ACCIDENT

Aircraft Type and Registration:	Robinson R22 Beta, G-CTRL	
No & Type of Engines:	1 Lycoming O-360-J2A piston engine	
Year of Manufacture:	2004 (Serial no: 3601)	
Date & Time (UTC):	30 January 2018 at 1045 hrs	
Location:	Nottingham Heliport	
Type of Flight:	Training	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Minor)	Passengers - N/A
Nature of Damage:	Extensive damage, beyond economic repair	
Commander's Licence:	Student	
Commander's Age:	62 years	
Commander's Flying Experience:	41 hours (of which 41 were on type) Last 90 days - 9 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The helicopter rolled onto its right side when the student pilot attempted to lift into the hover to make his first solo flight. The instructor was watching from nearby and witnessed the helicopter rotate around the right skid and fall on its side due to dynamic rollover.

History of the flight

After a satisfactory training flight lasting 55 minutes, which incorporated numerous takeoffs and landings, the instructor assessed that the student pilot had handled the helicopter competently and was ready for his first solo flight. He reminded the student pilot that, with no instructor occupying the left seat, the helicopter's Centre of Gravity (CG) would move right and aft, so the cyclic stick would have to be positioned to the left and forward to compensate, and that gentle control movements should be made during lift off.

The instructor moved away to a safe distance before signalling the pilot to lift off. When the pilot saw this signal, he adjusted the cyclic stick to what he thought was the correct position and raised the collective lever. He stated that he used the available visual cues and made appropriate control adjustments, but was unable to prevent the helicopter rolling quickly onto its right side. The instructor reported that the pilot kept the helicopter straight through correct use of the yaw pedals but did not apply sufficient left cyclic control to compensate for the change of CG. He saw the helicopter roll onto its right side with the rotor blades stopping when they hit the grass (Figure 1).

Figure 1

G-CTRL after the accident with the front transparencies broken and the left door open

The instructor approached the helicopter and found the pilot trapped in his seat with minor injuries to his hands, so he helped him climb out through the left doorway, prior to arrival of the heliport rescue service. The instructor then switched off the fuel and electric supplies to the helicopter. His assessment was that the accident occurred as a result of dynamic rollover; a phenomenon the pilot had been briefed about in the classroom and pre-flight.

Aircraft information

The Pilots' Operating Handbook and Rotorcraft Flight Manual for G-CTRL contains Robinson Helicopter's Safety Notice SN-9 which discusses dynamic rollover. The notice was revised in June 1994 and it states:

> *'A dynamic rollover can occur whenever the landing gear contacts a fixed object, forcing the aircraft to pivot about the object instead of about its own center of gravity…Once started, dynamic rollover cannot be stopped by application of opposite cyclic alone…Quickly applying down collective is the most effective way to stop dynamic rollover.'*

The SN advises how to avoid dynamic rollover, including:

> *'Always use a two-step liftoff. Pull in just enough collective to be light on the skids and feel for equilibrium, then gently lift the helicopter into the air.'*

This is the lift off technique which the EASA requires its training providers to teach.

Other information

The AAIB has reported on four other accidents in the last 10 years that have involved dynamic rollover. Three of these occurred during a student pilot's first or second solo flight in a Robinson R-22 Beta (G-SBUT - AAIB Bulletin 3/2009; G-BYCF - AAIB Bulletin 7/2014; G-DEFY - AAIB Bulletin 2/2016), while the fourth accident occurred during a student pilot's first solo flight on type, in a Robinson R-66 (G-LROK - AAIB Bulletin 2/2016).

The European Helicopter Safety Team (EHEST) has produced a number of educational leaflets which can be accessed on the EASA website. EHEST leaflet HE-1 '*Safety Considerations*'[1] includes a section concerning dynamic rollover and techniques to avoid it.

Footnote

[1] Leaflet HE 1 is available via the following link https://www.easa.europa.eu/system/files/dfu/Leaflet_EHSIT_Training_final.pdf