

ACCIDENT

Aircraft Type and Registration:	X' Air 582(1), G-BZAF	
No & Type of Engines:	1 Rotax 582/48-2V piston engine	
Year of Manufacture:	2000	
Date & Time (UTC):	13 June 2009 at 0717 hrs	
Location:	Carland Cross, Cornwall	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damaged beyond economic repair	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	37 years	
Commander's Flying Experience:	88 hours (of which 21 were on type) Last 90 days - 19 hours Last 28 days - 12 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further investigation by the AAIB	

Synopsis

Approximately 15 mins after takeoff the pilot felt a "violent vibration" through the aircraft followed, by what he believed was a loss of lift from the right wing. The pilot subsequently flew a forced landing into a field of standing crops. After touchdown the aircraft nosed over onto its back. The pilot vacated the aircraft uninjured.

History of the flight

The pilot stated that he was planning to fly from Perranporth, Cornwall to Northrepps Airstrip, near Cromer, Norfolk. Approximately 15 minutes after takeoff, while flying below the cloud base of 600 ft agl, the pilot felt a "violent vibration"

through the aircraft followed by a perceived loss of lift from the right wing. Having closed the throttle and transmitted a MAYDAY call, the pilot flew a forced landing into a field of standing crops near Carland Cross, Cornwall, approximately 5 nm east of Perranporth. After touchdown the nosewheel struck a rut causing the aircraft to nose over before coming to rest inverted. The pilot vacated the aircraft uninjured. After vacating the aircraft the pilot noticed that several battens on the right wing were protruding through the underside of the wing by about 6 inches. The aircraft was damaged beyond economic repair.

Engineering examination of propellers

Two of the three propeller blades were received by AAIB in November 2009. Both showed evidence of having been removed from the propeller hub by the use of a saw. The third blade and the hub were not made available to the AAIB. One of the blades received had been separated into two pieces along the blade's span and showed evidence of a partial bending failure in a forward direction at the hub end.

Both propeller blades were subjected to a detailed examination. This examination found the blade that showed the evidence of a partial bending failure had surface defects where the resin within the surface plies had cracked and local fractures of the carbon fibres within the weave had occurred. Cross-sections of the defects showed that the surface woven carbon plies were only weakly bonded and in some areas disbonding had occurred. Where disbonding had occurred, the unsupported carbon fibres appear to have fractured in compression due to the action of flexural stresses. It was not possible to determine why or when the surface plies in these regions had begun to disbond.

Dry fibres, where the glass fibres were poorly impregnated with resin, were observed close to the root end of the blade. Cross-sections of these areas showed evidence of crack growth into the surrounding plies, which could account for some of the delaminations near the root end. Such delaminations could potentially have led to a localised reduction in the stiffness of the blade. It was not possible to determine what damage was present prior to the impact with the ground. If the partial disbonding of the surface plies and crack propagation from the poorly impregnated fibres had occurred in flight, this may have reduced the stiffness of the blade, which could have resulted in vibration being generated.

There was no evidence of similar surface defects in the second propeller blade.

Photographic evidence

The pilot sent a number of digital photographs taken at the accident site both with the aircraft inverted and after it was recovered into an upright position. From the photographs it could be seen that when the aircraft had come to rest inverted one of the propeller blades was projecting vertically downwards and would have been in contact with the ground. The two other propeller blades appeared intact and undamaged. The photographs taken after the aircraft had been recovered to the upright position showed that the propeller blade that was projecting vertically upwards had damage at the leading edge in the area of the hub end of the blade.

Pilot's comments

The pilot commented that he kept the aircraft parked outside without covers on the propellers. He added that on the previous flight he flew through rain for approximately 35 mins. During the pre-flight inspection, prior to the accident flight, there was no sign of damage to the propellers.

The pilot believed that the apparent loss of lift was probably due to low level turbulence.

Aircraft importer's comments

The aircraft importer viewed the accident photographs. He commented that he has not known the battens to unseat themselves in flight. He believed the protruding battens are likely to have been pushed through the fabric of the wing as a result of the weight of the aircraft on them in the inverted attitude. He added that if a few battens did unseat themselves they would only come out

1 to 1.5 inches and would have no appreciable effect on the aircraft's handling.

He added that the propellers can suffer damage if flown through rain for more than a few minutes.

Discussion

Despite the limited choice of forced landing site available due to the relatively low cruise altitude, the field selected appeared from the air to be suitable. Although it contained standing crop which obscured the rut that caused the aircraft to overturn, the alternative fields were all much smaller.

The propeller examination showed evidence of partial

disbonding of the surface plies, crack growth and a partial bending failure at the root end of one of the propeller blades but it was not possible to determine when this damage occurred. The pilot stated that he did not cover the propellers when the aircraft was parked, he had flown through rain prior to the accident flight and there were no visible signs of damage during his pre-flight inspection. As a result it is possible that the propeller cracked due to the latent partial disbonding and aerodynamic forces that affect the propeller in flight, causing the vibration experienced by the pilot. It is also possible that the damage to the propeller blade could have occurred during the accident and subsequent wreckage recovery.