

Safety Investigation Report

Ref. AAIU-2016-25
Issue date: 20 June 2018
Status: Final

Classification:	Accident	Type of operation:	Non-commercial Cross country
Level of investigation	Standard	Phase:	Lift-off
Date and time:	8 December 2016 at 09:18 UTC	Operator:	Private
Location:	Roosdaal 50° 49' 32.89"N - 4° 5' 48.16"E	Persons on board:	1
Aircraft:	Robinson R44	Aircraft damage:	Substantial
Occurrence category:	Loss of control-inflight (LOC-I)	Injuries:	None

Flight history

The purpose of the flight (first of the day) was to transport 3 big burlap sacks full of walnuts, each of them weighing about 20 kg, taking off from the pilot's backyard. The pilot placed one sack beside him on the left front seat, and the 2 other sacks on the rear seats and secured them with the helicopter safety belts. Immediately after the lift-off, when hovering, the helicopter was taken by a rocking movement causing the bag on the front seat to shuffle and push against the vertical bar of the cyclic control. The cyclic control was blocked resulting in the pilot's inability to control the helicopter, with a total loss of control as a consequence. The helicopter violently hit the ground with the right hand skid and turned on the right side. The pilot was not injured and could vacate the helicopter helped by a neighbor, who came down to the location after he had heard the noise of the impact.



Figure 1: pictures showing damage to the helicopter and the burlap bag involved

Discussion

The safety restraint system installed in the helicopter were three-point retractable seat belts (with a lap and shoulder belt). The retractor, that allows the belt spool to be unwound against a spring force, has a locking mechanism that locks the spool when something jerks the safety belt. The activating force of this mechanism is the speed of the spool rotation. The operating element is a centrifugal clutch, which is a weighted pivoting lever mounted to the rotating spool. When the spool spins slowly, the lever doesn't pivot at all. But when the spool is spun more quickly, the centrifugal

force drives the weighted end of the lever outward. This causes a pawl to lock into a ratchet gear, preventing further unwinding of the spool. This design works perfectly for solid human bodies, but is not to be used to secure bags as they can slide under the belts when the jerking force on the spool is not immediately high enough.

Findings and probable cause

The accident was caused by a loss of control at low altitude, further to a heavy bag, not adequately secured, falling on the cyclic column and impeding its movement.

Safety message

Safety restraint systems which have to a certain degree freedom of extension and movement should never be used to secure cargo, in particular when they could interfere with the flight and engine controls. If cargo is to be transported on a regular basis, the aircraft manufacturer should be contacted to seek for advice.

Aircraft information

Type	Helicopter	Certificate of Airworthiness:	Issued on 24 July 2015 by Belgian CAA
Manufacturer:	Robinson	Airworthiness Review Certificate:	Issued on 30 June 2016 by Air Technology Belgium valid up to 24 July 2017
Model:	R44-Raven II	State of registry:	Belgium
Built year:	2015	Total airframe time:	219.6
Serial number:	13827	Time since last inspection:	2 flight hours
Maximum take-off weight:	1134 kg (2500 lb)	Number and type of engine(s):	1 reciprocating
Airworthiness:	EASA Aircraft, based on US 14 CFR Part 27	Engine model:	Lycoming IO-540-AE1A5

Meteorological information

Source:	METAR EBBR	Clouds:	CAVOK
Time:	09:20 UTC	Temperature:	06° C
Distance from site:	15 NM	Dew point:	01° C
Wind direction:	190°	QNH:	1030 hPa
Wind speed:	12 kt	Reported visibility on site:	VMC
Visibility:	CAVOK	Reported wind on site:	Coming from 190° (windsock on site)

Pilot information

Age:	71	Medical:	Class 2 valid until 06 May 2017
Nationality:	Belgian	Last medical exam:	26 April 2016
License:	PPL(H) issued on 23 October 2008	Injuries:	None
Ratings:	R44 valid until 31 December 2016	Restraint used:	Three-point seatbelt
Flight experience:	1377.9 total flight time		

About this report

As per ICAO Annex 13 and European Regulation (EU) No. 996/2010, each safety investigation shall be concluded with a report in a form appropriate to the type and seriousness of the accident and serious incident. For this occurrence, a limited-scope, fact-gathering investigation and analysis was conducted in order to produce a short summary report.

It is not the purpose of the Air Accident Investigation Unit to apportion blame or liability. The sole objective of the investigation and the reports produced is the determination of the causes, and, where appropriate define recommendations in order to prevent future accidents and incidents.