AIRCRAFT ACCIDENT SHORT REPORT

CA18/2/3/9731: ZT-RBF, Loss of power during a crop spraying operation

Date and time	:	18 September 2018, 0540Z
Occurrence type	:	Accident
Aircraft registration	:	ZT-RBF
Aircraft manufacturer and model	:	Bell Helicopter Textron, Bell 206B
Last point of departure	:	Private farm in Melmoth, KwaZulu Natal Province
Next point of intended landing	:	Private farm in Melmoth, KwaZulu Natal Province
Location of accident site with reference to easily defined geographical points (GPS readings if possible)	:	GPS coordinates: 28°39'52.00" South, 031°24'43.00" East
Meteorological Information	:	Surface wind: 220° at 3kts, temperature: 16°C, CAVOK
Type of operation	:	Commercial (Part 137)
Persons on board	:	1 + 0
Injuries	:	Nil
Damage to aircraft	:	Substantial

All times given in this report are Coordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (2011) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and ***not to apportion blame or liability.***

Disclaimer:

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1. SYNOPSIS

1.1 The pilot took off from a private farm in the Melmoth area at 0539Z, the purpose of the flight was for crop spraying and return to the private farm. A moment after take-off, at low level (5-10m above ground level), the low main rotor RPM horn sounded. The pilot stated that he attempted to recover by lowering the collective and rolling on the throttle, but that action did not aid in recovering the RPM. There was insufficient height and the pilot elected to perform a forced landing between two tree lines within the orchard. The left skid impacted hard with the ground followed by the main rotor blades impacting an avocado tree. The helicopter then rolled onto its left side and came to rest in that position.

1.2 The helicopter sustained damage to the main rotor, skids, the transmission system, and the crop spraying system. The pilot was not injured.

1.3 Investigation revealed that during take-off, the collective was raised rapidly which increased the main rotor blades pitch angles at a rate which caused the main rotor RPM to decay and subsequently the helicopter to descend which resulted in a hard landing.

2. FACTUAL INFORMATION

2.1 On Tuesday 18 September 2018, a Pilot operating Bell 206B helicopter with registration marking ZT-RBF, took off from a private farm in the Melmoth area conduct crop spraying detail. The intention of the flight was to crop spray an avocado orchard on a farm in the Melmoth area with a nutrient “Boron” mixed with water.

2.2 During the first part of the flight the pilot noticed that he had not set his TracMap (crop spraying mapping) system, so he landed on a clear area to set the system. He took off again and approximately 5-10m above ground level, the low main rotor RPM horn sounded. The pilot stated that he attempted to recover by lowering the collective and rolling on the throttle, but these actions did not aid in recovering the RPM. There was insufficient height for him to flare the helicopter, therefore he elected to perform a forced landing between two tree lines within the orchard. The left skid impacted hard with the ground followed by the main rotor blades impacting

an avocado tree. The helicopter then rolled onto its left side and came to rest in that position. The pilot switched off the battery, closed the throttle and disembarked from the helicopter unassisted.

2.3 The helicopter sustained substantial damage. The pilot was not injured.

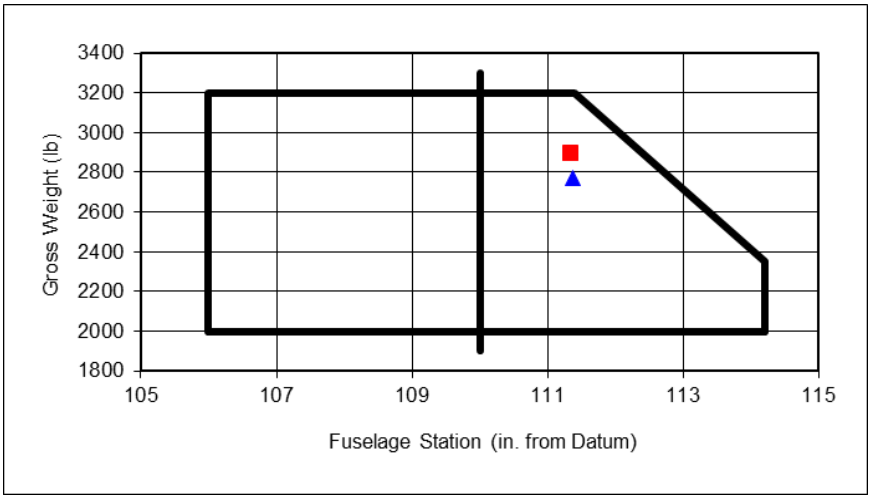
2.4 The accident occurred during daylight conditions at a geographical position that was determined to be 28°39’52.00” South 031°24’43.00” East at an elevation of 2 500ft above mean sea level (AMSL).

Figure 1: Helicopter accident site

Figure 2: The helicopter as it came to rest

3. ADDITIONAL INFORMATION

3.1 On the day of the accident, 20L of fuel was in the helicopter and 350L of pesticide was loaded into the Isolair system before take-off. According to the computed weight and balance, the helicopter weighed 3 022lbs prior to take-off, however the pilot stated that the actual maximum weight was 3 185lbs. Both values were below the maximum take-off weight (MTOW) of the helicopter, which is 3 200lbs but were very close to the MTOW.



WEIGHT & BALANCE: Equipment Bell 206B Jet Ranger	ZT-RBF Kit and 350L	Category:	G5
Item	Arm in. from datum	Weight lbs	Moment lb-in.
Basic empty weight as equipped	117.3	1 799.6	211 093
Oil	179.0	12.0	2 148
Pilot	65.0	231	15 015
Passenger - Forward	65.0	0	0
Passenger - Aft Right	104.0	0	0
Isolair Spray Kit	110.2	847	93 339
Passenger - Aft Left	104.0	0	0
Baggage Compartment	148.0	0	0
Zero Usable Fuel	**111.3**	**2 890**	**321 657**
Usable fuel at 6.8 lbs/gal (JP-5)	110.8	132	14 626
MAUW	**105.1**	**3 200**	**336 293**
All Up Weight (take-off fuel)	**111.3**	**3 022**	**336 349**
	Balance (lbs)	**178**	

Fuel (gal)	To be used	Available	% Full
Main Tank (6.6 lbs/gal JP-5)	20	91	22

Weight conversion	kg	lbs	
Pilot	105	231	
Passenger - Forward	0	0	
Passenger - Aft Right	0	0	
Isolair Spray Kit	385	847	
Passenger - Aft Left	0	0	
Baggage Compartment	0	0	250 lbs max

Figure 3: Weight and Balance calculation

3.2 The pilot stated that he was at a height of 5-10m (16-33ft) AGL and his speed was below 40kts. This means according to the height velocity diagram that he was in the dead man's curve, low speed and close to the ground.

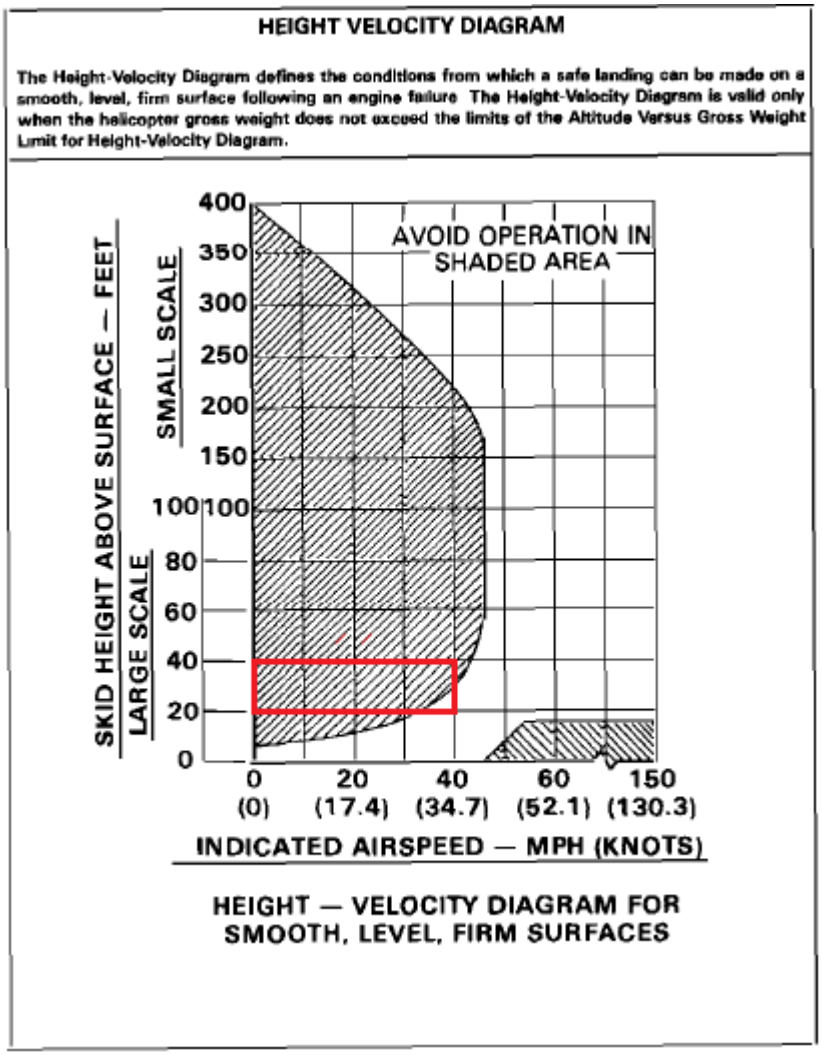


Figure 4: Helicopter's take-off profile

4. Findings:

4.1 The pilot held a Commercial Pilot licence (Helicopter) which was issued on 07 February 2018 and it was due to expire on 31 March 2019. The pilot conducted his last competency check on 07 February 2018 at Port Elizabeth Airport (FAPE).

4.2 He was issued with an agricultural pilot rating which was endorsed on his logbook on 07 December 2017. His agricultural rating was conducted while flying a Robinson R44.

4.3 The Bell 206B helicopter was endorsed in the pilot's licence.

4.4 The pilot's aviation medical certificate was valid with the following restrictions: corrective lenses with near vision limit and medical time limit of twelve months. The medical certificate was issued on 24 July 2018 and was due to expire on 31 July 2019.

4.5 The last mandatory periodic inspection (MPI) was carried out on 18 June 2018 at 21 748.2 airframe hours (777.4 Hobbs).

4.6 The aircraft had a total of 21 846.6 airframe hours (875.8 Hobbs) at the time of the accident and had flown 98.4 hours since the last inspection.

4.7 The helicopter had a valid Certificate of Airworthiness which was issued on 21 April 2017 and had the expiry date of 30 April 2019.

4.8 This was a commercial flight which was operated under the provisions of part 127 with air service licence endorsement G5 (agricultural spraying, seeding and dusting) of the CARs of 2011.

4.9 The operator was in possession of an air operating certificate (AOC) effective from 25 June 2018.

4.10 The flight was conducted under visual flight rules (VFR) by day.

4.11 The pilot stated that the wind came from the south at approximately 3kts, CAVOK and the temperature was 16°C.

4.12 The weight of the helicopter according to the computed weight and balance sheet on take-off was 3 022lbs which was 178lbs below the MTOW of 3 200lbs. The pilot also stated that the actual weight before the accident was 3 185lbs.

4.13 The investigation revealed that the pilot likely pulled the collective rapidly which increased the main rotor blades pitch angles at a rate that caused a sudden loss of rotor RPM. Added to that he was within the shaded region of the height velocity diagram which is dangerous to operate because it may be impossible for the pilot to complete an emergency landing should he need to.

5. PROBABLE CAUSE/CONTRIBUTING FACTOR

5.1 The helicopter lost rotor RPM during take-off due to incorrect collective inputs which resulted in a hard landing.

6. REFERENCES USED IN THE REPORT

6.1 Bell 206 Pilot's Operating Handbook, Bell Helicopter Textron

6.2 FAA Helicopter Flying Handbook Chapter 10: Advanced Flight Manoeuvres

7. SAFETY RECOMMENDATION

7.1 None.

This Report is issued by:

Accident and Incident Investigation Division
South African Civil Aviation Authority
Republic of South Africa