FINAL REPORT

ACCIDENT 1676/17

State Commission on Aircraft Accidents Investigation (PKBWL)

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FINAL REPORT

ACCIDENT

OCCURRENCE NO – 1676/17

AIRCRAFT– aeroplane, Ultralight PelegrinTarragon

DATE AND PLACE OF OCCURRENCE – 21 JULY 2017, EPML

This Report is a document presenting the position of the State Commission on Aircraft Accidents Investigation concerning circumstances of the air occurrence, its causes and safety recommendations. The Report was drawn up on the basis of information available on the date of its completion.

The investigation may be reopened if new information becomes available or new investigation techniques are applied, which may affect the wording related to the causes, circumstances and safety recommendations contained in the Report.

Investigation into air the occurrence was carried out in accordance with the applicable international, European Union and domestic legal provisions for prevention purposes only. The investigation was carried out without application of the legal evidential procedure, applicable for proceedings of other authorities required to take action in connection with an air occurrence.

The Commission does not apportion blame or liability.

In accordance with Article 5 paragraph 6 of the Regulation (EU) No 996/2010 of the European Parliament and of the Council on the investigation and prevention of accidents and incidents in civil aviation […] and Article 134 of the Act – Aviation Law, the wording used in this Report may not be considered as an indication of the guilty or responsible for the occurrence.

For the above reasons, any use of this Report for any purpose other than air accidents and incidents prevention can lead to wrong conclusions and interpretations.

This Report was drawn up in the Polish language. Other language versions may be drawn up for information purposes only.

WARSAW 2021

ABREVIATIONS

AFIS	Aerodrome Flight Information Service
AGL	Above Ground Level
BRS	Ballistic Recovery System
EPKW	ICAO code for Kaniów aerodrome
EPML	ICAO code for Mielec aerodrome
FIS	Flight Information Service
LMT	Local Mean Time
MTOW	Maximum Take Off Weight
TRA	Temporary Reserved Area
UACP	Certificate of qualifications of the ultralight aircraft pilot
UAP(L)	Ultralight Aeroplane (Land)
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

Occurrence reference number:	1676/17			
Type of occurrence:	ACCIDENT			
Date of occurrence:	21 July 2017			
Place of occurrence:	EPML, Poland			
Type and model of aircraft:	Ultralight aeroplane, PelegrinTarragon			
Registration marks:	YL-RCT			
Aircraft User/Operator:	Viasani Group Sp. z o.o.			
Aircraft Commander:	UACP			
Number of victims/injuries:	Fatal	Serious	Minor	None
	2	-	-	-
Domestic and international authorities informed about the occurrence:	CAA Poland SIA Latvia (TAIIB)			
Investigator-in-Charge:	Ryszard Rutkowski, Jacek Bogatko (from 1 Sep 2018)			
Investigating Authority:	Państwowa Komisja Badania Wypadków Lotniczych State Commission on Aircraft Accidents Investigation			
Accredited Representatives and their advisers:	Accredited Representative from Latvia (TAIIB)			
Investigation Team	Jacek Bogatko; Ireneusz Boczkowski			
Document containing results::	FINAL REPORT			
Safety recommendations:	ONE			
Recommendations addressees:	MANUFACTURER			
Investigation completed:	8 March 2021			

1. Type of occurrence:
ACCIDENT

2. Investigating Authority:
PKBWL

3. Date and local time of the occurrence:
21 July 2019, 7:49 hrs LMT (all times in the report are in LMT)

4. Point of departure and point of intended landing:
Departure: EPML, landing: EPKW

5. Place of occurrence:
South of EPML aerodrome, outside its fence, on a property of Husqvarna Poland

6. Type of operation:
En route flight

7. Phase of flight:
Initial climb

8. Flight conditions:
VMC, daylight

9. Weather factors:
It was raining the day before the accident. The weather station of EPML aerodrome recorded the wind from the direction of 315° at a speed of 1.74 m/s, cloud cover about 5/8 Stratocumulus with base at about 200 m. The horizontal visibility was very good, as an AFIS officer stated, a church located 4.5 km from the aerodrome tower was clearly visible.

Weather conditions had an impact on the occurrence.

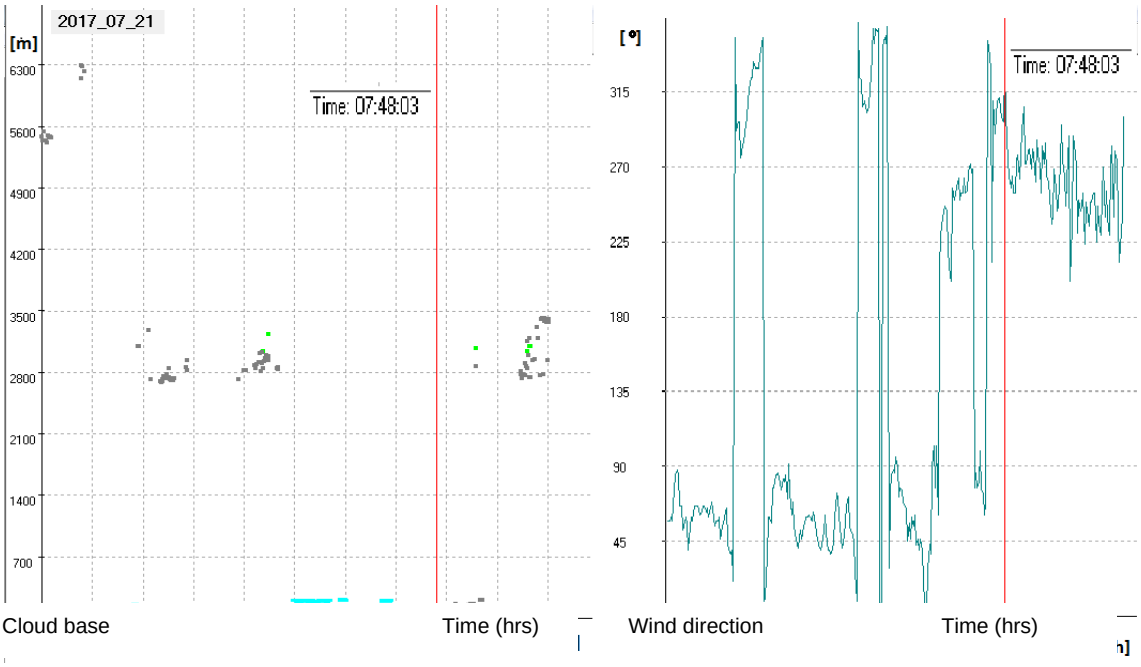

Fig. 1. Cloud base and wind direction [source: PKBWL]

10. Flight organizer:

Private

11. Aircraft commander data:

Pilot: male, aged 42, a holder of UACP with rating for UAP(L). Class 2 Medical Assessment valid until 20 May 2019. Total flight time on ultralight aeroplanes – 400h. In his records the pilot had ratings for four types of ultralight aircraft: Skyleader 500, Skyleader 600, Sirius and Tarragon.

12. Injuries to the crew:

The pilot and the other occupant were killed at the scene.

13. Course and analysis of the occurrence:

Fig.2. Pelegrin Tarragon 502 CBD aeroplane [source: PKBWL]

On 21 July, 2017 the pilot of the ultralight aircraft Pelegrin Tarragon (Fig. 2) arrived at EPML aerodrome with a passenger to perform a flight to EPKW aerodrome.

After completing pre-flight operations, at 7:36 hrs the pilot reported to AFIS officer and requested clearance for starting the engine. The AFIS officer cleared the pilot to start the engine and informed that the air temperature was +19°C.

At 7:39 hrs, after starting and warming up the engine the pilot requested clearance for taxiing to the runway (RWY) 27 threshold. The AFIS officer cleared the pilot to taxi to RWY 27 threshold via taxiway (TWY) Bravo, informed him about the wind direction (300°) and wind speed (4 knots) and cleared to enter the RWY when ready for flight.

At 7:44 hrs the pilot reported that he had entered RWY 27 and that he would take off when ready. The AFIS officer confirmed that RWY 27 was empty and cleared the pilot to take off. He also asked the pilot to report leaving the TRA 10 zone after take-off. The pilot confirmed the correspondence and at 7:48 hrs commenced the take off roll. After lift-off, the aircraft entered a steep climb at the angle of about 30° ÷ 40° (such a climb is typical for this aircraft due to its flight characteristics).

At about 200 m AGL the aircraft was brought to level flight and entered a cloud, in which, most likely, it was brought to stall during the left turn and started the left spin. At a height of about 30 m, the pilot activated a parachute rescue system (BRS), which was launched, but it turned out that it was not attached to the airframe. The plane crashed into the ground at an angle of about 70° and about 16 seconds later caught fire (Fig. 3).

Fig. 3. Time-lapse photos from aerodrome monitoring system [source: airport management]

As a result of the accident, the pilot and passenger were killed on the spot and the plane was destroyed.

After the crash, the ATIS officer launched rescue procedures.

In the evening on the eve of the accident a crew testing Orlik aircraft on EPLM aerodrome noticed the accident Tarragon and looked more closely at it (it was interesting for them due to similarity of Tarragon shape to Orlik). When they moved the rudder and the ailerons, they found that water was flowing out of them (Fig. 4).

Fig. 4. Photo taken 20 July 2017 on EPRZ. Photo shows Tarragon and Orlik aircraft. Visible puddles of rainwater [source: test pilot]

The plane was insured and had the documents necessary to perform flights. The pilot's flight documentation and the aircraft's technical documentation burned down during the accident.

ANALYSIS

- Aircraft. Tarragon is a plane made of carbon-epoxy composites and its maneuverability is comparable to fighter aircraft from World War II (article Aero 2014: The new face of Ultralights). The airplane was equipped with EPA Power SrL, 28012 Cressa – Italy 135 HP engine. The aircraft speeds: VNE 335 km/h, cruise VNO 290 km/h and the surface load - 50.3 kg/m2.

  The instructor pilot who flew about 300 hours on Tarragon stated that it can easily enter stall and start autorotation, especially in a turn at lower speeds (in level flight the plane stalls at a speed of about 65 km/h). The instructor pilot noticed that if the plane was slightly rolled during the stall, it would easily enter autorotation in the roll direction.

  The instructor stated that when he was flying with a heavy pilot in the rear seat and demonstrated the stall, the aircraft entered autorotation without warning and to stop it, it was necessary to push the pedal opposite to the direction of rotation and push the stick fully forward. If during a recovery the engine remained at high RPM, the aircraft did not stop the autorotation (spin).

- Weather. At the time of the accident the cloud cover was about 5/8 and the ceiling about 200 m. When performing a VFR flight, the pilot should fly away from the clouds, but in the investigated case a minute after take-off the plane entered a cloud. As the FIS officer testified, the cloud was not thick and he could see the plane all the time. However, even if gaps among clouds exist, when approaching

the cloud base, the pilot sees them as a continuous layer which significantly reduces horizontal visibility, and can lead to loss of spatial orientation.

- Based on testimonies of witnesses and the damage to the propeller, it can be stated that the engine of the aircraft was working until it hit the ground.
- Balance. There is a warning in the Flight Manual Chapter 6 (Weight and Balance) – Fig. 5.

WARNING: It is the responsibility of the pilot to make sure the airplane is loaded properly. Operation outside of prescribed weight and balance limitations could result in an accident and serious or fatal injury.

Fig. 5. Warning [source: Flight Manual]

Table 1 presents calculations of mass and moments for aircraft loading, assuming the estimated weight of the fuel, pilot, passenger and their baggage.

ITEM DESCRIPTION	WEIGHT (kg)	MOMENT (kgm)	CG ARM (m)
1 Basic empty weight	300	1059	3.53
2 Fuel (@ 0.72 kg/l)			
- Standard fuel 90l max.			
- Reduced fuel, e.g., 50l	35	122.22	3.49
3 Pilot	100	345	3,45
4 Passenger	60	258,6	4,31
5 Baggage	10	49,6	4,96
6 Ramp Weight	505	1834,42	3.63
7 Fuel for start, taxi, run-up	-5	-17.46	3.49
8 Take-Off Weight	500	1816,96	3.63
9 Tail tail water	3,2	27,36	8,55
10 **Take-Off Weight**	503,2	1844.3	3.67
This sample extreme aft loading problem puts the sample airplane well within the CG range (3.57-3.82m).			

Table 1. Calculations of the mass and moments of the aircraft

Table 1 shows that the take-off weight was 500 kg (item 8). The MTOW for this class of aircraft is 472.5 kg, so it was exceeded by 27.5 kg. The centre of gravity of the aircraft was within the prescribed limits (item 10, Table 1).

There was a rainfall on the day before the accident over EPML aerodrome and the test pilots found water in the elevator of the aircraft, therefore the Investigation Team checked whether it was possible that water penetrated and

remained inside the elevator. It was found that it was possible via holes, where the hinges connecting the horizontal stabilizer to the elevator were attached. Because the horizontal stabilizer, to which the elevator is mounted, has a negative elevation angle, the water inside the tail could remain (Fig. 5). There were no drainage holes at the tips of the elevator.

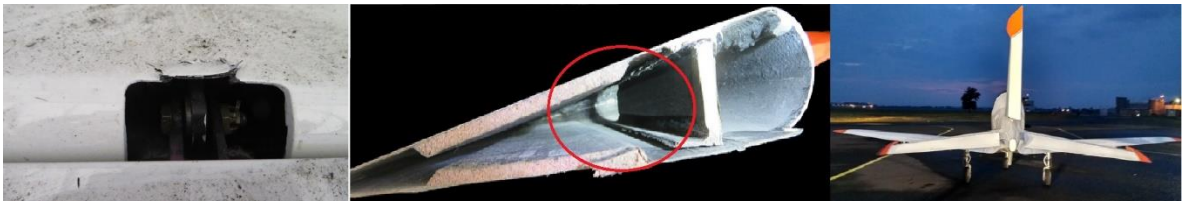

Fig. 6. The horizontal tail hinge mounting hole, jack end and tail angle [source: PKBWL, test pilot]

During the test, when the elevator was in horizontal position, it was possible to pour inside about 3.2 l of water (1.6 l for each half of the elevator - Fig. 7)

Fig. 7. Amount of water that was poured into the elevator [source: PKBWL, test pilot]

As a result of pouring water, the aircraft center of gravity moved back, but it was still within the prescribed limits (Table 1, item 9 and 10).

During the inspection of the aircraft on the day of the accident, the members of the Investigation Team did not find any water in the elevator. However, it should be remembered that after the collision with the ground the plane caught fire and the water could have evaporated.

- Pre-flight check. In the Commission opinion, the pilot probably did not check the control surfaces for free movement. When checking the tail of an airplane, the pilot should have noticed the presence of water in the elevator.
- Rescue system. Magnum 501 Ballistic Recovery System was installed on the plane. During the occurrence, when the plane was at a height of about 30 m, the pilot activated the system. The rocket engine pulled the parachute out of the container, but the parachute was not attached to the aircraft (Fig. 8).

Fig. 8. Ballistic Recovery System [source: PKBWL]

The parachute with the rocket engine was found 43.5 m from the tail of the plane. The shackle connecting the system with the airframe was closed.

Using the system at such a low altitude did not give a chance for its effective operation. The Flight Manual of this aircraft states that:

NOTE: BRS needs at least 250 feet (80m) high for the parachute to inflate properly. BRS activation at lower altitudes reduces the chance of a successful emergency landing.

The aircraft manufacturer inquired about installation of the BRS system, replied that the system was installed on 7 April 2015 at Palegrin Sp. z o.o. premises. The manufacturer attached a photo showing the system installation (Fig. 9)

Fig. 9. Ballistic Recovery System installed on a Tarragon aircraft [source: SIA Pelegrin]

During interview, the mechanic who serviced this aircraft stated that, according to his knowledge, no one had examined this system during operating the aircraft in Poland. The plane was new and there was no need for this.

Because the plane was burned, the Commission could not determine whether the airframe was fitted with tapes to which the rescue system should be attached.

The Commission was not able to determine whether the BRS system was not connected with the airframe during its assembly or was disconnected during later operation.

- Recording of the aerodrome camera (Fig. 10). The first section of the recording ("1" in Fig.10, from 7:48:27 to 7:48:39 hrs) is showing the plane during a gentle climb.

Fig. 10. Aerodrome camera recording [source: aerodrome management]

About 200 m AGL, the plane started a shallow left turn (as concluded from the change of the angle of sunlight on the fuselage) and entered a single cloud - section "2" (from 7:48:39 to 7:48:46 hrs). The entering into the cloud could have caused a temporary loss of spatial orientation by the pilot. Then the plane appeared in mushing condition and heavily rolled on left wing and started the left spin – section "3" (from 7:48:46 to 7:48:49 hrs).

In the next phase (section 4), the aircraft has transited from the left to the right spin. The change in the spin direction might have been caused by an incorrect recovery technique. If the pilot recovered from the spin by displacing the rudder in the direction opposite to the rotation direction and did not fully pushed the stick forward, then only the direction of the spin changed. It could have also happened that after stopping the spin to the left, due to the low height (deficit of height and time) the pilot did not stop applying the right pedal, brought the plane to the level flight too abruptly and entered a spin again, this time to the right.

About 30 m AGL the BRS was launched (from 7:48:49 to 7:48:51hrs). The recovery system was not attached to the airframe, so the process of opening the parachute was not initiated. At 7:48:51 hrs the plane collided with the ground – section “5”.

The collision occurred in the south direction. At the moment of collision the plane was descending at an angle of about 70° relative to the ground and was rolled a few degrees to the right wing. During an examination of the accident site no traces of the landing roll were found (Fig. 11).

Fig. 11. Accident site. Burnt wreck and burnt grass indicating the direction of the spilling fuel after the impact [source: PKBWL]

About 16 seconds after the impact (at 7:49:04 hrs) the plane caught fire.

Based on the available evidence, the Commission determined that:

1) The pilot was authorized to perform the flight.
2) The aircraft was operational and had the required documents.
3) The powerplant operated until the moment of the collision with the ground.
4) The pilot was not under the influence of alcohol.
5) The weather had an impact on the accident.
6) The pilot performed the flight contrary to the VFR.
7) The MTOW of the aircraft was exceeded by 27.5 kg.
8) There was water in the aircraft horizontal empennage.
9) Most likely the pilot did not carry out the pre-flight check carefully.
10) After lift-off the plane entered a steep climb.
11) At a height of about 200 m, the plane entered a cloud.

12) The plane left the cloud in mushing condition and heavily rolled on left wing and started autorotation (spin).
13) At a height of about 30 m the pilot activated the BRS.
14) BRS was not attached to the airframe at the time of the accident.
15) The plane hit the ground at an angle of about 70°, during the impact was rolled a few degrees to the right and about 13 seconds after the impact caught fire.
16) The pilot and the other occupant were killed on the spot.
17) The aircraft was destroyed.

14. Causes of the occurrence:

Pilot error consisting in stalling the plane during turn in cloud.

15. Contributing factors:

Entering the cloud, in which the pilot probably lost spatial orientation.

The pilot performed the flight contrary to the VFR.

16. Safety recommendations:

For the aircraft manufacturer:

Make drainage holes which can drain water that may accumulate inside the empennage.

17. Proposed systemic changes and/or other comments:

None

16. Annexes:

None

THE END

Investigator-in-Charge

Signature on original

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