ACCIDENT

Aircraft Type and Registration:	Rotorsport UK MT-03, G-TELC
No & Type of Engines:	1 Rotax 914-UL piston engine
Year of Manufacture:	2008 (Serial no: RSUK/MT-03/028)
Date & Time (UTC):	7 May 2017 at 1427 hrs
Location:	Near Carrickmore Airfield, Co Tyrone
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Minor) Passengers - 1 (Minor)
Nature of Damage:	Damaged beyond economic repair
Commander's Licence:	Private Pilot's Licence (A) and (G)
Commander's Age:	59 years
Commander's Flying Experience:	539 hours (of which 173 were on type) Last 90 days - 11 hours Last 28 days - 9 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The gyroplane was departing from Runway 26 at Carrickmore Airfield. After lifting off, the pilot lowered the nose attitude to accelerate and then, as the end of the runway approached, the gyroplane started to sink. It descended into trees in a ravine beyond the end of the runway.

History of the flight

There was a fly-in at Carrickmore Airfield over the weekend of 6 May to 7 May 2017. The pilot and passenger had flown there from Glasgow on the day of the accident; the flight was uneventful.

For the return flight to the UK mainland the pilot planned to fly first to Newtownards, Co Down, to refuel, before continuing across the sea to Kirkbride Airfield, Cumbria. The pilot reported that the gyroplane had 25 kg of fuel on board and a calculated takeoff weight of 445 kg, 5 kg below the Maximum Authorised Takeoff Weight. Weather conditions were clear with a surface wind from 010º at 9 kt and a temperature of 18 ºC. Runway 26 was in use, which has an asphalt surface of 375 m length and 6 m width.

The airfield was busy; there were a number of aircraft departing after the fly-in and a Robinson R44 helicopter was carrying out local pleasure flights. The pilot lined up on Runway 26 and, mindful that the runway was relatively short, added an extra 50 rpm to the

normal rotor pre-rotation speed of 200 rpm before starting to move along the runway. The takeoff run appeared normal. After lifting off the pilot lowered the nose to maintain a level attitude and the gyroplane started to accelerate and then to climb.

Towards the end of the runway the pitch attitude increased slightly and two seconds later the gyroplane started to sink. The pilot could not prevent the sink and turned slightly left, then right attempting to follow lower lying ground. The gyroplane descended into trees in a ravine beyond the end of the runway. It came to rest on a steep slope with the forward fuselage having struck a large tree stump.

The pilot and the passenger were both wearing full four-point harnesses, robust outdoor clothing and helmets. Both occupants were unconscious for a period of time after the impact and commented that they considered the helmets had protected them from more severe injury. Rescuers on foot, and subsequently the emergency services, arrived at the scene some minutes after the accident and assisted the pilot and the passenger. They were both flown to a nearby hospital.

Airfield information

Carrickmore Airfield is situated at an elevation of 541 ft amsl on the side of a valley where the ground rises from the north to the south. Runway 26 has a hard surface of 375 m length, with a downslope. Immediately north of the airfield, alongside and below Runway 26, is a line of trees which shelters the runway in northerly wind conditions. At the western end of Runway 26 the ground falls away into a steep wooded ravine. An aerial image of the runway at Carrickmore is at Figure 1.

Figure 1

Airfield at Carrickmore in 2016, Runway 26 threshold at bottom of image

Aircraft information

The Flight Manual for the MT-03 at 450 kg Maximum Takeoff Weight indicates that a takeoff roll of between 20 m and 170 m would be expected, and a takeoff distance (to 18 m /50 ft) of 320 m under standard conditions would be required. A note in the Flight Manual advises: '*If possible always take off into wind.'*

Other information

Shortly before the gyroplane took off another aircraft had departed ahead from Runway 26 and then a Robinson R44 helicopter crossed the runway from north to south at about the mid-point. The pilot reported afterwards that he may have felt under some pressure to depart quickly so as not to delay other aircraft.

A video of the takeoff and initial climb, up to the point where the gyroplane started to sink, was available for the investigation. The gyroplane reached a height estimated as between 50 ft and 100 ft above the runway before it started to sink; no change of engine note was apparent.

The UK Civil Aviation Authority publication '*Handling Sense Leaflet 4, Gyroplane Handling and Performance'* is intended to share knowledge and information for pilots in an effort to improve the safety record of gyroplanes. Pilots' understanding of the takeoff performance of a gyroplane in the conditions prevailing on the day is identified as a key area for improvement.

The publication notes*:*

> *'Bringing the stick back without sufficient airspeed will simply increase the rotor drag and even with 100% engine power the gyroplane will descend, nose high, to the ground.'*

and

> *'If you bring the stick back before you have airspeed, you will fly "behind the power curve" and instead of climbing, you will slow down and sink to the ground.'*

Analysis

There was no evidence to suggest that any other aircraft movements around the time of the accident had any effect on the performance of the gyroplane.

The reported surface wind from 010º at 9 kt would have given a small tailwind component on the runway of 2 kt to 3 kt. As the gyroplane climbed above the runway it would have lost the benefit of ground effect. At the same time it would have lost the shelter provided by the trees and been exposed to an increasing wind strength, and therefore tailwind. These two factors are likely to have had an adverse effect on the airspeed and performance. In a gyroplane, airspeed is a critical element of climb performance. Raising the nose attitude prematurely will cause a reduction of airspeed and lead to a reduction in available power for

climb, perhaps causing the gyroplane to sink. Any attempt to counter the sink by raising the nose will make the situation worse.

The gyroplane took off from a relatively short runway and climbed above a sheltering tree line. The increasing wind strength with tailwind component would have had an adverse effect on the climb performance, it is also possible that the gyroplane encountered a downdraft downwind of the tree line. It is likely that either or both of these factors caused a reduction in airspeed and the gyroplane started to sink. A slight increase in pitch attitude was observed two seconds before the sink, this may have been as a result of a pilot input or the wind conditions. There was insufficient height to lower the nose and accelerate to regain climb speed.

Conclusion

The gyroplane was taking off from a short runway with a tailwind. During the transition, it started to climb above the shelter of a line of trees upwind of the runway and may have lost airspeed as a result of encountering sinking air or an increasing tailwind. The gyroplane started to sink in a position from where there was not sufficient height to recover.