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AAIB
Air Accidents Investigation Branch

Department for Transport

AAIB Bulletin S2/2012 *SPECIAL*

ACCIDENT

Aircraft Type and Registration:	EC225 LP Super Puma, G-REDW
No & Type of Engines:	2 Turbomeca Makila 2A1 turboshaft engines
Year of Manufacture:	2009 (serial no 2734)
Location:	20 nm east of Aberdeen
Date & Time (UTC):	10 May 2012 at 1114 hrs
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 2 Passengers - 12
Injuries:	Crew - None Passengers - 2 (Minor)
Nature of Damage:	Damage to be assessed following salt water immersion
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	To be advised
Commander's Flying Experience:	To be advised
Information Source:	AAIB Field Investigation

The investigation

The Air Accidents Investigation Branch (AAIB) was notified at 1112 hrs on 10 May 2012 that the helicopter was preparing to ditch in the North Sea approximately 20 nm east of Aberdeen. Preparations were made for the deployment of an investigation team. The team deployed to Aberdeen that afternoon and commenced the investigation.

In accordance with established International arrangements, the Bureau d'Enquetes et d'Analyses pour la Securitie de l'Aviation Civile (BEA), representing the State of Manufacture of the helicopter, and the European Aviation Safety Agency (EASA), the Regulator responsible for the certification and continued airworthiness of the helicopter, were informed of the accident. The BEA has appointed an Accredited Representative to lead a team of investigators from the BEA and Eurocopter, the helicopter manufacturer. The UK Civil Aviation Authority and the aircraft operator are also providing assistance to the AAIB team.

The investigation into the circumstances of this accident is being conducted under the provisions of the Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 1996, Annex 13 to the ICAO Convention on International Civil Aviation and Regulation EU 996/2010.

Because of the importance of helicopter operations in support of the offshore oil and gas industry it is considered appropriate to disseminate the results of the initial investigation as soon as possible. No analysis of the facts has been attempted.

Synopsis

The crew of the helicopter carried out a controlled ditching following indications of a failure of the main gearbox (MGB) lubrication system and, subsequently, a warning indicating failure of the emergency lubrication system. All passengers and crew evacuated the helicopter into a life raft and were subsequently rescued. Two passengers sustained minor injuries. The investigation has identified a 360° circumferential crack in the bevel gear vertical shaft in the main gearbox, in the vicinity of a manufacturing weld, causing disengagement of the drive to both mechanical oil pumps.

History of the flight

The helicopter was on a scheduled flight from Aberdeen Airport to the Maersk Resilient platform, in the North Sea 150 nm east of Aberdeen. On board were two flight crew and twelve passengers. The helicopter was in the cruise at 3,000 ft with the autopilot engaged and at an approximate speed of 143 KIAS. 34 nm east of Aberdeen Airport, the crew were presented, almost simultaneously, with the following indications:

- WARN red light and aural gong

- MGB.P[1] caption illuminating on the Central Warning Panel (CWP)

- CAUT amber light

- XMSN caption illuminating on the CWP

- M.P[2] and S/B.P[3] illuminated on the vehicle monitoring system (VMS)

- SHOT illuminated on the MGB control panel

- Zero indication on the main gearbox oil pressure gauge.

In addition, CHIP illuminated on the VMS and the MGB oil temperature started to increase.

The commander assumed control of the helicopter, reduced speed towards 80 KIAS, turned back towards the coast and initiated a descent. The crew activated the emergency lubrication system.
During the descent, the MGB EMLUB[4] caption illuminated on the CWP, for which the associated procedure is to land immediately. The commander briefed the passengers and carried out a controlled ditching. The total flight time was 27 minutes.

The helicopter remained upright, supported by the emergency flotation gear. After shutting down the engines and stopping the rotors, the crew and passengers evacuated the helicopter into one of the life rafts via the

Footnote

1 The MGB.P caption indicates a pressure drop in the MGB oil distribution manifold
2 Pressure drop in the main lubrication system
3 Pressure drop in standby lubrication system
4 The MGB EMLUB caption indicates loss of emergency MGB lubrication

starboard cabin door. Six of the occupants were rescued from the life raft by a search and rescue helicopter, eight were transferred to a RNLI lifeboat.

Helicopter information – lubrication of the main gearbox

The main gearbox lubrication system includes two mechanically-driven oil pumps and a crew-activated emergency system. The gearbox normally contains 22 litres of oil. The oil pumps (a main pump and a standby pump) are driven by the oil pump drive pinion located on the lower part of the bevel gear vertical shaft (part no 332A32510100) within the main gearbox. This particular vertical shaft is fitted to all EC225 and some AS332 L1 and L2 helicopters. The bevel gear vertical shaft is manufactured from two sections welded together.

The emergency system includes an 11 litre tank of glycol and an electric pump. When selected, the glycol is pumped into the main gearbox with engine bleed air to form a spray. This spray is designed to provide a minimum of 30 minutes of main gearbox cooling and lubrication in the event of total loss of oil lubrication. The MGB EMLUB caption illuminates if there is a failure of this system.

Recorded data

The helicopter was equipped with a combined digital voice and data recorder (DVDR). It was also equipped with a HUMS[5] system which included two vibration sensors that monitored the drive to the main gearbox oil pumps. These sensors had recorded increasing vibration levels during the previous few flying hours prior to the accident flight and were being monitored, in accordance with the manufacturer's maintenance manual.

The combination recorder and other items of the helicopter's avionics have been recovered and are being analysed by the AAIB.

Preliminary engineering investigation

The main gearbox was drained and was found to contain about 14 litres of fluid, which was predominantly oil but with evidence of some glycol. An initial visual inspection of the main gearbox has identified a 360° circumferential crack on the bevel gear vertical shaft, in the vicinity of the weld that joins the two sections. As a consequence of this failure, the main and standby oil pump gears ceased to be driven. During this inspection it was observed that the lower part of the vertical shaft was displaced downwards by 6 mm.

Further investigation

Detailed examination of the failure to the bevel gear vertical shaft in the main gearbox and the reason for the indication of a failure in the emergency lubrication system continues.

Footnote

5 HUMS – Health and Usage Monitoring System which monitors and records vibration levels at various locations on the helicopter