Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

AIR TRANSPORTATION SAFETY INVESTIGATION REPORT A22Q0116

IN-FLIGHT SEPARATION OF LEFT WING

Privately registered
Wag-Aero Sportsman 2+2 (amateur-built floatplane), C-FFDA
Rivière Bonnard Aerodrome, Quebec, 13 NM WSW
23 September 2022

History of the flight

At approximately 0830[1] on 23 September 2022, the Wag-Aero Sportsman 2+2 amateur-built floatplane (registration C-FFDA, serial number 792), with the pilot and 1 passenger on board, took off from Lake Mylène, 12 nautical miles west of the Rivière Bonnard Aerodrome (CRB4), Quebec, to conduct a local visual flight rules flight.

Approximately 4 nautical miles south of Lake Mylène, the floatplane's left wing separated completely, resulting in an uncontrolled descent of the floatplane, which then struck the terrain. The 2 occupants were fatally injured. The floatplane was destroyed by the force of the impact. There was no post-impact fire. The 406 MHz emergency locator transmitter activated, and the Cospas-Sarsat search and rescue satellite system detected the signal at 0846.

[1] All times are Eastern Daylight Time (Coordinated Universal Time minus 4 hours).

Weather information

According to Environment and Climate Change Canada observations for the area of CRB4, located 13 NM east-northeast of the accident site, winds were from the west-northwest between 13 and 17 km/h (7 to 9 knots) between 0800 and 0900 on the day of the occurrence. The temperature was 4 °C, and the dew point was 2 °C.

The graphic area forecasts valid at the time of the occurrence indicated moderate mechanical turbulence between the surface and 3000 feet above ground level (AGL) and, occasionally, towering cumulus clouds topped at 14 000 feet above sea level, ceilings at 1200 feet AGL, and visibility of 2 to 5 statute miles in light rain and snow showers and/or mist.

Pilot information

The pilot held the appropriate licence and ratings to conduct the occurrence flight in accordance with existing regulations: he had a private pilot licence issued in 1989 and a valid Category 3 medical certificate. The pilot had accumulated over 4400 flight hours, almost all of them on the occurrence aircraft.

According to information gathered during the investigation, there was no indication that the pilot's performance was affected by medical or physiological factors.

Aircraft information

The aircraft—an amateur-built floatplane—had been built by the occurrence pilot in 1989. According to the aircraft's journey log, on 04 September 2022, the aircraft had accumulated 4422 flight hours since it was built.

The floatplane was equipped with a 200 hp Avco Lycoming IO-360-A1B6 engine (serial number L-59367A). Each wing was supported by 2 main wing struts and 2 secondary wing struts (Figure 1).

Figure 1. Occurrence aircraft (Source: aircraft owner, with TSB annotations)

Accident site and wreckage examination

The floatplane's left wing was found approximately 300 feet away from the wreckage. It was heavily damaged. The aft main wing strut was practically intact and was still attached, but the clevis that attached the strut to the fuselage was corroded and had a clean break. The other main strut (the forward main strut) normally found on the same wing was missing and was not found at

the site. Nearly all of the attachment points, hinges, and flight control linkages on the left wing showed significant signs of corrosion.[2]

The floatplane wreckage came to rest inverted. Damage to the floats and the engine was symmetrical, a sign that the aircraft was not rolling when it struck the ground. The right wing severed a small tree. The distance between this tree and the wreckage suggests a nose-down angle of approximately 60° when the aircraft struck the ground. As with the left wing, nearly all of the attachment points, hinges, and flight controls linkages on the right wing, as well as on the aircraft's tail, showed significant signs of corrosion (Figure 2).

Figure 2. Example of corrosion seen on the occurrence aircraft's tail (Source: TSB)

Technical examination

For the purposes of this investigation, the 2 main struts for the right wing (forward and aft), the aft main strut for the left wing, and all clevises attaching the struts to the fuselage were sent to the TSB Engineering Laboratory in Ottawa, Ontario, for examination. The examination revealed that the right strut clevises and aft left strut clevis had failed in overload. The forward left strut clevis showed signs of fatigue cracking.

The forward left clevis was examined using a macroscope[3] and most of the fracture surface was found to be flat with beachmarks except for a small portion at the end, which was raised and textured (Figure 3, top left image). The clevis was then examined with a scanning electron microscope.[4] The flat portion of the fracture surface was found to be heavily obliterated, although

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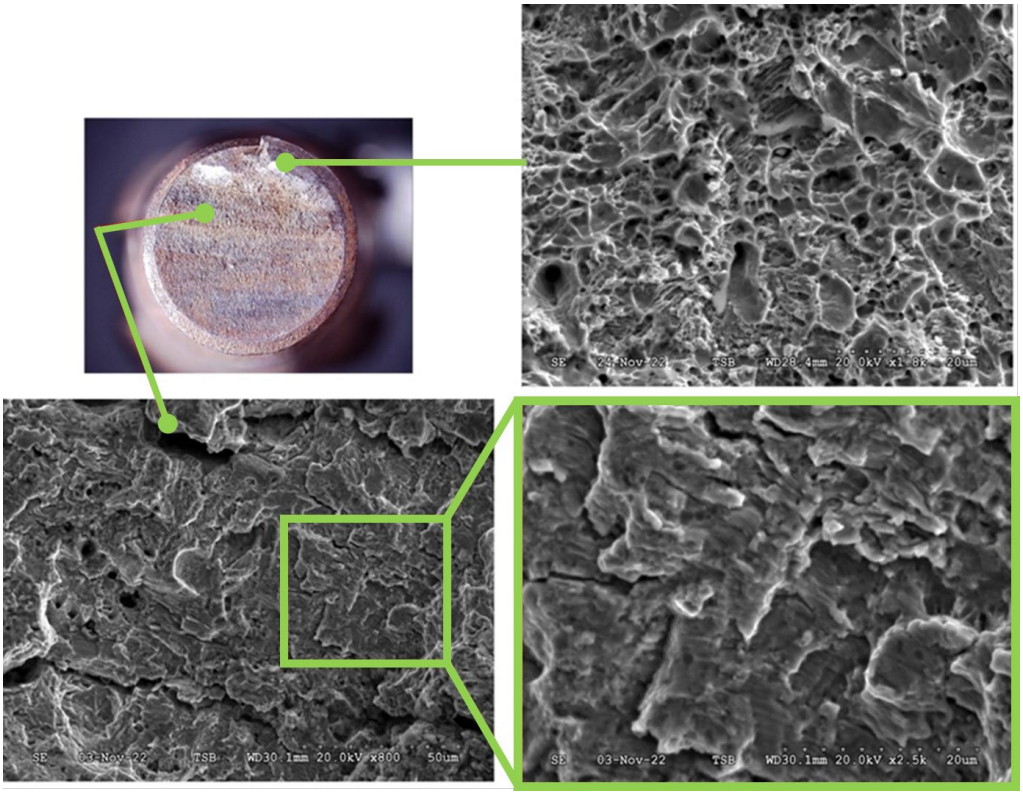
[2] Corrosion is a natural phenomenon that attacks metal and can result in the destruction of the metal to the point of making the aircraft unfit for flight.

[3] A macroscope is an optical microscope that provides low magnification and large depth of field.

[4] A scanning electron microscope produces images of a sample by scanning the surface with a focused beam of electrons.

some striations and secondary cracking (indicative of fatigue) were observed (Figure 3, lower images). No crack initiation sites were found. The raised and textured area observed macroscopically consisted of ductile dimples (Figure 3, top right image), which is indicative of ductile overload.

Figure 3. Fracture surface of the forward left clevis (top left image), ductile dimples (top right) and micrographs showing striations and secondary cracks (lower images) (Source: TSB)



The failure of the forward left clevis likely caused the aft left clevis to fail in overload, which in turn caused the separation of the left wing. An irreversible loss of control then occurred, followed by the collision with the terrain.

Aircraft maintenance

All aircraft must be maintained in accordance with a maintenance schedule[5] that lists the scheduled inspections to be carried out. The depth of these inspections must be "consistent with the general condition and operating role of the aircraft."[6] A maintenance schedule must be approved by the Minister except when the owner of a small aircraft that is not being used for commercial operations decides to comply with appendices B and C of *Canadian Aviation Regulations* (CARs) Standard 625.

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[5] Transport Canada, SOR/96-433, *Canadian Aviation Regulations*, section 605.86.

[6] Ibid., Standard 625: Aircraft Equipment and Maintenance Standard, Appendix B: Maintenance Schedules, subsection (5).

Performance of maintenance tasks

One of the requirements in Appendix B states, "[t]he method of inspection for each item on the maintenance schedule shall be in accordance with the manufacturer's recommendations or standard industry practice."[7]

For amateur-built, as well as owner-maintained aircraft, the person who performs the maintenance is not required to hold an aircraft maintenance engineer licence. However, according to the information note in Standard 571, which provides clarification on CAR 571.02, "[p]ersons who perform maintenance or elementary work are required to follow the manufacturer's recommendations, or equivalent practices."[8] For amateur-built aircraft, maintenance instructions may have been published by the kit provider. These instructions could serve as the basis for a manufacturer (the person who builds the aircraft) who decides to develop specific recommendations.[9]

Where the manufacturer has not made specific recommendations, standard industry practices are to be used. These practices include, but are not limited to, the methods published by Transport Canada, or a foreign Civil Aviation Authority, the manufacturer of a similar product,[10] or other practices that may be published provided that they are generally accepted by the Canadian aviation industry.[11]

One standard industry practice consists of using the methods published by the U.S. Federal Aviation Administration (FAA) in Advisory Circular (AC) 43-13.[12,13] This circular contains methods and practices that are acceptable for aircraft maintenance when the manufacturer has not provided recommendations.

According to the floatplane's journey log, the occurrence pilot, who was also the builder, had been carrying out annual maintenance inspections since the floatplane was built. There was no indication that these inspections were being performed according to a maintenance schedule or that they complied with specific recommendations or standard industry practices.

Over the past 5 years, the TSB has investigated 5 occurrences,[14] including this one, which highlighted issues relating to aircraft maintenance.

TSB laboratory reports

The TSB completed the following laboratory reports in support of this investigation:

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7 Ibid., Standard 625: Aircraft Equipment and Maintenance Standard, Appendix B: Maintenance Schedules, subsection (4).

8 Ibid., Standard 571: Maintenance, section 571.02.

9 Wag-Aero did not publish maintenance instructions.

10 According to the kit manufacturer, the Wag-Aero Sportsman 2+2 is a reproduction of the Piper PA-14. (Source: manufacturer's website, at www.wagaero.com/wag-aero-kit-airplanes/sportsman-2-2.html [last accessed on 16 February 2023]).

11 Transport Canada, SOR/96-433, *Canadian Aviation Regulations*, Standard 571: Maintenance, section 571.02.

12 Federal Aviation Administration (FAA), Advisory Circular (AC) 43-13-1B, Acceptable methods, techniques, and practices—Aircraft inspection and repair (08 September 1998).

13 Transport Canada does not have a document equivalent to FAA Advisory Circular AC 43-13.

14 TSB air transportation safety investigation reports A21Q0090, A21O0085, A19C0026, and A18O0106.

- LP098/2022 – Wing strut fractures
- LP102/2022 – NVM Recovery - GPS

Safety message

It is important that owners of amateur-built or owner-maintained aircraft ensure that maintenance work is carried out in accordance with the manufacturer's recommendations or, in the absence of such recommendations, in accordance with equivalent maintenance practices, such as those described in FAA AC 43-13.

This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 26 April 2023.

Visit the Transportation Safety Board of Canada's website (www.tsb.gc.ca) for information about the TSB and its products and services. You will also find the Watchlist, which identifies the key safety issues that need to be addressed to make Canada's transportation system even safer. In each case, the TSB has found that actions taken to date are inadequate, and that industry and regulators need to take additional concrete measures to eliminate the risks.

ABOUT THIS INVESTIGATION REPORT

This report is the result of an investigation into a class 4 occurrence. For more information, see the Policy on Occurrence Classification at www.tsb.gc.ca

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