Aviation Safety Investigation Report 199001167

Aerospatiale AS350B

4 December 1990

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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: 199001167 Occurrence Type: Accident

Location: Strahan TAS

Date: 4 December 1990 **Time:** 1411

Highest Injury Level: Nil

Injuries:

	Fatal	Serious	Minor	None
Crew	0	0	1	1
Ground	0	0	0	-
Passenger	0	0	0	1
Total	0	0	0	2

Aircraft Details: Aerospatiale AS350B

Registration: VH-HRR **Serial Number:** 1263

Operation Type: Aerial Work
Damage Level: Substantial
Departure Point: Hibbs Bay TAS

Departure Time: 1351

Destination: Strahan TAS

Approved for Release: 2nd March 1992

Circumstances:

While the helicopter was flying at about 60 knots and 400 feet above the ground, the pilot heard a loud bang. The helicopter yawed slightly and the pilot felt an airframe vibration. As the pilot reduced airspeed and initiated a descent, he saw the red fire warning light illuminated and realised that the engine had failed. After a successful autorotative landing, the pilot extinguished several small scrub fires under the helicopter tail boom. These fires were ignited by hot metal ejected from the engine. He also extinguished a small oil fire in the engine bay. The engine failure resulted from the failure of the intermediate gear/pinion in the reduction gearbox. The gear failed due to fatigue cracking which commenced at an overstress crack. This crack, plus similar cracks found in the root of five adjacent gear teeth, probably occurred as a result of main rotor blade strikes which occurred when the helicopter rolled over during a ground run approximately 765 hours time-in-service earlier. After this earlier rollover accident, the reduction gearbox was inspected and returned to service in accordance with the Turbomeca Arriel 1 Engine Maintenance Manual. The engine manufacturer is aware of two other total ruptures of intermediate gears of the same modification status as was fitted in the reduction gearbox of VH-HRR. Eight more failures of intermediate gears of a later modification status have been detected by pilots, without ensuing engine failures, because of warning lights triggered by metal particles on an electric magnetic plug.

Significant Factors:

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

1. VH-HRR experienced a rollover accident involving main rotor blade strikes approximately 765 hours time-inservice previously.

- 2. Engine maintenance manual inspection requirements do not necessarily require overhaul or crack testing of a reduction gearbox after main rotor strikes/sudden stoppages.
- 3. Fatigue cracking commenced at an overstress crack on the intermediate gear within the reduction gearbox.

Reccomendations:

It is recommended that the CAA liaise with the engine manufacturer to consider the desirability of incorporating more stringent inspection requirements in the engine maintenance manual to detect cracks in components after rotor blade strikes/sudden stoppages. RESPONSE TO S The CAA has been in contact with the engine manufacturer (Turbomeca) and the relevant certification authority (DGAC) with respect to reduction gearbox failures. Turbomeca intends to be more precise in the wording of the Engine Maintenance Manual concerning inspections to be carried out after rotor blade strikes/sudden stoppages.