The original of the Final Report was issued in the Slovak language.
In case of inconsistency original version in Slovak language is applicable.

MINISTRY
OF TRANSPORT
AND CONSTRUCTION
OF THE SLOVAK REPUBLIC

AVIATION AND MARITIME INVESTIGATION AUTHORITY
Námestie slobody 6, P.O.BOX 100
810 05 Bratislava

FINAL REPORT

on the safety investigation of an air accident

of a helicopter type **Guimbal Cabri G2**

registration mark **OK-BRI**

Reg. No: SKA2018001

The original of the Final Report was issued in the Slovak language.
In case of inconsistency original version in Slovak language is applicable.

The investigation of occurrence has been conducted pursuant to Art. 18 of the Act No. 143/1998 on Civil Aviation (Civil Aviation Act) and on Amendment of Certain Acts and in accordance with the Regulation (EU) No. 996/2010 of the European Parliament and of the Council on investigation and prevention of civil aviation accidents and incidents, governing the investigation of civil aviation accidents and incidents.

The final report is issued in accordance with the Regulation L 13 that is the application of the provisions of ANNEX 13 Aircraft Accident and Incident Investigation to the Convention on International Civil Aviation.

The exclusive aim of investigation is to establish causes of accident, incident and to prevent their occurrence, but not to refer to any fault or liability of persons.

This final report, its individual parts or other documents related to the investigation of occurrence in question have an informative character and can only be used as recommendation for the implementation of measures to prevent occurrence of other accidents and incidents with similar causes.

Abbreviations and acronyms

A109	Abbreviation for type marking of an AgustaWestland helicopter
ARP	Geometric centre of the runway
°C	Degrees Celsius
CPL(H)	Commercial Pilot License (Helicopter)
EC120B	Abbreviation for type marking of a Eurocopter helicopter
fenestron	Tail rotor
FI(H)	Flight Instructor Rating (Helicopter)
ft	Feet (dimensional units)
hr	Hour (unit of time)
HU269	Abbreviation for type marking of a Schweizer helicopter
km	Kilometres
LZSV	The ICAO code for the Spišská Nová Ves airport
m	Metres
MHz	Megahertz
MTOW	Maximum Take-Off Weight
MR	Main rotor
CS	Cyclic stick
CL	Collective lever
R44	Abbreviation for type marking of a Robinson helicopter
UTC	Co-ordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

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A. INTRODUCTION

Operator/Owner:	LION Helicopters s.r.o. / the helicopter was rented by LCP, s.r.o. for the purposes of flight training
Flight type:	training flight
Helicopter type:	Guimbal Cabri G2
Registration mark:	OK-BRI

Take-off site:	LZSV	
Flight phase:	take-off	
Accident site:	LZSV	
Accident date and time:	7 April 2018	11:30

Note: All time data in this report is reported in UTC time.

B. INFORMATIVE SUMMARY

On 7 April 2018, when the helicopter took off to initiate a training flight, it immediately started turning left spontaneously after the landing skids had lifted off the ground. In spite of all his efforts, the pilot was not able to prevent the helicopter from rotating and, during his continuing effort to stabilize his flight, the helicopter got caught in the nearby fence with the blades of its MR and fenestron and crashed. After the crash, the helicopter remained lying on its right side with a slightly damaged cabin, skids and tail section.
The helicopter crew did not suffer any injuries during the crash. The helicopter sustained major damage during the occurrence. The accident was reported by the helicopter operator to the Aviation and Maritime Investigation Authority of the Ministry of Transport and Construction of the Slovak Republic by telephone.

A committee was set up to investigate the causes of the occurrence:

Ing. Zdeno Bielik	chairman of the investigation committee
Lic. Jaroslava Mičeková	member of the investigation committee

The Report has been issued by:

The Aviation and Maritime Investigation Authority
The Ministry of Transport and Construction of the Slovak Republic

C. MAIN PART OF THE REPORT

1. FACTUAL INFORMATION

1.1 History of the flight

The helicopter flight was planned as part of the training of a student who had previously performed 3 flights on this helicopter. After they had seated themselves in the cabin and adjusted the control pedals, the instructor with the student performed all actions as stated in the check list and started up the engine. When performing such actions, they did not spot any malfunctions which could indicate any technical problems with the engine, control or on-board systems of the helicopter. Before hovering, the instructor told the student that he was going to perform the take-off and fly the helicopter from the heliport to the airport area himself and he asked her to take her hands and feet from the helicopter´s control elements. Then he started to lift the CL, slightly pushing the right control pedal. Immediately after lifting the landing skids off the ground, the helicopter started turning left spontaneously. The instructor responded by increasing the angle of the right pedal continuously all the way down but the helicopter continued rotating and, since there was no change, he again pushed the right pedal all the way down. After several 360° turns of the helicopter, the instructor decided to push the CS in order to bring the helicopter to a direct flight from the hangar towards a nearby free area. After such action, the spontaneous rotation did not stop but the helicopter started moving in a kind of right slide, losing about 1-2 m of height, coming into contact with a nearby fence with its tail section and consequently also with its MR.

During the take-off, the helicopter was located on a heliport which is about 15-20 cm higher compared to the continuously maintained surrounding terrain and it took off facing the hangar. Since the heliport is located on the edge of the above-mentioned elevated asphalt area, after the helicopter started rotating spontaneously, the instructor was worried that, during any potential immediate landing on the heliport, the skids could reach the edge of the area and the helicopter could turn over.

Neither the instructor nor the student could describe in detail where the student´s feet were placed in relation to the helicopter control (pedals) during the take-off. In her testimony, the student stated that she could not precisely remember the position of her feet at the time when the instructor was trying to stop the spontaneous rotation of the helicopter.

Time period: day
Flight rules: VFR

1.2 Injuries of persons

Injury	Crew	Passengers	Other persons
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	2	-	

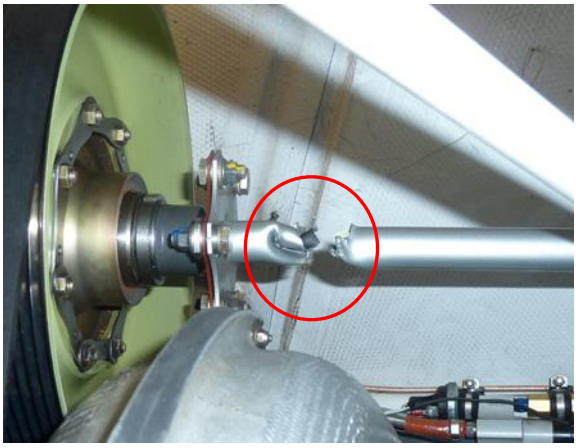
1.3 Damage to the helicopter

The helicopter sustained major damage when it hit the ground.

Pictures 1, 2. When the helicopter fell down, the fenestron and consequently the MR and the engine were stopped by force

Picture 3. From inside, the pilot cabin did not show any signs of damage; the cabin was slightly damaged on its right side

During a detailed inspection of the crashed helicopter, in particular of the functionality of the pedal control and of the functionality and integrity of the fenestron transmission, it was found that such elements were and remained functional even after the accident, except for the transmission which was disrupted as a result of the violent stoppage of the fenestron during the accident as a consequence of the engine torque.



Picture 4. Disrupted transmission

1.4 Other damage

No circumstances have been reported to the Aviation and Maritime Investigation Authority which might lead to any other claims for compensation for damage against a third party.

1.5 Personnel information

Pilot-instructor:

Czech citizen, aged 55, holder of CPL(H) issued on 2 April 1993 by the Civil Aviation Authority of CR.

Medical certificate class 1 with marked validity until 12/11/2018.

Valid General Radiotelephone Operator License.

Valid ratings:

FI(H)	marked valid until 31/10/2020
A109	marked valid until 31/05/2018
CABRI G2	marked valid until 30/09/2019
EC120B	marked valid until 31/10/2018
HU269	marked valid until 31/10/2018
R44	marked valid until 31/05/2018
NIGHT	unlimited

Total flight hours:	6,452 hrs. 09 min.
In the last 90 days:	28 hrs. 00 min.
In the last 30 days:	13 hrs. 00 min.
Total on the CABRI G2 type:	4 hrs. 09 min.

Student:

Slovak citizen, aged 42, holder of a student license issued by the OMBRE flying school on 28 January 2018.

Medical certificate class 2 with marked validity until 24/01/2020.

1.6 Information about the helicopter

Type:	Cabri G2
Registration mark:	OK-BRI
Serial number:	1143
Manufacturer:	Hélicoptéres Guimbal, France

Certificate of registration in the Register of the Czech Republic issued on 19 May 2016.

Airworthiness certificate No. 6133.

Airworthiness inspection certificate No. 6133 valid until 12/06/2018.

Mandatory insurance: Allianz No. 400039293.

Aircraft Station License No. 232968/LR, valid until 31/05/2021.

Certificate of Maintenance and Release to Service No. 03/2018, valid until 23/03/2019.

Total flight hours as of 6 April 2018: 380 hrs. 19 min. / 1776 flights.

Engine

Type:	Lycoming O-360-J2AM462RF
Manufacturer:	Lycoming typ 0-360-J2A
Serial number:	L-42779-36E
Total flight hours:	380 hrs. 19 min.

With the pilot and the student, the take-off weight amounted to 605 kg; i.e. the MTOW of 700 kg was not exceeded.

1.7 Meteorological information

On 7 April 2018, at around 11:30, it was almost cloudy with no precipitation in the cadaster of the town of Spišská Nová Ves in the airport area. Stratocumulus was the prevailing type of cloud, with its base at 1,000 to 1,500 m. Altocumulus opacus was seen as well, though to a lesser extent. The air temperature reached 12°C, relative humidity was 50% and horizontal visibility was approximately 30 km. A changeable, prevailingly south-easterly to easterly wind was blowing in the area in question, at a speed of 2 to 3 m/s, gusting to 5 m/s. Between 11:00 and 12:00, the weather condition was stable in the area of Spišská Nová Ves, without any major changes in temperature, wind direction or speed.

1.8 Aids to navigation

N/A.

1.9 Communications

The helicopter crew was tuned to 123.500 MHz but the crew failed to establish contact with LZSV before the take-off.

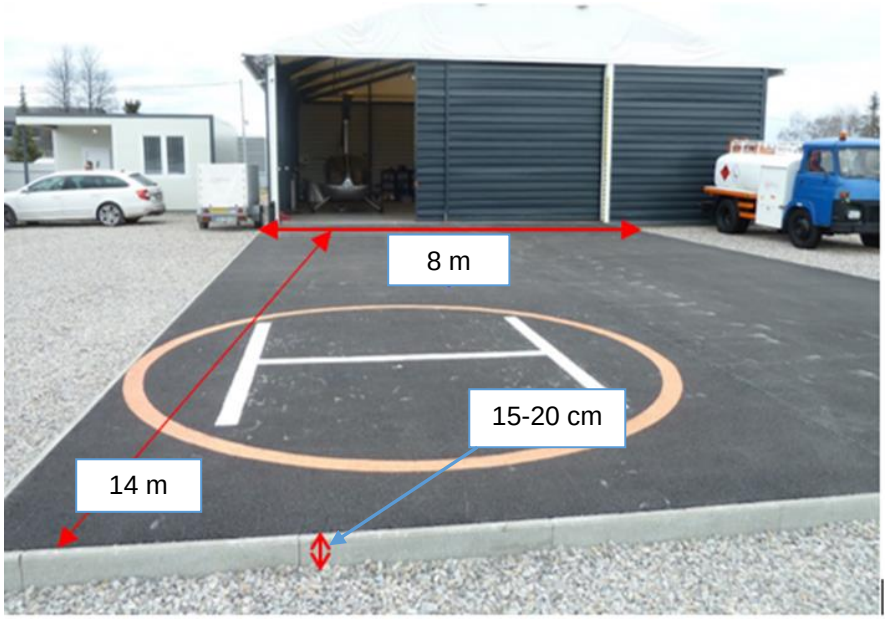
1.10 Information about the aerodrome

LZSV is a public national airport located 2 km to 225° from the centre of Spišská Nová Ves.

Altitude: 1 624 ft (495 m).

Coordinates: ARP 485627N 0203202E.

The heliport is located on an aircraft stand sized 14x8 m, eccentrically in the left corner (when looking at the hangar) of the more remote part (i.e. with its centre approximately 12 m from the hangar).



Picture 5. Heliport location and size

1.11 Flight recorders and other recording devices

The helicopter was not equipped with flight recorders to record flight parameters.

1.12 Wreckage and impact information

The helicopter fell on a hardened local road bordered with wire fencing at a distance of 30 m from the take-off site.

Pictures 6, 7. Air-crash site

1.13 Medical and pathological information

N/A.

1.14 Fire

None.

1.15 Survival aspects

It was not necessary to perform any investigation and rescue by SAR equipment.

1.16 Tests and research

N/A.

1.17 Organizational and management information

The flight training was performed with OMBRE, a flying school in SNV, which has a license issued by the Civil Aviation Authority of SR No. SK/RF-04 issued on 14 April 2011.

The helicopter was rented from LION Helicopters s.r.o. with its registered office at 533 52 Ráby 119, CR.

The flying school has all necessary documentation about the student´s training.

1.18 Additional information

The committee had a video recording from a camera located on the hangar. The recording shows the take-off part from the moment the helicopter took off from the heliport until the start of the third 360° turn. The recording also shows that both crew members have their hands and feet on the helicopter´s control elements and also the right deflection of the instructor´s control pedal.

Picture 8. Position of the student´s feet on the control pedals

It is also obvious from the recording that the helicopter started rotating immediately after the landing skids had lifted off the ground.

1.19 Useful or effective investigation techniques

Common investigation methods were applied.

2. ANALYSIS

The spontaneous left rotation of the helicopter, caused by the torque reaction from the right-turning main rotor, started immediately after the landing skids had lifted above the heliport. In spite of the instructor´s effort to control the rotation by pushing the right control pedal, the initial deflection of the pedal was not sufficient to stabilize the required direction of the flight so he gradually tried to push it all the way down. However, not even the subsequent increase in the deflection to its limit caused the helicopter's rotation to stop. This leads to the conclusion that the student probably had her feet on the control pedals (Picture 7), limiting the instructor´s possibility to really move the control pedals to the necessary position and thus preventing the right pedal from being pushed fully down (which the instructor did not know about and at that moment he was convinced that the right pedal was pushed all the way down). Then he further pulled the CL but the deflection was not sufficient for the fenestron to eliminate the rotation of the helicopter caused by the torque reaction from the MR.

In spite of the instructor´s effort to bring the helicopter to a forward flight in a safe direction from the hangar by pushing the CS, he was not able to stop the rotation and the helicopter started to perform an undefined skid movement and it continued moving in such manner until it encountered an obstacle and fell to the ground.

The instructor justified his decision to continue taking off, in spite of the immediate spontaneous rotation of the helicopter, by his concerns regarding the proximity of the helicopter´s left skid to the heliport's edge, considering the lowered surrounding terrain, i.e. he was concerned that the helicopter could turn over if it landed on the heliport's edge. However, it is obvious from the video recording of the helicopter's take-off that, in order to deal with the situation correctly, it was necessary to ***immediately*** abort the landing after the helicopter had started turning spontaneously.

3. CONCLUSIONS / Causes of the air accident

3.1 **Findings**

- the instructor had all valid ratings to perform the flight in question,
- the helicopter had valid documentation and did not demonstrate any malfunction either before the take-off or during the flight;
- the helicopter met airworthiness conditions before the critical flight according to the available documentation;
- the helicopter was not equipped with a flight data recorder; the analysis is based on witness reports, the provided documentation and a video recording from a camera located on a hangar;
- the technical condition of the helicopter had no impact on the air accident;
- the weather conditions had no impact on the air accident.

3.2 **Causes of the air accident**

The cause of the air accident was a fall of the helicopter to the ground (after the fenestron rotor and the MR got caught in a wire fence), caused by a spontaneous rotation of the helicopter after the take-off and by the instructor´s failure to stop it.

4. SAFETY RECOMMENDATIONS

The Final Report on the safety investigation of an air accident does not contain any recommendations.

In Bratislava, 28/06/2018