Air Accident Investigation Unit Ireland

ACCIDENT REPORT
Robinson R22 Beta II, EI-EAS
Hazelwood, Co. Sligo
27 June 2011

An Roinn Iompair
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport

AAIU Report No: 2011-015
State File No: IRL00911058
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In accordance with the provisions of SI 460 of 2009, the Chief Inspector of Air Accidents, Jurgen Whyte, on 27/06/2011, appointed himself as the Investigator-in-Charge to carry out a Field Investigation into this Accident and prepare a Report. The sole purpose of this Investigation is the prevention of aviation Accidents and Incidents. It is not the purpose of the Investigation to apportion blame or liability.

Aircraft Type and Registration:	Robinson R22 Beta II, EI-EAS
No. and Type of Engines:	1 x Lycoming O-360-J2A
Aircraft Serial Number:	2605
Year of Manufacture:	1996
Date and Time (UTC):	27 June 2011 @ 15.50 hrs
Location:	Hazelwood, Co Sligo, Ireland N54° 16.105', W008° 25.464'
Type of Flight:	Private (Self Fly Hire)
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - Minor Passengers - Nil
Nature of Damage:	Substantial
Commander's Licence:	PPL(H) issued by the Irish Aviation Authority (IAA)
Commander's Details:	Male, aged 31 years
Commander's Flying Experience:	75 hours, of which 75 were on type
Notification Source:	Shannon Air Traffic Control (ATC)
Information Source:	AAIU Accident Report Form submitted by Pilot AAIU Field Investigation

SYNOPSIS

While conducting an air taxiing-hover manoeuvre, the helicopter suddenly descended, the right landing skid made contact with the ground and the helicopter subsequently rolled over onto its right side. The helicopter was extensively damaged. The Pilot suffered a minor wrist injury. There was no fire.

1. FACTUAL INFORMATION

1.1 History of the Flight

The Pilot took-off from Ireland West Airport, Knock (EIKN) at 14.30 hrs on a private (Self Fly Hire) flight to his home at Hazelwood, Co. Sligo which is located approximately 6 nautical miles (nm) east of Sligo Town.

On landing (15.06 hrs) in a large grassland field adjacent to farm buildings, the Pilot shut down and awaited the arrival of some friends, who he intended to bring on a local sightseeing flight.

At 15.45 hrs, the Pilot, with one passenger on board, made contact with Sligo ATC and sought permission to take-off for a local flight. Lift was approved with the wind at Sligo Airport (EISG) given as 320 degrees at 09 kts. After a short period of time, Sligo ATC, who had expected to hear the Pilot call airborne in the area, called EI-EAS a number of times but to no avail. Sligo ATC then attempted to reach the Pilot by mobile phone and tried a number of different contact options but this too proved unsuccessful. At 16.05 hrs, the Pilot made contact with Sligo ATC by mobile phone and advised that he had been in an accident, but that both occupants were uninjured. Sligo ATC then alerted the appropriate authorities advising that EI-EAS had been involved in an air accident with both persons on board being uninjured. On arrival at 16.36 hrs the fire service found fuel leaking from the side of the helicopter. They turned off the ignition, disconnected the battery and maintained a presence until the arrival of the Air Accident Investigation Unit (AAIU) at 21.00 hrs.

1.2 Pilot Interview

In a frank interview, the Pilot told the Investigation that after take-off from the top of the field, he air taxied at a height of 15-20 ft in a southerly direction down towards the far end of the field. It was his intention to re-establish the hover and carry out a left pedal turn for a departure on 350 degrees. He considered the local wind to be 310 degrees at 9 kts. As he slowed down to re-establish the hover, the helicopter suddenly descended and the right landing skid made contact with the ground. This was followed by a rollover to the right side. The main rotor blades made ground contact and stopped instantly, following which, the engine stalled and the canopy shattered. The Pilot released the passenger from her harness and evacuated her through the left side door. The Pilot also evacuated through the left side door and both persons then left the scene. In his efforts to evacuate the helicopter the Pilot suffered a minor injury to his wrist. The passenger although shaken was uninjured. There was no fire.

A short time later the Pilot returned to the accident site, turned off the fuel shut-off valve and master switch, but did not turn off the ignition. He then recovered his mobile phone from the wreckage and alerted Sligo ATC to the fact that he had been involved in an air accident. Shortly thereafter, the emergency services arrived at the scene, secured the accident site and confirmed the well-being of both occupants.

The Pilot told the Investigation that he had experienced no warnings in flight, nor did he consider that the helicopter had suffered a technical failure or malfunction prior to impact. He was not sure if he had applied more power or not as the helicopter descended towards the ground, but considered that his out of wind manoeuvring may have contributed to the initiation of the unintentional descent.

1.3 Pilot Experience

The Pilot first commenced flying in August 2007 and accumulated over the intervening 4 years a total of approximately 75 hours on type, 32 hours of which were as Pilot-in-Command. He had a valid licence (until 30/04/2012) and a valid Class 2 medical (until 30/07/13).

The Pilot successfully completed a pre-flight check ride on 20/01/2011 with a Chief Flying Instructor prior to undertaking Self Fly Hire and he also completed his renewal check ride with an IAA Examiner on the 03/03/2011.

1.4 Aircraft and Operator Information

The Robinson R22 Beta II, EI-EAS was based at Ireland West Airport, Knock and the Operator had a valid Certificate of Approval of an aircraft for use by a Registered Training Facility (RTF). At the time of the accident the Pilot was operating under a Self Fly Hire agreement.

The helicopter had a valid (30/12/2011) Certificate of Airworthiness (C of A), aerial works, issued by the IAA. The last 50 hour Inspection was completed on the 04/04/2011 at total airframe hours of 487.8 hrs (Datcon)[1]. The airframe hours at the time of the accident were 522.8 hrs. It was carrying no recorded defects. The next inspection (100 hour) was due at 537.8 hours or on 04/10/2011. Maximum weight at the time of impact was approximately 1,290 lbs, which was below the maximum all up weight (MAUW) of 1,320 lbs. The helicopter was within Centre of Gravity (C of G) limits.

1.5 Landing Site

The landing site was a large rectangular open grassland field orientated in a north/south direction. The northern and eastern sides of the field were bounded by forest/trees. The southern and western sides were open fields free of significant obstacles. The area in which the Pilot positioned the helicopter for departure was open and flat. However, the surface was made up of deep grass with large 'clumps of grass' embedded. **(Photo No. 1)**.

Photo No. 1: Final resting position of EI-EAS in deep and 'clumpy' grassland

[1] **Datcon:** A meter which records the running time of an engine.

1.6 Aircraft Damage

The helicopter was substantially damaged. In particular, following main rotor blade ground contact, the main rotor driveshaft and pylon separated from the fuselage. In addition, the tail rotor drive shaft fractured within the tail boom.

1.7 Additional Information

A helicopter is susceptible to a lateral rolling tendency called dynamic rollover. For dynamic rollover to occur some factor has to first cause the helicopter to roll or pivot around its landing gear (skids or wheels) until its critical rollover angle is reached. Then beyond this point, main rotor thrust continues the roll and if the critical rollover angle is exceeded, the helicopter rolls onto its side.

The roll or pivot can occur for a variety of reasons, including the failure to remove a tie-town or skid securing device, or if the landing gear contacts or is restricted by a fixed object while moving sidewards, or if one side of the landing gear is stuck in ice, soft asphalt, or mud. It may also occur if a pilot does not use the proper landing/take-off technique or while performing sloping ground operations.

If the landing gear does become a pivot point, dynamic rollover is possible, particularly if the pilot does not apply the proper corrective technique. Once started, dynamic rollover cannot be stopped by application of opposite cyclic control alone, for example, if the right skid contacts an object and becomes the pivot point while the helicopter starts rolling to the right. Even with full left cyclic applied, the main rotor thrust vector and its moment follows the helicopter as it continues rolling to the right. A combination of opposite cyclic and quickly applying down collective is the most effective way to respond to developing dynamic rollover. If main rotor blade/ground contact is made, recovery will not be possible.

2. ANALYSIS

The prevailing wind conditions during the positioning of the helicopter for departure were such that the Pilot was operating in a nose out of wind/downwind condition. When the Pilot sought to re-establish the hover from the air taxiing, the nose out of wind/downwind condition would have demanded more hover power. As the helicopter began to sink/descend, the Pilot either did not anticipate/respond to the need for increased power, or he did not apply sufficient power to arrest the descent. Following impact of the right skid with the ground it is considered likely that any sideways skid movement would have been restricted by the deep clumpy grass. This restriction would have become a roll/pivot point around the right skid. Had the Pilot immediately responded with opposite cyclic and a reduction in power/collective, the roll to right may have been arrested. However, once the roll went beyond the critical rollover angle (dynamic rollover), the main rotor blades made contact with the ground and the helicopter rolled onto its side.

When operating out of wind, pilots have to be mindful that the controls are somewhat less responsive and power demand is greater while manoeuvring or maintaining a steady hover. Anticipation of power demand and available power is crucial. Where possible, manoeuvring should be carried out 'nose into wind', in order to reduce power demand.

The surface type and condition is also an important factor with regard to take-offs, landings and manoeuvring of helicopters. Skid type helicopters are particularly susceptible to dynamic rollover, due to the exposed overall length and mass of the skids themselves. As such to reduce the risk of dynamic rollover, the surface should be relatively flat, firm and free of low level obstructions that could impede lateral movement of the helicopter. Had an appropriate recovery technique been used, i.e., opposite cyclic and reduction in power/collective, the dynamic roll may have been arrested.

3. CONCLUSIONS

(a) Findings

1. The helicopter was manoeuvring nose out of wind with a downwind component.
2. The increased demand for power was not appropriately responded to by the Pilot, the helicopter descended and the right skid impacted the ground.
3. The helicopter subsequently suffered dynamic rollover to the right, following which the main rotor blades made ground contact and it came to rest on its right side.
4. The surface condition of deep clumpy grassland would have increased exposure to the risk of dynamic rollover during any lateral movement.

(b) Probable Cause

Failure to anticipate and/or respond to an uninitiated descent while manoeuvring in nose out of wind conditions.

(c) Contributory Factor(s)

1. Ground surface condition.
2. Inadequate response to a dynamic roll situation.

4. SAFETY RECOMMENDATION

This Investigation does not sustain any Safety Recommendations.

- END -

In accordance with Annex 13 to the International Civil Aviation Organisation Convention, Regulation (EU) No 996/2010, and Statutory Instrument No. 460 of 2009, AIR NAVIGATION (NOTIFICATION AND INVESTIGATION OF ACCIDENTS, SERIOUS INCIDENTS AND INCIDENTS) REGULATION, 2009, the sole purpose of these investigations is to prevent aviation accidents and serious incidents. It is not the purpose of any such accident investigation and the associated investigation report to apportion blame or liability.

A safety recommendation shall in no case create a presumption of blame or liability for an occurrence.

Produced by the Air Accident Investigation Unit

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