



Państwowa Komisja Badania Wypadków Lotniczych

# FINAL RAPORT

2023-0005

OCCURRENCE NUMBER

## ACCIDENT

LOC-I: Loss of control – in flight



The sole objective of safety investigations is the prevention of future accidents and incidents.

The Commission does not apportion blame or liability.

The investigation is independent and separate from any judicial or administrative proceedings.

Any use of the Report for purposes other than prevention of accidents and incidents may lead to wrong conclusions and interpretations.

## **NISA AIR, s. r. o., training flight**

### **Robinson, R22 Beta, OK-MAZ.**

#### **Lubin Airport (EPLU), 28 February 2023**

The Final Report was issued by PKBWL based on information available on the date of its completion.

The Report presents only facts related to circumstances of the occurrence, its causes and safety recommendations.

The original Report was drawn up in the Polish language.

Warsaw, 20 December 2023



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## INTRODUCTION

### LEGAL BASIS

The State Commission on Aircraft Accidents Investigation is the safety investigation authority referred to in Article 4(1) of Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and occurrences in civil aviation and repealing Directive 94/56/EC (Office Journal of the EU L 295 of 12 November 2010, page 35, as amended).

The Commission shall conduct investigations on the basis of the provisions of the Aviation Law of 3 July 2022 (Journal of Laws 2022 No. 130, item 1112, as amended) and law of the European Union in the field of civil aviation accidents and occurrences, and taking into account the standards and recommended methods of conduct contained in Annex 13 to the Convention on International Civil Aviation, drawn up in Chicago on 7 December 1944 (Journal of Laws of 1959, item 212, as amended).

**BASIC INFORMATION ABOUT THE OCCURRENCE** Operator (user), or type of operation – NISA AIR, s. r. o., training flight.

Manufacturer, type, model and registration marks of the aircraft – Robinson, R22 Beta, OK-MAZ.

Place and date of occurrence – Lubin Airport (EPLU), 28 February 2023.

### OCCURRENCE REPORTING

The occurrence was reported to PKBWL occurrence in accordance with the mandatory occurrence reporting system, on 28 February 2023.

The occurrence was allocated the reference number 2023-0005.

Based on initial information, the occurrence was classified as an accident.

During the investigation the classification of the occurrence was not changed.

### NOTIFICATION ABOUT THE OCCURRENCE

PKBWL notified about the occurrence the following entities:

- State of Registry – the Czech Republic (UZPLN);
- State of the Operator – the Czech Republic (UZPLN);
- State of Design – the US (NTSB);

- State of Manufacture – USA (NTSB);
- EASA;
- ULC.

## INVESTIGATION ORGANIZATION

The investigation is being conducted by – the PKBWL.

Investigator-in-Charge (IIC) – Mieczysław Wyszogrodzki.

PKBWL Investigation Team – Andrzej Bartosiewicz.

Investigation groups – not established.

Accredited Representatives (ACCREPs) and their advisers – no country has designated ACCREP.

## RECOMMENDATIONS

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. Details are provided in Chapter 4 of this Report.

## TIME

All times in the Report are given as LMT. On the day of the occurrence LMT=UTC+1.

## DATE

If the Report contains a date in digital format DD/MM/YYYY, the individual digits mean: DD is the day, MM is the month, and YYYY is the year.

## FIGURES AND TABLES

Unless stated otherwise in this Report – source is PKBWL.

## SUMMARY

On 27 and 28 February 2023, the EPLU airport hosted training flights in an R22 BETA helicopter with OK-MAZ registration marks. At approximately 2:08 p.m., the student pilot took off for an individual flight. After about 28 minutes of flight, in the final phase of the approach to landing, while performing a hover, at an altitude of about 2 m AGL, the helicopter lost control. The helicopter, which tilted and rotated around a vertical axis, hit the ground with the main rotor blades, after which the fuselage collided with the grassy part of the airport, and then rolled over to the left side. The student pilot sustained minor injuries and left the helicopter's cabin unassisted. The helicopter was substantially damaged.

## **SYMBOLS, ACRONYMS AND ABBREVIATIONS**

### **SYMBOLS**

°	Degree (examples °C (temperature) and 1° (angle))
'	Minute
”	Second

### **ACRONYMS AND ABBREVIATIONS**

AGL	Above Ground Level
AIP	Aeronautical Information Publication
ARC	Airworthiness Review Certificate
ATO	Approved Training Organisation
C	Degrees Celsius
CG	Centre of Gravity
C of A	Certificate of Airworthiness
CPL	Commercial Pilot Licence
CVR	Cockpit Voice Recorder
RWY	Runway
ELT	Emergency Locator Transmitter
FI	Flight Instructor
FT	Feet
FDR	Flight Data Recorder
h	Hour(s)
hPa	Hektopaskal
IIC	Investigator-In-Charge
kg	Kilogram
LMT	Local Mean Time
L	Liter(s)

LAPL	Light Aircraft Pilot Licence
m	Meter(s)
MHz	Megahertz
min	Minute(s)
NTSB	National Transportation Safety Board
PIC	Pilot-In-Command
P/N	Part Number
PPL(H)	Private Pilot Licence (Helicopters)
PPL(A)	Private Pilot Licence (Aeroplanes)
QNH	Barometric Pressure Adjusted To Sea Level
RPM	Revolutions Per Minute
RWY	Runway
s	Second
SEP(L)	Single Engine Piston Land
S/N	Serial Number
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
ULC	Civil Aviation Authority
UTC	Coordinated Universal Time
UZPLN	Air Accidents Investigation Institute (cz. Ústav Pro Odborné Zjišťování Příčin Leteckých Nehod)



## 1. FACTUAL INFORMATION

### 1.1. History of the flight

On 27 and 28 February 2023, training and independent flights were performed at Lubin Airport (EPLU) as part of training for the PPL(H) license. The training was conducted by the Czech Approved Training Organisation (ATO) NISA AIR. The initial stage of training was completed by the student-pilot in the Czech Republic. The training in self-piloted flights took place at Lubin Airport (EPLU), as the student-pilot did not have sufficient language proficiency (ICAO level) to communicate in Czech or English.

On 27 February 2023, upon arrival at the airport, the crew reviewed the airport's documentation in AIP VFR Poland, the traffic situation, the meteorological situation, and then performed a pre-flight inspection of the helicopter during a briefing.

On the same day, the student-pilot performed four check flights according to Exercise 19P under the supervision of an instructor, including a flight permitting individual flights. Subsequently, the student-pilot performed two individual circle flights according to Exercise 20, in accordance with the training program.

On 28 February 2023, the student pilot and the pilot-instructor arrived at the airport in the morning, performed a pre-flight inspection and conducted a briefing.

At around 08:20 a.m., the student-pilot and the pilot-instructor made two check flights around the circle according to Exercise 19P, and then the student-pilot made two solo flights according to Exercise 20. After discussing the flights, the crew went for a break.

At approximately 12:38 p.m., the student pilot performed another two check flights and two solo flights for manoeuvring in hover, according to Exercise 22.

At around 2:08 p.m., the student pilot took off for another solo flight according to Exercise 22 (instead of manoeuvring in hover, according to the training program) and made a circular flight, which lasted 28 minutes (Figure 5).

Approaching the landing with a heading of RWY 13R, the student-pilot made a hover at an altitude of about 2 meters, from where he intended to make a landing at the previously agreed parking apron.

According to the student-pilot's statement, while in hover, the helicopter began to rotate to the right, around the vertical axis. The student-pilot reacted by moving the left pedal to its maximum position, but failed to stop the rotation.

According to witness statements, the helicopter made about two rotations to the right along the vertical axis, during which it moved about 15 m in a westerly direction (Figure 4).

During the rotation, the helicopter tilted to the left side, and one of the main rotor blades hit the ground. The helicopter collided with the ground on the grassy part of the airport, tipping over onto the left side of the fuselage.

After the fall, the student pilot turned off the electrical power, unfastened himself from his seat belts and left the cabin unassisted. The student pilot does not remember the moment of impact on the ground.

Fire Service, Ambulance Service and Police units arrived at the place. After the student-pilot had taken a sobriety test (result: 0.00‰), he was taken to a hospital in Lubin.

After examination, the doctor found that the student-pilot had sustained only minor injuries. The doctor did not order hospitalisation, and after providing medical supplies, the student-pilot was released home.

## 1.2. Injuries to persons

Table 1. Numerical breakdown of the injured

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor	1		1	Not applicable
None				Not applicable
<b>TOTAL</b>	1		1	

## 1.3. Damage to aircraft

The helicopter was substantially damaged. All the damages to the helicopter were the result of its collision with the ground. The results of the collision with the ground include:

- damaged main rotor blades;
- damaged main rotor hub;
- damaged covering of the left side of the fuselage;

- separation of the tail beam from the fuselage along with the tail gear and tail rotor blades.

The extent of the damages is shown in (Figure 1).



Figure 1 Robinson R44, OK-MAZ – at the place of occurrence.

#### **1.4. Other damage**

No other damages occurred.

#### **1.5. Personnel information**

Pilot-in-Command - student pilot: male, age 64, with the following qualifications:

- License: in training to obtain of the pilot's license PPL(H) – private pilot license (helicopter).
- Type flight time:
  - a) R22 57:34 h in training flights as a student pilot;
  - b) R22 2:06 h in solo flights (including the last flight).
- Flight time prior to the occurrence:
  - a) R22 in the last 24 h: 3:06 h (1:28 h dual, 1:38 h solo);
  - b) R22 in the last 7 days 4:06 h;
  - c) R22 in the last 90 days: 7:28 h.

- The pilot's aero-medical certificate – class 2, no limitations, expired on 1 October 2023.
- Other ratings: license: PPL(A) – private pilot license (aeroplanes).
- Ratings entered into the licence: SEP(L) valid until 31 May 2024.
- Total flight time: on aeroplanes about 800 h.

#### Student-Pilot:

- in the last 48 h, received 8 h of rest in hotel conditions.
- became familiar with the regulations for flying at EPLU Airport during the briefing. On the day of the occurrence, prior to the accident, he had performed consecutive solo flights.
- During the accident, the student pilot occupied the right seat and was the pilot flying.

### **1.6. Aircraft information**

The R22 BETA helicopter is manufactured by Robinson Helicopter Company, based in Torrance (USA). The R22 BETA is a lightweight, two-seat, single-rotor helicopter of metal-composite construction in a classical configuration with a tail rotor, equipped with a fixed landing gear with two skids, powered by a single Lycoming O-360-J2A engine.

#### Airworthiness and maintenance

##### a) General information:

- manufacturer – Robinson Helicopter Company;
- factory designation (model) BETA II;
- factory (serial) number - 4864;
- year of construction – 2022;
- registration marks – OK-MAZ;
- owner – ZETMARK Małgorzata Markuszewska;
- user – ZETMARK Małgorzata Markuszewska ;
- certificate of registration – date of entry 03 July 2022, registration number 6793;
- airworthiness review certificate (ARC), issued 15 July 2022, valid until 14 June 2023.

##### b) History of the aircraft:

- Time Since New – 102 h;
  - Time Since Overhaul -- no overhaul carried out;
  - flight time since the last inspection – 50 h.;
  - modifications – none;
  - on-board technical log – maintained dutifully;
  - maintenance documentation – maintained dutifully;
  - airworthiness directives – all airworthiness directives were executed.
- c) Engine, main rotor blades and tail rotor:
- Lycoming O-360-J2A, four-cylinder boxer with carburettor system fuel supply, air-cooled;
  - main rotor blades, operating time: from the beginning of operation 102:00 h, after the last periodic check 50:00 h;
  - tail rotor blades, working time: from the beginning of operation 102:00 h, after the last periodic check 50:00 h.
- d) Fuel:
- recommended – 91/96 UL, AVGAS 100LL and 100/130;
  - used in flight – AVGAS 100LL;
  - quantity on board - approx. 70 l;
  - distribution on the deck - main and auxiliary tank.
- e) The sub-assemblies and components – no malfunction during the flight.
- f) Deferred defects – the helicopter's documentation did not contain any information about deferred defects.
- g) Weight and balance of the aircraft:
- MTOW – 621 kg;
  - The MTOW was not exceeded;
  - CG - within permissible limits;
  - Aircraft systems or parts contributing to the accident: Not applicable;
  - Efficiency and use of collision avoidance systems: Not applicable.

### **1.7. Meteorological information**

On the day of the occurrence, the meteorological situation in Poland was characterised by a widespread and stationary high pressure system of 1032 hPa,

with its centre over central Europe. Over the northern part of the country, in the region of the Baltic Sea, there was a low-pressure gulf associated with a low-pressure system (978 hPa), moving to the north-east. The above baryonic situation over most of Poland, provided stable atmospheric conditions.

The area of the airport was cloudless, with a moderate wind blowing from the north-east with a speed of 2.6 to 3.5 m/s, with gusts of 7 m/s.

The helicopter crew used the weather station of the EPLU airport.

The conditions according to the EPLU airport weather station report on the day of the occurrence, were as follows:

- date: 28 February 2023;
- time: 14:36 h;
- wind direction: north-east, average direction 60°;
- wind speed: 3.5 m/s with gusts of 7 m/s;
- visibility: 10 km (30000 ft);
- ambient temperature: 3,8°C;
- dew point temperature: – 3,1°C;
- atmospheric pressure: QNH 1029,7 hPa.

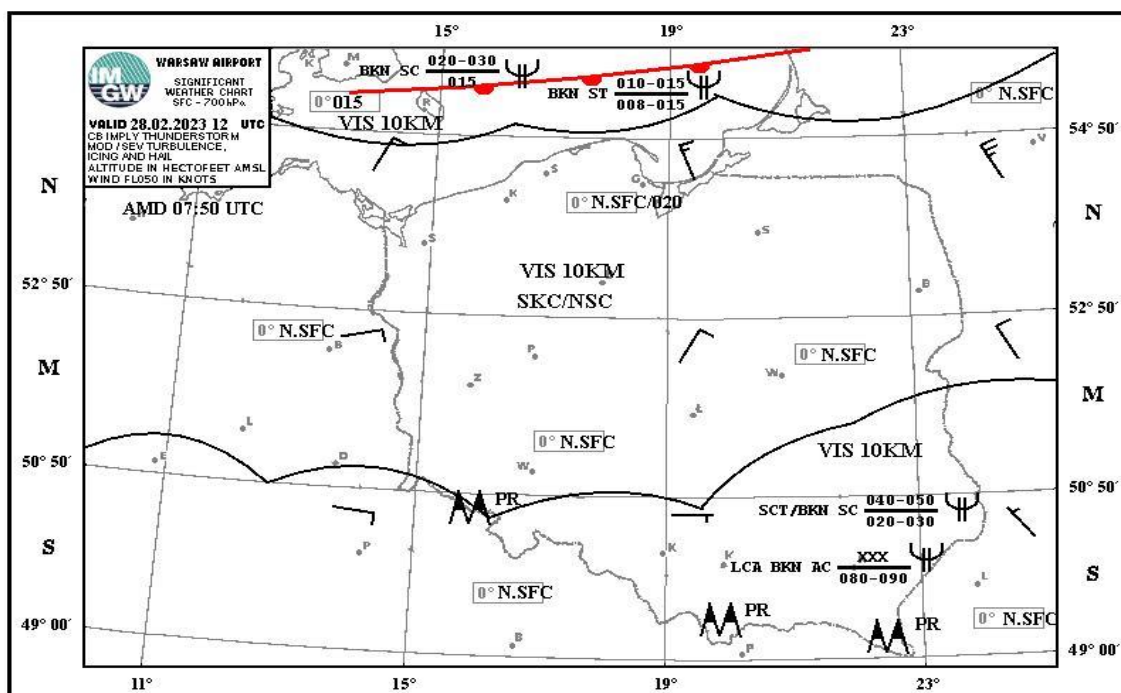


Figure 2 Area weather forecast [source: Significant Gamet]

### **1.8. Aids to navigation**

Not applicable.

### **1.9. Communications**

The student-pilot maintained continuous radio communication with the instructor on 119.525 MHz. Correspondence in both directions was clear.

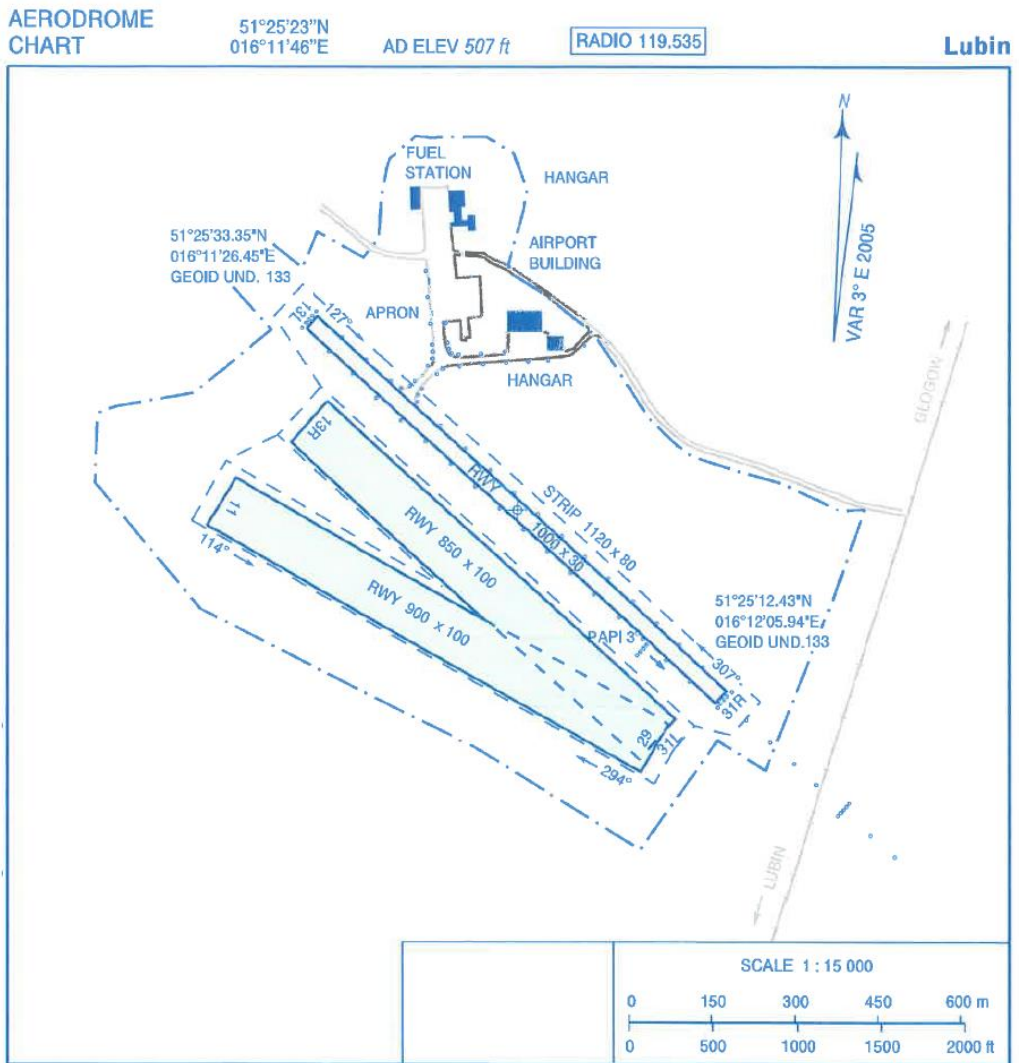
### **1.10. Aerodrome information**

Lubin Airport (EPLU):

- airport coordinates and location: 51°25'23"N 016°11'46"E;
- elevation: 507 ft;
- airport operator: Aeroklub Zagłębia Miedziowego;
- permitted traffic according to VFR regulations day and night;
- runways, 13L/31R (concrete/asphalt surface), 13R/31L (grass surface) and 11/29 (grass surface).

AIP VFR  
POLAND

VFR AD 4 EPLU 3-0  
24 MAR 2022



RWY	TRUE (°)	MAG (°)	DIMENSIONS (m)	SURFACE	MTOW / STRENGTH	TORA (m)	LDA (m)
13L	130	127	1000 x 30	CONC/ASPH	-	1000	1000
31R	310	307				1000	1000
13R	130	127	850 x 100	GRASS	-	850	850
31L	310	307				850	850
11	117	114	900 x 100	GRASS	-	900	900
29	297	294				900	900

Figure 3 Lubin Aerodrome (EPLU) Visual Operation Chart [source: AIP VFR Polska]



### 1.11. Flight recorders

The aircraft was not equipped with a Flight Data Recorder (FDR) or a Cabin Voice Recorder (CVR). Neither of these recorders was required by applicable aviation regulations.

### 1.12. Wreckage and impact information

A general view of the accident site is shown in Figures 1 and 4.

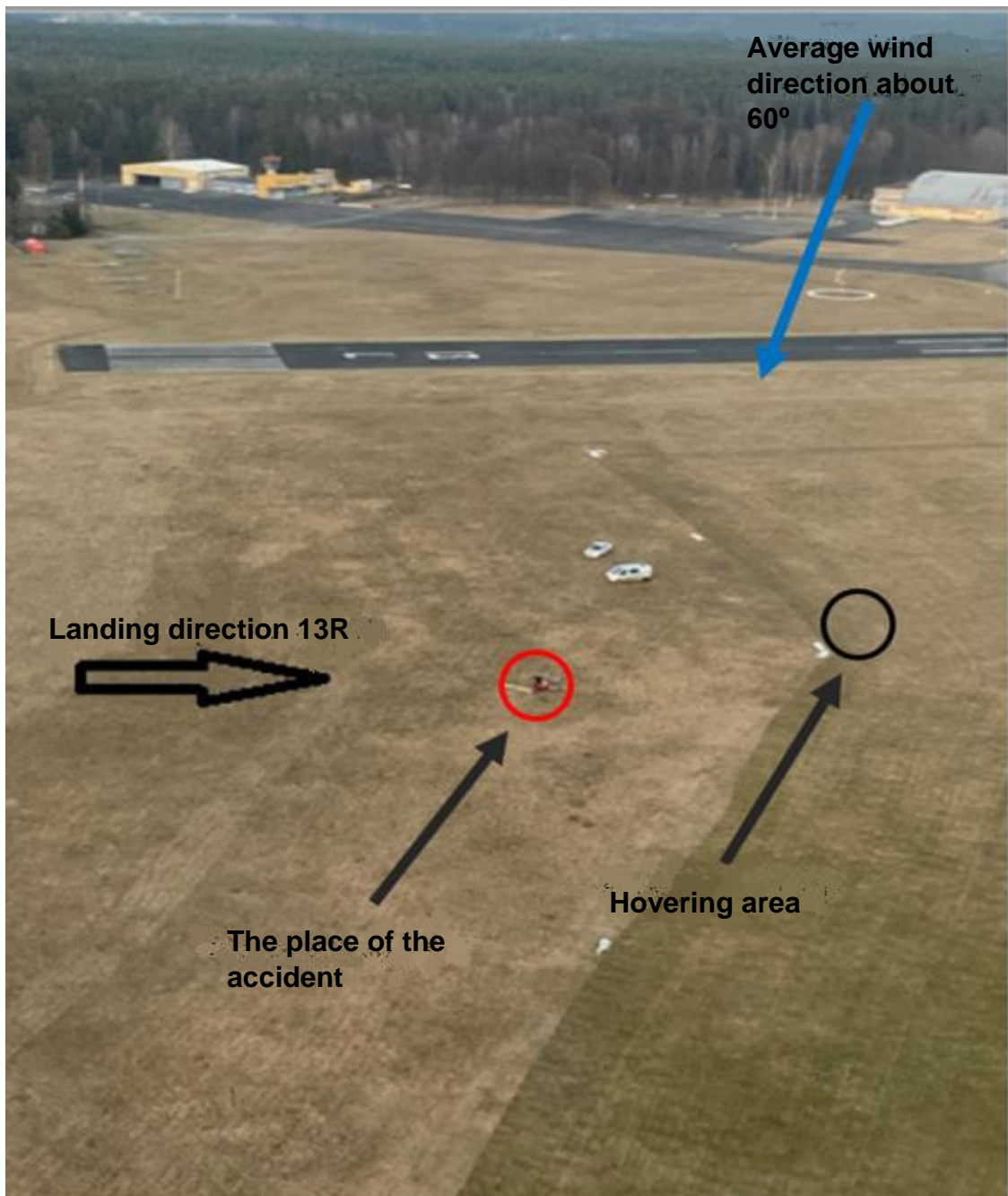


Figure 4 The blue arrow indicates the average wind direction, the black circle marks the hovering area, the red circle marks the accident site.

All the debris of the helicopter was found on an area of about 30 m<sup>2</sup>, on the grassy, operational part of the airport.

No part of the helicopter was found to have separated from it before impact with the ground.

While hovering (at an altitude of about 2 m), the helicopter rotated to the right around the vertical axis, and then the helicopter moved in an uncontrolled manner about 15 m in a westerly direction. While in tilt to the left side, one of the of the main rotor blades hit the ground. As a result of the destruction of the main rotor blades, the helicopter collided with the ground on the grassy part of the airport and then rolled over onto its left side.

### **1.13. Medical and pathological information**

As a result of the accident, the pilot sustained minor injuries.

There was no evidence that any illness, inability or physiological factors affected the pilot's actions.

The pilot was not under the influence of alcohol or other substances impairing his actions.

### **1.14. Fire**

No traces of fire were found during the flight and after the accident.

### **1.15. Survival aspects**

The circumstances under which the accident occurred indicate that the low altitude (hovering at about 2 meters) of the helicopter and the fact that the student-pilot was wearing a seatbelt what created conditions conducive to the survival. There were low forces acting on the student-pilot.

Both seats in the flight deck were factory-equipped with three-point inertia safety belts. The seats in the helicopter's cabin were not deformed.

The student-pilot left the wreckage of the helicopter unassisted, before the arrival of the emergency services.

### **1.16. Tests and research**

A visual inspection of the wreckage of the helicopter was performed at the site of its storage, in the village of Skepe. During the inspection it was found that:

- a) the swashplate responded to movements of the collective and the cyclic pitch control;

- b) tail rotor pitch control push-pull tubes moved as the pedal position was shifted. Tail propeller blade pitch angle control maintained kinematic continuity;
- c) cyclic pitch control is placed in the centre of the cabin with a cyclic pitch control suspended on a the articulated joint in each direction without resistance or jamming;
- d) the main rotor blade pitch angle links swashplate moved without resistance or jamming;
- e) both levers of the collective pitch control were moved to the maximum upper position and the engine throttle control was set to the open position (full power - charging);
- f) both levers of the collective pitch control could be moved from the minimum to the maximum position without jamming, the engine control throttles were also fully operational;
- g) the left side of the helicopter's fuselage, the left door of the cockpit, along with the glazing, was significantly damaged;
- h) Both seats in the crew cabin were factory-fitted with a with three-point inertia seat belts and were not deformed;
- i) the ELT transmitter signal was not transmitted due to damage to the external antenna as a result of the occurrence.

### **1.17. Organizational and management information**

Flight training was carried out by the Czech NISA AIR s.r.o., which also provided comprehensive maintenance of the helicopter.

– The instructor – a man of Czech nationality, holds a CPL(H) license and an FI(H) Instructor certification on R44 and R22 helicopters. His general airfare was about 4,000 h, and his airfare as an instructor on R44 and R22 types totalled about 1,000 h. He holds a medical-flight certificate – 1st class valid until 4 October 2023.

– In solo flights, the instructor-pilot observed the student and maintained constant radio communication with him on the frequency 119.525 MHz.

### **1.18. Additional information**

According to the instructor's statement, at the time of the helicopter's clockwise rotation, the instructor-pilot observing the occurrence felt that the student-pilot

was probably late or not decisive enough to counteract the helicopter's rotation by moving the left pedal.

In his statement, the student-pilot said that from the moment the helicopter began to rotate to the right along the vertical axis after the left pedal was moved to its maximum position, he does not remember what happened next.

Based on the radar recording, a depiction of the flight after the circle is shown (fig. 5) according to exercise 22, the flight lasted 28 minutes.

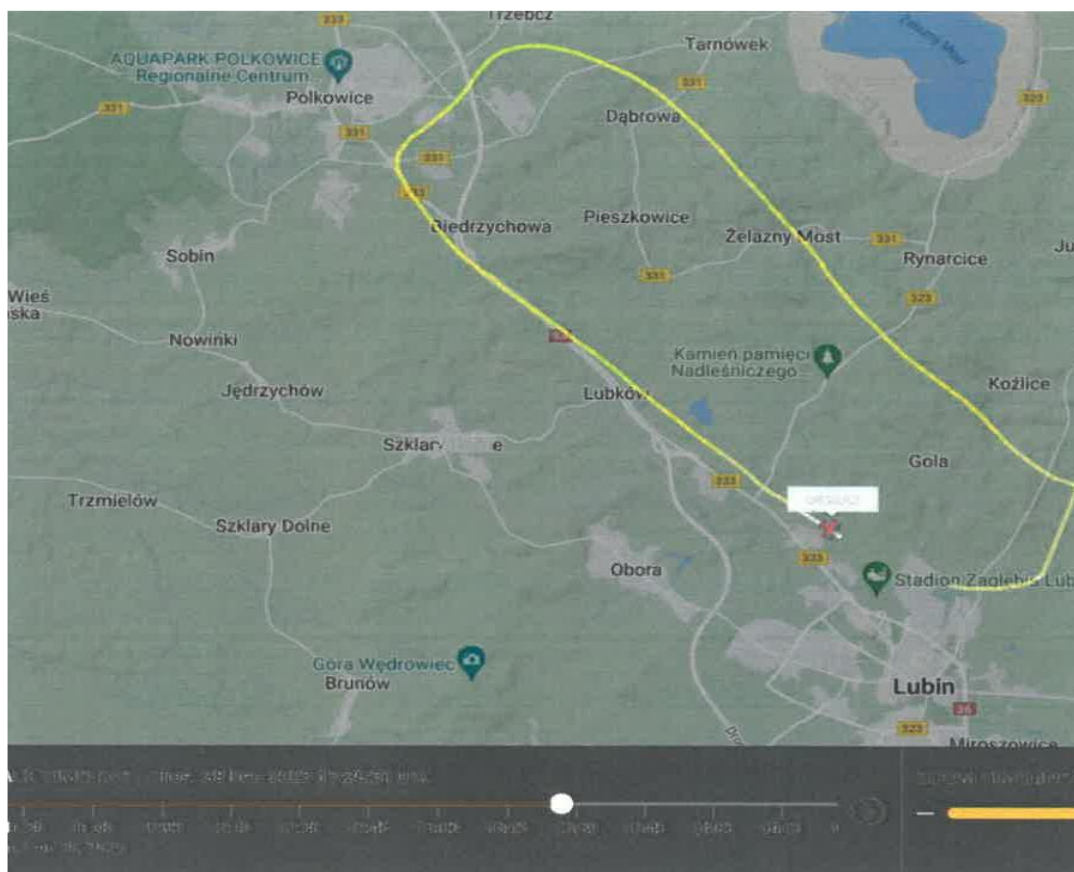


Figure 5 Flight route [source flightradar24.com].

## 1.19. Useful or effective investigation techniques

Standard investigation techniques were used.

## 2. ANALYSIS

### 2.1. Flight operations

#### 2.1.1. Crew qualifications

The instructor's evaluation indicated that the student-pilot's knowledge and familiarity with the aircraft's systems were sufficient for solo flight. The student-pilot held a valid appropriate aero-medical certificate.

#### 2.1.2. Operational procedures

In the flight in which the accident occurred, the student-pilot improperly implemented the flight training program. According to the content of Exercise 22, he should have performed manoeuvring in a hover with ground influence while observing the following:

- a) correct upwind and downwind hovering;
- b) 360° rotations around a designated location;
- c) rotations around the tail rotor;
- d) rotations around the geometric centre of gravity;
- e) building flight around a four sides of a square;
- f) safe turn to improve visibility;
- g) controlling RPM rotations keeping in mind the effect of torque, limitations due to the position of the centre of gravity, and speed and wind direction;

Instead of exercise 20 (solo flight around the circle), the student performed the above exercise 22 (manoeuvring flight), which was inconsistent with the training program.

#### 2.1.3. Weather

The following meteorological conditions prevailed at EPLU Airport during the flight:

- 1) during take-off at about 2:08 p.m., there was a ground wind of 2.6 m/s with gusts up to 7 m/s from a 60° direction;
- 2) during landing at 2:36 p.m., there was a ground wind of 3.5 m/s with gusts up to 7 m/s from a 60° direction.

The student pilot-made a hover with a course of 13R, the wind blowing from the left side of the helicopter's fuselage at an angle of about 90° created unfavourable conditions for this type of helicopter.

According to the R22 Beta helicopter's instruction manual, the in-flight wind speed to 7 m/s did not exceed the maximum allowable wind strength for this type of helicopter.

#### 2.1.4. Communications

In solo flights, the instructor-pilot observed and maintained continuous radio communication with the student-pilot on the Lubin Radio frequency 119.525 MHz.

The short time between the helicopter's turn to the right and its collision with the ground did not give the instructor an opportunity for any radio advice.

### 2.2. Aircraft

The R22 Beta helicopter is a light helicopter characterised by low inertia, thanks to which it responds extremely quickly and decisively to movements of the cyclic pitch control. Also, when adjusting the overall pitch lever, the helicopter's rotation should be controlled along the vertical axis with the pedals. A delayed reaction will cause the helicopter to rotate in the direction opposite of the rotation of the main rotor. A more lengthy delay or insufficient reaction can result in an uncontrollable or/and difficult to control rotation.

#### 2.2.1. Aircraft maintenance

The aircraft was operated in accordance with applicable regulations and approved procedures.

#### 2.2.2. Mass and balance

The mass and centre of gravity of the aircraft were within determined limits.

#### 2.2.3. Human factor

The human factor of the student pilot's wrong action was decisive in the occurrence of the accident. Improper reaction to the helicopter's right turn consisting of a delayed or undecided reaction in shifting the left pedal. The student-pilot, wishing to avoid a collision with the ground, reflexively moved the collective pitch control to the upper position in a vigorous movement, which further accelerated the helicopter's rotation to the right. Correctly, the pilot should have reacted to the situation caused by the sudden rotation, simultaneously with depressing the left pedal by slightly moving the collective control lever down.

#### 2.2.4. Psychological and physiological factors affecting the personnel involved

The student pilot was surprised by the situation caused by the sudden rotation of the helicopter to the right, according to the vertical axis. Although the student-pilot's first instinct was to react correctly by shifting the left pedal, stopping the helicopter's rotation was unsuccessful due to a late or indecisive reaction in shifting it. The correct reaction to the rotation of the helicopter should be to press the left pedal with simultaneously shifting the collective control lever down.

## **2.3. Survivability**

### **2.3.1. Rescue fire service response**

Fire and rescue services arrived at the scene of the accident after about 20 minutes. The student-pilot, even before the services arrived and he had left the cabin, had turned off the electrical power. The fire rescue disconnected the power source by removing the battery from the helicopter. Since the fuel tanks and fuel system were sealed, the fire service did not use fire extinguishing agents, and preventively assisted with the wreckage of the helicopter.

### **2.3.2. Analysis of injuries and fatalities**

As a result of the accident, the student-pilot sustained minor injuries in the form of epidermal abrasions to his head and abrasions to his left forearm; after disentangling himself from his seat belt, he left the wrecked helicopter unassisted. The student-pilot was taken to a hospital in Lubin for examination. After the examination, the doctor did not order hospitalisation, the student-pilot was provided with medical supplies and released home.

### **2.3.3. Survival aspects**

The circumstances under which the accident occurred, the lack of forward speed, the low altitude (hovering with rotation around the vertical axis of the helicopter at a height of about 2 m) and the fact that the student-pilot was wearing a seat belt, provided an opportunity for survival and avoidance of serious injury. The correct action of the student-pilot in turning off the electrical power and not unsealing the fuel tanks minimized the risk of fire.

## **3. CONCLUSIONS**

### **3.1. Findings**

3.1.1. The student-pilot was qualified to perform solo flights, confirmed by the instructor.

3.1.2. No evidence was found that the student-pilot's behaviour was influenced by illness or physiological factors.

3.1.3. The student-pilot had a valid, appropriate aero-medical certificate, and was rested before the flight.

3.1.4. The aircraft had a type certificate and a valid airworthiness certificate.

3.1.5. The flight during which the accident occurred was not in compliance with the content of Exercise 22 according to the Training Program for the PPL(H).

- 3.1.6. The aircraft was equipped and operated in accordance with applicable regulations and approved procedures.
- 3.1.7. The aircraft's weight and centre of gravity were within regulatory limits.
- 3.1.8. There was no evidence of any malfunction or failure of the helicopter's systems.
- 3.1.9. The aircraft was structurally intact prior to the accident.
- 3.1.10. The aircraft was airworthy by the time it collided with the ground.
- 3.1.11. Damage to the aircraft resulted from the accident.
- 3.1.12. The aircraft was substantially damaged.
- 3.1.13. During the flight, the helicopter's engine was running until it collided with the ground.
- 3.1.14. The student-pilot while approaching the landing, performed a hover without taking into account the wind direction.
- 3.1.15. During the hover, the student-pilot lost control of the aircraft.
- 3.1.16. The aircraft was not equipped with a on-board flight data recorder (FDR) or cockpit voice recorder (CVR), neither of which was required by regulation.
- 3.1.17. Toxicological tests for common narcotics and alcohol were negative.

### **3.2. Causes and contributing factors**

- 3.2.1. The cause of the aviation occurrence was the student pilot's error of belated and indecisive shifting of the left pedal and too vigorous shifting of the collective pitch control to its upper position.
- 3.2.2. Little experience of the student-pilot in solo flight.
- 3.2.3. The student-pilot, while approaching the landing, performed a hover without taking into account the wind direction.

## **4. SAFETY RECOMMENDATIONS**

- 4.1.1. PKBWL did not propose safety recommendations after the investigation.

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**THE END**