

ACCIDENT

Aircraft Type and Registration:	Robinson R22 Beta, G-CBPT	
No & Type of Engines:	1 Lycoming O-360-J2A piston engine	
Year of Manufacture:	2002	
Date & Time (UTC):	26 August 2005 at 1537 hrs	
Location:	Near the Prince Consort Buoy, ½ nm off Cowes, Isle of Wight	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Helicopter sank intact	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	44 years	
Commander's Flying Experience:	416 hours (of which 84 were on type) Last 90 days - 4 hours Last 28 days - 1 hour	
Information Source:	AAIB Field Investigation	

Synopsis

Whilst flying north of Cowes on a private sightseeing flight, the pilot heard a loud bang and found that the helicopter was no longer flying normally. He immediately entered an autorotation and was able to make a controlled touchdown beside the Price Consort Buoy, at the entrance to Cowes harbour. He and his passenger were rescued almost immediately. The helicopter sank quickly and was not recovered. The symptoms reported by the pilot were consistent with the failure of one of the two drive belts transmitting power from the engine to the main transmission. One safety recommendation has been made regarding advice to pilots in the event of ditching.

History of the flight

The pilot intended to conduct a sightseeing flight, with a friend, in a helicopter hired from a flying training organisation at Blackbushe. Earlier in the day he had flown with an instructor in order to satisfy the currency requirements of the training organisation. During this flight the pilot practiced several manoeuvres including simulated engine failures. He then refuelled the helicopter and departed at 1110 hrs for a flight of approximately 30 minutes duration to a private landing site near Lee-on-Solent, Hampshire, where he had arranged to meet his passenger. He subsequently departed at 1525 hrs and planned to fly along the nearby coast; however, on approaching Lee-on-Solent he found that there was gliding activity at that airfield and he therefore decided to fly south towards the Isle of Wight.

Approaching Cowes from the north, the pilot turned to the right in order to return to the private landing site. The pilot reported that after completing the turn there was a loud bang which appeared to come from above and behind his head; the helicopter lurched and the controls became slack. It was apparent that power to the rotors had been lost and the helicopter was no longer flying normally. Although he did not recall the manoeuvre clearly, the pilot believed that the helicopter had turned left from a northerly onto a westerly heading. He immediately lowered the collective and entered an autorotation, noting that the airspeed indicator was reading zero. As ditching was inevitable, the pilot told his passenger to loosen his seatbelt and open his door while making the same preparations himself. His priority was to land the helicopter as close as possible to one of a number of boats present in the area to increase the chance of a rapid rescue. He was able to make a controlled touch down beside the Prince Consort Buoy, at the entrance to Cowes Harbour. The helicopter started to fill with water immediately and sank quickly below the surface; however, both occupants were able to vacate the helicopter unaided and without injury. They were rescued almost immediately.

Additional information

Clutch system observations

The pilot recalled that on start up at Blackbushe, he had observed that the main rotor took longer than usual to start turning. During the flight to the private landing site, the clutch caution light illuminated several times but for less than six seconds on each occasion. On shutdown at the private landing site, the clutch light took longer than usual to extinguish.

The pilot also reported that, during the accident flight, as the aircraft headed across the Solent, he thought he heard what he described as “whining” sounds. At the

time he judged that he may have been imagining this since he had some trepidation about flying over water in a single-engine aircraft.

Fuel

Records provided by the fuel supplier at Blackbushe Airport indicated that the helicopter uplifted 40 litres of AVGAS at 0857 hrs and a further 55 litres at 1103 hrs. Entries in the aircraft’s technical log indicating fuel onboard and fuel uplifted correspond to these amounts, and indicate that on the flight prior to the accident flight the helicopter departed from Blackbushe with approximately 20 US gallons (USG) of fuel. The pilot stated that, having refuelled the helicopter at Blackbushe, he also inspected the fuel tank contents visually on arrival at the private landing strip, and estimated that there were 14 USG remaining. The pilot estimated that the helicopter had been in flight for no more than 20 minutes before the accident, which suggests that, at an average cruise consumption rate of 10 USG/hr or less, there would have been at least 10 USG of fuel remaining.

Meteorological information

The pilot reported a south-westerly surface wind of 15 to 20 kt with broken cloud at 3,000 ft and visibility in excess of 5,000 m. Historical information provided by the Met Office confirmed the pilot’s assessment and indicated that the outside air temperature and dew point were approximately +18°C and +11°C respectively. Consequently, there would have been a possibility of moderate carburettor icing at cruise power.

Wreckage location

A survey of the seabed, using side-scan sonar, commenced on the fourth day after the accident in order to assess the possibility of recovering the helicopter or its wreckage. Nothing was identified that was considered likely to

be part of G-CBPT. The average tidal movement in a twelve hour period was assessed as approximately 1 kt to the west, indicating that any wreckage which had not become anchored or obstructed would have travelled 6 nm or more downstream of the point of impact since the time of the accident. Had parts of G-CBPT been located after such movement, it was considered likely that they would have been so disrupted as to provide no assistance with the investigation, and the survey was terminated. No wreckage was recovered.

Survival aspects

Safety Sense leaflet 21B – *General Aviation Ditching*, is published by the Civil Aviation Authority. It states:

It is vital TO WEAR a suitable lifejacket whilst flying in a single engined aircraft over water beyond gliding range from land.

Neither the pilot nor the passenger wore a life jacket, and none were carried in the helicopter. In this instance, both occupants were fortunate to have been rescued almost immediately by one of a large number of boats that were present.

The leaflet contains further information about what to expect in the event of ditching. Although there is no specific reference to the use of seatbelts, the text makes clear that the forces of impact can be severe and it follows that adequate restraint is vital to reduce the likelihood of injuries. The aircraft was equipped with lap and inertia reel shoulder harnesses which were designed to lock in the event of an accident. The pilot of G-CBPT was able to touch down in full control of the helicopter and loosening of the seat belts did not result in injury in this case. However, it is usual in the event of an emergency for seatbelts to remain securely fastened until the aircraft has come to rest.

The pilot's decision to unlatch the doors prior to touchdown was prudent. In the event of a violent touchdown, distortion of the structure may have made it difficult or impossible to open cabin doors. Prior opening of the doors enabled the cabin to flood immediately, thus equalising pressure either side of the doors and allowing them to be opened very shortly after touch down. Appropriate advice is included in the Emergency Procedures section of the Pilot's Operating Handbook (POH) under the heading "DITCHING – POWER ON" but not under the heading "DITCHING – POWER OFF". It is therefore recommended that:

Safety Recommendation 2006-04

The Federal Aviation Administration should ensure that Robinson Helicopter Corporation includes, in each of the ditching procedures published in the Emergency Procedures section of the R22 Pilot's Operating Handbook, an instruction to unlatch the doors prior to touchdown.

Technical Investigation

No wreckage from the helicopter was recovered; however, some (if not all) of the symptoms reported by the pilot would be consistent with failure of one of the two drive belts transmitting power from the engine to the main transmission. A comprehensive discussion of the known problems which can afflict these belts, particularly those which have been fitted relatively recently, is contained in the account of an accident to a similar helicopter, G-LEDA, in AAIB Bulletin 1/2004. This report noted the vulnerability of low-time belts to failure due to stretching after installation, which can allow the belts to partially ride-up out of the pulley grooves during clutch engagement and incur damage eventually leading to failure.

Of particular note is the pilot's statement that it took longer than normal for the rotors to start turning after the clutch was engaged prior to takeoff. The POH states, in the Normal Procedures section covering Engine Starting and Run-up:

Clutch switch.....Engaged

Blades turning.....Less than 5 seconds

The reason for the 5 second limitation is to check whether the drive belts have stretched. Although the clutch actuator should always maintain the correct belt tension when engaged, an abnormally long time interval

between selection and rotor movement indicates that the actuator is having to travel further before the correct tension value is reached (or that the action of the actuator is slow for some reason). It is during this period that damage can be caused.

The G-LEDA report mentions the particular vulnerability of drive belts with less than 50 hours running time since new and that most failures were occurring within 20 hours. G-CBPT had had a matched pair of new belts fitted some 20 hours prior to this accident, although a check of the clutch rigging and adjustment of belt alignment had been carried out 6 hours prior to the flight.