

**FINAL REPORT ON THE ACCIDENT
TO ROBINSON R44 II REGISTERED
OO-PTA IN ZEEBRUGGE ON
11 MARCH 2011**

Ref. AAIU-2011-04
Issue date: 22 August 2011
Status: FINAL

FOREWORD.....	III
SYNOPSIS.....	IV
1. FACTUAL INFORMATION.....	5
1.1 HISTORY OF FLIGHT.	5
1.2 INJURIES PERSONS.	8
1.3 DAMAGE TO AIRCRAFT.	8
1.4 OTHER DAMAGE.	9
1.5 PERSONNEL INFORMATION.	9
1.6 AIRCRAFT INFORMATION.....	10
1.7 METEOROLOGICAL CONDITIONS.....	12
1.8 AIDS TO NAVIGATION.....	12
1.9 COMMUNICATION.....	14
1.10 AERODROME INFORMATION.....	15
1.11 FLIGHT RECORDERS.	15
1.12 WRECKAGE AND IMPACT INFORMATION.	15
1.13 MEDICAL AND PATHOLOGICAL INFORMATION.....	16
1.14 FIRE.	16
1.15 SURVIVAL ASPECTS.	17
1.16 TESTS AND RESEARCH.....	17
1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION.....	17
1.18 ADDITIONAL INFORMATION.....	18
1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES.....	18
2. ANALYSIS.....	18
3. CONCLUSIONS.....	19
3.1 FINDINGS.....	19
3.2 CAUSES.....	19
4. SAFETY RECOMMENDATIONS.....	19

FOREWORD

This report is a technical document that reflects the views of the investigation team on the circumstances that led to the accident.

In accordance with Annex 13 of the Convention on International Civil Aviation, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the determination of the causes, and define recommendations in order to prevent future accidents and incidents.

In particular, Art. 17.3 of EU Regulation 996/2010 stipulates that a safety recommendation shall in no case create a presumption of blame or liability for an accident, serious incident or incident.

Unless otherwise indicated, recommendations in this report are addressed to the Regulatory Authorities of the State having responsibility for the matters with which the recommendation is concerned. It is for those Authorities to decide what action is taken.

The investigation was conducted by L. Blendeman and S. Laureys.
The report was compiled by L. Blendeman

NOTE:

For the purpose of this report, time will be indicated in UTC, unless otherwise specified.

Synopsis

Date and hour of the accident

11 March 2011 at 13:20 UTC

Aircraft

Robinson R44 II, msn 11445, registered OO-PTA

Accident location

N51°13.383' E 2°57.775' Noord-Edestraat in Bredene, Belgium.

Aircraft owner

The pilot is the owner

Type of flight

Private.

Persons on board

3

Abstract

The pilot came back to Belgium after two weeks of training in the United Kingdom for training (ATPL course).

As the weather was particularly favourable, he contacted two friends for a leisure flight with the R44 OO-PTA helicopter.

The helicopter took off from Zeebrugge and flew in direction of Bredene,

After some evolutions, they decided to fly further in the direction of the Nukker brug.

The helicopter came in the vicinity of the bridge, then turned left. By doing this, he went close to the HV line, without noticing its presence.

The main rotor went in contact with the ground line of the HV line, severing it.

The pilot brought the helicopter cautiously down. After hovering to check any possible damage, he put the helicopter to the ground, next to the HV power pole.

The pilot and the passengers climbed out, uninjured.

1. Factual information.

1.1 History of flight.

The pilot came back to Belgium after two weeks of ATPL training course in the United Kingdom.

As the weather was particularly favourable, he contacted two friends for a leisure flight with his helicopter, a Robinson R44 registered OO-PTA.

He took off from Zeebrugge (Marcus Gerardsstraat, 12) where the helicopter is usually stationed, around 13:02. The flight preparation did not include a study of the Low-Air map in the vicinity of Bredene.

The helicopter flew in direction of Bredene, where the two passengers had their residence. One of the purposes was to fly around their home, and take some pictures.

The pilot contacted the EBOS tower, requested authorization to enter the CTR of Oostende airport and reported an altitude of 500ft, or below.

The helicopter flew above Bredene and surroundings at an altitude ranging from 200 to 400 ft agl.

After flying around the water tower of Bredene, the helicopter flew south, in the direction of the Nukkerwijk, and the Nukkerbrug, where the 150 kV power Line Brugge – Slijkens (150.15-16 (EV204)) runs.

The helicopter path was perpendicular to the HV power line. When coming in the vicinity of the bridge, at a height of 130ft, the helicopter turned left.

The pilot did not notice the presence of the HV line until he saw a shadow, followed by a loud bang.

The pilot brought the helicopter cautiously down. After hovering to check any possible damage, he put the helicopter to the ground, next to the HV pole.

The pilot stated that when he put the helicopter down, in front of the HV pole, he had the impression the helicopter was descending between the HV lines.

The helicopter severed the ground cable of the power line with the main rotor. The cable itself caused some impact damage to the forward windscreen, the mast cover, and to other locations.

The pilot and the passengers climbed out, uninjured.



Flight track above Bredene city



Flight track in the vicinity of the HV Line

1.2 Injuries persons.

Injuries	Pilot	Passenger	Others	Total
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	1	2	0	3
Total	1	2	0	3

1.3 Damage to aircraft.

The airplane sustained damages to ;

- the main rotor,
- the rotor mast,
- the windscreen and the cabin structure is punctured.





1.4 Other damage.

The ground wire of the High Voltage line is cut-off.

1.5 Personnel information.

Pilot

Sex: male

Age: 39 years old

Nationality: Belgian

Private Pilot Licence (Helicopters), first issued 08 AUG 2008, valid until 08 AUG 2013.

Rating:

Bell 206/206L, valid until 30/04/2011

EC120, valid until 31/1/2012

R22, valid until 31/08/2011

R44, valid until 31/08/2011

Medical Certificate: Class 1, valid until 8 APR 2012.

Total Flight Experience: ca 300 FH, from which:

R22 – 60 FH

R44 – 220 FH

EC120 – 15 FH

Bell 206 – 5FH

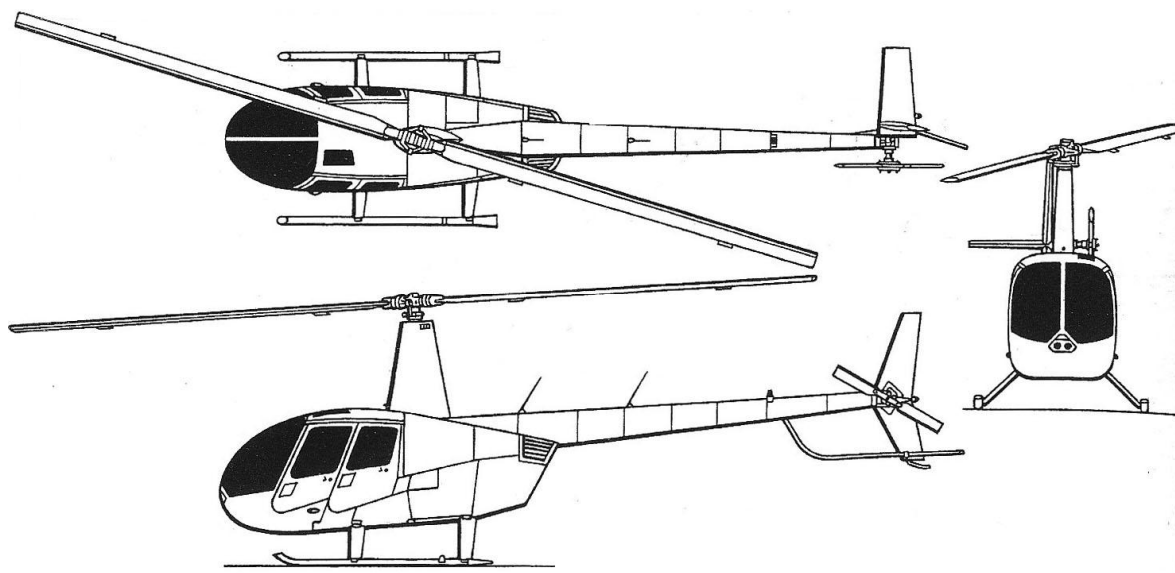
1.6 Aircraft information.

The Robinson R44 is a four-place light helicopter produced by the Robinson Helicopter Company since 1992. It is a single-engined helicopter with a semi-rigid two-bladed main rotor and a two-bladed tail rotor and a skid landing gear. It has an enclosed cabin with two rows of side-by-side seating for a pilot and three passengers.

The Robinson R44 is type certificated by EASA under the reference EASA.IM.R.121, issue 3 dated 21 April 2010.

General characteristics

- **Crew:** one or two pilots
- **Capacity:** four, including pilot
- **Payload:** 900 lb (408 kg)
- **Length:** 21 ft 5 in (9.0 m)
- **Rotor diameter:** 33 ft (10.1 m)
- **Tail rotor diameter:** 4 ft 10 in (1.5 m)
- **Height:** 10 ft 9 in (3.3 m)
- **Empty weight:** 1,450 lb (657.7 kg)
- **Loaded weight:** 2,500 lb (1,134 kg)



Performance

- **Maximum speed:** 130 kt (240 km/h)
- **Cruise speed:** 110 kt (200 km/h)
- **Range:** 300 nmi (560 km;)

Airframe

- Manufacturer: Robinson Helicopter Company.
- Type: R44 Raven II
- Serial Number: 11445
- Built year: 2006
- Total Time: 505.4 FH (hourmeter)
- Registration: OO-PTA
- Certificate of Registration, issued by BCAA on 11 December 2008.
- Certificate of Airworthiness, issued by BCAA in December 2008.
- Airworthiness Review Certificate: issued by Air Technology Belgium, Part M Subpart G – approved agency (ref BE.MG.24) on 9 November 2009, and revalidated on 08 November 2010, valid until 09 November 2011.
- Total FH flown since Belgian registration: 282.7FH (from 12 dec 2008 till 11 mar 2011).

Engine

- Manufacturer Lycoming
- Model: IO-540-AE1A5
- Serial Number: L-31504-48A
- Engine TT: 505.4 FH.

Owner

- HPS BVBA

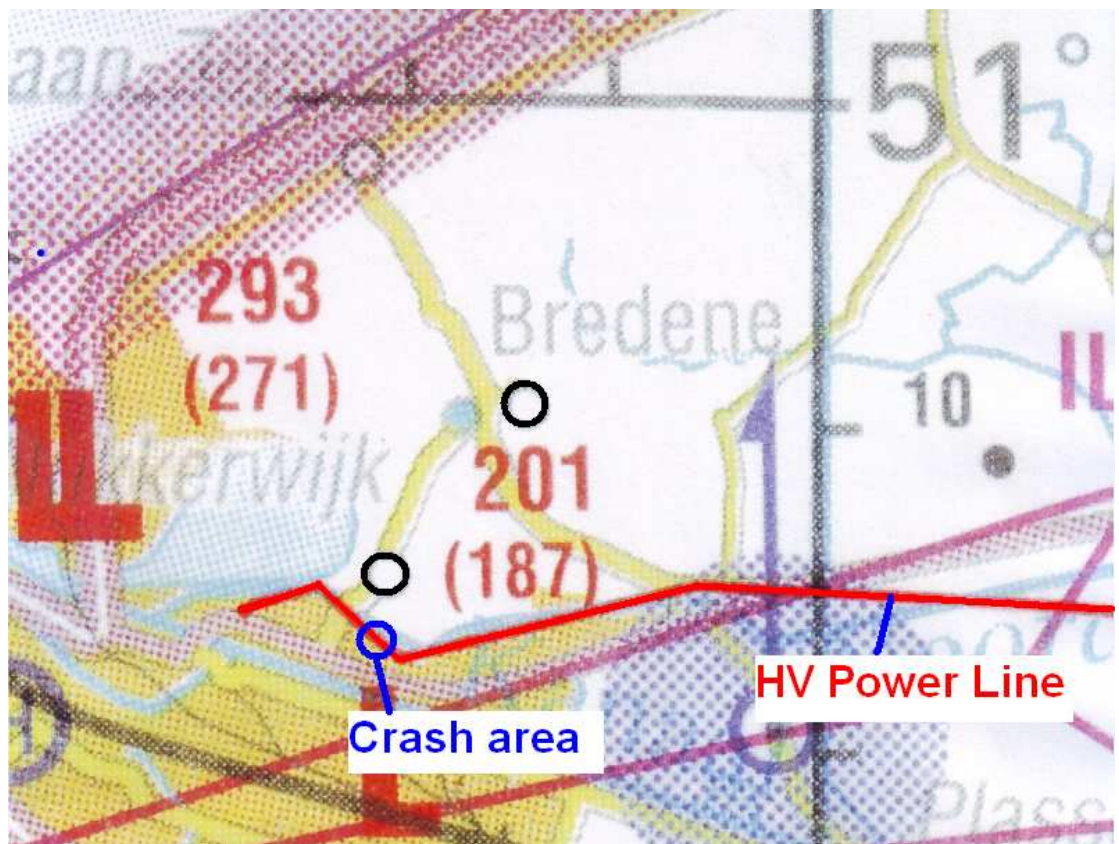
Maintenance:

The maintenance program bears the reference ATB-00-R44, and is performed by a Part-145 approved Maintenance Organisation (ref: BE.145.24).

When reported on the Low-Air map (see above), we could see that the helicopter was only visible for a relatively short period of time, The radar loses the tracking when the helicopter flies under the detection threshold (300 ft).

Aviation charts

The presence of the High Voltage (150 kV) Power line in the vicinity of Bredene village and the Nukkerwijk is clearly identified on the M534 Low-Air Chart Ed 2010.



1.9 Communication.

Radio communication was established between the helicopter and the Tower of Oostende (frequency: 118.175 MHz). The transcript is as follows:

Time	Calling station	Communication
13:03:13	OO-PTA	Ostend Tower, this is OO-PTA, good afternoon
13:03:19	EBOS	OO-PTA, good afternoon, Sir
13:03:22	OO-PTA So for helicopter VFR, from Zeebrugge to Zeebrugge, for local photo work overhead Bredene. Request to enter your CTR following the coastline to Bredene and for local shots and back to Zeebrugge.
13:03:46	EBOS	OO-PTA, what will be your altitude ?
13:03:51	OO-PTA	euh... 500ft or below
13:03:54	EBOS	Proceed 500ft or below QNH1017 and report Bredene
13:03:58	OO-PTA	QNH 1017, clear to zone, will contact you when overhead Bredene, OO-PTA
13:05:43	EBOS	OO-PTA, squawk 6345
13:05:51	OO-PTA	Squawk 6345, is that correct, Oostende
13:05:57	EBOS	6345 is correct, yes
13:06:58	EBOS	O-PTA, confirm actual position, I have negative radar contact
13:07:01	OO-PTA	euh... Wenduine, flying at 300ft
13:07:11	EBOS	Roger
13:07:21	OO-PTA	Correction, Oostende, PTA is overhead De Haan, met 300ft
13:07:24	EBOS	De Haan, roger
13:07:52	OO-PTA	OO-PTA is overhead Bredene
13:09:58	EBOS	..read a report mission completed
13:10:03	OO-PTA	report mission completed OO-PTA
13:17:16	OO-PTA	OO-PTA, overhead watertoren of Bredene, so no longer overhead the coastline
13:20:55	OO-PTA	Oostende Tower, OO-PTA
13:20:57	EBOS	O-PTA ?
13:20:59	OO-PTA	OPTA, we have a problem. I touched a HT line. We are OK, helicopter is OK but I see one cable is cut off. I am now at the ground precaution at the ground in Bredene
13:21:17	EBOS	OK, it's copied, you need any other assistance ?
13:21:21	OO-PTA	Don't think it will be necessary, I check the helicopter, and then I call you back
13:21:25	EBOS	OK, it's copied

1.10 Aerodrome information.

The helicopter flew out of its home base in the Marcus Gerardstraat in Zeebrugge, a non-registered helipad, as defined in MB 24 december 1970.

1.11 Flight recorders.

The helicopter is not equipped with a Flight recorder, but the pilot used two GPS (Garmin and Bendix/King), allowing the recording of tracking parameters. The download was used to sketch the flight path of the helicopter.

1.12 Wreckage and impact information.

Power distribution

The helicopter cut the ground cable of the electrical power distribution in the neighbourhood of the Nukkerbrug.

The cables were hanging from 2 poles (47 and 48), in a NW – SE direction.

The 150 kV high Voltage pole, next to where the helicopter landed (reference 48 of the 150.15-16 (EV204) line) has a height of 48.44 m (159 ft). The height of the ground cable at the point of contact with the helicopter would be slightly below that value.

The power distribution occurs by 2 series of 3 cables, left and right of the poles. That day, only the cables located on the south side were powered.

The distance between cables, as reported by Elia, the power distributor, is a minimum of 4.5m for the 150kV distribution cables.



Impact

The main rotor blade shows traces of the contact with the ground wire at 1m from the blade extremity.

After the contact between the main rotor and the ground cable, the helicopter landed next to the 150 kV High Voltage pole.

The ground cable is made of a bundle of smaller tiny cables, that broke on contact with the main rotor and the mast of the helicopter.

Small portions of the cable perforated the skin of the helicopter, entered the cabin, and exited through the windscreen. The pilot reported having found a small 10cm portion of a 1mm-dia cable trapped inside his sweater.



1.13 Medical and pathological information.

Not applicable

1.14 Fire.

There was no fire.

1.15 Survival aspects.

Not applicable.

1.16 Tests and research.

Not applicable.

1.17 Organizational and management information.

Regulation about low flying in helicopter in Belgium.

Art 74 of the Royal Decree of 15.09.1994 states:

Sauf pour les besoins du décollage et de l'atterrissage ou sauf autorisation du Ministre chargé de l'administration de l'aéronautique ou du directeur général de l'Administration de l'Aéronautique, il est interdit de faire évoluer un aéronef selon les règles de vol à vue :

- a) au-dessus des villes et des parties agglomérées de communes, des zones d'habitation, des complexes industriels, du terminal LNG de Zeebrugge, des centrales nucléaires, [1 es prisons, des établissements pénitentiaires]1 ou des rassemblements de personnes en plein air à une hauteur inférieure à 300 m (1 000 pieds) au-dessus de l'obstacle le plus élevé, situé dans un rayon de 600 m autour de l'aéronef.

Toutefois, pour les hélicoptères, une hauteur minimale différente peut être fixée par le Ministre chargé de l'administration de l'aéronautique ou le directeur général de l'Administration de l'Aéronautique, en tenant compte des caractéristiques de l'itinéraire d'accès visé à l'article 43, § 1er, de l'arrêté royal du 15 mars 1954 réglementant la navigation aérienne, modifié par l'article 3 de l'arrêté royal du 31 août 1970, sans qu'elle puisse être inférieure à 100 m (300 pieds) au-dessus de l'endroit survolé;

- b) ailleurs, à une hauteur inférieure à 150 m (500 pieds) au-dessus du sol ou de l'eau et à une distance inférieure à 150 m de tout obstacle artificiel fixe ou mobile. Toutefois, en ce qui concerne les hélicoptères, ces hauteur et distance minimales sont ramenées à 50 mètres (150 pieds).

Behalve wanneer dit nodig is om op te stijgen of te landen, of behalve toestemming van de Minister belast met het bestuur van de luchtvaart of van de directeur-generaal van het Bestuur van de Luchtvaart, is het verboden te vliegen overeenkomstig de zichtvliegvoorschriften :

- a) boven steden en bebouwde kommen van gemeenten, industriële complexen, de LNG-terminal te Zeebrugge, woonzones, nucleaire centrales [¹ , gevangenissen, strafinrichtingen] ¹ of mensverzamelingen in open lucht op een hoogte lager dan 300 m (1 000 voet) boven de hoogste hindernis binnen een straal van 600 m rond het luchtvaartuig.

Voor hefschroefvliegtuigen evenwel kan een andere minimale hoogte worden vastgesteld door de Minister belast met het bestuur van de luchtvaart of de directeur-generaal van het Bestuur van de Luchtvaart, rekening houdend met de kenmerken van de toegangsweg bedoeld in artikel 43, § 1, van het koninklijk besluit van 15 maart 1954 betreffende de regeling der luchtvaart, gewijzigd door artikel 3 van het koninklijk besluit van 31 augustus 1970 zonder dat deze hoogte lager mag zijn dan 100 m (300 voet) boven de overvlogen plaats;

- b) elders, op een hoogte lager dan 150 m (500 voet) boven de grond of het water en op minder dan 150 m van elke vaste of verplaatsbare kunstmatige hindernis. Voor hefschroefvliegtuigen evenwel worden deze minimumhoogte en minimumafstand teruggebracht op 50 m (150 voet).

1.18 Additional information.

Not Applicable.

1.19 Useful or effective investigation techniques.

Not Applicable.

2. Analysis.

2.1. The flight

Contacting the EBOS Tower, the pilot reported he expected to fly at an altitude of 500 ft or below. Indeed, most of the flight was performed at an altitude ranging from 200ft to 400ft, as reported on the GPS read-out. The vertical precision of the GPS would be around +/- 60 ft.

The radar plot is only showing part of the flight when the helicopter flies above 300 ft. For most part of the flight, the helicopter was invisible to the radar screen of the EBOS tower.

The pilot stated also he was not aware of the proximity of the HV line upon reaching the Nukkerbrug. It did not spot the lines nor the poles, because of the orientation of the sun. The GPS on board did not give an indication of the proximity of the HV line.

2.2. Contact with the HV Line.

Taking into account that the main rotor cut the ground line 1m from the extremity of the blade, that the diameter of the rotor is 10.1m, and the helicopter height is 3.3m, the risk of contacting a phase power line (minimum distance: 4.5m) was high.

Fortunately, the power line (3 cables) from the side of the helicopter was not powered at the time.

3. Conclusions.

3.1 Findings.

- The helicopter was airworthy.
- The pilot holds a valid PPL license.
- The helicopter flew in the vicinity of the High Voltage line at an altitude of 133ft.
- The High Voltage ground line is located at a maximum height of 159 ft.

3.2 Causes.

The accident was caused by the helicopter flying at a too low altitude.

4. Safety recommendations.

None issued.

Note: the High Voltage line in Bredene was removed in July 2011.