

MINISTRY OF INFRASTRUCTURE

AIR, MARINE AND RAILWAY ACCIDENT AND INCIDENT  
INVESTIGATION UNIT

Tržaška cesta 19, 1000 Ljubljana

T: 01 478 81 10

E: mzi.airsafety@gov.si

www.mzi.gov.si



Number: 37200-1/2023/55  
Date: 18. 12. 2023

**unofficial translation**

# FINAL REPORT

ON THE INVESTIGATION OF THE AIRCRAFT

UL motor aircraft TL Ultralight STREAM,

reg. mark OK-XUA 62,

in Dobravica, Šentjernej,

February 4, 2023

**Republic of Slovenia**

» 2023 «

## TABLE OF CONTENTS

<b>INTRODUCTION</b> .....	<b>3</b>
<b>1 SUMMARY</b> .....	<b>4</b>
<b>2 FACTS</b> .....	<b>5</b>
2.1 FLIGHT INFORMATION .....	5
2.2 PILOT INFORMATION .....	6
2.3 AIRCRAFT INFORMATION.....	6
2.4 METEOROLOGICAL DATA.....	7
<b>3 ANALYSIS</b> .....	<b>10</b>
<b>4 CONCLUSIONS</b> .....	<b>12</b>
4.1 FINDINGS.....	12
4.2 CONCLUSION .....	13
4.2.1 <i>Immediate cause</i> .....	13
4.2.2 <i>Indirect cause</i> .....	13
<b>5 SAFETY RECOMMENDATIONS</b> .....	<b>14</b>
<b>6 ATTACHMENTS</b> .....	<b>15</b>
6.1 ALTITUDE.....	15
6.2 GROUNDSPED .....	16
6.3 DEPARTURE FROM THE LJNM AIRPORT TO THE MANOEUVRING AREA .....	17
6.4 FLYING IN THE AREA OF ŠENTJERNEJ .....	17

## TABLE OF IMAGES

FIGURE 1: THE SCENE OF THE ACCIDENT - THE DIRECTION OF THE FLIGHT AND THE PLACE WHERE THE PLANE CRASHED .....	5
FIGURE 2: SATELLITE IMAGE OF CLOUD COVER AT 10:00 .....	8
FIGURE 3: SATELLITE IMAGE OF CLOUD COVER AT 13:30 .....	8
FIGURE 4: WIND SPEED AT CERKLJE OB KRKI AIRPORT.....	9
FIGURE 5: GAFOR FORECAST .....	9



## INTRODUCTION

The final aircraft accident investigation report contains the facts, analysis, causes, and safety recommendations of the air accident investigation commission based on the circumstances in which the accident occurred.

In accordance with point 3.1 of chapter 3 of Annex 13 to the Convention on International Civil Aviation (12th edition, July 2020), Article 1 of Regulation (EU) no. 996/2010 of the European Parliament and of the Council of 20 October 2010 on investigations and prevention of accidents and incidents in civil aviation (L 295/35), the fourth paragraph of Article 137 of the Aviation Act (Official Gazette of the Republic of Slovenia, No. 81/10 – official consolidated text, 46/16 and 47/19) and According to Article 2 of the Regulation on the Investigation of Air accidents, Serious Incidents and Incidents (Official Gazette of the RS, No. 72/03, 110/05 and 53/19), **the purpose of the final report on the investigation of an air accident is not to establish guilt or responsibility.**

The final investigation report must undoubtedly benefit aviation safety.

It is important that the final investigation report be used to prevent aviation accidents or incidents. Using the final aircraft accident report for other purposes may lead to misinterpretation.

# 1 SUMMARY

**Date and time of accident:** February 4, 2023, at 3:50 p.m. UTC <sup>1</sup>

**Place of the accident:** Dobravica settlement, Šentjernej municipality (N 45° 50' 32.5" / E 15° 19' 29.5"), Republic of Slovenia

**Type of flight:** private VFR flight (VFR: Visual Flight Rules)

**Aircraft:** UL, two-seat powered aircraft

- **Aircraft manufacturer:** TL – Ultralight s.r.o., Czech Republic
- **Manufacturer's mark:** STREAM
- **Aircraft registration:** OK-XUA 62 (in the register of the aircraft manufacturer)
- **Aircraft serial number:** 18STR05
- **Airworthiness validity:** August 24, 2023<sup>2</sup> (aircraft in the amateur-built aircraft category)

**Owner/operator:** TL-ULTRALIGHT s.r.o., Hradec Králové, Czech Republic

**User:** Private user, Slovenia

**Crew and passenger information:**

- **Crew:** pilot (1)
- **Number of passengers:** 0
- **Total number:** 1

**Consequences:**

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>
Fatal	1	/	/
Major	/	/	/
Minor/None	/	/	/

**Aircraft and equipment:**

The aircraft and equipment were 100 percent destroyed.

<sup>1</sup> Coordinated Universal Time (UTC) is used in this report. On the day of the accident, 1 hour must be added to the local time (UTC+1).

<sup>2</sup> Issued by the Czech organization for the extension of airworthiness, LAA CZ (The Light Aircraft Association of the Czech Republic), a technical certificate (TC) is issued on the airworthiness of a prototype aircraft produced by an individual builder. The validity of such permits is one year. Web: <https://en.laacr.cz/>



## 2 FACTS

### 2.1 Flight information

On the day of the accident, at 16:11 local time, the pilot took off from the Prečna - LJNM airport and arrived in the area of Šentjernej in a scheduled flight. Upon arriving above his hometown, he began performing manoeuvres with sharp turns at a height that was mostly below 300 m above the terrain. He made sharp turns in a very narrow radius between 150 and 700 m. The pilot flew the plane in concentrated circles in a densely populated part of the city by flying over groups of houses north of the settlement of Mihovica and infrastructure facilities and residential houses in the immediate vicinity of the Šentjernej racecourse. At approximately 16:50 local time, the pilot was making a left turn from a heading of approximately 080° west to a heading of 270° when he abruptly reversed course to a sharp right bank of over 60°, losing altitude during the turn. The pilot then slowly reduced the pitch of the aircraft to ground level when the aircraft, in a slight right bank of approximately 10°, collided with the grassy terrain of the yard in the immediate vicinity of residential houses in the village of Dobravica in the municipality of Šentjernej. The aircraft caught fire when it hit the ground violently. The pilot lost his life when he hit the terrain.



**Figure 1: The scene of the accident - the direction of the flight and the place where the plane crashed**

When the investigator arrived, firefighters and police representatives were present at the scene of the accident, and they adequately secured the scene of the accident. The investigation at the scene lasted two days, with a parallel investigation by the police. During the investigation, data was



obtained from competent services in the fields of meteorology, licencing, and flight operations at CAA, ATC, LJNM Airport, and the Institute of Forensic Medicine. In the investigation, data was obtained from the organisation for the production and design of the aircraft involved in the event through the investigative body of the country of registration. During the investigation, witness statements were obtained in cooperation with the police. The investigator obtained several video recordings, which were analysed in order to determine the circumstances that led to the accident.

## 2.2 Pilot information

When reviewing the data from the pilot's personnel folder at the CAA, it was established that the pilot had a valid licence to fly UL-powered aircraft and a valid medical certificate, with which he claimed the privileges of the UL licence:

- LAPL medical certificate, validity until May 12, 2023. The validity of the medical certificate for category II ended on May 12, 2022.
- UL motor aircraft pilot's licence with a date of issue of 7/25/2019.

The pilot's total flying time at the time of changing the UL pilot's licence, which was made in accordance with the amendment to the regulations dated July 25, 2019, was 513 hours and 17 minutes. The total flight time of the pilot from the date of the UL licence change to the date of the accident is unknown. Until the publication of the final report, it was not possible to obtain data from the flight book, in which the pilot kept records of the flight time. From the analysis of the obtained data, it follows that the pilot has been using the aircraft since 2018 and that he has maintained his aviation qualifications for flying the UL motor aircraft involved in the event without major interruptions. He flew normally with overflights over his home area and with overflights in the country of registration, where he provided the aircraft with regular technical inspections to extend its airworthiness.

## 2.3 Aircraft information

From the examination of parts of the wreckage of the aircraft and the analysis of the data on the aircraft, no irregularities were found that would have an impact on the event. The aircraft was registered in the register of the Czech aviation authorities, LAA CR, which is the competent authority for the certification, licencing, and operation of ultralight aircraft in the Czech Republic.



In the field of aircrew licencing, holders of a licence to fly UL-powered aircraft are required to meet the requirements of a category II medical certificate. A flight permit has been issued by the competent aviation organization. The validity of the permit was extended for 1 year on August 24, 2022 (until August 24, 2023), which according to LAA criteria applies to category "Z"—amateur-built or experimental aircraft.

From the obtained data, it is established that the sum of the determined values of the mass of fuel, the weight of the pilot, the mass of the empty aircraft (empty weight 325.0 kg), and the mass of the luggage did not exceed the limit value of the maximum permissible mass at take-off, MTOW 472.5 kg, which was specified by the manufacturer in the Operational Manual on the exploitation of the aircraft. The aircraft manufacturer determined that the maximum take-off weight of an aircraft equipped with a rescue parachute system is 472.5 kg and at the same time warned that in preparation for the flight, it is necessary to calculate the limit values of the aircraft's mass and determine the position of the centre of gravity, which must be within predetermined limits (the Centre of Gravity Positioning Permitted Range, or MAC) between 15% and 35% SAT.

The investigation did not fully establish the ownership of the aircraft and the obligation to insure it to third parties (according to Regulation (EC) No. 785/2004 and according to the provisions of the LAA CR for the UL category marked "Z" (experimental category)). In the accident, the device that stores data on flight elements and engine operation was destroyed. Recording devices are not mandatory for the specified category of aircraft.

## 2.4 Meteorological data

Based on the analysis of weather data by the responsible Slovenian Environment Agency, on April 3, 2023, there was an area of high air pressure over the British Isles and an area of low air pressure over northeastern Europe. A shallow cyclonic area over the Mediterranean weakened and moved eastward. Dry air lingered over Slovenia. Higher in the atmosphere, a weak northeasterly wind prevailed, with local winds blowing near the ground. There was fog in the lowlands of central and south-eastern Slovenia in the morning and afternoon. In the morning, the fog rose to low cloud cover, which dissipated at the latest in southeastern Slovenia at approximately 1 p.m..

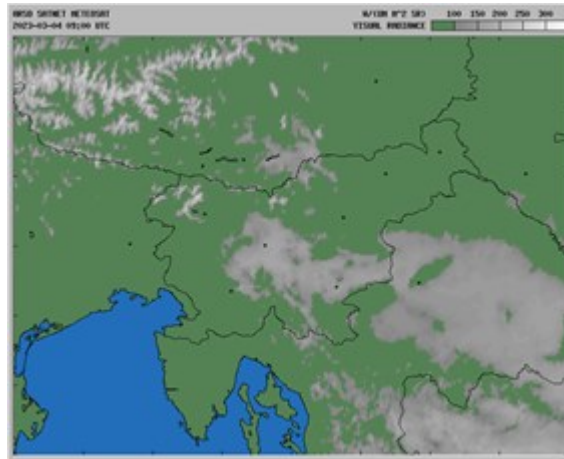


Figure 2: Satellite image of cloud cover at 10:00

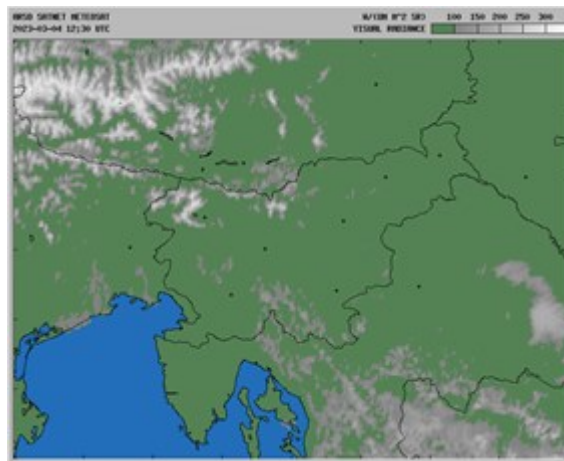


Figure 3: Satellite image of cloud cover at 13:30

### **Description of the weather in Dobravica on March 4, 2023, at 4:50 p.m.:**

The weather was clear. Visibility was above 30 km. During the day, a westerly wind blew in southeastern Slovenia with a speed of around 6 knots and gusts of up to 9 knots, but the wind stopped at 4 pm, and at 4:50 pm, it blew with a speed of up to 2 knots and gusts of up to 3 knots. The temperature at 16:50 was 10 °C and the relative humidity was 45%. No warning for dangerous meteorological phenomena was issued for the area of southeastern Slovenia. The forecast clearly predicted mostly clear weather without dangerous meteorological phenomena.



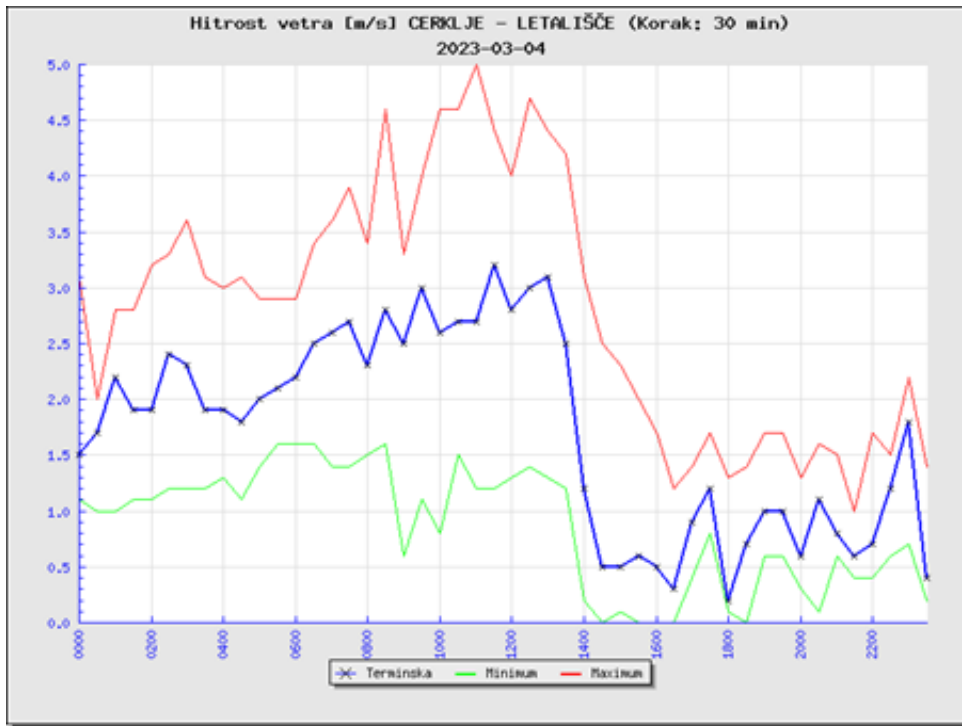


Figure 4: Wind speed at Cerklje ob Krki Airport

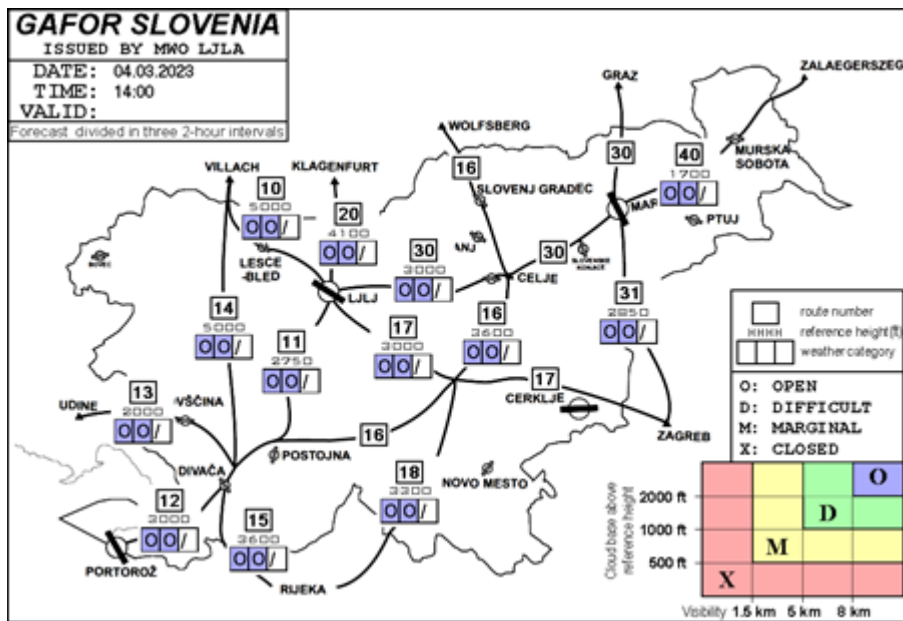


Figure 5: GAFOR forecast

### 3 ANALYSIS

From the analysis, it is possible to assess that the manoeuvres that the pilot performed before the accident require a high level of psychophysical fitness and the continuous maintenance of flight qualifications to perform manoeuvres with greater G loads, for which the pilot was not trained. This type of flying requires continuous psychophysical preparation and awareness of the impact of pilot fatigue on flying. In flight, fatigue in the initial phase is expressed as a reduced ability to control the aircraft during manoeuvres with higher G loads. In such cases, the pilot exerts more effort to keep the nose of the plane on the horizon.

When performing the manoeuvre, the pilot, from the left turn, which he performed at a height of approximately 60 m above the terrain, introduced the aircraft into a right turn. When changing pitch from left to right, a sharp turn obscured the visual contact with the terrain he had on the left wing side. It did not provide sufficient G loading in the manoeuvre to maintain such a critical flight altitude. Continuing the manoeuvre, the pilot reduced pitch while losing altitude so that the first collision of the aircraft with the terrain was with the top of the right wing and the lower part of the fuselage. In the crash line, the aircraft impacted the terrain with a descent angle of about 3° and a right bank of up to 10°.

After analysing the ATC radar images, a height calculation (true altitude) was made at the lower point of the manoeuvre before the crash. The calculation is made taking into account the fact that the air pressure at the time of the event was 1015 hPa. From this, it follows that the height of the flight in the manoeuvre before the crash was 810 ft, or 246 m (according to QNH). During the calculation, there was no significant difference between the detected and the corrected value (the correction takes into account the difference between pressure and air temperature at the time of the accident, which was close to the standard ISA model). Deviations due to the tolerance of the radar response system are negligible in this case. The ground speed of the aircraft during the manoeuvre was approximately 110 kn (200 km/h). If we take into account the altitude of the terrain at the place of the event, which is about 190 m, it follows that the height of the flight before the introduction into the right turn was just under 60 m (according to QFE). At the time of the incident, the pilot was flying significantly below the minimum permitted flight height, which according to aviation regulations is 300 m above the terrain.

The manufacturer of the aircraft specified in the instructions on the exploitation of the aircraft (POH) that the aircraft is not approved for performing aerobatic maneuvers. An aerobatic manoeuvre is an intentional manoeuvre involving a sudden change in aircraft altitude, abnormal



altitude, or abnormal acceleration not required for normal flight. The instructions state that the maximum allowable angle of inclination for a sharp turn is 60°. From the autopsy report of the Institute of Forensic Medicine, as part of the toxicological investigations, it appears that the pilot was under the influence of alcohol at the time of the accident.



## 4 CONCLUSIONS

*In accordance with the objectives of the investigation in relation to safety in civil aviation and the prevention of the recurrence of such accidents and incidents in the future, the findings given in this report do not constitute a determination of guilt or responsibility. Use of this report for purposes other than to improve aviation safety may lead to misinterpretation.*

### 4.1 Findings

- The pilot had a valid licence to fly UL-powered aircraft, issued by the competent Civil Aviation Agency (CAA).
- The pilot exercised the authorizations from the flight licence with a valid medical certificate for LAPL (valid until May 12, 2023). The validity of the medical certificate for category II expired on May 12, 2022.
- A flight permit has been issued by the competent aviation organization for the aircraft entered in the register of the Czech Aviation Authority. The permit is valid for 1 year (until August 24, 2023). LAA CR is the competent authority for the certification, licencing, and operation of ultralight aircraft in the Czech Republic, where flying UL-powered aircraft requires a Medical Certificate Class II (Medical Certificate Class 2).
- The investigation did not establish the ownership of the aircraft or the obligation to insure it (according to Regulation (EC) No. 785/2004).
- The investigation found no evidence of malfunctions in the operation of the aircraft, engine, propeller, or control system. It is established that at the time of the incident, the engine was running and the propeller was operating at high speed.
- The device in the cabin of the plane, which stores data on flight elements and engine operation, was destroyed in the accident. A recording device is not mandatory for the specified category of aircraft.

- Meteorological conditions on the day of the event were favourable for VFR/VMC flying. The weather did not affect the accident.
- The pilot did not follow the instructions and warnings of the aircraft manufacturer about the prohibition and danger of flying above its capacity, which the manufacturer specified in the aircraft's operating manual (Pilot's Operating Handbook, POH, point 2.6, Permitted Manoeuvres, Revision dated July 7, 2017).
- The pilot's arbitrariness, exceeding his own capabilities, and performing manoeuvres beyond the aircraft's capabilities contributed to the accident.
- The pilot was under the influence of alcohol during the flight.

## 4.2 Conclusion

### 4.2.1 *Immediate cause*

- Collision of the aircraft with the terrain while performing a manoeuvre at low altitude.

### 4.2.2 *Indirect cause*

- Arbitrariness, violation of aviation regulations, deviation from basic VFR flight rules, and flying under the influence of alcohol.

## 5 SAFETY RECOMMENDATIONS

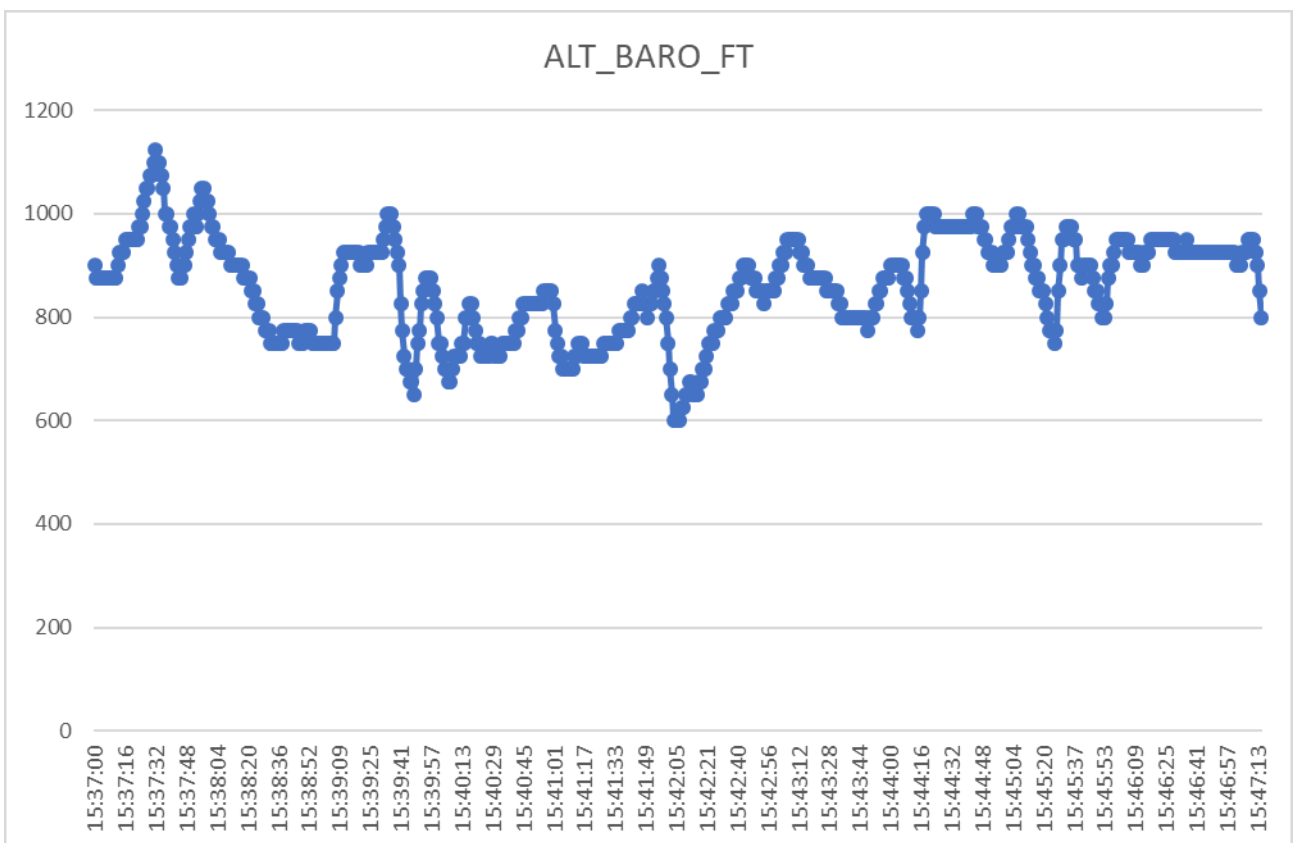
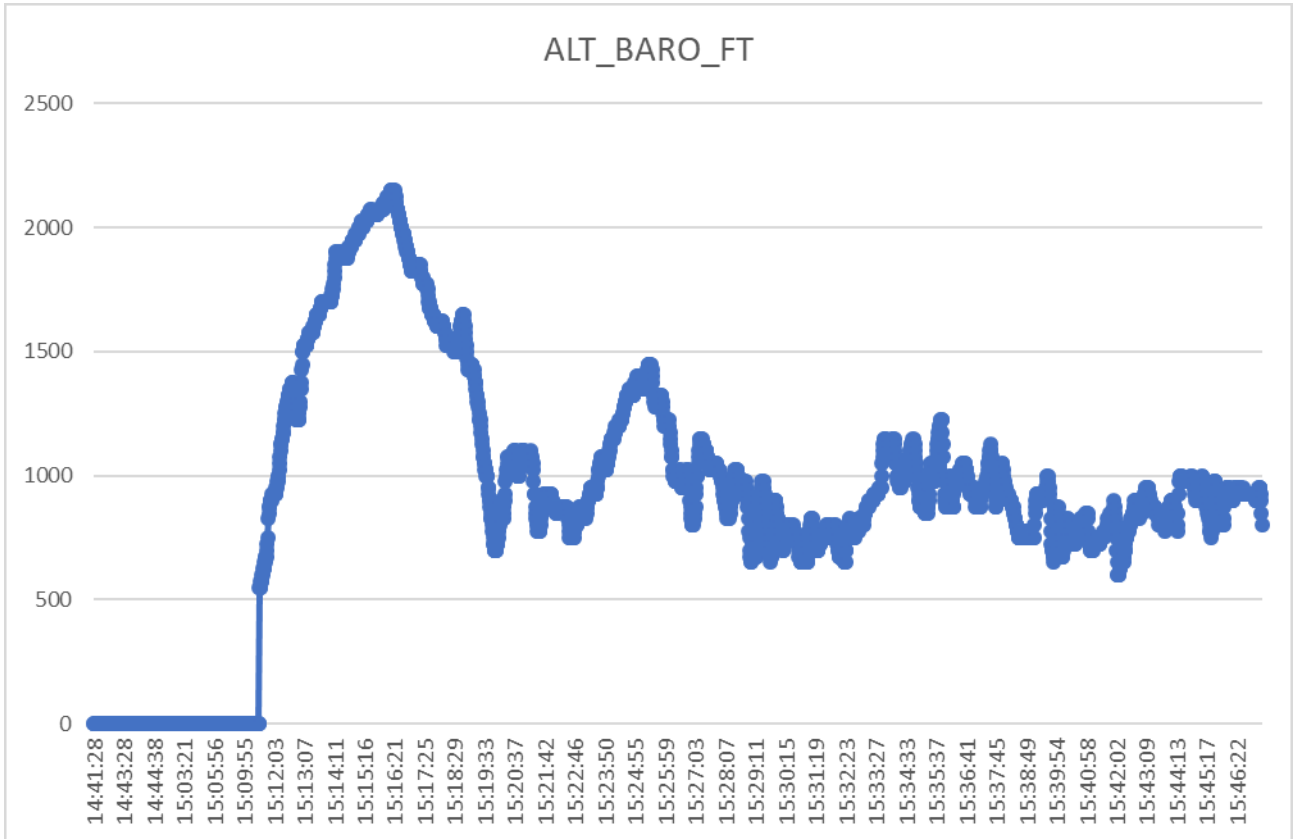
Based on the circumstances in which the accident occurred, the safety investigation authority has no safety recommendations.

**Toni STOJČEVSKI**  
**Investigator in Charge**

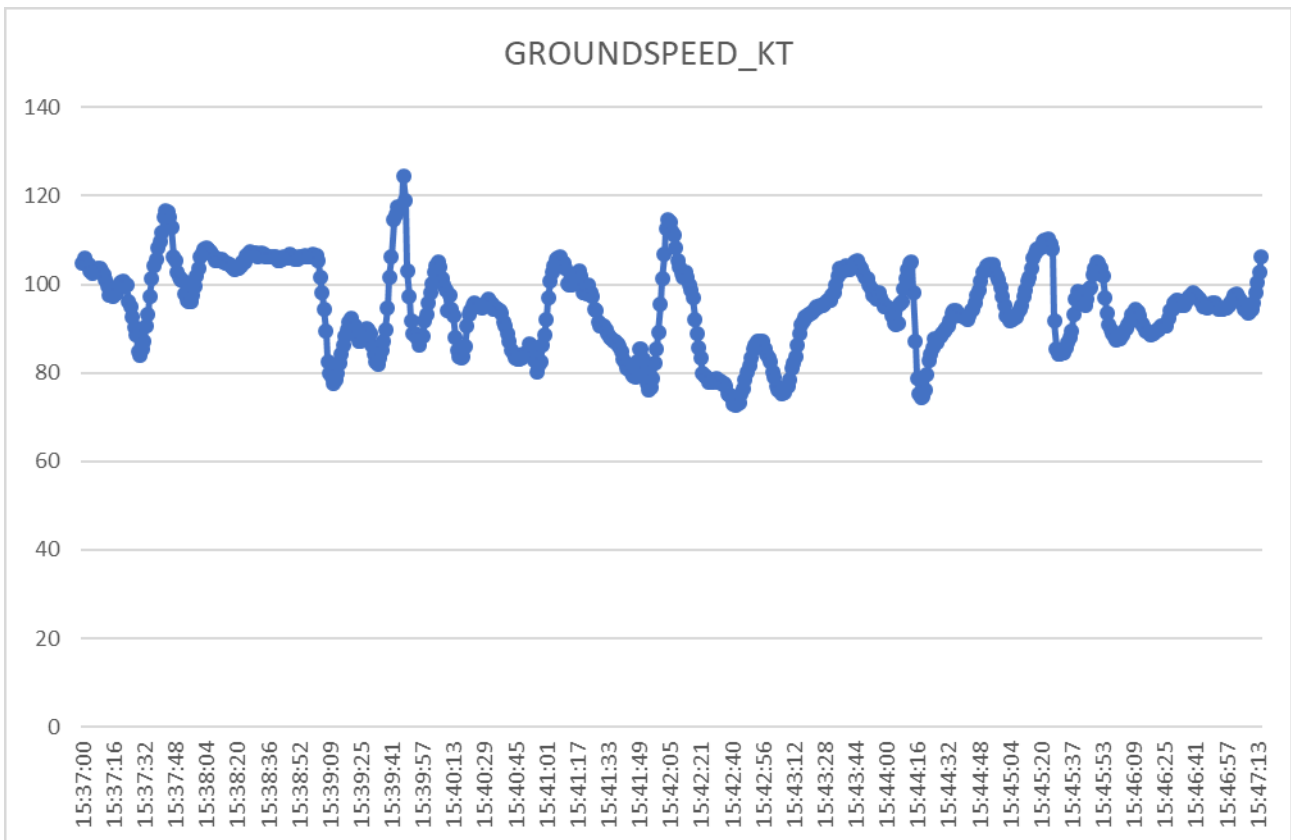
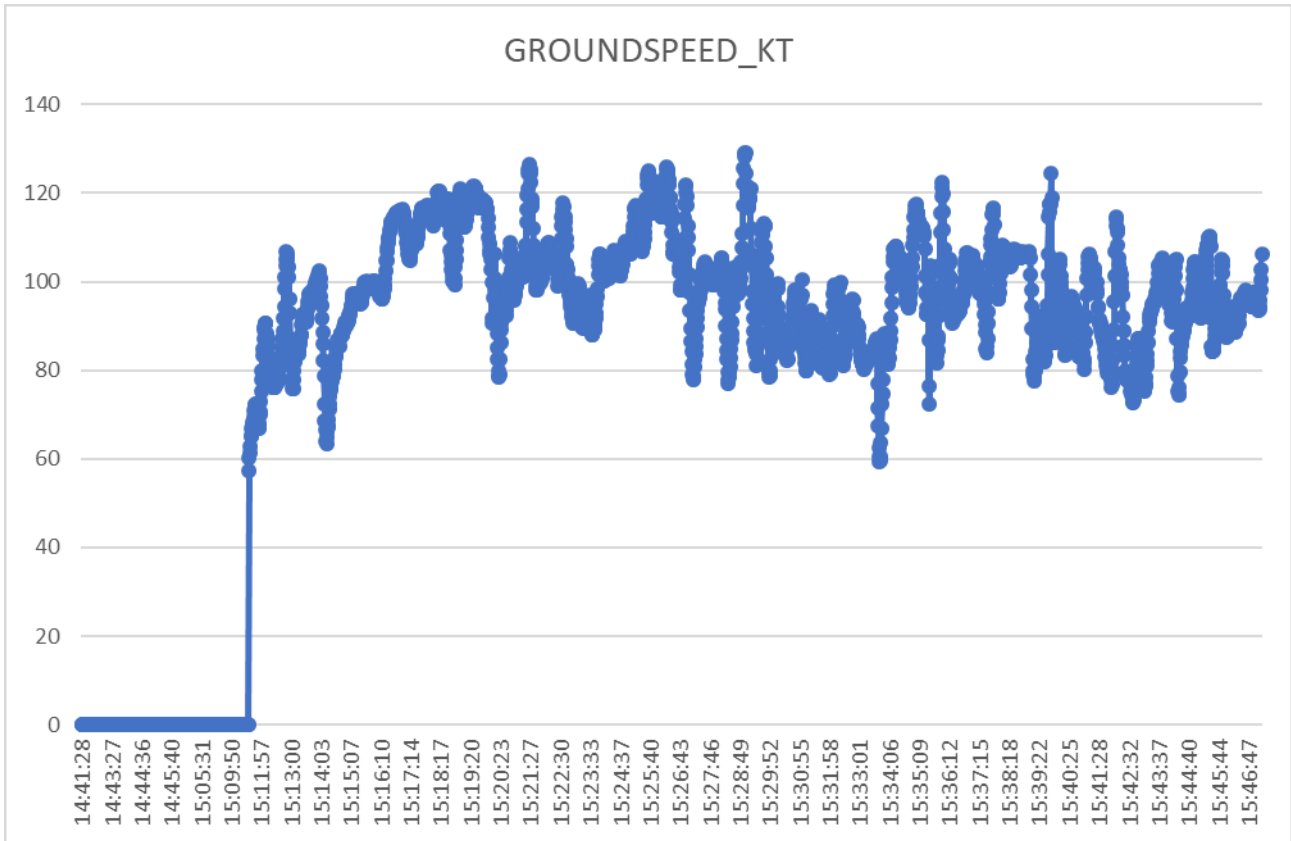


# 6 ATTACHMENTS

## 6.1 Altitude

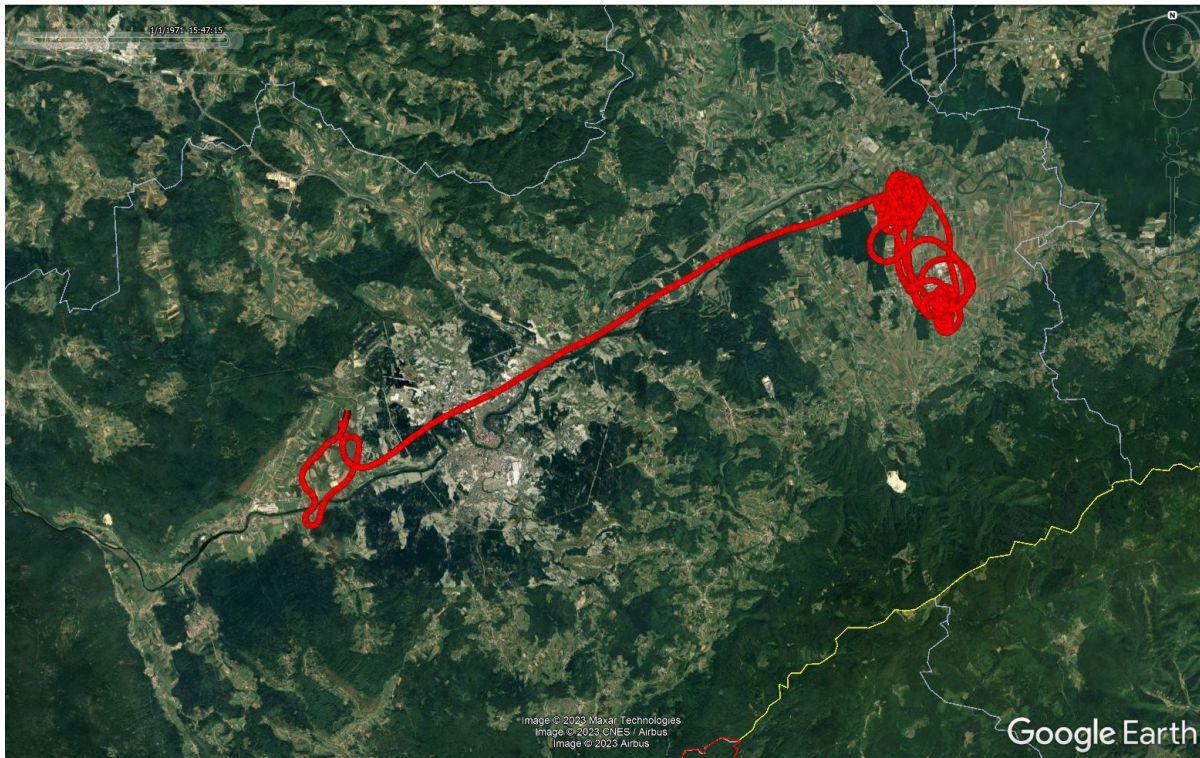


## 6.2 Groundspeed





### 6.3 Departure from the LJNM airport to the manoeuvring area



### 6.4 Flying in the area of Šentjernej

