AIRCRAFT ACCIDENT SHORT REPORT

CA18/2/3/9924: Engine stoppage during descent, followed by an unsuccessful forced landing in an open field close to Paradise Beach Aerodrome.

Date and time	: 30 October 2020, 0800Z
Aircraft registration	: ZU-IIJ
Aircraft manufacturer and model	: Zenith Aircraft Company, Zenith CH650B
Last point of departure	: Paradise Beach Aerodrome (FAPX), Eastern Cape
Next point of intended landing	: Paradise Beach Aerodrome (FAPX), Eastern Cape
Location of accident site with reference to easily defined geographical points (GPS readings if possible)	: Open field 325m from the threshold of Runway 26 GPS position: 34°05'49.34" South 024°53'29.02" East
Meteorological information	: Surface wind: Light and variable; Temperature: 19°C
Type of operation	: Private (Part 94)
Persons on-board	: 1 + 1
Injuries	: Minor
Damage to aircraft	: Substantial

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.

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.

Investigation Process:

The accident was notified to the Accident and Incident Investigations Division (AIID) on 30 October 2020 at about 0900Z. The investigator/s co-ordinated with all authorities off site by initiating the accident investigation process according to CAR Part 12 and investigation procedures. The State of Design had not appointed an Accredited Representative to this investigation. The AIID is leading the investigation as the Republic of South Africa is the State of Occurrence.

Notes:
1. Whenever the following words are mentioned in this report, they shall mean the following:
- *Accident — this investigated accident*
- *Aircraft — the Zenith CH650B involved in this accident*
- *Investigation — the investigation into the circumstances of this accident*
- *Pilot — the pilot involved in this accident*
- *Report — this accident report*

2. Photos and figures used in this report were taken from different sources and may have been adjusted from the original for the sole purpose of improving clarity of the report. Modifications to images used in this report were limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or addition of text boxes, arrows or lines.

1. SYNOPSIS

1.1 On Friday morning, 30 October 2020 at 0800Z, a Zenith CH650 aircraft with registration ZU-IIJ, sustained substantial damage when the pilot executed a forced landing following an engine stoppage while turning right base for Runway 26 at Paradise Beach Aerodrome. The two occupants sustained minor injuries and were treated at the scene by medical personnel who responded after the accident had occurred. Visual flight rules prevailed at the time of the occurrence and no flight plan was filed for the flight, which departed Paradise Beach Aerodrome (FAPX) on a local scenic flight with the intention to land back at the same aerodrome. The flight was conducted under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.2 The investigation could not determine any reason for the engine stoppage during descent for landing; it can reasonably be assumed that the possibility exists that it was attributed to the carburettor icing which caused engine splatter and vibration, resulting in the pilot conducting an unsuccessful forced landing.

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1 On Friday morning, 30 October 2020 at approximately 0700Z, a pilot accompanied by a passenger on-board a Zenith CH650 aircraft with registration ZU-IIJ took off from Runway 26 at Paradise Beach Aerodrome (FAPX) on a local pleasure flight with the intention to land back at the same aerodrome.

1.1.2 The pilot stated that once airborne, they met up with another aircraft and flew together in a loose formation. On their return to FAPX, the two aircraft spaced for landing, with ZU-IIJ being number two for landing on Runway 26. The pilot stated that when they were approximately four minutes out for landing, they experienced severe vibration which he assessed to have originated from the propeller. He stated that the propeller revolutions per minute (rpm) on the digital gauge in the cockpit, which were set at 2500rpm, were fluctuating and flickering.

1.1.3 He then advised the pilot of the other aircraft about their situation and requested that he could land first. While turning right base leg for Runway 26 at a height of approximately 200 feet (ft) above ground level (AGL), the engine stopped. The pilot was unable to make it to the destined runway due to a high rate of descent. He then opted to execute a forced landing in a densely vegetated area (fynbos). The aircraft was substantially damaged during the landing sequence. The two occupants sustained minor injuries and were treated on site by emergency services personnel who responded to the accident scene. There was still ample fuel on-board the aircraft.

1.1.4 The accident occurred during day time at a geographical position determined to be: 34°05’49.34” South 024°53’29.02” East at 23ft above mean sea level (AMSL).

Figure 1: Google Earth overlay indicating the location of the accident site.
The yellow pin indicates the location of the aircraft ZU-IIJ.

1.1.5 Pilot information and flying experience

Nationality	South African	Gender	Male	Age	66
Licence Number	0279036396	Licence Type	National Pilot Licence		
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	31 December 2022				
Restrictions	Must wear corrective lenses for near vision				
Previous Accidents	None				

Flying experience:

Total Hours	1 738.3
Total Past 90 Days	19.4
Total on Type Past 90 Days	19.4
Total on Type	131.0

1.1.6 Aircraft Information

The aircraft, a Zenith CH650, with serial number 6510377 was manufactured from a home build kit by a private builder (Amateur Built) in 2016. It had a total time of 203.5 airframe hours at the time of the accident. The last maintenance inspection prior to the accident flight was performed on 3 August 2020, and the aircraft had flown a further 19.4 hours since the said inspection. The aircraft was fitted with a Lycoming O-235-C1B engine with serial number L-7528-15 and an AX Sport Electric VP/CS propeller.

On 14 July 2018, the propeller was fitted to the engine as a new unit. According to a logbook entry, it was removed from the aircraft on 6 January 2020 after it had been in operation for 94.0 hours. It was then sent to the original equipment manufacturer (OEM) for repairs, which included the removal of the five M8 countersunk cap screws on all three propeller blades. These cap screws were replaced with the upgraded M10 countersunk cap screws. The propeller was then returned to the aircraft owner and re-installed on the engine on 26 January 2020 by an Approved Person (AP).

1.1.7 Meteorological Information

1.1.7.1 The weather condition entered in the table below was obtained from the pilot's questionnaire.

Wind direction	270°	Wind speed	Light	Visibility	+ 10km
Temperature	18°C	Cloud cover	6/8	Cloud base	2 500 ft
Dew point	Unknown	QNH	1027hPa		

1.1.7.2 The weather information below was obtained from the Meteorological Aeronautical Report (METAR) that was issued by the South African Weather Service (SAWS). The following weather was the METAR message recorded at Port Elizabeth International Airport (FAPE) (the closest station to location of accident) on 30 October 2020 at 0800Z and it contained the following weather variables: Wind direction and speed were reported as 24014KT 210V270.

Wind direction	240°	Wind speed	14 knots	Visibility	9999
Temperature	18°C	Cloud cover	Few	Cloud base	029 ft
Dew point	09°C	QNH	1028hPa		

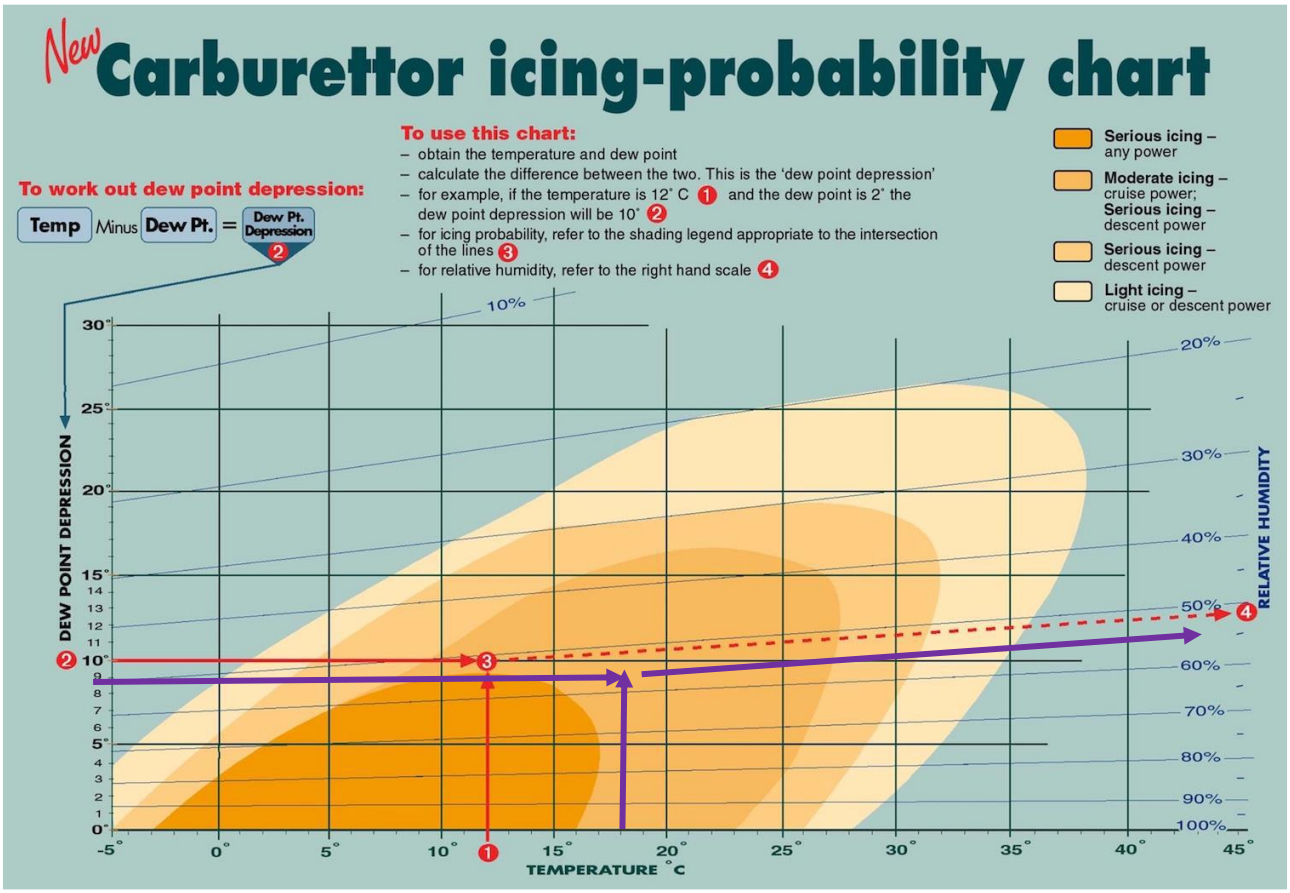

Figure 2: The carburettor icing chart showing a calculated icing probability in the FAPI area.
(Source: https://foxbatpilot.files.wordpress.com/2017/01/carburettor-icing-chart.jpg)

1.1.8 According to the chart (Figure 2), the relative humidity in the area around FAPI was at approximately 52% with the temperature of 18°C, and dew point depreciation of 9°C, the result will be a moderate icing condition at cruise power with serious icing on descent.

1.1.9 Wreckage and Impact Information

The pilot executed a forced landing and touched down on dense vegetation (fynbos). The aircraft came to rest in an upright position, approximately 325 metres (m) short of the threshold of Runway 26 at FAPX. The one propeller blade fractured on impact. The main landing gear broke off and the left wing was severely deformed. The cockpit/cabin area remained intact. The aft fuselage and empennage sustained minor damage.

Figure 3: The aircraft came to rest in an upright position. (Source: Pilot)

Figure 4: The aircraft at the accident site. (Source: Pilot)

Figure 5: The dense vegetation on which the aircraft was force-landed. (Source: Pilot)

Figure 6: A view of the cockpit that remained fairly intact. (Source: Pilot)

1.1.10 Propeller Examination

The propeller with serial number 17031 was removed from the crankshaft by the aircraft maintenance organisation (AMO) that recovered the aircraft. The propeller was couriered to the OEM in Cape Town. On Wednesday, 18 November 2020, the propeller was examined in the presence of the investigator. Only one of the three propeller blades were still intact. The other two blades had fractured near the blade root during impact with vegetation, but the blade roots were still secured within the hub assembly. A functional test was conducted by applying power to the constant pitch motor, all three propeller blades rotated simultaneously to the full coarse position and back to the full fine position. The hub assembly was then split, and no anomalies were found.

One of the propeller blades displayed evidence of damage on the leading-edge tip area. The dimensions were as follows: length, 18 millimetres (mm); and width, 4mm (see Figures 14 and 15). It could not be determined when this damage was caused.

Figure 7: The components of a new propeller assembly. (Source: www.axsportaviation.com).

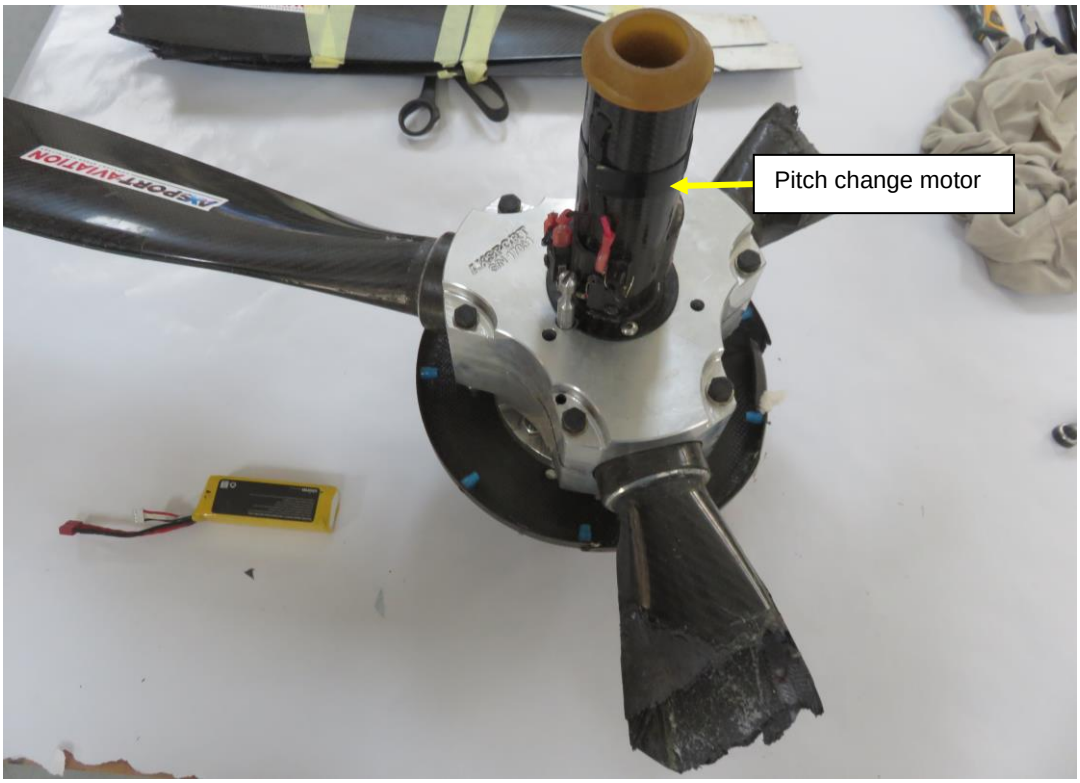

Figure 8: The propeller assembly as it was received, with no damage to the hub.

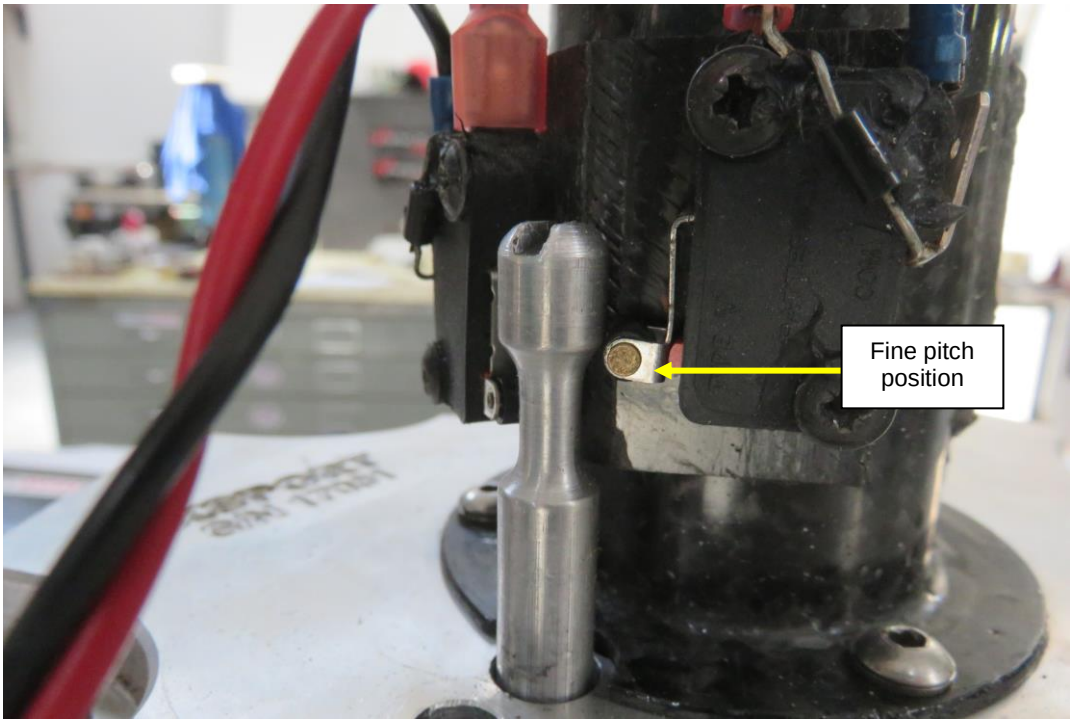

Figure 9: All three propeller blades were in fine position as indicated in the image.

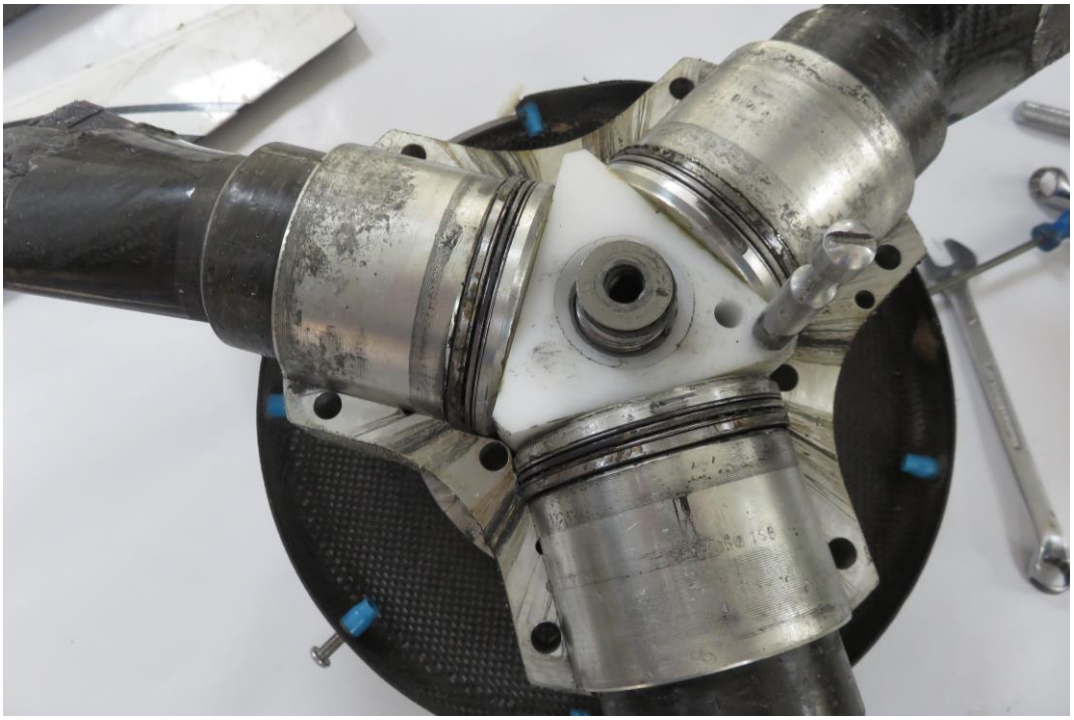

Figure 10: All three propeller blade ferrules were found to be in position.

Figure 11: The cam followers and thrust caps of all three propeller blades were secured.

Figure 12: The two blades that fractured during impact.

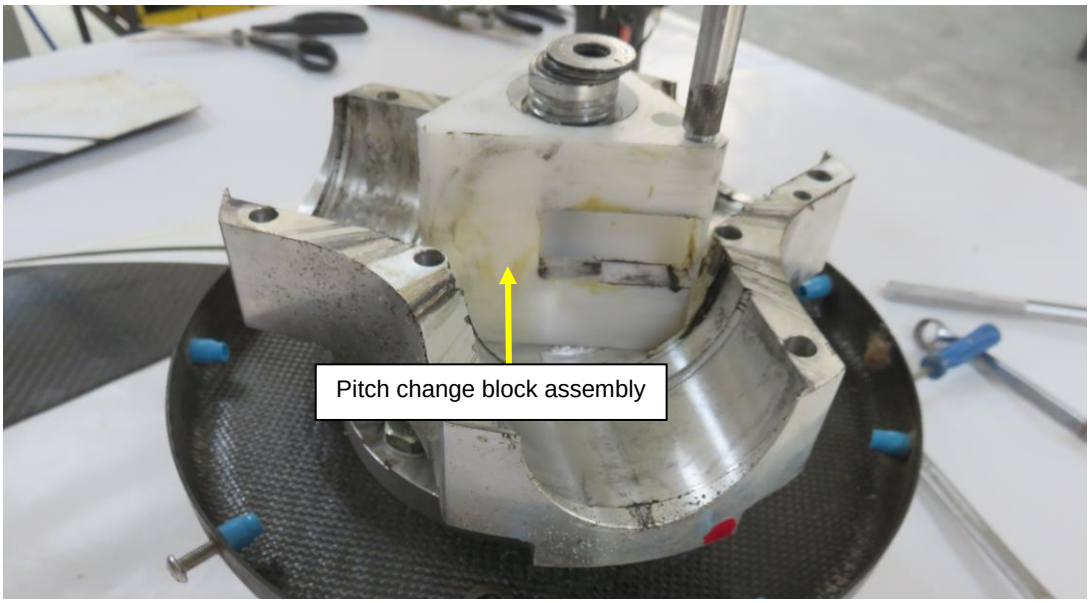

Figure 13: The pitch change block assembly was found to be intact.

Figure 14: The one blade presented damage on the leading tip.

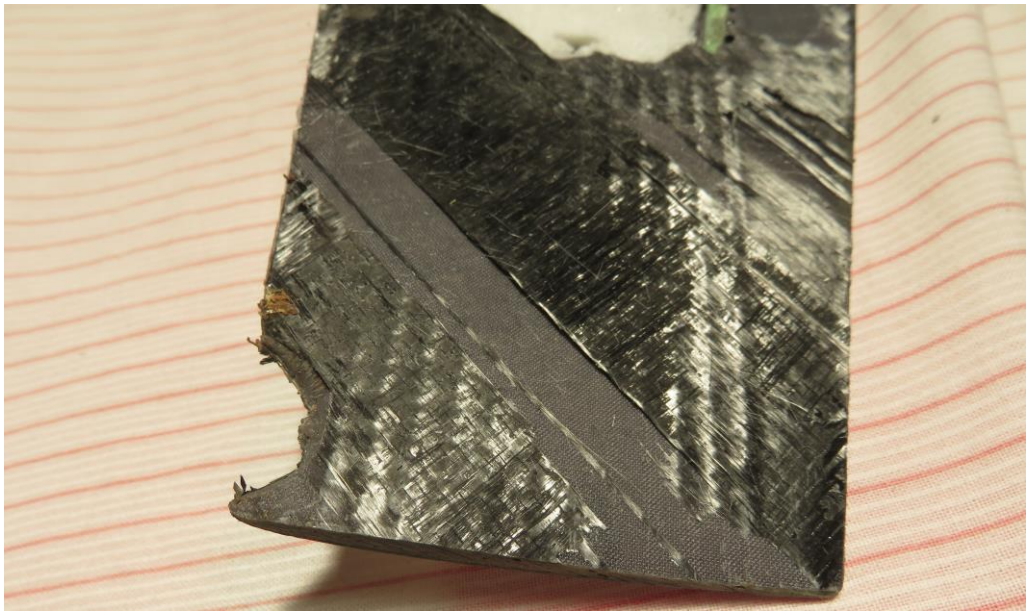

Figure 15: The blade was split in half in order to take this photograph.

1.1.11 The investigation team contacted the AMO that recovered the wreckage and the following observations were made:

1.1.11.1 Fuel found in both tanks was of a large quantity and was of correct colour — clear and with no sediments or water found. The fuel selector was found in the ON position.

1.1.11.2 Flight controls: All flight controls, flight control cables and push pull rods were found to be intact and correctly connected to the aircraft. Due to the damage sustained by the aircraft, it was not possible to carry out movements and travel checks of the flight controls.

1.1.11.3 Engine controls: All engine controls were found to be correctly attached and secured.

1.1.11.4 The wreckage was sold prior to the examination of the propeller on 18 November 2020. The person who purchased the wreckage collected it in Port Elizabeth and took it to his farm. Following the examination of the propeller, the investigator contacted the owner of the wreckage. He indicated that he had removed the engine from the wreckage, and that it was secured in storage. According to his observations, there was nothing wrong with the engine as he was able to rotate it and it sounded ‘normal’. Prior to concluding the report, the wreckage owner was again contacted, and he advised that the engine was still in storage and no work had been done to it since he bought it. No official engine examination was conducted.

2. Findings

2.1. The pilot was issued a National Pilot Licence on 27 July 2017 with an expiry date of 5 July 2022. He held the necessary ratings to operate the aircraft and had flown a total of 1 738.3 hours, of which 131.0 were on the aircraft type, and 19.4 hours were flown during the past 90 days.

2.2. The pilot was issued a valid Class 4 aviation medical certificate on 29 November 2019 with an expiry date of 31 December 2022, with a restriction to wear corrective lenses for defective near vision during flight.

2.3. This was a private flight conducted under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

2.4. The aircraft was issued an Authority to Fly on 2 August 2019 with an expiry date of 31 August 2021.

2.5. The aircraft was issued a Certificate of Release to Service on 3 August 2020 with an expiry date of 2 August 2021 or at 284.1 hours, whichever comes first.

2.6. The aircraft was issued a Certificate of Registration on 1 April 2019.

2.7. The last scheduled annual inspection that was carried out on the aircraft prior to the accident flight was certified on 3 August 2020 at 184.1 airframe hours. The aircraft had accumulated an additional 19.4 airframe hours since its last inspection.

2.8. The aircraft was maintained by an AP, licensed by Aeroclub of South Africa, with an aircraft maintenance AP number 032. The AP's licence/certificate number was issued on 20 May 2019 with an expiry date of 19 May 2021.

2.9. The propeller was removed from the aircraft on 6 January 2020 and was sent for repairs to the OEM. At the time of the removal of the propeller from the aircraft, it had been in operation for 94 hours since new. It was re-installed on the engine on 26 January 2020.

2.10. The AMO that carried out the wreckage recovery after the accident flight was in possession of an approved AMO certificate number 1244, issued by the SACAA on 6 December 2019 with an expiry date of 25 November 2020.

2.11. No corroborating evidence could be found to indicate the severe vibration that the pilot had mentioned originated from the propeller. The propeller could, therefore, not have contributed or have caused an engine stoppage in-flight.

2.12 According to the pilot questionnaire, the fuel remaining in the tanks equated to three hours of endurance.

2.13 The flight was conducted under visual flight rules (VFR) by day. The relative humidity was at approximately 52% with the temperature of 18°C and dew point depreciation of 9°C, therefore, the result will be a moderate icing condition at cruise power with serious icing on descent power and, thus, it was likely that carburettor icing may have contributed to the engine stoppage.

2.14 Approximately four minutes out for landing at FAPX, the pilot experienced severe vibration which he concluded to be originating from the propeller. He stated that the rpm on the digital gauge in the cockpit were giving erratic information. The rpm was set at 2500rpm and were fluctuating and flickering.

2.15 According to the pilot, while turning base leg onto final approach for Runway 26 at a height of approximately 200ft AGL, the engine stopped. The pilot was unable to glide to the runway due to an increase in the rate of descent. He then opted to execute a forced landing on dense vegetation. During the forced landing, the aircraft impacted vegetation.

2.16 The aircraft was substantially damaged during the accident sequence; the two occupants sustained minor injuries and were attended to at the scene by emergency personnel.

2.17 The accident occurred on an open bush type of terrain near Paradise Beach Aerodrome.

2.18 The investigation could not determine any reason for the engine stoppage during descent for landing; it could reasonably be assumed that the possibility exists that it was attributed to the carburettor icing which caused engine splatter and vibration, resulting in the pilot conducting an unsuccessful forced landing.

3. PROBABLE CAUSE

3.1 Engine power loss during a descent for landing which was likely caused by the carburettor icing, resulting in an engine splatter and vibration and a subsequent unsuccessful forced landing.

4. CONTRIBUTING FACTOR

4.1 None.

5. REFERENCES USED IN THE REPORT

5.1 Pilot questionnaire (form CA 12-03)
5.2 Operator questionnaire (form CA 12-04)
5.3 Aircraft maintenance documentation
5.4 Operations Manual for the AX-Sport Propeller
5.5 New Aircraft Owner statement
5.6 AMO that recovered the wreckage technical report
5.7 South African Weather Service weather report
5.8 An AP statement (the AP maintained the aircraft and was also on-site when aircraft was recovered).

6. SAFETY RECOMMENDATION

6.1 **Safety message:** In the interest of safety for operators of similar type aircraft, careful attention must be taken in weather conditions likely to cause carburettor icing during cruise or descent.

7. ORGANISATION

7.1 This was a private flight with the pilot also being the owner of the aircraft.

8. APPENDICES

8.1 None.

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