

**Aviation Safety Investigation Report
199400356**

**Aerospatiale
Squirrel**

11 February 1994

Readers are advised that the Australian Transport Safety Bureau investigates for the sole purpose of enhancing transport safety. Consequently, Bureau reports are confined to matters of safety significance and may be misleading if used for any other purposes.

Investigations commenced on or before 30 June 2003, including the publication of reports as a result of those investigations, are authorised by the Executive Director of the Bureau in accordance with Part 2A of the Air Navigation Act 1920.

Investigations commenced after 1 July 2003, including the publication of reports as a result of those investigations, are authorised by the Executive Director of the Bureau in accordance with the Transport Safety Investigation Act 2003 (TSI Act). Reports released under the TSI Act are not admissible as evidence in any civil or criminal proceedings.

NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

Occurrence Number: 199400356 **Occurrence Type:** Accident
Location: 3km N Perth Airport
State: WA **Inv Category:** 3
Date: Friday 11 February 1994
Time: 1601 hours **Time Zone** WST
Highest Injury Level: None

Aircraft Manufacturer: Aerospatiale
Aircraft Model: AS.350B
Aircraft Registration: VH-WCG **Serial Number:** 1572
Type of Operation: Commercial Other
Damage to Aircraft: Substantial
Departure Point: Perth Airport WA
Departure Time: 1547 WST
Destination: Perth Airport WA

Crew Details:

Role	Class of Licence	Hours on	
		Type	Hours Total
Pilot-In-Command	Commercial	430.0	7200

Approved for Release: Monday, May 27, 1996

Factual information

The aircraft was on an approach to Perth Airport. At 400 ft and 80 kts it began to vibrate severely. The vibration appeared instantly at full amplitude and did not vary for the remainder of the flight. The pilot declared an emergency and carried out a precautionary landing in a transport parking area. The aircraft was not damaged during the landing. The stainless steel leading edge strip of one tail rotor blade was missing. The out-of-balance tail rotor caused substantial damage to the tail boom in the vicinity of the tail rotor blade.

The stainless steel leading edge strip detached because the bond between the strip and the blade body was inadequate. There had been little transfer of adhesive to the steel and the adhesive contained many voids. The leading edge strip that remained attached to the other blade and its adhesive exhibited similar characteristics to the failed strip. The lack of bonding had allowed moisture into the area between the steel strip and the blade, causing further deterioration.

Analysis

A review of BASI air safety occurrences and the Civil Aviation Authority defect reporting database did not disclose any other reported instances where the leading edge strips had become detached during the life of the blade. The blade was manufactured in early 1991. The manufacturer reported that the pre-1991 manufacturing process had produced a number of faulty blades and the process was changed. It could not be determined if the blade had been manufactured using the pre- or post-1991 process. The factors leading to lack of bonding during the manufacture of the failed blade could not be determined.

Because debonding was seen as a significant potential problem, the operator required pilots to carry out a coin-tap test on the blade on a daily basis to determine whether debonding had occurred. A check was conducted by two different pilots on the day of the accident without disclosing any sign of debonding in the leading edge strip. In addition, the blades had been inspected on many previous occasions by both pilots and qualified aircraft engineers. These inspections also failed to disclose the lack of bonding. The lack of bonding on the tail rotor blades extended over the whole leading edge strip area on both blades. Consequently, it is unlikely that the coin tap-test would have produced sufficient variation in the sound between different parts of the blade for an observer to recognise debonding.

Significant Factors

The following factors were determined as being significant to the accident.

1. The bonding process used to attach the leading edge strip to the tail rotor blade was inadequate in that an unacceptable number of voids were left after the process was complete.
2. The use of a coin-tap test as a check for delamination was inadequate in that it may not have disclosed that the strip had delaminated to the point that failure was imminent.

Safety Action

1. The manufacturer has introduced a different bonding process to ensure a lower likelihood of debonding.