SAFETY INVESTIGATION DIVISION
OF MINISTRY OF JUSTICE OF THE REPUBLIC OF LITHUANIA

# Accident to experimental gyrocopter MTO sport, LY-MTQ, that occurred on 26 May 2023 in Bistrampolis manor, Kučiai village, Panevėžys district, Republic of Lithuania

## SAFETY INVESTIGATION REPORT

No. (A-23/05) 1A-45
9 April 2025

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## FOREWORD

The Safety Investigation Division of the Ministry of Justice of the Republic of Lithuania is the independent structure part of the Ministry of Justice. The Safety Investigation Division carries out safety investigations into accidents and incidents involving aircraft, ships, railways, cableway installations and road transport.

The purpose of the safety investigation is to prevent the occurrence of accidents and incidents in the future, rather than establish blame or liability. The safety investigation is conducted independently of any judicial or administrative proceedings, to apportion blame or liability, are not related to them, and have no impact thereupon.

The safety investigations of the aircraft accidents and incidents is conducted in accordance with Annex 13 to the Convention on International Civil Aviation and 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 (hereinafter – Regulation (EU) No 996/2010).

Each safety investigation shall be concluded with a report in a form appropriate to the type and seriousness of the accident or incident. The report shall contain, where appropriate, safety recommendations, which shall in no case create a presumption of blame or liability for an accident or serious incident.

The safety investigation report is based only on the data obtained during the safety investigation. This information is published to inform the aviation industry and the public of the general circumstances of accident or serious incident. Extracts may be published without specific permission providing that the source is duly acknowledged, the material is reproduced accurately, and it is not used in a derogatory manner or in a misleading context.

The safety investigation report cannot be used as evidence in a judicial or administrative process seeking to apportion blame or liability, because this was not established in the course of the safety investigation, and it is not compatible with the objective of the safety investigation.

This is a courtesy translation by the Safety Investigation Division of the Safety Investigation Report. As accurate as the translation may be, the original text in Lithuanian is the authentic version and the work of reference.

## CONTENT

# FOREWORD

## General information

| | |
|---|---|
| Event | Accident |
| Date and Time | 26 May 2023,15.57 hrs[1] |
| Location | Bistrampolis Manor, Kučiai village, Panevėžys district, Republic of Lithuania |
| Aircraft type | Experimental gyrocopter MTOsport |
| Registration | LY-MTQ |
| Year of Manufacture | 2019, serial. no. M01750 |
| Commander | Citizen of Republic of Lithuania, 60 years |
| Commander's Licence | Ultralight aircraft pilot licence |
| Commander's Flying Experience | About 743 hours |
| Type of Flight | Private flight |
| Persons on Board | Crew – 1 |
| Injuries | Crew – 1 (fatal) |
| Nature of Damage | Experimental gyrocopter destroyed |
| Other Damage | Minor damage to the environment |

## Synopsis

On 26 May 2023 at 13.48 hrs the experimental gyrocopter MTOsport, registration marks LY-MTQ, piloted by a citizen of the Republic of Lithuania, took off from the Rojūnai aerodrome for the route flight. On the last leg of the route towards Rojūnai aerodrome, while flying past Bistrampolis manor at low altitude, the gyroplane hit trees growing in the park and crashed in the park territory. The pilot was fatally injured. The gyrocopter was destroyed.

The accident was caused by a loss of control of the gyroplane's flight path during a low-altitude maneuver (being in the avoided area of the height/velocity diagram), that was not required for normal flight. A contributing factor to the loss of control was the downwind turn, which resulted in a significant reduction in rotor lift. Although maximum engine thrust was applied at the last moment, there was insufficient time and altitude to recover to normal flight attitude.

## Safety investigation

On 26 May 2023, at 16.12 hrs, the Aeronautical Rescue Coordination Centre of SE Oro navigacija informed the Investigator-In-Charge of Aircraft Accidents and Incidents appointed by Minister of Justice of the Republic of Lithuania about the accident of the experimental gyrocopter MTOsport, LY-MTQ.

In accordance with Article 10 of Regulation (EU) No 996/2010, the German Federal Bureau of Aircraft Accident Investigation (*Die Bundesstelle für Flugunfalluntersuchung*) as a state of design and manufacture of the gyrocopter appointed an accredited representative, and the Safety Investigation Authority of the Republic of Austria (*Sicherheitsuntersuchungsstelle des Bundes*) as a state of design and manufacture of the engine appointed a contact person.

In accordance with Art. 8 of Regulation (EU) No. 996/2010, the European Union Aviation Safety Agency appointed a technical advisor for the safety investigation.

[1] Times in this report are local times.

# 1. FACTUAL INFORMATION

## 1.1. History of the flight

Flight preparation and the history of the flight are described based on the statements by eyewitnesses, records of video surveillance cameras of Rojūnai aerodrome, data recorded by the navigation programme used by the pilot during the flight, data recorded by the engine control unit of the gyrocopter and examination results of the accident site and gyrocopter wreckage.

On 26 May 2023, the pilot planned a route flight Rojūnai aerodrome (EYRO) - homestead Z (Z sodyba) – homestead A (A sodyba) – homestead L (L sodyba) - Molėtai Observatory (Molėtų Observatorija) - Rubikiai Tower (Rubikiai bokštas)- Rojūnai aerodrome (EYRO) (Fig. 1).

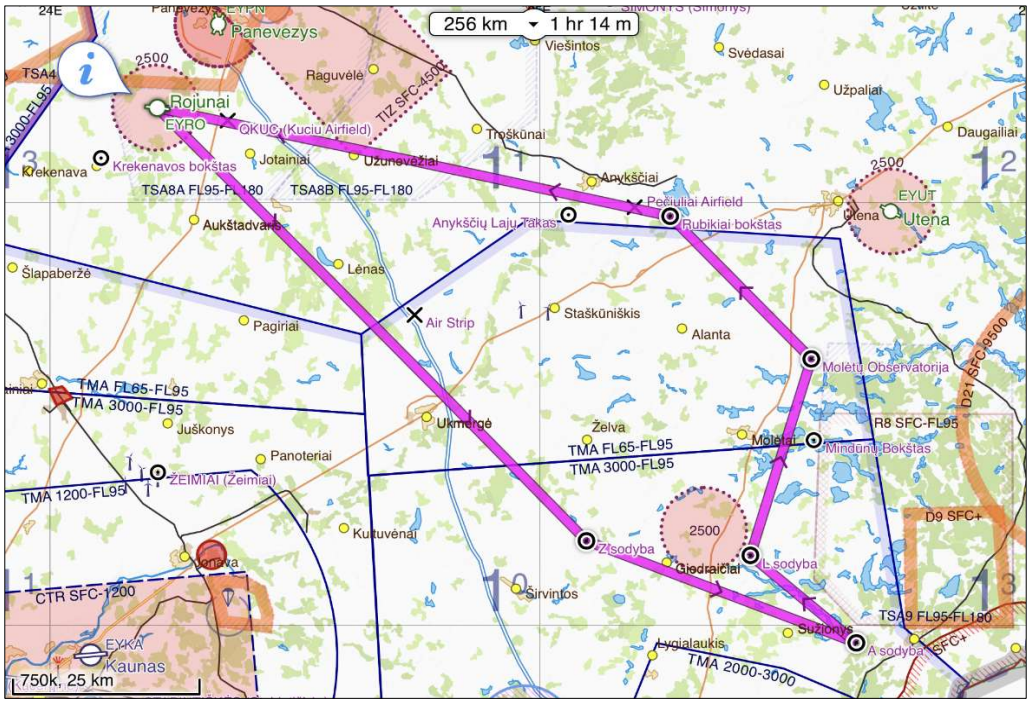



Fig. 1. Planned route (*SkyDemon*)

At 12.12 hrs the pilot arrived at the Rojūnai aerodrome.

At 12.38 hrs the pilot pulled the gyrocopter out of the hangar, refuelled, inspected the bottom of the gyrocopter from both sides, turned the engine propeller and checked the amount of oil.

At 13.14 hrs the pilot pulled out the gyrocopter through the gates outside the hangar fencing, then the pilot put on his flight suit, sat in the gyrocopter and put on his helmet.

At 13.40 hrs the pilot started the gyrocopter engine and 5 minutes later taxied towards the runway.

At 13.48 hrs the pilot took off from Rojūnai aerodrome. From Rojūnai aerodrome to homestead Z (Fig. 1. Planned route (*SkyDemon*)Fig. 1), the flight altitude ranged from 890 to 1 480 feet above the mean sea level.

At 14.25 hrs upon arriving at homestead Z (Fig. 2) the pilot performed a series of orbits around it, sometimes descending to a few feet above the ground. From homestead Z to homestead A (Fig. 1) the flight altitude ranged from 1 150 to 1 640 feet above the mean sea level.

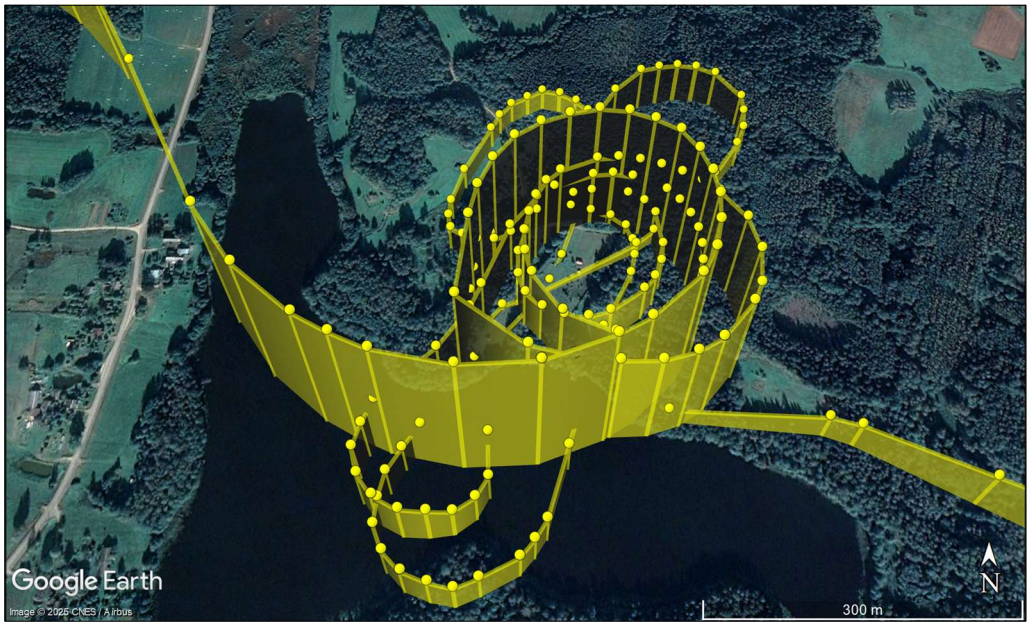



Fig. 2. Manoeuvres over homestead Z (*Google Earth*)

At 14.45 hrs. the pilot arrived at homestead A (Fig. 3). Over the homestead A, the pilot performed three orbits and during them also descended to a few feet above the ground. On the route from homestead A to homestead L (Fig. 1), the pilot flew over lake Asveja for about 7 kilometres at a height of 20 to 70 feet above the water surface.

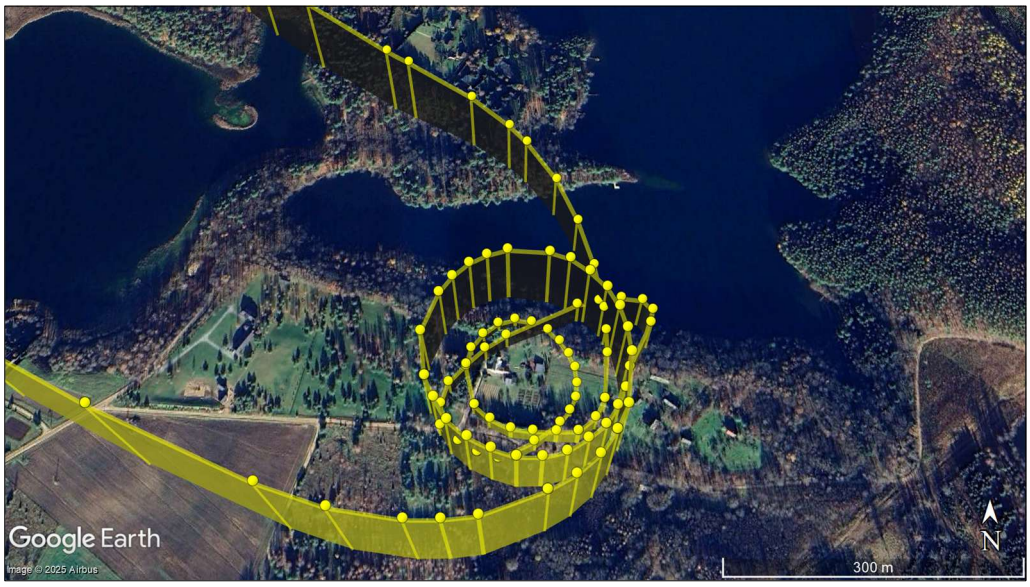



Fig. 3. Manoeuvres over homestead A (*Google Earth*)

At 14.58 hrs over the homestead L, the pilot performed two orbits passing next to the farmhouse very close to the ground surface (Fig. 4). From homestead L to the Molėtai Observatory (Fig. 1), the flight altitude ranged from 1 000 to 1 520 feet from the mean sea level.

At 15.12 hrs the pilot circled twice around the Molėtai Observatory, descending to 264 feet (Fig. 5).

From the Molėtai Observatory to the Rubikiai Tower (Fig. 1), the flight altitude ranged from 780 to 1 870 feet from the mean sea level. From the Rubikiai Tower to the Bistrampolis Manor – from 590 ft to 1 260 ft above the mean sea level.


Fig. 4. Manoeuvres over homestead L (*Google Earth*)

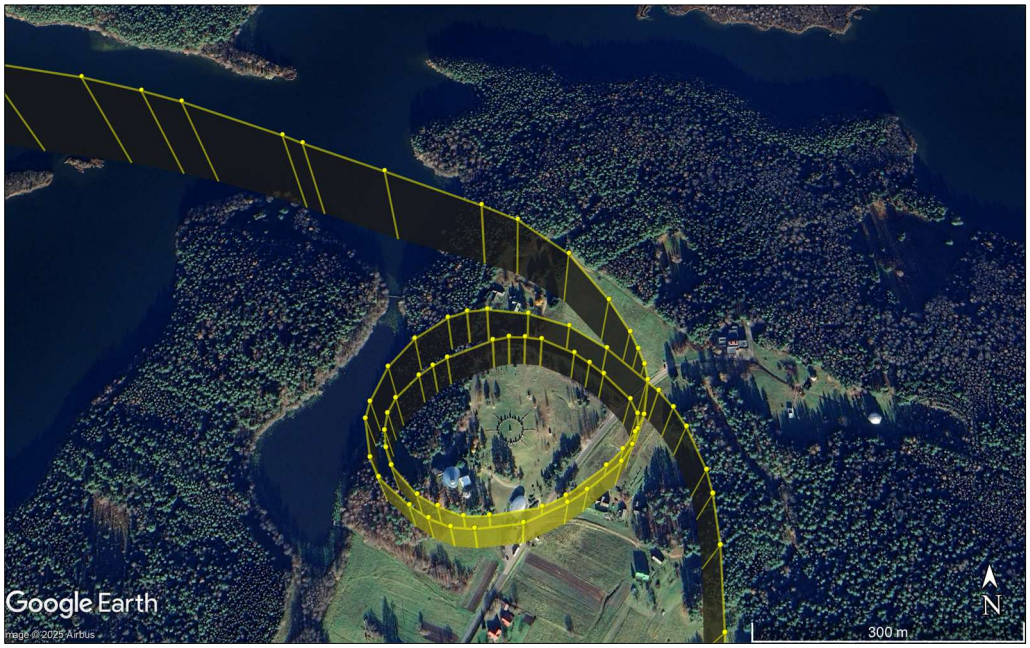



Fig. 5. Manoeuvres over the Molėtai Observatory (*Google Earth*)

The last leg of the route passed near the Bistrampolis Manor (Fig. 6.). At that time, a wedding was taking place at the Bistrampolis Manor and there were many people. Approaching the territory of the manor, the flight altitude was 505 feet. The pilot started a left turn with a descent over the territory of the manor. The gyrocopter performed one and a half spiral around the manor, struck the treetops with a rotor and crashed among the trees. According to the witness, the sound of the gyrocopter while he was flying around the manor was low, the whistling of the rotor blades was heard, and a few seconds before the collision with the trees, judging by the sound, the engine power was increased significantly.

The pilot flew 265 km from the departure of the aerodrome to the accident site for a total flight time of 2 hours and 9 minutes.


Fig. 6. Manoeuvres over the Bistrampolis Manor (Google Earth)

## 1.2. Injuries to persons

The pilot of the gyrocopter was fatally injured.

## 1.3. Damage to aircraft

The gyrocopter was destroyed.

## 1.4. Other damage

There was minor environmental damage.

## 1.5. Personnel information

The pilot was a 60-year-old citizen of the Republic of Lithuania, who at the time of the accident, held an Ultralight Aircraft Pilot Licence issued by the Lithuanian Ultralight Aircraft Pilots Federation and valid until January 2024. The RG class (gyrocopters) “AA” category (without restrictions) was specified in the licence.

The pilot had a driver’s medical certificate valid until March 2026. The pilot also held a Class 2 medical certificate issued by the Transport Competence Agency (hereinafter – TKA), valid until 30 June 2023. It contained the following limitations: ‘SSL - Specific restriction(s) as specified’ and ‘VNL - Valid only with correction for defective near vision’.

The pilot kept an electronic flight logbook, the data of which was not available during the safety investigation because the developer of the electronic flight logbook software no longer stores the logbook. According to the data provided by the Lithuanian Ultralight Aircraft Pilots Federation, as of 21 September 2018 the pilot's flight experience was 592 hours 56 minutes, of which 272 hours 51 minutes were flown in gyrocopters. The pilot’s friend indicated that since 2018 the pilot could have flown additional 150 hours approximately.

## 1.6. Gyrocopter information

### 1.6.1. General

The MTOsport gyrocopter is a single-engine two-seat tandem configuration gyrocopter (Figure 7). The gyrocopter is equipped with a tricycle wheel chassis with a nose wheel and a main landing gear spring spar made of glass fibre reinforced plastic. The gyrocopter's frame is welded from stainless steel tube, the two-blade rotor is made of extruded aluminium. The rudder and stabilizer surfaces are made of carbon fibre. The gyrocopter is equipped with a four-cylinder Rotax 915iS engine and a four-blade HTC-4B propeller. Data of the gyrocopter are given in Table 1.

Fig. 7. MTOsport gyrocopter (Pilot Handbook for gyroplane MTOsport model 2017 915iS (issue date 14.08.2019, revision 1.1))

Table 1. The gyrocopter data

| | |
|---|---|
| Aircraft manufacturer | AutoGyro GmbH |
| Aircraft type | MTOsport |
| Serial No. | M01750 |
| Year of manufacture | 2019 |
| Registration | LY-MTQ |
| Total flight hours | 176 hrs 4 min. |

### 1.6.2. Maintenance information

The gyrocopter had an Aircraft Registration Certificate issued by the TKA on 8 May 2019. On 16 August 2022, the TKA last time revalidated a Special Certificate of Airworthiness, which was valid until 15 August 2023.

The last gyrocopter and engine technical maintenance, or 100 hrs/annual maintenance, was performed on time on 2 July 2022 at 153 hrs flight time. No defects were found during the last technical maintenance of the gyrocopter, and the gyrocopter was declared airworthy on 16 August 2022. After the last maintenance the gyrocopter flew 23 hrs.

The gyrocopter had a manufacturer's Pilot Handbook for gyroplane MTOsport model 2017 915iS (issue date 14.08.2019, revision 1.1) (hereinafter – Pilot Handbook) and an engine Operators Manual for ROTAX engine type 915 i A / C24 series (REF NO.: OM-915 i A / C24, PART NO.: 898851, edition 1.09.2022, revision 4). The Pilot Handbook, among other information, described the pre-flight check procedures, which included an inspection of the exterior and interior of the gyrocopter, engine elements, control system, landing gear, rotor, etc.

### 1.6.3. Fuel quantity

The Pilot Handbook indicates that the gyrocopter's fuel tank capacity is 94 litres. The safety investigation did not determine how much fuel was in the gyrocopter before the flight. There were no pre-flight refuelling records in the aircraft logbook – the pilots flying the gyrocopter did not register pre-flight refuelling. The amount of fuel was also not recorded before the accidental flight. The video of pre-flight preparation showed the pilot filled the gyrocopter tank with two canisters of fuel. If the canisters were full, the gyrocopter could have been filled with a total of 40 litres of fuel.

### 1.6.4. Weight and balance

The empty weigh of the gyrocopter indicated in the application for the revalidation of a Special Certificate of Airworthiness was 284 kg and in the weighing report – 308,9 kg. The maximum take-off mass of the gyrocopter as stated in the Pilot Handbook is 560 kg.

The calculations of the mass and centre of gravity position carried out during the safety investigation confirmed that, at the time of the accident, the gyrocopter would not have exceeded the permissible mass and centre of gravity position limits with only one pilot and any amount of fuel from full to empty tank.

### 1.6.5. Limitations and performance

Section 2.4 of the Pilot Handbook specifies the airspeed limitations:

| Air Speed | Marking | |
|---|---|---|
| $V_{NE}$ Never Exceed Speed | Red radial | 195 km/h |
| Caution range | Yellow arc | 120-195 km/h |
| $V_B$ (Max design speed for strong gusty conditions) | Green arc | > 40-120 km/h |
| $V_{MIN}$ Minimum speed | Yellow arc | 0 - > 40 km/h |

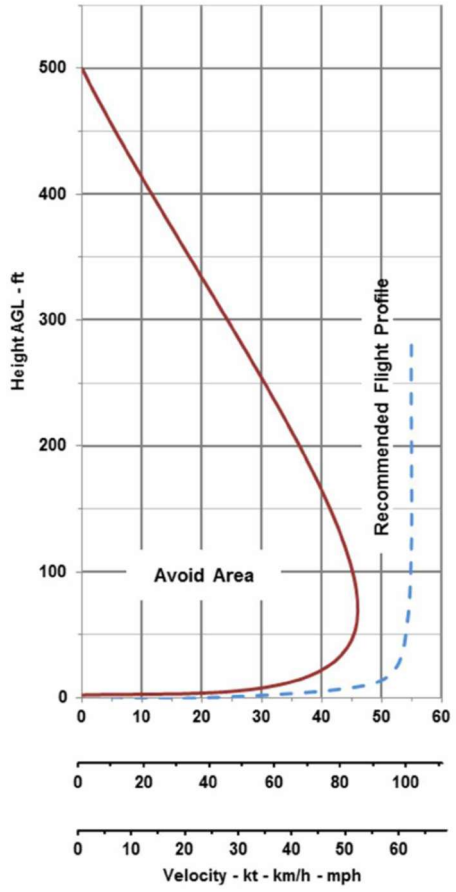
Section 2.6 of the Pilot Handbook specifies the engine speed limits:

| Engine Speed | Marking | |
|---|---|---|
| Maximum engine speed | Red radial | 5800 RPM |
| 5 minute take-off power regime | Yellow arc | 5500-5800 RPM |
| Maximum continuous power | Green arc | 1400-5500 RPM |
| Recommended pre-rotation clutch speed | Green radial | 2000 RPM |
| | Yellow arc | 0-1400 RPM |

Section 5.3 of the Pilot Handbook provides a Height-Velocity Diagram:

'The H/V diagram indicates combinations of height and speed (avoid area left side of the red graph) where a safe landing may not be possible in case of an engine failure. Therefore, operation on the left side of the red line must be avoided.

Take-offs and landings should be conducted according to the recommended flight profile, provided as blue dashed line.




## 1.7. Meteorological information

The Panevėžys meteorological station of the Lithuanian Hydrometeorological Service under the Ministry of Environment recorded meteorological conditions. The station is 181 ft above sea level and 16 km north of the accident site. At the time of the accident, the air temperature was 19.7 °C, the wind was south-westerly direction at an average speed of 3.1 m/s with gusts of up to 8.3 m/s, there was 7 octant cloud cover, meteorological visibility was over 10 km and atmospheric pressure at sea level was 1017 hPa. The wind information recorded by the meteorological station is shown in Table 2.

Table 2. Wind speed and direction

| Time | Average wind speed, m/s | Maximum wind speed, m/s | Wind direction, degrees |
|---|---|---|---|
| 13 hrs | 1,7 | 6,0 | 262 |
| 14 hrs | 2,0 | 5,4 | 214 |
| 15 hrs | 2,2 | 6,3 | 211 |
| 16 hrs | 3,1 | 8,3 | 212 |
| 17 hrs | 4,1 | 8,9 | 230 |

Bistrampolis Manor is located 72 km north of Kaunas Airport (EYKA) and 69 km south-east of Šiauliai Airport (EYSA). In the weather forecasts (TAF[2] information) for both airports from 15.00 hrs there was forecasted north-westerly wind of 15 knots gusting up to 25 knots.

[2] TAF – Terminal Aerodrome (Area) Forecast

TAF EYSA 260800Z 2609/2618 VRB05KT CAVOK TEMPO 2609/2912 25015KT TEMPO 2612/2618 29015G25KT

TAF EYKA 260501Z 2606/2706 28010KT 9000 OVC010 BECMG 2607/2609 NSC TEMPO 2612/2618 31015G25KT BECMG 2620/2621 36010KT

The METAR[3] for Šiauliai, Kaunas and Vilnius airports indicated:

EYSA 261250Z 26012KT 230V300 9999 FEW050 SCT060 21/06 Q1018 NOSIG

EYKA 261250Z 27010KT 230V340 CAVOK 20/08 Q1019

EYVI 261250Z 33010KT 300V360 CAVOK 19/06 Q1019 NOSIG

## 1.8. Aids to navigation

Not applicable.

## 1.9. Communications

The safety investigation did not reveal any evidence of in-flight communication.

## 1.10. Aerodrome information

Rojūnai aerodrome is located 16 km southwest of Panevėžys city centre. The elevation of the aerodrome is 177 ft (54 m) above sea level. The aerodrome has a grass runway measuring 780×40 m.

The Flight Instructions of Rojūnai aerodrome approved on 7 October 2019 and agreed with the TKA on 8 October 2019 (hereinafter – the Aerodrome Flight Instructions) indicate:

‘5.3. All flights within the Rojūnai [aerodrome traffic zone] must be conducted using aerodrome pressure (QFE).’

## 1.11. Flight recorders

### 1.11.1. Aircraft flight recorders

The gyrocopter was not equipped with a flight data recorder and cockpit voice recorder. The use of such devices in such type aircraft is not obligatory.

### 1.11.2. Video records

The records of video surveillance cameras were obtained from the Rojūnai aerodrome. The video recordings were analysed to determine the gyrocopter’s preparation for the flight and take-off.

### 1.11.3. Engine data

The gyrocopter engine had an electronic engine control unit which recorded engine operating parameters. Fig. 8 shows the last 60 seconds of flight data obtained by analysing information from the engine control unit. The red line represents the engine revolutions per minute, the green line represents the linear throttle position expressed as a percentage of throttle travel, and the black line represents the ambient air pressure in kilopascals (kPa).

[3] METAR – METeorological Aerodrome Report

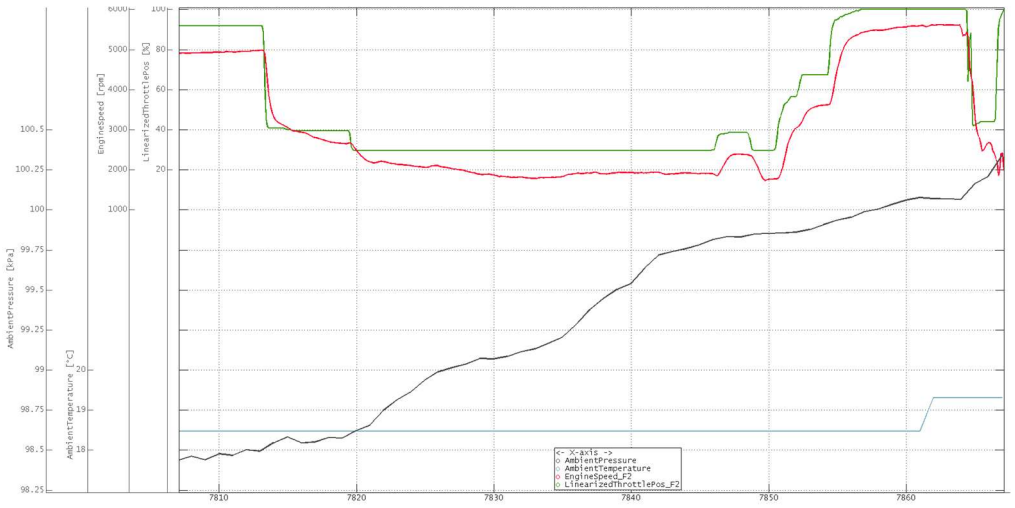



Fig. 8. Engine data (last 60 seconds)

### 1.11.4. iPad mini tablet

The pilot's iPad mini tablet with the active SkyDemon navigation app was found at the accident site, which retained the planned route and flight data. Fig. 9 shows the gyrocopter's altitude, speed and descent path data derived from the information recorded in the SkyDemon navigation software.

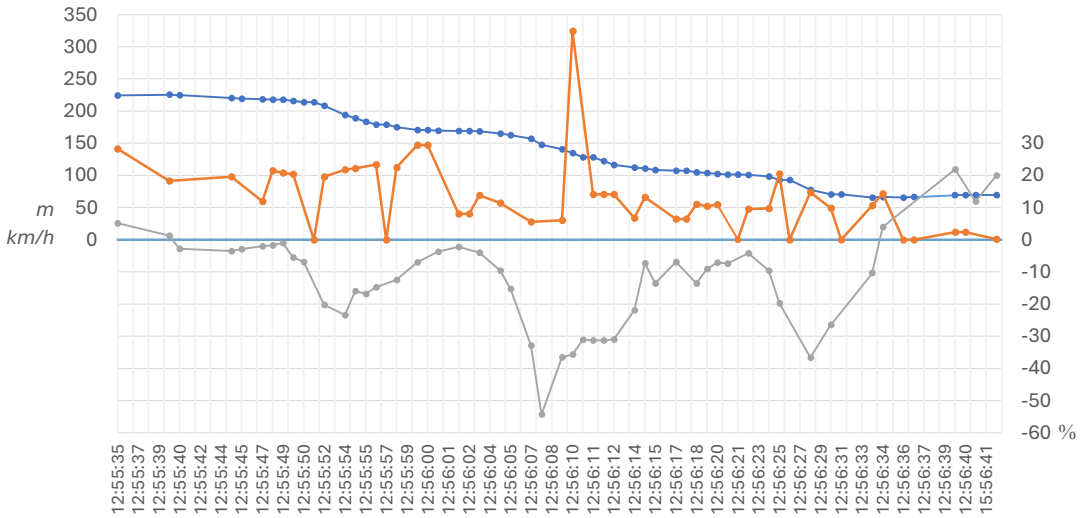



Fig. 9. Graph of the altitude, speed and descent path slope

In Fig. 9 the blue line indicates the gyrocopter's altitude above sea level in metres, the orange line indicates the gyrocopter's speed in kilometres per hour and the grey line indicates the slope of the gyrocopter's descent path expressed in percent. The horizontal axis of the graph represents UTC time. The vertical axis on the left side of the chart indicates the gyrocopter's altitude in metres and speed in kilometres per hour, and the vertical axis on the right side of the chart indicates the slope of the descent path, expressed in percent.

Speed is specified as ground speed, which is the vector sum of the aircraft's true speed and the wind direction and speed. When flying at a low altitude, the true speed is equal to the indicated speed. Indicated speed is used in aerodynamics because it determines the magnitude of aerodynamic forces acting on the aircraft and therefore the controllability of the aircraft.

## 1.12. Wreckage and impact information

The gyrocopter crashed in the territory of the Bistrampolis Manor park about 20 m from its south-eastern edge (Fig. 10). The gyrocopter was lying on its right side. The front part of the gyrocopter and the front instrument panel were smashed, the main frame at the space between the seats was bent to the left. The right landing gear wheel was broken off. All of the engine's propeller blades showed damage, with the blade tips broken off. One blade tip fragment was found about 30 m from the gyrocopter. One of the rotor blades was straight and the other was bent upwards in two places, both blades had edge damage.

Fig. 10. The gyrocopter MTO sport at the accident site (STS)

The speed indicator needle on the front instrument panel was stuck at a 25 km/h mark, the electronic altimeter was reading 30 feet, and its pressure window showed a pressure of 1 013 hPa. The throttle lever was fully forward – in the maximum thrust position.

After restoring the gyrocopter to an upright position at the accident site, the fuel level sight gauge showed about 20 litres of fuel in the tank. The fuel sample taken from the gascolator and the fuel tank drains showed visually that the gasoline was clear and clean.

## 1.13. Medical and pathological information

The pilot's post-mortem examination was carried out by the Panevėžys Division of the State Forensic Medicine Service. The post-mortem examination showed that the pilot died of injuries sustained in the accident impact. Toxicological tests showed that there was no ethyl alcohol in the pilot's blood.

## 1.14. Fire

Not applicable.

## 1.15. Survival aspects

The pilot was fastened by his seat belts and was wearing the helmet. The accident was not survivable due to forces of gyrocopter impact into the trees and ground.

## 1.16. Tests and research

Not applicable.

## 1.17. Organizational and management information

Not applicable.

## 1.18. Additional information

### 1.18.1. Height of a flight

Section 5 of the Annex Rules of the air to Commission Implementing Regulation (EU) No. 923/2012[4] laying down the common rules of the air and operational provisions regarding services and procedures in air navigation states:

> 'SERA.5005 Visual flight rules
>
> <...>
>
> (f) Except when necessary for take-off or landing, or except by permission from the competent authority, a VFR[5] flight shall not be flown:
> <...>
> <...> at a height less than 150 m (500 ft) above the ground or water, or 150 m (500 ft) above the highest obstacle within a radius of 150 m (500 ft) from the aircraft.'

### 1.18.2. Gyrocopters flight safety aspects

The Pilot Handbook recommends safe flight procedures:

> 'SECTION 10 - SAFETY TIPS
> <...>
>
> Overconfidence Prevails in Accidents
>
> A personal trait most often found in pilots having serious accidents is overconfidence. High-time fixed-wing pilots converting to gyroplanes and private owners are particularly susceptible. Airplane pilots feel confident and relaxed in the air, but have not yet developed the control feel, coordination, and sensitivity demanded by a gyroplane. Private owners must depend on self-discipline, which is sometimes forgotten. When flown properly and conservatively, gyroplanes are potentially the safest aircraft built. But especially gyroplanes also allow little tolerance when flown to their limits. Gyroplanes must always be flown defensively.
> <...>
>
> Flying Low over Water is Very Hazardous
>
> Accidents repeatedly occur while manoeuvring low over water. Many pilots do not realize their loss of depth perception when flying over water. Flying over calm glassy water is particularly dangerous, but even choppy water, with its constantly varying surface, interferes with normal depth perception and may cause a pilot to misjudge his height above the water.'

The United States Federal Aviation Administration Rotorcraft Flying Handbook, FAA-H-8083-21, 2000, Part 'Gyroplane', Chapter 20 'Gyroplane Flight Operations' states:

> 'Flight at slow airspeeds
>
> <...> At the point where maximum power available is being used, no further reduction in airspeed is possible without initiating a descent. This speed is referred

[4] Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010.
[5] VFR – Visual Flight Rules.

to as the minimum level flight speed. Because there is no excess power available for acceleration, recovery from minimum level flight speed requires lowering the nose of the gyroplane and using altitude to regain airspeed.
<...>

High rate of descent

A gyroplane will descend at a high rate when flown at very low forward airspeeds. This maneuver may be entered intentionally when a steep descent is desired, and can be performed with or without power. An unintentional high rate of descent can also occur as a result of failing to monitor and maintain proper airspeed. In powered flight, if the gyroplane is flown below minimum level flight speed, a descent results even though full engine power is applied. Further reducing the airspeed with aft cyclic increases the rate of descent. For gyroplanes with a high thrust-to-weight ratio, this maneuver creates a very high pitch attitude. To recover, the nose of the gyroplane must be lowered slightly to exchange altitude for an increase in airspeed.'

In his book Flying a 'New Generation' Gyrocopter, author Phil Harwood states:

'Slow flight and fast flight

In a Gyrocopter there is a relationship between speed and the power required to sustain level flight. In general, the **faster** you want to go, the **more** power is required. However this is not true for all speeds. Below about 50 mph, the **slower** you want to fly, the **more** power is required. <...> Flying below 50 mph is known as flying behind the power curve (here 50 mph speed is for instructional use only and you must refer to your Pilot Operators Handbook for the machine you are flying to find out correct figures for your aircraft).
<...>

The dangers of flying behind the power curve

Although a Gyrocopter cannot stall it is a **foolish** pilot that believes you can fly slowly safely, especially below 500 ft. It requires careful consideration of power. If you are flying slowly and you have a high rate of descent, it is very **unlikely** that applying full power will reduce this rate of descent significantly and although you will not stall, you will 'mush' into the ground with a high vertical descent rate. This is even more important if you are not flying directly into wind.

If you find yourself descending with a low forward speed, **ALWAYS lower the nose** and then apply power to regain speed and reduce your rate of descent. **You cannot do it by power alone.**
<...>

Letting the speed bleed off and applying power to correct it

At some time or other, I expect you will be flying along looking at the scenery, perhaps transfixed on some activity going on below you and you will find your speed bleeding off unnoticed as you enter a nose-high situation. As you will not have adjusted your power you will also be descending. It may be that you are descending dangerously close to the ground, perhaps caught out by sink or rollover in the lee of a hill.

As you are approaching the ground quickly, your instinct will be to apply full power to arrest the rate of descent. As covered in the previous chapter, this will not be very effective and you may 'mush' into the ground.

You must **lower** the nose to raise the airspeed, which in the short term, in actually **increases** your rate of descent before you are able to fly away safely.'

# 2. ANALYSIS

## 2.1. Manoeuvres causing the accident

The pilot flew 265 km from the departure aerodrome to the accident site for a total flight time of 2 hours 9 minutes. The pilot had almost 9 km or a few minutes of flight left to Rojūnai aerodrome. The pilot's planned route did not include Bistrampolis Manor as a waypoint, but the last leg of the flight passed near it. Thus, it is likely that manoeuvres over Bistrampolis Manor were not planned, but the pilot, having spotted the people, decided to fly over the manor at low altitude.

Having approached the territory of the Bistrampolis Manor, the pilot began to descend making a left turn around the manor (Fig. 6). 52 seconds before the accident, the pilot set the throttle to the 40% of travel position and then approximately 5 seconds later – to the 30 % of travel position. The throttle lever remained in this position for about 27 seconds. The engine speed at that time was about 2 000 rpm. The gyrocopter's speed at the start of the descent was 91.3 km/h. At an altitude of about 285 ft above the ground the speed dropped to 27.8 km/h. It is likely that the pilot noticed the decrease in speed and corrected it by lowering the nose, as the increase in speed to 70.5 km/h was accompanied by an increase in the slope of the descent path. At an altitude of about 138 feet above the ground, the speed dropped again to about 33 km/h. At that time, the direction of the gyrocopter flight was approximately into the wind, which may have contributed to the decrease in speed. It is possible that the pilot did not take into account the wind changes during the flight. The wind was blowing at the time of departure at 2 m/s gusting up to 5.4 m/s. At the time of the accident, the wind had increased to 3.1 m/s gusting to 8.3 m/s. The wind direction was variable throughout the flight and fluctuated between 230° and 340° at the time of the accident. 20 seconds before the accident, it appears that the pilot, noticing the decrease in speed, increased the engine thrust to 40 % for a couple of seconds, then returned the throttle to 30 % for a couple of seconds and then within 6 seconds the engine power lever was fully pushed forward. The gyrocopter was about 110 feet above the ground when the power increase was initiated. The engine responded adequately to the power increase and 9 seconds before the accident engine speed increased to 5 600 rpm.

The Pilot Handbook states that the minimum speed zone is between 0 – 40 km/h. Based on the gyrocopter's performance, if the speed drops below the minimum flight speed, it is necessary to lower the nose and gain a higher speed, in order to stop descending and regain the energy necessary for the climb. Even with maximum engine thrust, it is impossible to stop descent quickly. Therefore, even though the engine had reached maximum thrust, the gyrocopter continued to descend at increasing speed and increasing flight path slope during last 7 seconds before the impact with the trees. Before the collision with the trees, the gyrocopter's speed was 49 km/h and the flight path slope was 26 %. The last section of the flight was downwind, the gusts of which could have affected the gyrocopter's flight. The remaining time and height were not sufficient for the gyrocopter to achieve the required climb speed, so it collided with trees. At the collision point, the thrust lever was pulled to approximately 43 % of travel position, the engine speed responded accordingly dropping to 2 500 rpm within 1 second. 2 seconds later the gyrocopter crashed to the ground, its engine shut down.

The gyrocopter has performance that allow it to fly both very low and at very low, almost zero, speeds. However, the Height-Velocity diagram specified in the gyrocopter Pilot Handbook must be taken into account. Flying slowly and at the same time low is technically possible for an experienced pilot, who evaluates the wind direction, the gyrocopter's weight to engine thrust ratio, and many other

factors. Nevertheless, such a flight is risky even for an especially experienced pilot, due to possible unforeseen circumstances (for example, nearby obstacles, engine failure, wind shear and many others). Flying low and at the same time slowly enters the avoidable area of the Height-Velocity diagram and endangers both the pilot himself and others around him.

A gyrocopter can remain under control when flying relatively slowly (compared to airplanes). The rudder is particularly effective because it is located just behind the propeller. When flying at low speed, more engine power is required to maintain altitude, so the rudder is in a strong airflow from the propeller, therefore the direction of flight can be changed very quickly. When a gyrocopter turns downwind, the airflow over the rotor is initially reduced, resulting in a reduction of rotor lift and a loss of altitude. Increased engine power, due to inertia, cannot suddenly compensate for this loss of lift. Therefore, there is a high probability that the pilot, in an attempt to reduce the rate of descent in this situation, will pull the control stick back, thus only making the situation worse.

It is likely that the pilot spontaneously thought of performing several manoeuvres just before returning to the aerodrome and did not envision the course of the flight. While flying over Bistrampolis Manor, the pilot might have been focused on the people on the ground, not on the control of the gyrocopter.

## 2.2. Flight altitude

The pilot performed orbits over all waypoints of his planned route, descending almost to the ground level. It is likely, that when choosing homesteads as route waypoints, the pilot planned manoeuvres over them. Also, on the route leg from homestead A to homestead L (Fig. 1), the pilot flew over Lake Asveja for about 7 kilometres at an altitude of 20 to 70 feet above the water surface.

Visual flight rules state that, except when necessary for take-off or landing, flights shall not be conducted at a height less than 500 ft (150 m). A low pass is not a take-off or landing. Such information should have been known to the licensed pilot, so flying at a lower altitude shows a lack of concern for flight safety. This behaviour can be explained by the pilot's desire to demonstrate flight manoeuvres to people on the ground. A low-altitude flight to demonstrate one’s abilities to people on the ground is an obvious risk taken by the pilot, which can be explained by various factors: insufficient consideration of safety, lack of flight preparation and not having a plan for a flight, the desire to show one's abilities to others and the pursuit of positive emotions and enjoyment. However, unnecessary flying at low altitude and performing impromptu demonstrations to friends or others on the ground, pilots can exceed their capabilities, and the consequences can be fatal.

Low altitude manoeuvres imply a significant reduction in safety margins due to the presence of identified or unidentified obstacles in the proximity and there is less time to react to unforeseen situation during the manoeuvre. Low altitude and lack of time leave no opportunity to recover the aircraft from an abnormal situation or correct mistakes. Low altitude flight hazards are warned against in both the Pilot Handbook and other training material.

## 2.3. Preparation for the flight

After the accident the altimeter on the pilot’s instrument panel showed an altitude of about 30 feet. The pressure setting in the altimeter was 1 013 hPa. At that time, according to the information provided by Kaunas and Vilnius aerodromes the pressure was 1 019 hPa, while in Šiauliai it was 1 018 hPa. It can be assumed that the pilot had set the altimeter to the aerodrome pressure (QFE) on departure from

the Rojūnai aerodrome as specified the Aerodrome Flight Instructions, and did not change it to atmospheric pressure at sea level (QNH) during the route, therefore the altimeter readings did not show the actual flight altitude above sea level throughout the entire route. At any time during the flight, the pilot could contact Šiauliai, Kaunas and Vilnius flight information service operators to obtain information about the current QNH.

The video surveillance cameras also show that the pilot did not perform a consistent pre-flight inspection of the gyrocopter in accordance with the procedures specified in the Pilot Handbook.

## 3. CONCLUSIONS

### 3.1. Findings

- The pilot held a valid Ultralight Aircraft Pilot Licence.
- The gyrocopter had a valid Special Certificate of Airworthiness.
- Gyrocopter's maintenance works were carried out on time and properly.
- No defects in the gyrocopter or its engine were identified that could have contributed to the accident.
- The gyrocopter was destroyed by the impact to the trees and the ground.
- The accident occurred when the gyrocopter was flying at low altitude at low speed, thus entering the avoidable area of the Height-Velocity Diagram, and attempted to transit from descending flight to the climb making a downwind turn.
- The pilot frequently manoeuvred and flew below the minimum flight altitude specified by the Visual Flight Rules.
- On the route and over its points were manoeuvred at very low altitudes and were flown in such a way that there was a high risk of an accident.
- The pilot flew 265 km from the departure aerodrome to the accident site for a total flight time of 2 hours 9 minutes.
- While flying past the Bistrampolis Manor, the pilot manoeuvred spontaneously and likely did not envision the course of the flight.
- Wind speed and its gusts may have contributed to the accident.

### 3.2. Causes

The accident was caused by the loss of control of the gyrocopter's flight path during a low altitude manoeuvre (being in the avoidable area of the Height-Velocity Diagram) that was not required for a normal flight. The contributing factor to the loss of control was a turn to the downwind, which significantly reduced the rotor lift. Although maximum engine thrust was applied at the last moment, there was insufficient time and altitude to recover to normal flight attitude.

## 4. SAFETY RECOMMENDATIONS

This report does not provide safety recommendations.