



Section/division

Accident and Incident Investigations Division

Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9459	
Aircraft Registration	ZS-SBM	Date of Accident	01 August 2015		Time of Accident	0915Z
Type of Aircraft	Robinson R44		Type of Operation		Training (Part 141)	
Pilot-in-command Licence Type		CPL	Age	29	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	2022.1		Hours on Type	747.0
Last point of departure		Wonderboom Aerodrome (FAWB): Gauteng Province				
Next point of intended landing		Wonderboom Aerodrome (FAWB): Gauteng Province				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
Aeropark Zynkraal runway 27 (GPS: 25°54'11.44"S, 028°32'44.63"E)						
Meteorological Information		Wind: Light and variable; Visibility: 10km; Temperature: 15°; Cloud cover: None				
Number of people on board	2+0	No. of people injured	0	No. of people killed	0	
Synopsis						
<p>An instructor and a student were engaged in a training flight from Wonderboom aerodrome (FAWB) with the intention to practise circuits and autorotation at Aeropark Zynkraal airfield and then return to FAWB. The student pilot stated that when they arrived at Aeropark they performed one circuit and then on final approach he initiated an autorotation into the wind for runway 27. The student pilot stated that during descent for the runway, approximately 200ft AGL the main rotor revolutions per minute (RPM) started to decay and he lost control of the helicopter. The instructor took control of the helicopter and tried to recover the rotor RPM by lowering the collective and opening the throttle. The rotor RPM continued to decay and the helicopter was losing altitude. The instructor decided to flare the helicopter to gain rotor RPM and at the end of the flare he levelled the helicopter, but the rotor RPM was too low. The instructor started a run on landing, but the helicopter started shaking violently and the left hand skid struck the ground and broke off. The main rotor blades struck the runway 3 times and cut off the tail boom into pieces. The helicopter rolled over on its left side and came to rest on the centre of the runway. The Instructor and the student did not sustain any injuries and the helicopter sustained substantial damage.</p>						
Probable Cause						
Hard landing following unsuccessful autorotation practice.						
Contributing factor						
<ul style="list-style-type: none"> Incorrect autorotation technique. 						
SRP Date				Release Date		



AIRCRAFT ACCIDENT REPORT

Name of Owner : Verraux's Air (PTY) LTD
Name of Operator : 360 Aviation
Manufacturer : Robinson Helicopter Company
Model : R44 II
Nationality : South African
Registration Marks : ZS-SBM
Place : Aeropark Zynkraal
Date : 01 August 2015
Time : 0915Z

All times given in this report are Co-ordinated 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 establish legal liability.***

Disclaimer:

This report is produced without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1. On 01 August 2015, the flight instructor and a student pilot of Robinson R44, registration ZS-SBM took off from Wonderboom Airport (FAWB) at 0830Z with the intention to practice circuits and autorotation at Aeropark Zynkraal and then return to FAWB. As soon as the helicopter left the controlled traffic region (CTR), it headed out to Bronkhorspruit dam and then Aeropark Zynkraal. The flight to Bronkhorspruit dam and Aeropark Zynkraal was uneventful.

1.1.2. The student pilot stated that they started with one circuit at Aeropark Zynkraal. On final approach for runway 27 at Aeropark, the student pilot initiated an autorotation into the wind. On entry, the rotor RPM was 100% and engine RPM was 90%. The student pilot stated that at about 200 feet above ground level (AGL), the rotor RPM

started to decay. The flight instructor noticed that the rotor RPM was decaying and he took over control of the helicopter. The instructor lowered the collective and opened the throttle to recover the helicopter. He heard the engine labour but the rotor RPM did not increase. Approximately 100ft AGL, the instructor started to flare the helicopter and levelled the helicopter but rotor RPM failed to increase. The instructor decided to do a run on landing and the helicopter started to shake violently. The left hand skid struck the ground and broke off. The main rotor blades struck the ground 3 times and severed the tail boom into pieces. The helicopter rolled over on its left side and came to rest on the centre of the runway.

1.1.3. The Instructor and the student did not sustain any injuries and the helicopter sustained substantial damage.

1.1.4. The accident occurred during daylight at Aeropark Zynkraal Airfield, at a geographical position determined to be S 25°54'11.44'', E 028°32'44.63'' at 0915Z, elevation 4900 ft above mean sea level (AMSL).



FIGURE 1: Google Earth view of the incident site.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	1	1	-	-

1.3 Damage to Aircraft

- 1.3.1 The helicopter sustained substantial damage to the main rotor blades, tail boom, left hand skid, the fuselage and windshield.



FIGURE 2 & 3: Damage to the helicopter.

1.4 Other Damage

- 1.4.1 The main rotor blades struck the ground 3 times and left marks on the runway.



FIGURE 4: Main rotor blades marks on the runway.

1.5 Personnel Information

- 1.5.1 The instructor

Nationality	South Africa	Gender	Male	Age	29
Licence Number	0272219833	Licence Type	Commercial Pilot-Helicopter		
Licence valid	Yes	Type Endorsed	Yes		

Ratings	Flight Instructor (Grade 2)
Medical Expiry Date	30/09/2015
Restrictions	None
Previous Accidents	None

Flying Experience:

Total Hours	2022.1
Total Past 90 Days	180.6
Total on Type Past 90 Days	142.2
Total on Type	747.0

1.5.2 Student

Nationality	South Africa	Gender	Male	Age	40
Licence Number	0272529496	Licence Type	Student Pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	31/05/2016				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	36.5
Total Past 90 Days	27.6
Total on Type Past 90 Days	7
Total on Type	7

1.6 Aircraft Information

Airframe:

Helicopter description:

The high performance R44 Raven II has a Lycoming IO-540 fuel-injected, angle-valve, tuned-induction engine, which eliminates the need for carburettor heat. The standard 28-volt electrical system ensures good starting performance in hot or cold weather, and provides additional electrical power for optional equipment.



FIGURE 5: Accident helicopter photograph taken from internet.

Type	Robinson Helicopter R44 II	
Serial Number	12099	
Manufacturer	Robinson Helicopter Company	
Date of Manufacture	01/2008	
Total Airframe Hours (At time of Accident)	988.8	
Last MPI (Hours & Date)	944.8	25/06/2015.
Hours since Last MPI	44	
C of A (Issue Date)	20/08/2014	
C of A (Expiry Date)	27/02/2016	
C of R (Issue Date) (Present owner)	12/06/2014	
Operating Categories	Standard Part 127	

Engine:

Type	Textron - Lycoming
Serial Number	L-32478-48E
Hours since New	988.8
Hours since Overhaul	Not yet reached

Main Rotor Blades:

Type	C016-5
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Serial Number	4676/4735
Hours since New	988.8
Hours since Overhaul	Not yet reached

Tail Rotor Blades:

Type	C029-2
Serial Number	6268/6269
Hours since New	988.8
Hours since Overhaul	Not yet reached

1.7 Meteorological Information

1.7.1 The meteorological information as obtained from the pilot's questionnaire

Wind direction	Variable	Wind speed	>5kts	Visibility	10km
Temperature	15°C	Cloud cover	None	Cloud base	N/A
Dew point	N/A				

1.8 Aids to Navigation

1.8.1 The helicopter was equipped with standard navigational equipment as per the minimum equipment list approved by the regulator.

1.9 Communications

1.9.1 The helicopter was equipped with standard communication equipment as per the minimum equipment list approved by the regulator. The pilot did not experience any difficulties communicating with FAWB Air Traffic Controller on frequency 118.35MHz.

1.10 Aerodrome Information

Aerodrome Location	Aeropark Zynkraal Airfield	
Aerodrome Co-ordinates	S 25° 54' 11" E 28° 32' 48"	
Aerodrome Elevation	4900 ft	
Runway Designations	09/27	
Runway Dimensions	950mX8m	
Runway Used	27	

Runway Surface	Tar
Approach Facilities	None

1.11 Flight Recorders

1.11.1 The helicopter was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR). Neither recorder was required by the relevant aviation regulations.

1.12 Wreckage and Impact Information

1.12.1 The student pilot stated that they started with one circuit at Aeropark Zynkraal. On final approach for runway 27 at Aeropark, the student pilot initiated an autorotation. The student pilot stated that during autorotation the rotor RPM started to decay. The instructor tried to recover the helicopter but was unsuccessful. The helicopter left hand skid struck the ground and broke off. The helicopter rolled over and came to rest at the centre of the runway. The damage to the main rotor blades is consistent with a rotor system striking the tail boom while turning at moderate RPM.

1.12.2 The helicopter sustained substantial damage to the main rotor blades, tail boom, left hand skid, the fuselage and windshield.



FIGURE 6 & 7: Position of the helicopter as found on site.



FIGURE 8: Wreckage distribution as found on site.

1.12.3 The main rotor blades struck the runway three times and cut off the tail boom into pieces.



FIGURE 9: Main rotor blades marks on the runway.

1.13 Medical and Pathological Information

1.13.1 Neither occupant was injured during the accident sequence.

1.14 Fire

1.14.1 There was no evidence of pre- or post-impact fire.

1.15 Survival Aspects

1.15.1 The accident was considered to be survivable because of the low kinetic energy during impact and both occupants were wearing their safety harnesses. None of the safety harnesses had failed.

1.16 Tests and Research

1.16.1 None.

1.17 Organizational and Management Information

1.17.1 The Instructor and student were engaged on a training flight when the helicopter crashed due to loss of control after loss of rotor RPM.

1.17.2 Aviation Training Organisation (ATO) responsible for the training flight had a valid ATO Approval Certificate issued under Part 141. The helicopter was maintained by an approved aircraft maintenance organisation (AMO) at Wonderboom airport. The last MPI was carried out on 25 June 2015 at 944.8 airframe hours. The helicopter had flown an additional 44 hours since the last MPI. The helicopter had a valid C of R and a valid C of A at the time of the accident. All damage to the helicopter appeared to be a result of the accident.

1.17.3 The helicopter was operated in accordance with the operating category: Part 127, restricted to part 141.

1.17.4 The flight instructor had a valid helicopter commercial pilot licence with grade 2 helicopter flight instructor endorsed.

1.18 Additional Information

1.18.1 Information below extracted from Rotorcraft Flying Handbook (FAA-H-8083-21)

Autorotation

In a helicopter, an autorotation is a descending maneuver where the engine is disengaged from the main rotor system and the rotor blades are driven solely by the upward flow of air through the rotor. In other words; the engine is no longer supplying power to the main rotor.

1.18.2 EXTRACTED FROM HELICOPTER FLYING HANDBOOK

Autorotation Technique

1. Adjust carb heat if required.

2. Lower collective to down stop and adjust throttle as required for small tachometer needle separation.

CAUTION

To avoid inadvertent engine stoppage, do not chop throttle to simulate a power failure. Always roll throttle off smoothly for small visible needle split.

NOTE

Governor is inactive below 80% engine RPM regardless of governor switch position.

NOTE

When entering autorotation from above 4000 feet, reduce throttle slightly before lowering collective to prevent engine overspeed.

3. Adjust collective to keep rotor RPM in green arc and adjust throttle for small needle separation.
4. Keep airspeed 60 to 70 KIAS.
5. At about 40 feet AGL, begin cyclic flare to reduce rate of descent and forward speed.
6. At about 8 feet AGL, apply forward cyclic to level aircraft and raise collective to control descent. Add throttle if required to keep RPM in green arc.

CAUTION

Simulated engine failures require prompt lowering of collective to avoid dangerously low rotor RPM. Catastrophic rotor stall could occur if the rotor RPM ever drops below 80% plus 1% per 1000 feet of altitude.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1 The student pilot and the instructor were appropriately licensed in accordance with SACAA regulations. The student pilot had a total of 36.5 flying hours with 7 hours on type. The instructor had a total of 2022.1 flying hours with 142.2 hours on type. Both their flying medical certificates were valid and issued without any restrictions.

2.2 On final approach for runway 27 at Aeropark, the student pilot initiated an

autorotation into the wind. On entry, the rotor RPM was 100% and engine RPM was 90%. According to the autorotation procedures, lowering collective is the most important part of doing an autorotation. The student pilot did not lower the collective when entering autorotation and that resulted in the helicopter losing rotor RPM. The instructor noticed that rotor RPM was starting to decay; he then lowered the collective and opened the throttle. At that stage the helicopter was at 100 ft AGL. The instructor initiated a flare and levelled the helicopter but the rotor RPM was still low. He then started a run on landing; the left hand skid struck the ground and broke off. The helicopter started to roll and the main rotor blades struck the runway 3 times and cut-off the tail boom. The helicopter came to rest on its left side on the centre of the runway.

- 2.3 The helicopter was certified, equipped and maintained in accordance with existing regulations and approved procedures.
- 2.4 The weather was not considered to be a contributing factor to the cause of the helicopter accident.
- 2.5 The helicopter was substantially damaged during the accident sequence and both occupants were uninjured.

3. CONCLUSION

3.1 Findings

- 3.1.1 The helicopter had a valid C of R and a valid C of A. The helicopter was certified, equipped and maintained in accordance with existing regulations and approved procedures.
- 3.1.2 The helicopter was serviceable when dispatched for the flight.
- 3.1.3 The instructor held a valid Commercial Pilot (Helicopter) Licence and was properly certified and qualified to perform this flight. He also had flight instructor grade II rating endorsed on his licence.
- 3.1.4 The student pilot was a holder of a Student Pilot licence and had a total of 36.5 flying hours with 7 hours on type.
- 3.1.5 The student pilot and the instructor held valid aviation medical certificates that were issued by a CAA accredited medical examiner.
- 3.1.6 During autorotation exercise, the student pilot did not lower collective when entering

autorotation and the helicopter rotor RPM started to decay.

3.1.7 Weather conditions were fine and did not contribute to the accident.

3.2 Probable Cause/s

3.2.1 Hard landing following unsuccessful autorotation practice.

Contributing factor

- Incorrect autorotation technique.

4. SAFETY RECOMMENDATIONS

4.1 None.

5. APPENDICES

5.1 None.

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