SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10418						
Classification	Accident	**Date**	30 January 2024		**Time**	0925Z	
Type of Operation	Training (Part 141)						
Location							
Place of Departure	Morningstar Airfield, Western Cape Province	Place of Intended Landing	Morningstar Airfield, Western Cape Province				
Place of Occurrence	Morningstar Airfield, Western Cape Province						
GPS Co-ordinates	Latitude	34°45'32" S	Longitude	018°33'52" E	Elevation	200 feet	
Aircraft Information							
Registration	ZU-RDY						
Make; Model; S/N	Xenon 2 RST (Serial Number: CAH08973S)						
Damage to Aircraft	Substantial	Total Aircraft Hours	469.4				
Pilot-in-command							
Licence Type	Recreational Student Pilot Licence (RSPL)	Gender	Male	Age	19		
Licence Valid	Yes	Total Hours	11.4	Total Hours on Type	11.4		
Total Hours Past 30 Days	8.3	Total Flying Hours on Type Past 90 Days	8.3				
People On-board	1 + 0	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On Tuesday, 30 January 2024, a student pilot on-board a Xenon 2 RST gyrocopter with registration ZU-RDY took off from Runway 20 at Morningstar Airfield in the Western Cape province to conduct a training flight. The student pilot intended to return to land at the same airfield. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 141 of the Civil Aviation Regulations (CAR) 2011 as amended.

According to the student pilot, he refuelled the gyrocopter and completed the pre-take-off checks before taxiing to the holding point for Runway 20 where he conducted engine run-up checks. Thereafter, he lined up for take-off and pre-rotated the gyrocopter at 2100 engine revolutions per minute (RPM). He stated that the rotor RPM was 185 when he rolled forward, gradually (slowly) applying full power. As the pilot delayed in applying full power, the rotor RPM decreased. This caused the trailing rotor blade to flap down and, thus, impacted the runway. However, the pilot continued to climb. He flew a circuit at 600 feet (ft) above ground level (AGL) and landed the gyrocopter without further issues. The pilot was not injured. The rotor blades were damaged during the accident sequence.

The accident occurred during day light at Global Positioning System (GPS) co-ordinates determined to be 34°45'32" South 18°32'52" East, at an elevation of 2166 ft.

Figure 1: Aerial view of Morningstar airfield where the pilot took-off. (Source: Google Earth)

Figure 2: The aircraft after the accident. (Source: Pilot)

Figure 3: The damaged rotor blade. (Source: Pilot)

BLADE FLAP *(Source:* faa-h-8083-21.pdf)

On a gyroplane with a semi-rigid, teeter-head rotor system, blade flap may develop if too much airflow passes through the rotor system while it is operating at low r.p.m. This is most often the result of taxiing too fast for a given rotor speed. Unequal lift acting on the advancing and retreating blades can cause the blades to teeter to the maximum allowed by the rotor head design. The blades then hit the teeter stops, creating a vibration that may be felt in the cyclic control. The frequency of the vibration corresponds to the speed of the rotor, with the blades hitting the stops twice during each revolution. If the flapping is not controlled, the situation can grow worse as the blades begin to flex and bend. Because the system is operating at low r.p.m., there is not enough centrifugal force acting on the blades to keep them rigid. The shock of hitting the teeter stops combined with uneven lift along the length of the blade causes an undulation to begin, which can increase in severity if allowed to progress. In extreme cases, a rotor blade may strike the ground or propeller.

Figure 4: Taxiing too fast or gusting winds can cause the blade to flap if the rotor is turning slowly. If not controlled, the rotor blade could strike the ground. (Source: faa-h-8083-21.pdf)

Findings

1. The pilot was initially issued a Recreational Student Pilot Licence (RSPL) by the South African Civil Aviation Authority (SACAA) on 21 October 2020 with an expiry date of 3 February 2025. The pilot had flown a total of 11.4 hours on the aircraft type.

2. The pilot had a valid Class 4 aviation medical certificate that was issued on 11 July 2019 with an expiry date of 31 July 2024.

3. The aircraft had a Certificate of Registration (C of R) that was issued to the owner on 21 September 2021. The aircraft had a valid Authority to Fly (ATF) which was issued on 21 February 2020 and renewed on 19 January 2023 with an expiry date of 28 February 2024.

4. The aircraft was issued a Certificate of Release to Service (CRS) on 22 June 2023 at 452.35 hours with an expiry date of 28 February 2024 or at 552.35 hours, whichever occurs first. There were no defects recorded in the flight folio at the time of the flight.

5. The gyrocopter rotor blade flapped excessively during take-off which led to the trailing blade striking the ground.

Probable Cause

During the take-off roll, the gyrocopter rotor blade flapped excessively which resulted in the trailing blade striking the ground.

Contributing Factor

Aggressive inputs on the controls.

Safety Action(s)
None.
Safety Message
None.
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 desk top enquiries 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