PKBWL

State Commission on Aircraft Accidents Investigation

PRELIMINARY REPORT

2024-0025

ACCIDENT

SCF-PP: System/Component Failure or Malfunction (Powerplant)
CFIT: Controlled Flight Into or Toward Terrain

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 this Report for purpose other than prevention of air accidents and incidents may lead to wrong conclusions and interpretations.

Non-commercial (NCO), flight along route

Bell Textron Inc., Bell 505

Wiciejów k/ m. Mrozy

This Preliminary Report was issued by PKBWL based on information available on the date of its completion.

This Report presents only facts related to circumstances of the occurrence and ad hoc safety recommendations, when necessary.

This Report was drawn up in Polish.

Warszawa, 16 June 2024

State Commission on Aircraft Accidents Investigation
ul. Nowy Świat 6/12, 00-497 Warszawa

kontakt@pkbwl.gov.pl

24h Duty Phone: +48 500 233 233

https://www.pkbwl.gov.pl

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INTRODUCTION

LEGAL BASIS

The State Commission on Aircraft Accidents Investigation (Państwowa Komisja Badania Wypadków Lotniczych, PKBWL) 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 incidents in civil aviation and repealing Directive 94/56/EC (Official Journal of the European Union L 119, 12.11.2010, p. 35, as amended).

The Commission shall conduct investigations on the basis of the provisions of the Aviation Law of 3 July 2002 (Journal of Laws No 130 of 2002, item 1112, as amended) and the law of the European Union in the field of accidents and incidents in civil aviation, 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 ON THE OCCURRENCE

Operator (user), flight no. or type – Non-commercial (NCO), flight along route from the town of Duchnów-near Mińsk Mazowiecki, Horbów-Kolonia near Biała Podlaska.

Manufacturer, type, model and registration marks of the aircraft –Bell Textron Inc., Bell 505.
Place and date of occurrence –Wiciejów near Mrozy.

OCCURRENCE REPORTING

PKBWL was notified on the occurrence under the mandatory occurrence reporting system on 16 May 2023.

The occurrence was assigned a reference number – 2024-0025.

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

The classification was not changed in the course of the investigation.

OCCURRENCE NOTIFICATION

PKBWL notified the occurrence to:

- State of Design – USA (NTSB);
- State of Manufacture – Canada (TSB);
- State that provided relevant information, significant facilities or experts – France (BEA);
- EASA;
- European Commission;
- ULC.

ORGANISATION OF THE INVESTIGATION

The investigation is conducted by – PKBWL.

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

Specialist groups – no specialist groups were appointed.

Accredited Representatives (and their advisers) – appointed by BEA.

SAFETY 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.

TIME

All times in the Report are given in LMT. On the day of the occurrence LMT = UTC+2.

DATE

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

FIGURES AND TABLES

Unless stated otherwise in this Report – PKBWL is the source.

SYNOPSIS

On 16 May 2024, the owner of a Bell 505 helicopter with registration marks SP-RMK planned a flight on the route: Duchnów near Mińsk Mazowiecki - Horbów-Kolonia near Biała Podlaska. He arrived at the airfield with passengers (employees of the helicopter owner's company). After preparing the helicopter for flight, the pilot started the powerplant at around 09:50 hrs. The take-off took place at around 10:00 hrs. According to the pilot-in-command, after ascending to around 1200 ft AMSL, maintaining the speed of around 100 kt, the powerplant suffered loss of power in around the 10th minute of the flight. With a forest clearing ahead of him, the pilot performed a precautionary autorotation landing. Upond landing, the pilot activated the ELT, turned off electric power, stopped the main rotor blades, after which he notified the services of the occurrence. The pilot and passengers exited the aircraft on their own. After the arrival of the rescue services, the pilot and two passengers were transported to hospitals.

SYMBOLS, ACRONYMS AND ABBREVIATIONS

SYMBOLS

°	Degree e.g. °C (temperature) and 1° (angle)
%	Percent e.g. 95% of fan speed (N1)
'	Minute
”	Second

ACRONYMS AND ABBREVIATIONS

A

AD	Airworthiness Directive
AGL	Above Ground Level
AMSL	Above Mean Sea Level

C

C	degree Celsius
CAA	Polish Civil Aviation Authority (Polish: Urząd Lotnictwa Cywilnego)
CAVOK	visibility, cloud and weather conditions at the moment of observation are better than the recommended values or conditions (Cloud And Visibility OK)
CG	Centre of Gravity
cm	Centimetre(s)
C of A	Certificate of Airworthiness

D

DFDR	Digital Flight Data Recorder
DH	Decision Height

E

E	East / eastern longitude

F

FDR	Flight Data Recorder

FIS	Flight Information Service
ft	ft Foot / Feet
ft / min	feet per minute
	G
g	normal acceleration
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
	H
H	Hour(s)
hPa	Hectopascal(s)
	I
IAS	Indicated Airspeed
IIC	Investigator-in-Charge
	K
kg	Kilogram(s)
kt	Knot(s)
	L
L	Litre(s)
	M
m	Metre(s)
MET	Meteorological / Meteorology / Meteorological Services
min	minute(s)
MTOM	Maximum Take-Off Mass
	N
N	North / northern latitude / Newton
	O
OAT	Outside Air Temperature)

P

PDC Pre	Departure Check
PIC	Pilot-in-Command
P / N	Part Number
PPL	Private Pilot Licence

Q

QNH	the altimeter subscale setting in which after landing the instrument will indicate the altitude of the place of landing (the pressure setting to indicate the height above mean sea level)

R

RF	Radio Frequency
RFFS	Rescue and Fire Fighting Services
RPM	Revolutions per Minute

S

s	Second(s)
S	South / southern latitude
SAR	Search and Rescue
SB	Service Bulletin
S / N	Serial Number

T

TWR	aerodrome tower / aerodrome control

U

UTC	Coordinated Universal Time

V

VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VML	Valid only with correction for defective distant, intermediate and near vision

W

W	West / western longitude

1. FACTUAL INFORMATION

1.1. History of the flight

On 16 May 2024, the owner of a Bell 505 helicopter with registration marks SP-RMK planned a flight on the route: Duchnów near Mińsk Mazowiecki - Horbów-Kolonia near Biała Podlaska. The pilot held a valid PPL and a valid aero-medical certificate. The pilot arrived at the airfield with passengers at around 09:30 hrs. After preparing the helicopter for flight in accordance with the check-list, performing a pre-departure check and cabin check, the pilot carried out a safety briefing for the passengers (employees of the helicopter owner's company) at around 09:50 hrs. The female passenger occupied the rear left seat in the passenger compartment, and the male passenger occupied the left seat in the cockpit. On taking the right seat, the pilot proceeded to start up the helicopter. After starting up and preparing the powerplant for take-off, the pilot took off at around 10:00 hrs. After take-off, the pilot established communication with FIS Warsaw, and next with TWR at the Mińsk Mazowiecki aerodrome (EPMM). TWR recommended staying on its frequency until exiting its area. The pilot stated that at that time, he maintained an altitude of around 1200 ft AMSL and a speed of around 100 kt. After around 10 minutes of flight, the powerplant suffered a loss of power.

The helicopter had been refuelled with JET A1 fuel and in the pilot's assessment, the fuel tank was approximately 70% full.

Prior to the loss of powerplant power, the pilot had not reported any irregularities.

With a forest clearing ahead, the pilot performed a precautionary autorotation landing. Upon landing, he activated the ELT, turned off electric power, stopped the main rotor blades and ordered the passengers to exit the helicopter immediately. The pilot and passengers exited the helicopter on their own. After the arrival of the rescue services, the pilot and two passengers were transported to hospitals.

Figure 1. The site of the emergency landing at the town of Wiciejów 52°08'33" N 21°40'32" E. [source: https://tvn24.pl/tvnwarszawa]

Figure 2. The helicopter at the site of the emergency landing.

The rescue operation was initiated upon the receipt of information about the helicopter's emergency landing. Allocated to the rescue operation were the LPR Ratownik 18 helicopter stationed in Sokołów Podlaski and the military SAR W3 from Mińsk Mazowiecki.

The rescue services which arrived at the accident site administered first aid to the victims. The passengers were transported to a hospital in Warsaw, and the pilot to the hospital in Siedlce.

1.2. Injuries to persons

Table 1. General – summary of the number of injuries

Injuries	Crew	Passengers	Total on board the aircraft	Others
Fatal				
Serious	1			
Minor		2		Not applicable
None				Not applicable
TOTAL	1	2	3	

Table 2. Summary of injuries by the nationality of the victims

State/ nationality	Crew injuries		Passenger injuries	
	Fatal	Serious	Fatal	Minor
Poland		1		1
Cuba				1

1.3. Damage to aircraft

The helicopter was seriously damaged. All damage to the helicopter was caused by the collision with the ground. The damage sustained by the helicopter is shown in Figures 3-8.

Figure 3. Damage to the left landing skid of the helicopter.

Figure 4. Damage to the right landing skid of the helicopter.

Figure 5. Damaged oil sight glass, torn off control cable chip detector in the angled gearbox.

Figure 6. Damaged pedals on the side of the pilot flying.

Figure 7. Rear passenger seat after operation of the energy absorption system

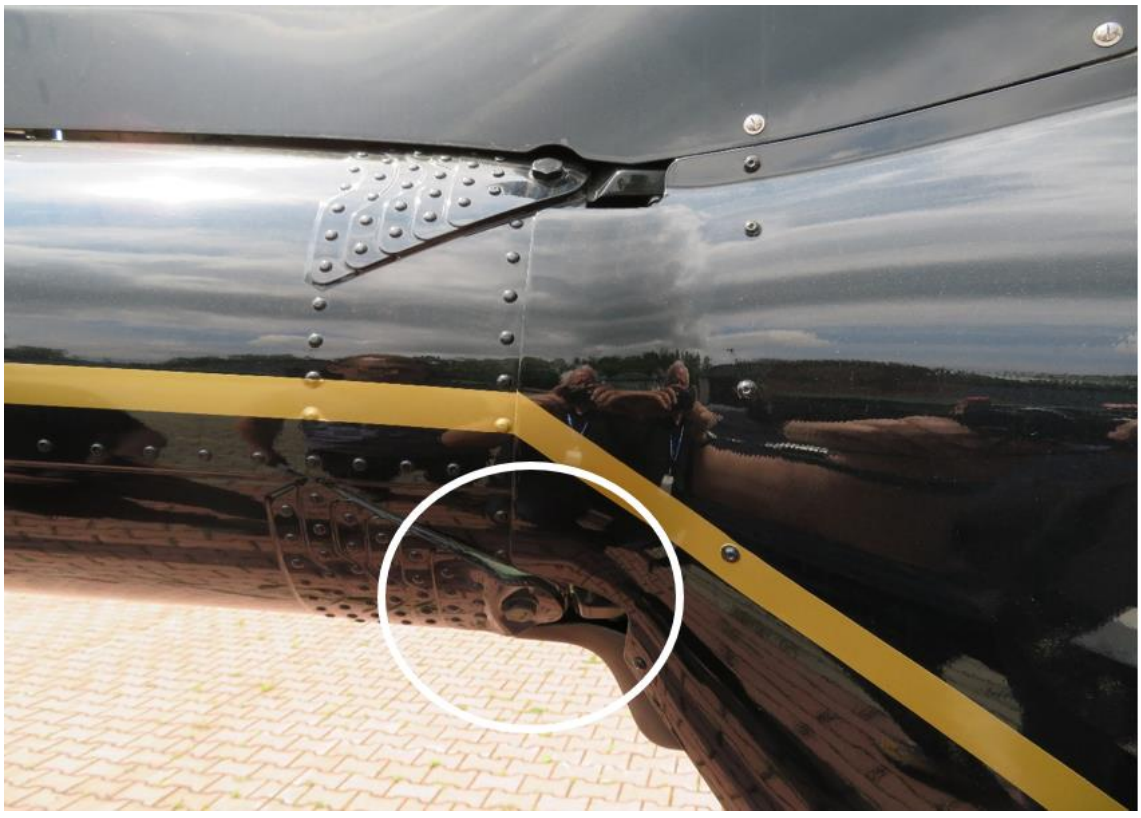

Figure 8. Damage to the lower attachment of the tail beam to the helicopter fuselage.

1.4. Other damage

None.

1.5. Personnel information

1.5.1. Pilot-in-Command.

Pilot: male, aged 53.

Licence: PPL(H) – Private Pilot Licence (Helicopter)

Ratings endorsed in the licence:

- Bell 505 TR valid until 31 March 2025;
- ICAO level 6, English language, unlimited validity.

Total flight time: approx. 2000 h, including as pilot-in-command - no data available.

Flight time on type:

- R44: approx. 1780 h;
- Bell 505: approx. 225,7 h;

Flight time prior to the occurrence:

- within last 24 h: approx. 2 h on Bell 505;
- within last 7 days: approx. 4 h and 50 min;
- within 90 days: no data available.

OPC passed TR Bell 505 check, carried out on 21 March 2024.

Aero-medical certificate – Class II with VML, valid until 15 March 2025.

Rest during last 48 h – the pilot was provided with an opportunity to rest for 8 h in home conditions.

The pilot's familiarity with the airfield and experience on the flight route – the pilot often performed daytime VFR flights on the Horbów near Mińsk Mazowiecki – Kolonia near Biała Podlaska route, and knew the said airfield very well.

Seat in the cockpit and actions performed – during the occurrence, the pilot occupied the right seat and was the pilot flying.

1.6. Aircraft information

The Bell 505 is a light five-seat, single-rotor helicopter of classic metal-composite design with a tail rotor. It is equipped with a fixed skid landing gear, and powered by a single turboshaft engine Arrius 2R;

1.6.1. Airworthiness and maintenance

a) General information:

- manufacturer – Canada;
- manufacturer designation (model) – Bell 505-S/N 65297;
- serial number – 65292;
- year of manufacture – 2019;
- registration marks – SP-RMK;
- owner –private;
- user – private;
- Certificate of Registration – date of entry 4 February 2020, registry no. 842 – validas of the day of the occurrence;
- Certificate of Airworthiness – issued on 5 March 2020, withoutlimitations – valid as of the day of the occurrence;

b) History of the aircraft:

- time since new– 225.7 h;
- time since overhaul – no overhaul carried out;
- time since last maintenance (C1) – 17.5 FH
- modifications – none;
- aircraft technical log – kept in accordance with applicable regulations;
- maintenance documentation – to be supplemented.
- airworthiness directives – all airworthiness directives implemented;
- to be verified.
- service bulletins – to be verified.

c) Engine, main rotor and tail rotor blades:

- Arrius 2R engine, S/N 54171;

- main rotor blades, operating time: time since new 225,7 h, time since last periodic check 17:30 h;
- tail rotor blades, operating time: time since new 225,7 h, time since last periodic check 17:30 h.

d) Fuel:

- recommended – Jet A-1;
- used during the flight – Jet A-1;
- quantity of on board (as indicated by the fuel gauge) – approx. 400 litres.
- distribution on board – in the fuselage.

e) Devices and generators which malfunctioned during the flight:

- investigation pending

1.6.2. f) Aircraft systems or components which influenced the accident:

a) investigation pending.

1.7. Meteorological information

On 16 May 2024, the GAMET area forecast for flights on low flight levels in FIR Warsaw was as follows: the baric situation had brought stable weather conditions over the greater part of Poland. Sunny, clear day, in the centre of a high-pressure system, pressure 1029 hPa.

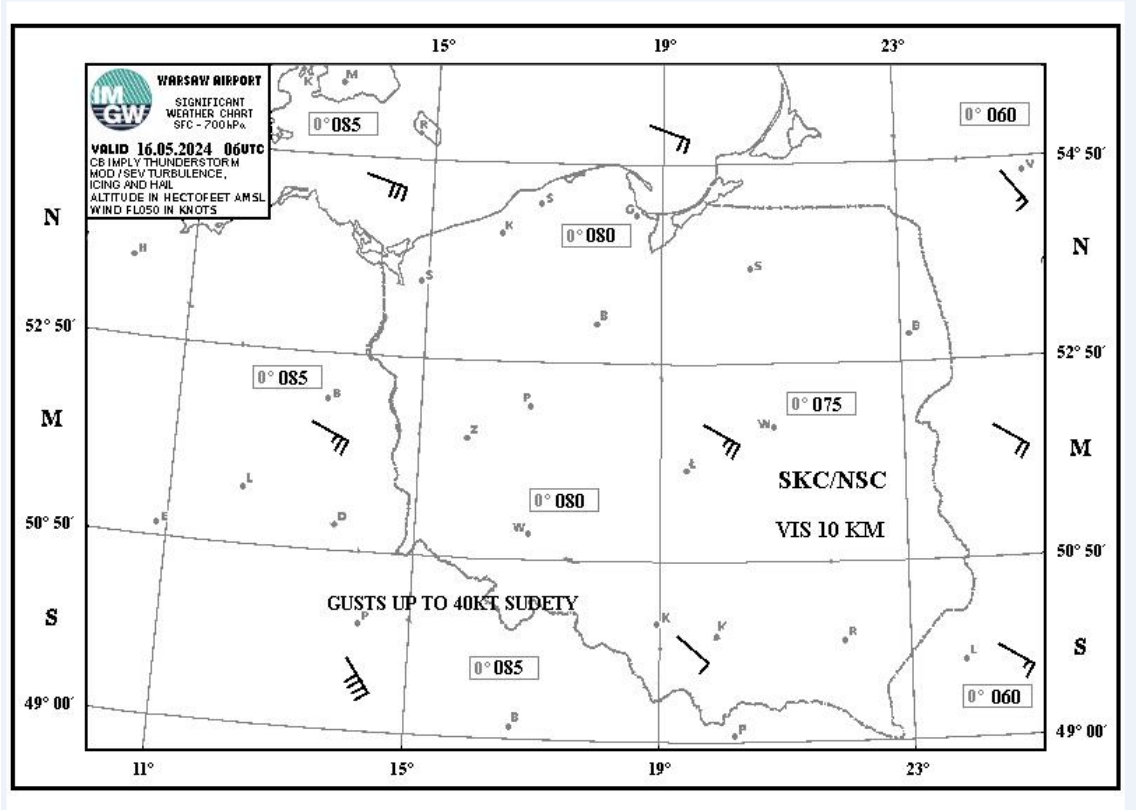

Figure 9. Meteogram for the area of Poland [source:IMiGW]

Weather conditions in the area of the occurrence were as follows:

– visibility over 10 km;

– wind at the ground level 100-120° from the easterly direction - 8 kt;

– wind direction at 1000 ft AMSL: 130° - 25 kt;

– maximum temperature 24°C, local pressure 1011 hPa.

1.8. Aids to navigation

The helicopter was equipped with glass cockpit avionics certified for day / night VFR flights, Garmin G1000H navigation instruments.

1.9. Communications

The pilot maintained standard radio communication with TWR EPMM in Polish. Communication was clear in both directions.

1.10. Airfield information.

The airfields at the town of Duchnów near Mińsk Mazowiecki and the town of Horbów-Kolonia near Biała Podlaska.

1.11. Flight recorders

The helicopter was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), but had the following standard flight data recording devices:

- Garmin G1000H integrated display.

1.12. Wreckage and impact information

A general view of the accident site is shown in Figures 1–8.

All helicopter wreckage was found at a single site of the area of approx. 15 m^2 No component of the helicopter was found to have detached from the helicopter prior to the ground impact.

The pilot was surprised by the situation on board. Overflying a wooded area, he found a clearing which he used for emergency landing.

1.13. Medical and pathological information

As a result of the accident, the pilot suffered a serious spine injury and was hospitalised for around 7 days.

The passengers suffered minor injuries and were discharged home after outpatient treatment.

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

1.14. Fire

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

1.15. Survival aspects

The persons involved in the accident occupied two front seats in the cockpit and one seat in the passenger compartment. Each seat in the helicopter was equipped with factory-installed 4-point safety belts, with the main restraint being a lap restraint anchored at the connection of the seating surface and the backrest of the seat. The lap restraint is connected with two shoulder restraints holding the seated person upright, anchored to the structure behind the person's back at the neck height.

The pilot and the male passenger seated in the cockpit, and the female passenger in the passenger compartment, had their lap and shoulder restraints fastened; they remained intact and met their purpose.

At the moment of ground impact, the persons on board the helicopter were subjected to significant G-load and inertial force directed downwards.

The seat occupied by the pilot and passengers sustained damage and deformation. The brackets mounting the cabin seats to the floor were partially deformed. This shows that the seat structure absorbed some energy of the helicopter ground impact.

The pilot and passengers occupying the seats in the helicopter suffered injuries (the pilot serious, the passenger minor).

They got out of the wreckage on their own before the rescue services arrived. The rescue services arrived at the site after around 30 minutes and administered aid to the victims.

The ELT signal was transmitted after the ELT had been turned on by the pilot.

1.16. Tests and research

Initial inspection was carried out on the occurrence day. Detailed inspection was carried out on 3 June 2024.

The findings of the inspections will be presented in the Final Report.

1.17. Organisational and management information

1.17.1. The helicopter owner was the sole person deciding on the time and place of flight.

1.18. Supplementary information

1.18.1. None.

1.19. Useful or effective investigation techniques.

Standard investigation techniques were applied.

2. SAFETY RECOMMENDATIONS

Based on the data acquired, the State Commission on Aircraft Accidents Investigation has not formulated any safety recommendations prior to the publication of this Preliminary Report.