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Collision with terrain, VH-RDU Double Mountain, Queensland 8 September 2011

Abstract

At about 1140 Eastern Standard Time on 8 September 2011, a Eurocopter AS350BA helicopter, registered VH-RDU, with a pilot and two passengers on board, collided with terrain on approach to land at a helicopter landing site that was located on a peak of Double Mountain South, Queensland.

The pilot and front seat passenger were fatally injured and the rear seat passenger received serious injuries. The helicopter was substantially damaged. There was no fire.

The investigation is continuing.

FACTUAL INFORMATION

The information contained in this preliminary report is derived from initial investigation of the occurrence. Readers are cautioned that there is the possibility that new evidence may become available that alters the circumstances as depicted in the report.

History of the flight

At about 1140 Eastern Standard Time[1] on 8 September 2011, a Eurocopter AS350BA helicopter, registered VH-RDU, with a pilot and two passengers on board was conducting aerial work operations under the visual flight rules in the Shoalwater Bay military training area, Queensland (Qld). The helicopter collided with terrain on approach to land at a helicopter landing site (HLS) that was located on a peak of Double Mountain South (Figure 1).

Figure 1: Location of the accident site

The pilot and front seat passenger were fatally injured and the rear seat passenger received serious injuries. The helicopter was substantially damaged. There was no fire.

Survivor's description

The surviving passenger, who occupied the rear left seat, reported that the pilot was preparing to land after twice circling the helipad slowly to the right, before making an approach from the south-west. While hovering at a height of about 80 ft from the landing pad, the helicopter

1 Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 hours.

commenced a climb, and turned left in what the passenger believed was a controlled manoeuvre by the pilot.

The passenger stated that at that moment, the helicopter encountered a lifting 'gust' and started to spin to the left, completing two full rotations. The helicopter's nose dropped in what the passenger thought was an attempt by the pilot to regain control. The helicopter then began to 'oscillate', a manoeuvre that the passenger demonstrated using a helicopter model as a steep nose-down attitude, with roll[2] and yaw[3] from side to side. The helicopter struck the tree canopy before colliding with the ground, inverted.

The passenger reported that he was able to cut himself free from the seat belt using a 'Leatherman' tool, and summon emergency services using a mobile phone. He was later rescued by paramedics and flown to hospital by rescue helicopter.

Pilot information

The pilot held a Commercial Pilot (Helicopter) Licence, a helicopter class endorsement on the AS350, and a valid Class 1 Medical Certificate. The pilot commenced helicopter training in 2002, and had a total helicopter experience of 957 hours, including 32.8 hours in the AS350. He had worked as a casual pilot for the operator over the last 6 years and this was his first flight to the HLS at Double Mountain South.

The pilot's logbook showed that he had satisfactorily completed a helicopter flight review on 25 September 2009. The pilot was checked again on 29 May 2011, before recommencing flying duties following an occurrence in PNG earlier that year.

The passenger reported that the pilot was well rested and had performed his duties that day in a normal manner. On the previous day, the pilot flew 1.8 hours in similar operations in the Shoalwater Bay training area and was on duty for 8.5 hours. The passengers and pilot were reported to have dined together that evening and to have retired to their respective accomodation by 2130.

Two days prior to the accident, the pilot had flown 5.9 hours in the helicopter from Cairns to Yeppoon, Qld, in preparation for the for the planned airwork in the Shoalwater Bay area.

Aircraft information

The helicopter, serial number 2495, was a six-seat, single-engine helicopter that was manufactured in France in 1991. In 1992, it was converted to an AS350BA, including by fitting wider chord main rotor blades and a tail rotor servo that were also found in the twin-engine AS355 helicopter. It was placed on the Australian register in August 2003.

In August 2007, the helicopter's Turbomeca model Arriel turbine engine was replaced by a Honeywell model LTS101-600-A3A turbine engine. That modification was carried out in accordance with Soloy Aviation Solutions kit supplementary type certificate number SR00805SE and LTS 101 conversion kit AS350SD1.

In June 2009, after a hard landing and tailrotor strike, the helicopter's engine, tailrotor blades, control rods and drive system components, along with several skid-type landing gear components were replaced. The main rotor blades were removed, inspected, repaired and reinstalled.

At the time of the accident, the helicopter had a total time in service (TTIS) of 19,679.2 hours.

The maintenance release was valid until 20 July 2012 or 19,745.3 hours TTIS, and showed that the last scheduled maintenance was a 25-hourly inspection on 22 August 2011. There were no recorded defects at that time.

The helicopter was refuelled the previous day from new drum stock and had flown 2.4 hours since that time.

Weather conditions

The passenger reported that the weather at the time was fine. He recalled some turbulence as the helicopter approached the HLS and that the vanes on the wind turbines at the site were spinning in the wind[4].

Recorded data from the Bureau of Meteorology (BoM) weather station at Samuel Hill, which was located on the coastal plain 25 km east of Double Mountain, showed a moderate east to east-south-easterly wind of up to 15 kts that day.

2 Rotation of the helicopter about its longitudinal axis.

3 Rotation of the helicopter about its vertical or normal axis.

4 The design of the wind turbines did not permit them to provide an accurate indication of the wind strength or direction.

An Aerological diagram was derived by the BoM from data that was obtained by weather balloon at Rockhampton Airport, Qld at 0900 that morning showed the wind at 2,500 ft as 15 kts from the east-north-east and a temperature of 16 °C. The national aeronautical processing inoformation system had no record of the pilot accessing weather or NOTAM information for that day.

Double Mountain South HLS

The HLS was situated atop the western peak of Double Mountain and under the control of the Department of Defence. It had an elevation of 2,421 ft and was surrounded by trees on three sides and a mast and antenna array on the other (Figure 2). A number of trees encroached the approaches to the HLS and the landing surface was uneven and covered by long grass. Numerous tree stumps protruded above ground level.

Figure 2: View of the HLS, looking south-east

The helipad was established to permit access to radio communication equipment associated with the military training area. Helicopters were the only means by which maintenance crews could access that equipment, as there were no roads or tracks to the site.

The passenger reported that he and the other passenger had intended to carry out maintenance of the HLS. That entailed spraying herbicide and clearing vegetation from around the helipad as they had done at a previous helipad. He stated that, although there were environmental concerns about unneccessarily clearing vegetation, they took guidance from the pilots as to the extent of the clearing necessary to ensure safe approaches and departures from the HLS. The clearing of vegetation occurred annually as no permanent herbicides were used in support of that task.

The helicopter operator described operations into the helipad as not being the most difficult of those in the Shoalwater Bay military training area but, as with most of them, ongoing clearing of the surrounding vegetation improved helicopter access. It was reported that the HLS could be affected by wind 'rushing' up the slope but that generally, a steady wind assisted helicopter operations at the site.

Wreckage examination

The wreckage of the helicopter was located on a steep slope about 50 m west of the HLS, in dense forest (Figure 3). It was oriented on a magnetic bearing of 250°. During the impact sequence, the helicopter descended through the trees at a very steep angle, breaking off a number of substantial tree branches before impacting the ground.

Figure 3: Aerial view of the wreckage

All of the helicopter's major rotor and dynamic components were accounted for at the accident site with the exception of one tailrotor blade that was liberated during the impact sequence. Continuity of the flight control system was established.

Blade cuts on the tree branches were consistent with marks on the leading edges of the main rotor blades and of the remaining tailrotor blade. The first blade strikes were on branches at a height of about 23 m on a tree that was about 9 m back along the swath through the trees.

The damaged rotor and drive systems displayed evidence of being powered at the time the

helicopter contacted the trees. A number of components from those systems and of the helicopter's flight controls were retained for technical examination. The pilot's Global Positioning System equipment was also recovered.

A substantial quantity of Avtur (aviation turbine fuel) was present in the helicopter's fuel tank.

Survival aspects

Helicopter and operator equipment

The helicopter was equipped with an ARTEX ME406 emergency locator transmitter (ELT). When armed, the ELT was designed to activate on impact and transmit a distress signal on frequency 406 MHz. The COSPAS-SARSAT international satellite-aided tracking system detected distress signals from activated ELTs and relayed those signals on a 24-hours a day basis to the Rescue Coordination Centre (RCC) of the Australian Maritime Safety Authority (AMSA), through ground receiver stations.

The ELT was registered with AMSA, which meant that a distress signal from the beacon would direct the RCC to the registration database that held information such as the aircraft's registration and relevant emergency contact names and telephone numbers. Although the helicopter's ELT activated, its antenna, which was mounted on top of the helicopter's tail boom, had separated on impact. Consequently, its distress signal was not received by the RCC.

The operator of the helicopter had also installed a flight monitoring system that used satellite and web-based communication systems to allow the operator to receive accurate information on the location of company aircraft every 10 minutes while they were in flight. An alert and the location of the helicopter was also provided in the event of an emergency. As such, it supplemented the other methods of search and rescue (SAR) alerting.

In an emergency, the flight monitoring system stopped transmitting to the website, immediately generating distress messages that were sent by text and email to the operator's nominated personnel. Those messages contained an affected aircraft's last recorded position, speed, altitude and direction of flight.

The operator reported that on the day, the system alerted the operations manager to an emergency and that the operations manager then called the pilot's mobile phone. When that call was diverted to message bank, the manager had contacted emergency services.

Range officer SAR watch

The range officer for the Shoalwater Bay military training area maintained a SAR watch over the helicopter operations in the training area. That entailed radio communication with helicopter occupants via portable radio sets.

Helicopter crews were required to report leaving each HLS with an estimated time of arrival at the next HLS, and to report when safely on the ground. If no report was received after landing then the range officer, if unable to establish the safety of the helicopter crew, would alert emergency services.

SARTIME

There was no record of a SARTIME[5] being lodged with CENSAR[6] for the flight.

Further investigation

The investigation is continuing and will include further examination of the:

- helicopter's maintenance records
- recovered flight control system components
- helicopter's performance, weight and balance
- pilot's flying experience and training
- helicopter landing site and the environmental conditions at the time
- recorded data from the recovered Global Positioning System equipment.

5 Time nominated by a pilot for the initiation of Search and Rescue action if a report from the pilot has not been received by the nominated unit.

6 An automated, centralised SARTIME database that was used by air traffic services to manage SARTIMES.