

ACCIDENT

Aircraft Type and Registration:	Robinson R44 Raven, G-RFUN	
No & Type of Engines:	1 Lycoming O-540-F1B5 piston engine	
Year of Manufacture:	2002 (Serial no: 1239)	
Date & Time (UTC):	5 August 2016 at 1135 hrs	
Location:	Near Crowden, Glossop, Derbyshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 3
Injuries:	Crew - None	Passengers - 1 (Minor)
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	43 years	
Commander's Flying Experience:	87 hours (of which 9 were on type) Last 90 days - 1 hour Last 28 days - 1 hour	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The helicopter took off at close to its maximum weight. It then flew to a hilly area, where the pilot made a downwind approach, with full carburettor heat applied, to an Out-of-Ground-Effect (OGE) hover. The manufacturer's performance figures show this to be outside the declared flight envelope of the helicopter. The helicopter was unable to sustain the hover and descended, probably entering a vortex ring state, before it landed heavily and rolled onto its side. The occupants escaped from the aircraft with one passenger sustaining a minor injury.

History of the flight

Following a successful start-up at the second attempt, the helicopter, with three passengers, lifted from Coal Aston Airfield (elevation 720 ft amsl), 5 nm south of Sheffield. The pilot reported that he flew a vertical takeoff, climbing to a height of around 50 ft, before he transitioned the helicopter into forward flight. Approximately 15 minutes later the helicopter arrived at a boar shooting ground where the pilot intended to hover, so they could wave at some friends. The boar shooting ground is in the Peak District National Park at approximately 1,000 ft amsl. The pilot flew over the selected site and circled whilst losing height. He then made an approach, with full carburettor heat applied, on an easterly heading, and reportedly came to a hover with 23 inches of power, at a height of 70 ft agl.

The pilot reported that after 2 or 3 seconds in the hover, he looked inside the helicopter to check the instruments; when he looked back outside, the helicopter was sinking. He raised the collective lever, but this had little effect and they continued to sink. Realising he was now too low to fly away, the pilot made the decision to try and land, on uneven ground to his right. He lowered the collective lever and yawed the helicopter to face into the hill, then pulled the collective back up to cushion the touchdown. The helicopter landed heavily on the front of its skids and then rolled onto its right-hand side before coming to a halt.

The pilot and his passengers, were able to vacate the helicopter by climbing through the left doors, although the passengers on the left (upper) side needed some assistance in undoing their seatbelts. The front seat passenger had a small cut to his head, but the rest of the occupants, though shaken, were unhurt. The pilot made the helicopter safe, by turning off the fuel and the electrics, and was then able to see ground marks which indicated to him that it had probably rolled onto its side when one of the main rotor blades had struck the ground.

Meteorology

The weather conditions were good with no significant cloud and good visibility. The Doncaster METAR at 1120 hrs showed the wind as 280° at 10 kt, the visibility was more than 10 km, the lowest clouds were at 4,000 ft, the temperature was 21°C and the QNH was 1020 hPa. At Manchester at 1150 hrs, the wind was 270° at 11 kt, more than 10 km visibility, the lowest cloud was 3,600 ft, the temperature was 19°C and the QNH was 1018 hPa.

Weight and balance

The loading calculations in the pilot's initial accident report show a pilot and passenger combined weight of 770 lbs which would have meant the helicopter was 29 lb above its maximum takeoff weight of 2,400 lbs. The pilot's calculations did not include an aircraft cover and several litres of oil, which were contained in one of the rear baggage compartments, and were reported to weigh 17 lb. The AAIB received a separate report that the weights used by the pilot for his loading calculation were incorrect, and detailed pilot and combined passenger weights of 182 lbs and 609 lb respectively; this would have made the aircraft's takeoff weight 2,467 lb.

The pilot was asked to reconfirm his weight and that of the passengers, and he provided new figures of 154 lb for himself and a combined weight of 574 lb for the passengers. The investigation also contacted the passengers individually for their weights, and established a combined weight of 595 lb, which would have placed the aircraft slightly above its maximum takeoff weight.

Aircraft performance

The pilot described the aircraft making a downwind transition to an OGE hover at the board shooting ground (approximately 1,000 ft amsl). The performance section of the POH for

the R44 shows at this altitude and temperature, in zero wind, the aircraft should be able to hover OGE at its max weight 2,400 lbs. There is a note in the performance section of the POH that all hover performance data is given with the carburettor heat off:

'Full carburettor heat reduces hover ceilings by up to 2400 feet.'

With full carburettor heat applied, the maximum weight the aircraft should have been able to hover OGE at the boar shooting ground would be approximately 2,230 lbs.

Pilot's assessment of cause

The pilot reported he did not see or feel anything unusual in entering the hover, but that the aircraft lost power. When asked why he had used full carburettor heat, the pilot stated he had been taught "you can never have too much carb heat". He was unaware that carburettor heat had an adverse effect on the aircraft's performance.

Robinson Safety Tips

The Robinson R44 POH has a section containing safety tips and the following were considered relevant to this accident.

'10. Never make takeoffs or landings downwind, especially at high altitude. The resulting loss of translational lift can cause the aircraft to settle into the ground or obstacles.'

'11. A vertical descent or steep approach downwind can result in "settling with power." This happens when the rotor is settling in its own downwash and additional power will not stop the descent. Should this occur, reduce collective and lower the nose to increase airspeed. Settling with power can be very dangerous near the ground as the recovery results in a substantial loss of altitude.'

Analysis

The relatively inexperienced pilot flew the helicopter, at close to its maximum weight, downwind to an OGE hover, in hilly terrain with full carburettor heat applied. The performance figures in the POH show this was outside the declared flight envelope of the helicopter. Having reached the hover, it therefore started to descend, and probably entered a vortex ring state (settling with power) before landing heavily. As the helicopter had taken off and flown without incident for 15 minutes to its destination, the initial unsuccessful start-up attempt was considered to be unrelated to the accident.

Safety Message

The CAA issue a series of Safety Sense Leaflets; Number 17 concerns helicopter airmanship and contains a range of advice pertinent to the prevention of this type of accident.