

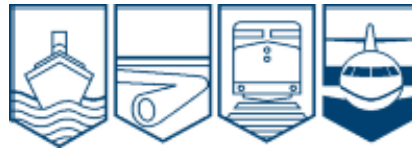
Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A05O0204



AIRCRAFT LOSS OF CONTROL – COLLISION WITH TERRAIN

**GREAT LAKES GLIDING CORPORATION
PEZETEL SZD-50-3 PUCHACZ GLIDER C-FLCK
LORETTO, ONTARIO
10 SEPTEMBER 2005**

Canada

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

Aviation Investigation Report

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Summary

The Pezetel SZD-50-3 Puchacz glider (registration C-FLCK, serial number B-2090), owned by the Great Lakes Gliding Corporation, was flying in the vicinity of Ronan Field (44°02'30" N, 079°50'42" W) near Loretto, Ontario, on a pleasure flight with two pilots on board. After approximately 45 minutes of flight, the glider was about 1000 feet above ground level and appeared to be approaching the circuit. It then entered a spin and rotated about three times before disappearing behind trees. At approximately 1605 eastern daylight time, the glider struck the ground in a steep, nose-down attitude. The aircraft was destroyed, and the two pilots were fatally injured.

Ce rapport est également disponible en français.

Other Factual Information

The weather at the time of the accident was good visual meteorological conditions (VMC) and was not considered to be a factor.

The pilot-in-command (PIC) was seated in the rear seat. He held a commercial pilot licence, issued 02 June 2000, and a glider pilot licence, issued 24 June 2002. As of May 2005, the PIC had accumulated approximately 87 hours in gliders and 505 hours in powered aircraft. His latest aviation medical examination was conducted on 03 March 2004. This examination validated his glider pilot licence, but not his commercial pilot licence since the validity period of the medical was six months for the commercial licence and five years for the glider licence.

The PIC had been taking the prescription drug Vioxx for knee arthritis, possibly for a considerable length of time before it was removed from the market. At that time, he likely switched to Celebrex. His Transport Canada Civil Aviation medical file did not indicate that he was taking either of these prescription drugs. Transport Canada Civil Aviation medical authorities confirmed that there is a very small increased risk of heart disease associated with the use of Vioxx, and that the risk would return to normal when the drug was no longer used. It was also confirmed that the use of Vioxx would not have affected the fit medical status of the PIC. Based on autopsy and medical records, there was no indication that incapacitation or physiological factors affected his performance.

The front seat pilot held a valid medical certificate and met the regulatory requirements to hold a glider pilot licence, having successfully completed the flight test on 28 May 2005. He was issued a temporary glider pilot licence, valid for 90 days, pending the issuance of a glider pilot licence. However, the licence had not been issued by Transport Canada due to administrative delays, and his temporary privileges had expired on 26 August 2005. Therefore, at the time of the accident, he did not have the necessary pilot licence documentation. He had accumulated approximately 60 hours in gliders. Based on autopsy and medical records, there was no indication that incapacitation or physiological factors affected his performance.

The accident flight was the seventh flight of the day for C-FLCK. There were no problems with the glider on the previous six flights, which had ranged in duration from 3 to 25 minutes. Some spin training had been conducted earlier in the day, with nothing unusual noticed about the spins or the spin recoveries. The general opinion of Puchacz pilots is that the Puchacz enters a spin quite easily and will also readily recover from a spin when the recovery technique, as outlined on the following page, is applied. The rate of rotation is higher than in many other gliders and the Puchacz spins with a steep, nose-down attitude, losing about 300 feet per full rotation.

In 1990, a Puchacz spinning accident that resulted in two fatalities was investigated by the Transportation Safety Board of Canada (TSB). It was determined that the glider had inadvertently entered a spin at an altitude that was too low to allow for recovery. In 2004, the United Kingdom Air Accidents Investigation Branch (AAIB) investigated a Puchacz spinning accident that resulted in two fatalities. The AAIB report¹ noted that Puchacz gliders had been involved in five previous spinning accidents in the United Kingdom, four of which resulted in fatalities, and the majority of which were the result of inadvertent spins.

¹ AAIB Bulletin No. 1/2005

The AAIB report made reference to a British Gliding Association (BGA)–sponsored low-speed handling trial of the Puchacz that was conducted in 1994 in response to three fatal Puchacz spinning accidents between 1990 and 1993. The trial was flown by test pilots and instructors. The Puchacz spin recovery was judged against the following standard spin-recovery technique, as outlined in Joint Aviation Regulation (JAR) 22, Acceptable Means of Compliance:

1. Check ailerons neutral.
2. Apply rudder opposite spin.
3. Ease control column forward until rotation ceases.
4. Centralise rudder and ease out of ensuing dive.

The Canadian equivalent to JAR 22 is the *Canadian Aviation Regulations (CARs)*, Part V – Airworthiness, Standards, Airworthiness Manual Chapter 522, which covers airworthiness standards for gliders and powered gliders.

The trial confirmed that the glider was compliant with JAR 22; however, it considered two areas worthy of additional comment. The glider was considered only marginally compliant in respect of stalls during turns, and it was noted that avoidance of uncontrolled rolling and spinning off a turn was reliant on pilot awareness and skill. The trial also noted that the height loss in a spin was significantly greater than on other glider types and that this was largely due to the steep attitude (70° nose down) of the developed spin.

The trial also investigated the aircraft's recovery characteristics when using non-standard, spin-recovery techniques. The only action that appeared to delay immediate spin recovery was the retention of full aft stick. Releasing the controls or failing to apply opposite rudder resulted in a recovery from the spin, although there were other handling issues. The AAIB report concluded that the only control mishandling of the Puchacz that can lead to a delay in spin exit is the retention of full pro-spin elevator (that is, aft stick). The report highlighted the following human factors–related issue:

When full opposite rudder is applied to counter the yaw rate, it leads to a pitch down in the spin. As the spin is already 60-70° nose down, the additional pitch down gives a very steep exit, perceived to be over vertical but probably not so. It also contributes to the extensive height loss during exit. In a tense or panic situation, particularly at low level, the involuntary reaction could be expected to be retention of full aft stick. This will sustain a spin against full opposite rudder at CG aft of 6 inches aft of datum.

C-FLCK, manufactured in 1994, had a valid Certificate of Airworthiness issued on 17 June 2004 and a valid Certificate of Registration issued on 02 September 2004. It was first registered to the Great Lakes Gliding Corporation in May 2003. Records indicate that the glider was airworthy and within the established weight and centre of gravity (C of G) limits. On the accident flight, the C of G was approximately 4 to 6 inches aft of datum.

Examination of the occurrence site and wreckage indicated that the glider was in a left spin when it struck the ground in a left-wing-low, very steep (approximately 60 to 70°) nose-down attitude. After the initial impact, the aircraft continued to rotate to the left and rebounded rearward approximately 12.5 feet. The aircraft came to rest right side up on an easterly heading. The leading edges of both wings left ground scars, and the nose left an indentation in the

ground that was several inches deep. Structure from the right side of the forward fuselage was found embedded in the ground. The fuselage, forward of the wing leading edge, which includes the cockpit, was completely destroyed at impact. The wings and tail remained attached to the fuselage, but the tail was displaced slightly to the left. The glider was equipped with four-point lap and shoulder restraints, which were worn by both occupants.

A detailed examination of the glider revealed multiple overload failures of the flight control system in the fuselage and cockpit areas. However, it was established that no pre-impact failures had occurred in any of the primary flight control systems. It was noted that the left airbrake was fully deployed and the right airbrake was partially deployed. A loss of synchronization of the airbrakes would likely affect the ability to recover the aircraft from a spin. A detailed examination was conducted to establish whether the unequal deployment occurred during flight or as a consequence of ground impact.

The design of the airbrake system is such that fore and aft movement of the airbrake lever in the cockpit results in the rotation of a torque tube located across the fuselage, between the wings. The torque tube ends are connected via dog-clutches to mechanisms in each wing that transmit the drive through a bevel gear assembly to span-wise control rods. These, in turn, are connected, via an over-centre mechanism, to the airbrake surfaces. It was found that the connection from the cockpit control to the torque tube had failed in overload, allowing the torque tube to move freely. Rotation of the torque tube by hand resulted in normal extension and retraction of the right airbrake, but no movement of the left airbrake.

Further examination of the left wing revealed that the plywood web supporting the bevel gear in the left airbrake system had become detached from the inner surface of the wing root rib. This had allowed the bevel gear assembly to lean away from the mating gear, resulting in the gear teeth no longer mating. Subsequently, this allowed the left and right airbrakes to move independently of one another. Examination of the detached area revealed clean fracture surfaces, indicating that the fracture was new. The nature of the failure suggested a peeling action, indicating a span-wise load direction. This is consistent with the impact loading of the left wing. It was therefore concluded that there was no loss of synchronization of the airbrakes before impact.

Analysis

It could not be determined why the glider entered a spin, nor could it be determined why recovery was not successful. Since it was considered highly unlikely that the pilots would intentionally spin the glider at such a low altitude, the spin was almost certainly entered into inadvertently. Before entering the circuit in preparation for landing, the pilots may have encountered a thermal and attempted to gain altitude, perhaps inadvertently allowing the speed to decrease to the point of stall and spin. There was no indication that incapacitation or physiological factors affected the performance of either pilot.

Since the glider was still in a spin at ground impact and the investigation revealed no flight control discrepancies before impact, it is likely that the pilots did not execute the proper spin-recovery technique. The possibility that a loose article in the cockpit became jammed in the controls and prevented the pilots from applying proper spin-recovery controls cannot be ruled out. However, it is considered more likely that the very steep, nose-down attitude of the glider

while in the spin, coupled with the ground proximity, resulted in the pilot flying retaining pro-spin elevator controls. As highlighted in the British Gliding Association report, the retention of aft stick could be expected to be the involuntary reaction of the pilot in such a situation.

Findings as to Causes and Contributing Factors

1. The glider inadvertently entered a spin at approximately 1000 feet above ground level and did not recover from the spin before ground impact.
2. The glider pilots likely did not execute the proper spin-recovery technique.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 02 February 2006.

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