

**Aviation Safety Investigation Report
199301775**

**Robinson Helicopter Co
R22**

16 June 1993

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: 199301775 **Occurrence Type:** Accident
Location: Lyndhurst Station
State: QLD **Inv Category:** 4
Date: Wednesday 16 June 1993
Time: 1415 hours **Time Zone** EST
Highest Injury Level: None

Aircraft Manufacturer: Robinson Helicopter Co
Aircraft Model: R22 BETA
Aircraft Registration: VH-HEW **Serial Number:** 0622
Type of Operation: Non-commercial Aerial Mustering
Damage to Aircraft: Substantial
Departure Point: Lyndhurst Station
Departure Time: 1415 EST
Destination: Clarke Hills Station

Approved for Release: Monday, August 29, 1994

Following lift-off, at approximately 50 ft AGL, the pilot heard a loud bang and drive to the main rotor was lost. In the subsequent heavy landing, the main rotor struck and severed the tail boom. The aircraft remained upright.

Wreckage examination revealed that, while under power, both main rotor drive belts had rolled off the drive pulleys. It was found that both the forward and intermediate flexplates had also failed. The front flexplate had fractured and separated first, causing the intermediate flexplate to fail when it was free to move forward out of alignment. The main rotor drive shaft assembly, including all broken pieces of the forward and intermediate flexplates, was removed from the wreckage and forwarded for specialist metallurgical examination.

The examination determined that the forward flexplate had failed under load as a result of metal fatigue. The fatigue cracking had initiated at an area of corrosion pitting on the forward edge of the flex plate. Areas of corrosion were also observed under sections of blistered paint at several other sites on the flexplate surface. The edges of the flexplate had been painted with a chromate primer and a protective top coat. The paint had blistered and formed sites that acted to trap moisture next to the metal. Chlorides contained in the moisture then acted as the electrolytic agent that caused the corrosion.

The investigation was not able to determine the source of the chlorides. However, they could have resulted from environmental factors caused by the helicopter operating in coastal areas or over dry salt lakes. A further possibility was that 'hard' water (containing minerals) from artesian or other sources could have found its way on to the plates.

The maintenance records indicate that with respect to main rotor drive shaft alignment, the helicopter was maintained in accordance with the manufacturers maintenance procedures.



The maintenance documentation indicated that the failed flexplate (p/n A947-1) had been in service for a total of 3,136 hours. Striations in the surface of the fatigue crack indicated that crack growth had occurred over a period of about 180 flights.

Subsequent to this accident, a flexplate fitted to VH-HBO (BASI report 9303302) failed in similar circumstances. Crack initiation to failure occurred over 350 flights on the flexplate which had been in service for a total time of 1,249 hours. A similar failure occurred in New Zealand. In the New Zealand example, the number of cycles to failure was not determined. However, the total time in service for this component was 1,486 hours. The Bureau recently obtained a flexplate which had been in service for 4,500 hours and which showed no visible evidence of cracking. The manufacturer does not specify a service life for the flexplates.

Significant Factors

The following factors were considered relevant to the development of the accident:

1. Localised corrosion pitting was created under regions of blistered and lifting paint on the edge of the flexplate.
2. Fatigue cracking had initiated from one area of pitting.
3. The flexplate failed as a result of fatigue cracking.

Safety Action

The safety deficiencies identified in this investigation were found to be similar to those identified in occurrence 9303302.

The Bureau of Air Safety Investigation issued a recommendation, R940092 with Air Safety Occurrence Report 9303302 and the recommendation is detailed in that report.

