory progression after being recommended for a solo flight (at 34 hours).

The Civil Aviation Regulations Part 61.02.7 outlines the requirements for discontinuation of flight training if satisfactory progress is not made after flying solo.

61.02.7 DISCONTINUANCE OF FLIGHT TRAINING

Failure to make satisfactory progress after having flown solo

(1) A student pilot assessed in terms of section 2(5) of technical standard 61.02.5 who fails to show satisfactory progress shall undergo a flight assessment by the CFI of the ATO where he or she is receiving flight training.

(2) If the CFI cannot recommend solo flight for the student pilot, then the following shall apply:

(a) The student pilot shall be informed in writing that a potential safety risk has been identified and that CAR 61.02.7 may be brought into effect.

(b) A training program of not more than 3 hours dual flight instruction shall be designed and implemented to address the knowledge, skills and attitude of the student.

(c) Once the additional 3 hours of dual flight instruction are flown a recommendation must be made by the responsible flight instructor for continued flight training. If a recommendation cannot be made then the student must be referred for assessment by a DFE appointed for this purpose by the Director.

(3) At any point during flight training where the student pilot is assessed by the flight instructor to be a potential safety risk then the student pilot shall undergo a flight assessment by a DFE appointed for this purpose by the Director.

(4) If the DFE cannot recommend continued flight training for the student pilot, then the following shall apply:

(a) The student pilot shall be informed in writing that a potential safety risk has been identified and that CAR 61.02.7 may be brought into effect.

(b) A training program of not more than 3 hours dual flight instruction shall be designed and implemented to address the knowledge, skills and attitude of the student pilot.

(c) Once the additional 3 hours of dual flight instruction are flown a recommendation must be made by the responsible flight instructor for continued flight training. If a recommendation cannot be made, then the student must be referred for assessment by a DFE appointed for this purpose by the Director.

(5) A student pilot who fails to be recommended for continued flight training shall undergo a flight assessment by a DFE appointed for this purpose by the Director.

(6) If the DFE cannot recommend continued flight training for the student, then the following shall apply:

(a) The student pilot shall be informed in writing that a potential safety risk has been identified and that all further flight training is to be suspended whilst awaiting the decision of the Director in terms of CAR 61.02.7. The student shall acknowledge receipt of the letter.

(b) The CFI shall inform the Director that flight training has been temporarily suspended.

(c) The CFI shall compile a report for the Director containing copies of—

(i) the student pilot's training file.

(ii) the progress reports.

(iii) the written letters advising that flight training may be discontinued and acknowledgement of receipt of these letters by the student pilot.

(iv) the written letters advising that a potential safety risk has been identified and that all further flight training is to be suspended whilst awaiting the decision of the Director in terms of CAR 61.02.7. Acknowledgement of receipt of this letter by the student must also accompany the report.

Findings

1. The student pilot had a Student Pilot Licence (SPL) that was initially issued by the Regulator (SACAA) on 24 February 2022 with an expiry date of 11 March 2025. The pilot's Class 2 aviation medical certificate was issued on 8 January 2024 with an expiry date of 26 January 2026. The student pilot had a total of 70 hours of which 65 hours were on the aircraft type.

2. The student pilot had logged 70 hours but had not obtained a Private Pilot Licence (PPL) at the time of the flight. A solo flight is recommended within 32 hours of flight time. The student pilot's excessive hours indicate a lack of satisfactory progression. According to CAR Part 61.02.7, if a student fails to make satisfactory progress after flying solo, specific assessment and training protocols must be followed.

3. The aircraft had an Authority to Fly (ATF) that was issued by the Regulator on 14 September 2023 with an expiry date of 30 August 2024. The aircraft was registered to the current owner on 18 January 2024.

4. The aircraft's annual inspection was conducted after which a Certificate of Release to Service (CRS) was issued on 20 September 2023 at 366.3 airframe hours with an expiry date of 30 August 2024 or at 466.3 airframe hours, whichever comes first. The aircraft had a total of 431.1 airframe hours at the time of the accident flight. It accrued 35.2 hours after the last annual inspection.

5. The approved person (AP) who conducted maintenance was issued an Approved Person Certificate on 23 January 2023 with an expiry date of 22 January 2025.

6. The approved training organisation (ATO) that operated the aircraft was issued an ATO Certificate by the Regulator on 15 July 2021 with an expiry date of 30 April 2026. The aircraft was endorsed on the ATO's operational specifications certificate.

7. The encountered significant left crosswind during the take-off roll played a major role in the student pilot's loss of directional control. Although the 11 kts crosswind was below the aircraft's maximum demonstrated limit of 14 kts, it was still a substantial factor given the student pilot's limited experience in managing crosswind conditions.

8. The student pilot inadequately managed the crosswind and did not apply full aileron and sufficient rudder to maintain direction; this led to the aircraft veering off the runway. The nose wheel's impact with the edge of the taxiway and the subsequent damage was a result of the failure to control the aircraft.

Probable Cause(s)

Loss of control of the aircraft due to a crosswind which caused the aircraft to veer off to the left of the runway, followed by the nose wheel impacting the concrete edge of the taxiway and the resultant damage to the nose gear, propeller spinner and propeller blades.

Contributing Factor(s)

Inadequate skill to take-off in crosswind conditions.

Safety Action(s)

None.

Safety Message

To improve safety, the approved training organisations (ATOs) should ensure that student pilots complete training in crosswind take-off procedures. Recent incidents show that student pilots may struggle with managing crosswinds, particularly when applying techniques such as aileron input and proper rudder co-ordination. By focusing on these skills, pilots would be better prepared, and the risk of future incidents could be reduced.

The chief flight instructor (CFI) should conduct a thorough flight assessment to evaluate the student pilot's skills and knowledge. This assessment will determine whether the student is fit to continue training or requires additional support.

About this Report

The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation, and that will determine the scope of an investigation. For this occurrence, a limited 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 limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desktop inquiries 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 occurrence.

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.

Purpose

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, 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.

Disclaimer
This report is produced without prejudice to the rights of the AIID, which are reserved.

This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa