Accident

Aircraft Type and Registration:	Eurofox 912(S), G-CIEF	
No & Type of Engines:	1 Rotax 912ULS piston engine	
Year of Manufacture:	2014 (Serial no: LAA 376-15218)	
Date & Time (UTC):	26 July 2023 at 1115 hrs	
Location:	Approx 1 mile to the east of Darlton Airfield, near Retford, Nottinghamshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Fatal)	Passengers - N/A
Nature of Damage:	Aircraft Destroyed	
Commander's Licence:	Light Aircraft Pilot's Licence	
Commander's Age:	75 years	
Commander's Flying Experience:	719 hours Last 90 days - 12 hours Last 28 days - 2 hours	
Information Source:	AAIB Field Investigation	

Synopsis

Following the successful tow and release of a glider at 3,000 ft, the accident aircraft G-CIEF began a descent to return to the departure airfield. The initial descent, during which the aircraft was in a right turn, appeared normal and consistent with previous flights. However, passing through 1,000 ft, the aircraft entered a left turn away from the final approach path for the airfield. The aircraft remained in a descending left turn until it struck a field approximately 1 nm from the airfield. The pilot was fatally injured.

There was no evidence of a technical malfunction. Although the postmortem report did not indicate that a medical event had occurred, on consideration of all the evidence available, including the pilot's previous medical history, the investigation determined that the pilot may have experienced a partial or full medical incapacitation which rendered him incapable of controlling the aircraft.

History of the flight

The pilot was both a powered aircraft and glider pilot. He was the trustee of a syndicate of five owners of G-CIEF, which was kept at the gliding club from which the accident flight departed. The aircraft was used regularly to conduct aerotow launches for the gliding club and was also flown for their own purposes by the syndicate members.

On the day of the accident flight, the pilot arrived at the gliding club and flew a short solo flight in the local area, departing just after 0800 hrs. He subsequently flew two aerotow launches, the first of which was released at 3,000 ft and the second at 2,000 ft.

The accident flight was an aerotow glider launch, with the glider being successfully released at about 3,000 ft to facilitate the training objective of the glider pilots who intended to conduct spin recovery training. The glider pilot reported that the tow and release were normal.

After the glider released from the aerotow rope, the pilot of G-CIEF began two right descending turns away from the glider, which was described by club pilots as the normal release procedure. The aircraft reached a maximum rate of descent of 3,000 ft/min before reducing to 2,000 ft/min. The descent was flown at approximately 90 kt and reached a maximum angle of bank of 45°. When the aircraft passed through the runway extended centreline, the rate of descent was approximately 1,800 ft/min. The aircraft altitude was 1,000 ft at a range of approximately one nautical mile from the runway threshold.

The aircraft then entered a left descending turn until it struck a field about 30 seconds after the turn commenced. The pilot was fatally injured. There was no radio call made by the pilot.

Accident site

The accident site was in a crop field (Figure 1). There was an initial witness mark on the ground which was made by the left wing then a small debris trail which led to the main accident site. Due to the high energy involved, the aircraft suffered structural break up as it hit the ground before finally coming to rest inverted approximately 33 metres from the initial impact point. There was no fire at the scene and fuel was recovered from both wing tanks.

Figure 1
Accident site

Recorded information

Recorded data

Data transmissions from a Flight Alarm (FLARM)[1] electronic conspicuity (EC) device fitted to the aircraft was recorded by two ground-based systems[2]. This provided the aircraft's GNSS derived position, groundspeed, and altitude during the accident flight. FLARM data was also available for flights flown earlier the same day. GNSS position and altitude data was also recorded by a software navigation application[3] that was operating on a tablet computer recovered from the wreckage.

The final seconds of the accident flight were also captured by a video camera (dashcam) fitted to a vehicle that was being driven westbound along the A57.

Accident flight

The aircraft and aerotow glider took off from Runway 23 at 1107 hrs and flew to the east of the airfield where they climbed to 3,200 ft amsl, at which point the glider released (Figure 2 and Figure 3, Point A). G-CIEF then made a descending right turn. Its descent rate initially reached about 3,000 ft/min but then gradually reduced to 2,200 ft/min as it completed a turn through 360°. The right turn continued for a further 270° at which point the aircraft started to roll out of the turn at an altitude of about 1,400 ft amsl. The bank angle during the right turns reached about 45°.

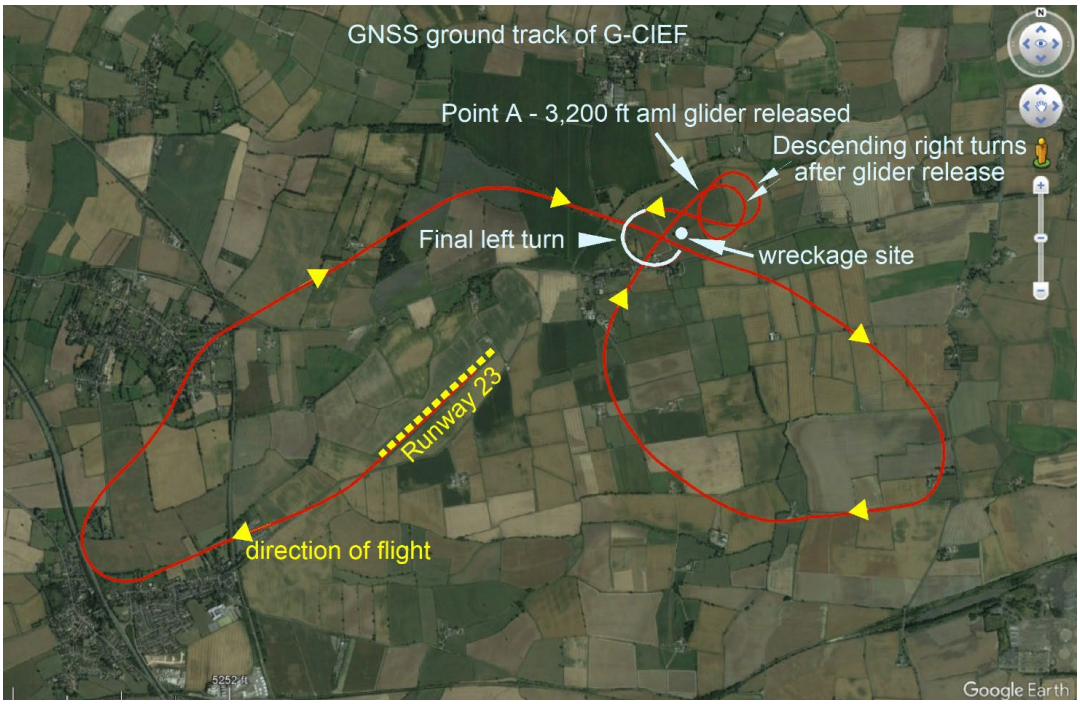

Figure 2

GNSS ground track of C-CIEF
(© 2023 Google, Image © landsat/copernicus)

Footnote

1 FLARM [accessed November 2024].
2 PilotAware Air Traffic Observation and Management (ATOM) grid and Open Glider Network (OGN).
3 SkyDemon [accessed November 2024].

The aircraft continued to descend and at about 1,100 ft amsl (~1,050 ft agl) it entered a left turn (Figure 2 Point B, Figure 3 and 4). Its groundspeed was 75 kt (an estimated airspeed of about 80 kt based on a wind from 230° at 11 kt) and the descent rate was approximately 1,800 ft/min. As the turn continued, the estimated bank angle of the aircraft increased progressively at an average rate of about 2°/s.

When the aircraft was at about 850 ft amsl (~800 ft agl) the data indicates that the descent rate had briefly reduced to about 1,000 fpm (Figure 4 and 5) but shortly thereafter started to increase again. The aircraft's bank angle at this point was estimated to have been about 30° and the normal load was approximately 1.15 g. The aircraft continued to descend, during which its rate of descent, calculated airspeed, bank angle and load factor continued to progressively increase.

The final recorded GNSS data point was recorded at 1118:12 hrs, which was shortly before the aircraft struck the ground. It was estimated that the aircraft's descent rate was about 3,000 ft/min, its airspeed was approximately 100 kt, the bank angle was about 55° left wing down and the normal load was nearly 2 g.

The dashcam footage of the final seconds of the flight was consistent with the GNSS data and showed the aircraft remaining in the descending left turn until it struck the ground, after which it could be seen to tumble several times before coming to rest.

The time between the aircraft starting the final left turn and striking the ground was about 30 seconds.

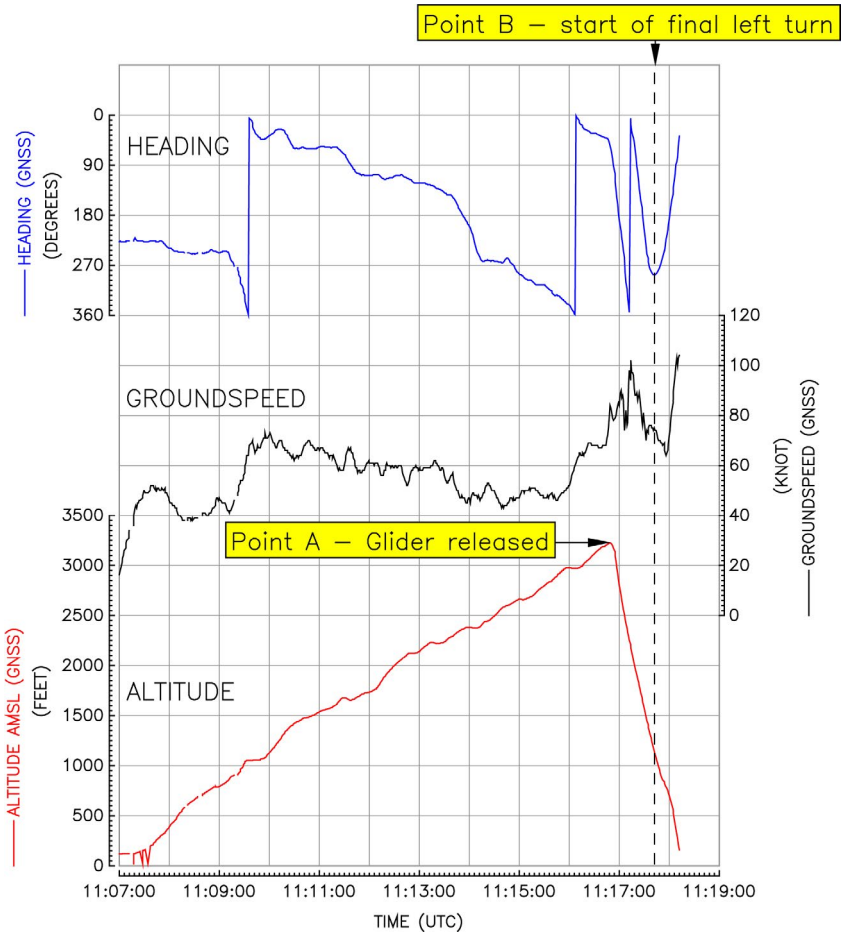

Figure 3

G-CIEF climb and descent

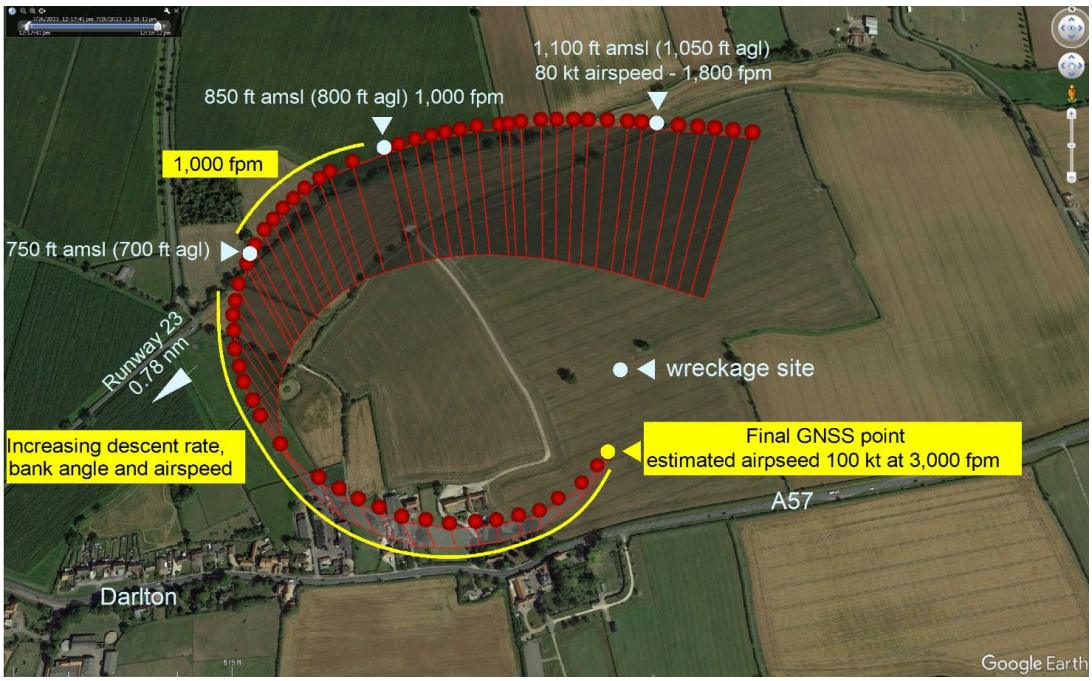

Figure 4

Final descending turn

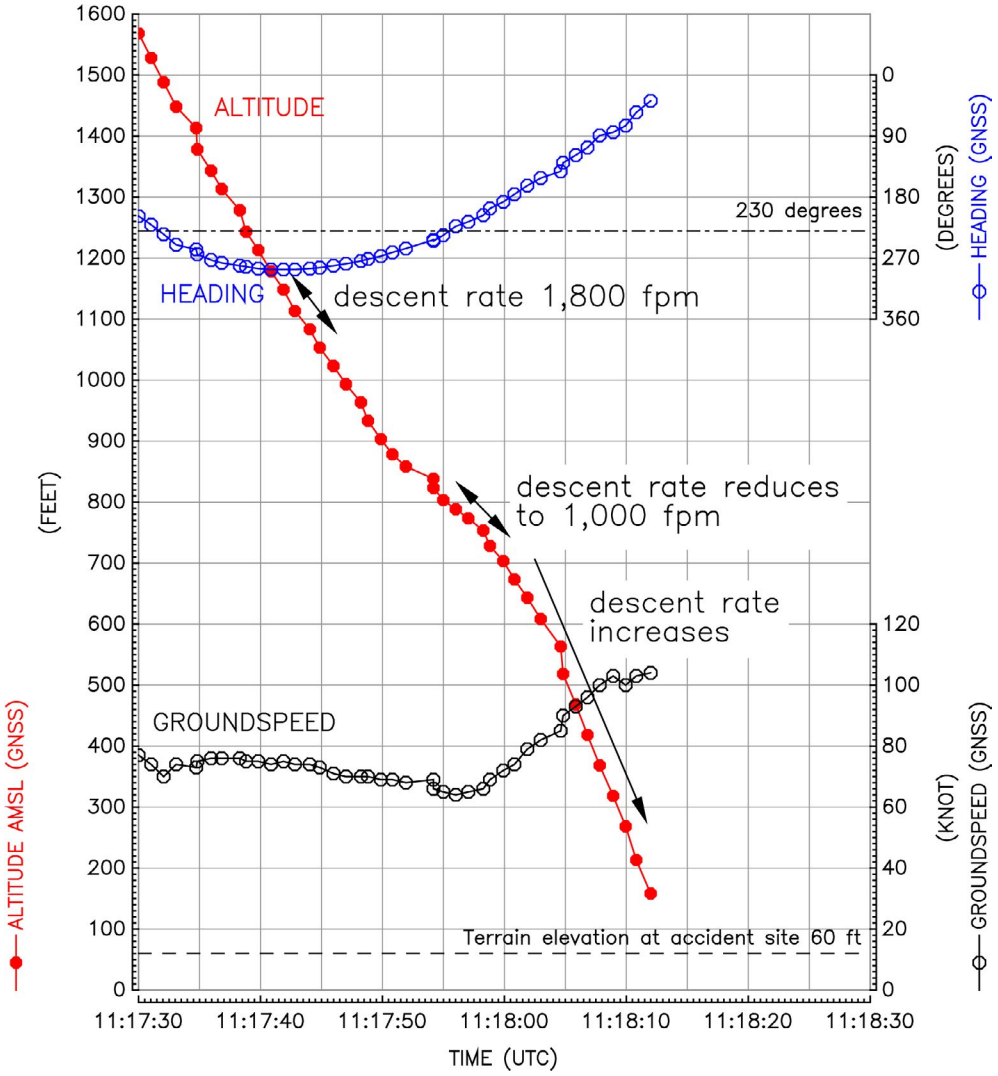

Figure 5

Plot of final descending turn

Aircraft position relative to Runway 23 final approach

Shortly after the aircraft commenced the final left turn it then flew through the extended centre line of Runway 23. At this point it was 0.78 nm from the runway threshold and at 780 ft amsl (655 ft above the runway threshold). From this position, the approach slope to have touched down at the runway threshold was just less than 8°, which would have required an average descent rate of 980 fpm if flown at a ground speed of 75 kt (estimated airspeed of about 86 kt based on a wind from 230° at 11 kt).

The standard approach slope to land is typically about 3°. At a distance 0.78 nm from the runway and on a 3° approach, an aircraft would be at an altitude of about 375 ft amsl (250 ft above Runway 23 threshold), and at a groundspeed of 75 kt the required rate of descent would be about 400 ft/min.

Previous flights

The pilot's first flight on the day of the accident lasted a total of 24 minutes (0807 hrs to 0831 hrs). This consisted of a local 20-minute flight followed by a touch-and-go landing on Runway 23. The aircraft then made a right turn, reaching a maximum height of 300 ft agl before landing back on the runway. Without coming to a complete stop, it then made a 180° turn and took off from Runway 05. A short distance from the end of the runway it completed a 180° right turn to land back on Runway 23 before coming to a stop. The subsequent two aerotows were from 0933 hrs to 0940 hrs and 1015 hrs to 1024 hrs.

Table 1 provides the relative distance, height and approach slope when G-CIEF was established onto the final approach to land during the previous three flights. For Flight 2 and 3, the aircraft's distance and height when at 0.8 nm from the runway threshold are also included for comparison with the accident flight when it turned through the runway extended centre line at about 0.8 nm.

Flight	Distance, height and approach slope relative to Runway 23 threshold
1 (solo) [4]	0.5 nm 570 ft 10.6°
2 (aerotow)	1.3 nm 1,780 ft 12.7° 0.8 nm 870 ft 10.1°
3 (aerotow)	2 nm 1,500 ft 7° 0.8 nm 650 ft 7.6°
Accident	0.8 nm 655 ft 7.8°

Table 1

Distance, height and approach slope

Aircraft description

The Eurofox kit is manufactured by Aeropro s.r.o. in Nitra, Western Slovakia. The Eurofox is a conventional, two-seat, high-wing, tractor monoplane, which with appropriate modifications is capable and widely used as a tug aircraft for gliders up to 750 kg.

Structure and systems

The cockpit is enclosed with side-by-side seating and the doors are top hinged gull wing type. The fuselage structure is welded steel tube and the wing structure is tubular aluminium spars with sheet aluminium ribs. The wings are braced with external lift struts and jury struts and the wings are easily foldable by one person. Control is through rudder, elevator and manually operated flaperons.

Each of the two wing tanks is of 40 litres capacity and mounted in the wing root supported by the front and rear spars. The wing tanks feed into a 6-litre collector tank (5 litres useable) mounted behind the cockpit seat. With a maximum gross weight of 560 kg for most examples, any combination of fuel loading, baggage loading and occupant weight, up to the placard maximum, is highly unlikely to place the aircraft outside of its C of G range.

Powerplant

The Eurofox 912(S) model is powered by a Rotax 912-ULS engine, rated at 100BHP at 5,800 rpm, mounted on a conventional welded steel tube mount. There are three types of propeller which may be fitted, either a DUC Windspoon or a Woodcomp SR200 or a DUC SWIRL-3-L, all being three-bladed ground-adjustable pitch types with moulded composite blades. However, the LAA require that for aerotow operations that the DUC Windspoon is fitted, this being a fine pitch three bladed propeller of 1,727 mm diameter.

Aircraft build and maintenance

The aircraft was sold as an amateur build kit under the 51% rule[4] and was assembled by the syndicate operating the aircraft with guidance and advice from the manufacturer and an LAA inspector. The build, which included LAA approved modifications required for tug flying, commenced in July 2013. The aircraft was registered with the CAA on 14 May 2014 and following successful build inspections and test flights was issued with a Permit to Fly on 14 November 2014. There had been no LAA approved modifications made to the aircraft since the initial Permit to Fly certification.

The maintenance required to ensure that the airworthiness of the aircraft is maintained is specified in the Aeropro Checklist B Service/Maintenance. Whilst the technical logbook for the aircraft could not be located during the investigation, inspection of the aircraft maintenance records showed that the aircraft had been maintained in accordance with the schedule with the last 50 hour check (carried out at 1,300 flying hours) undertaken two weeks before the accident flight. Service Bulletin SB 01/2014, which was issued in response to a rudder jam incident caused by a rotating adjustable centring spring attachment nodule on this aircraft type, was incorporated on G-CIEF in 2014.

Aircraft examination

The damage observed to the structure of the aircraft was consistent with an accident sequence that commenced with the left wing striking the ground first, and this correlated with the dashcam footage. All other damage observed was assessed to be due to the impact forces. There was no evidence of fatigue failure of primary or secondary structures that would have affected the integrity of the aircraft structure in flight.

Because of the severe damage sustained to the aircraft it was not possible to perform a full and free control continuity and freedom of movement check. Inspection of the flying control system showed damage to some of the control rods and cables, but this was all assessed to be due to impact forces. All fractures demonstrating typical overload failure characteristics associated with a high energy impact with the ground. There was no evidence found of control restriction in the flying control system. The rudder centring mechanism was inspected and whilst there was distortion to the frame around the mechanism from the impact forces, the adjustable centring spring attachment nodule remained in the correct orientation. The evidence indicated that the integrity of the flying control system was not compromised prior to the initial contact with the ground.

Footnote

[4] This rule provides the parameters under which a kit-based aircraft can be considered eligible for a Permit to Fly certificate.

The damage to the propeller and nose of the aircraft was consistent with the nose and cockpit striking the ground as part of the accident sequence. The Rotax 912 (ULS) has a gearbox, so if the engine stopped, the propeller would have likely stopped instantly and it would have been more likely that the carbon fibre propeller would have sustained unequal damage. The equal damage to the propeller blades suggests that the engine was turning when it hit the ground.

The engine was removed from the aircraft and disassembled and inspected at a specialist Rotax maintenance facility. Whilst it had sustained some post-impact damage, there were no mechanical or electrical issues discovered with the engine.

Survivability

The cockpit structure had sustained damage, but the steel lattice had not encroached into the cockpit area. The safety harnesses were intact, however the high energy initial impact and subsequent tumbling of the aircraft which resulted in the aircraft coming to rest upside down meant that this was not considered a survivable accident.

Weight and balance

With only the pilot on board and minimal baggage the aircraft would have comfortably been within its weight and balance limits for towing of gliders[5].

Meteorology

The weather conditions reported at Waddington Airfield, approximately 13 nm from the accident site, were good. The temperature was 20°C with a light wind from the south-west, few clouds at 3,900 ft.

Airfield information

Darlton Gliding Site has one Runway 05/23 which is 1,170 m long. The club owned four gliders which are operated by club members. Gliders are launched from the site by both winch launches and aerotows.

Personnel

Licence

The pilot had a total powered flight time of 719 hours. He first obtained his PPL(A) in 1989, which he converted to LAPL (A) in 2016. A LAPL (A) has a lifetime validity and does not contain ratings that need to be revalidated or renewed. However, in order to exercise the privileges of the licence, a pilot must meet the LAPL recency requirements[6]. The pilot's logbook showed that he met these recency requirements at the time of the accident.

The pilot had more than 30 years of gliding experience and had logged a total of 922 hours. He was a gliding instructor until 2017, when his FI(S) lapsed.

Footnote

[5] Light Aircraft Association Airworthiness Approval Note: LAA 376-874 Issue 11, Aircraft Type: Eurofox 912(S).
[6] Retained EU Regulation 1178/2011 Part-FCL.140.A LAPL(A) – Recency requirements.

Medical

The pilot had a LAPL medical certificate issued in September 2019 (expired October 2021) following an examination by an aeromedical examiner (AME). He subsequently completed a Pilot Medical Declaration (PMD) in October 2021, which was valid for three years.

The pilot had a stroke in February 2022. He experienced limited physical symptoms, however his cognitive function was affected and he was restricted from driving. Following an occupational therapy driving assessment, he was cleared to drive by a consultant medical doctor in March 2022, five weeks after his stroke occurred. There were multiple witness reports that after his stroke, the pilot was 'never quite the same'. He had no lasting physical effects, however, he was reported to have experienced verbal challenges for over a year after his stroke occurred, only reaching a full recovery in the three months preceding the accident.

The pilot's logbook and witness reports indicate that he flew in April 2022, six weeks after his stroke and four weeks after being cleared to drive.

Pilot Medical Declaration

If a private pilot intends to only fly UK registered aircraft in UK airspace, they can apply for a PMD by self-declaring their medical fitness using an online application. A medical declaration is an affirmation of a pilots medical 'fitness to fly' and may be used to exercise the privileges of a qualifying pilot's licence, with certain conditions and limitations which are outlined on the CAA website[7].

The pilot met the conditions and limitations to apply for a PMD at the time of his self-declaration in April 2020.

The CAA offers the following guidance with regards to a pilots decrease in medical fitness:

> *"The essential requirement of pilot medical fitness remains. Licence holders are reminded of their responsibility not to fly in the event of a decrease in their fitness with respect to an illness, medical condition, medical surgery or treatment that may affect the safe operation of an aircraft. Consultation with a medical practitioner and/or AME may be needed to advise the pilot as to whether the fitness conditions of the PMD are met."*

With regard to the validity of a pilot's licence, in the context of PMD's, the CAA guidance states:

> *"Your licence is invalid without a current medical certificate or having made a medical declaration. It is your responsibility to renew the declaration if it has expired.*

Footnote

7 https://www.caa.co.uk/general-aviation/pilot-licences/applications/medical/medical-requirements-for-private-pilots/ [accessed 23 April 2024].

If you have reason to believe you no longer meet the DVLA Group 1 ODL standard, or suffer from any of the specified medical conditions, you must not fly and must withdraw the declaration by ticking the appropriate box and re-submitting the form."

The CAA confirmed that the pilot's declaration should have been withdrawn during the time when he did not hold a valid driving licence, but that once the pilot was cleared to drive by a doctor, he met the criteria required to make a PMD. Official Record Series (OFS) 4 No. 1597[8] General Exemption 6131 to the ANO means that pilots, operating aircraft less than 2,000 kgs MTOW, are required to meet the medical requirements to hold a Group 1 driver's licence, and not be taking psychiatric medication in order to make a PMD. There are no additional medical requirements and there are no circumstances under which AME advice must be sought. Therefore, the pilot's PMD and pilot's licence were valid at the time of the accident.

Other information

Post-mortem examination

The post-mortem examination concluded that the pilot sustained fatal injuries to his head and chest at the point of impact. It stated although there was no evidence the pilot experienced a medical event prior to the accident, such events may not be apparent in post-mortem examination. Therefore, impaired cognitive function or medical incapacitation could not be excluded.

Analysis

Final flight path

Evidence from the pilots in the glider under tow during the accident flight, suggests the pilot was operating the aircraft as expected at least up until and at the point of tug release. The subsequent descending right turn was largely consistent with previous flights, and although the aircraft passed through the extended centreline relatively high for a nominal 3° descent profile, data from his previous flights indicate he routinely flew steep approaches.

Control input would have been required to stop the right turn and enter a left turn but, as there was no radio call made, it is not possible to know the pilot's intention. There was a brief reduction in the rate of descent during the left turn, which may have been an indication of pilot input. Thereafter, the aircraft rate of descent, angle of bank and speed remained consistent with how the aircraft would likely fly without further pilot input.

Medical fitness

Following his stroke, the pilot had undergone medical examinations to regain his driving licence and he met the criteria to hold a valid PMD. The post-mortem report stated the cause of death was severe head and chest injuries sustained at the point of impact. There was

Footnote

8 Official Record Series 4 No. 1597 General Exemption E 6131 available at https://www.caa.co.uk/publication/download/21806 [accessed 11 October 2024].

no evidence of a medical event identified during the postmortem which would conclusively indicate the pilot was incapacitated prior to the accident. However, it further stated that the absence of such evidence was not sufficient to rule out a medical episode (such as a stroke or cardiac event) having occurred prior to the accident. Incapacitation of the pilot could have been a partial impairment or full medical incapacitation.

Aircraft serviceability

Inspection of the aircraft build history, available maintenance documents and examination of the wreckage and engine could not identify technical causal or contributory factors to this accident.

Conclusion

There was insufficient evidence for the investigation to determine the cause of the accident with certainty. Taking into account the absence of any identified technical defects, the final flight path, postmortem report and the pilot's medical history, the investigation determined that the pilot most likely experienced a partial or full medical incapacitation which resulted in his inability to continue to fly the aircraft.

Published: 21 November 2024.