MINISTRY OF TRANSPORT, CONSTRUCTION AND REGIONAL DEVELOPMENT OF THE SLOVAK REPUBLIC
Aviation and Maritime Investigation Authority
Nám. slobody 6, P.O.BOX 100, 810 05 Bratislava 15

Reg. No. SKA2011015

F I N A L R E P O R T

on investigation of air accident

of powered paraglider
Registration No. **OM–P802**

and

aircraft **CTSW**
Registration No. **OM–M608**

Date: 17.09.2011

Place: Airport Dubová

A. I N T R O D U C T I O N

The investigation of air accident, serious incident, 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) of the European Parliament and of the Council No. 996/2010 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 Air Accident and Incident Investigation to the Convention on International Civil Aviation.

The exclusive aim of investigation is to establish causes of accident, serious 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 the air accident in question have an informative character and can only be used as recommendation for the implementation of measures to prevent occurrence of other air accidents and serious incidents with similar causes.

Type of operation:	general aviation
Type of aircraft:	powered paraglider („PPG“)
Registration No:	OM-P802
Type of aircraft:	CTSW
Registration No.:	OM-M608
Flight phase:	take-off of PPG
Place of air accident:	Airport Dubová

Date and time of detection of incident: 17.09.2011, 15:10 hrs

Geographic coordinates of the place of accident: N: 48°20´ 45,47´´
E:017°21´ 26,20´´

Note: All time data in this report are stated in UTC.

B. INFORMATIVE SUMMARY

At the take-off of PPG, registration No. OM-P802, PPG touched by its landing gear one wing and the front fuselage of grounded aircraft CTSW, registration No. OM-M608.

The crew of PPG was not injured.

An investigation commission for investigation of causes of the air accident was set up:

Ing. Igor BENEK

Ing. Milan GREGA

The report is issued by:

Aviation and Maritime Investigation Authority
of the Ministry of Transport, Construction and Regional Development of the Slovak Republic

C. MAIN PART OF REPORT

1. FACTUAL INFORMATION

2. ANALYSES

3. CONCLUSIONS

4. SAFETY RECOMMENDATIONS

1. FACTUAL INFORMATION

1.1 History of the flight

On the critical day, before the air accident, the pilot made two flights in the area of the Airport Dubová without defficiencies – a single-manned flight with a take-off at 05:15 hrs and a double-manned flight with take-off at 13:45 hrs.

The pilot of PPG with another person on board planned to make a recreational and sport flight in the area of the Airport Dubová. He used the grass runway („RWY“) for take-off with a start 40 m away from the threshold of RWY 312°.

Following instructions of the ground movement controller, the pilot of PPG was to make a take-off in the direction right from the axis of RWY 312°, in the direction with course of 360°, because of obstacles formed by three aircr aft grounded in a row close to RWY. The aircraft were aligned one behind the other with spacing of 10 m, turned by 132° against the take-off of PPG, about 150 m away from the threshold of RWY 312° and about 15 m away from the left edge of RWY 312°.

In the area left from the threshold of RWY 312°, cl ose to the row of shrubs and trees stretching more or less in parallel with the axis RWY 312°, there was a group of parked vehicles, tents and persons. Several people stood near the first grounded aircraft, examining it. The pilot of the first grounded aircraft CTSW braked the aircraft CTSW to stop using a parking brake before leaving the aircraft and moved about 10 m in front of the aircraft.

The pilot of PPG performed an inspection and check of the engine function before the third flight, during which the air accident occurred. He detected no defficiencies during the preparation. The preparation and the take-off took place between 15.00 hrs and 15.15 hrs During the take-off run from RWY 312° the pilot cha nged the direction of movement to the left, in order to get the landing gear of PPG under the axis of wing that banked to the left during the run. Once in the air, the pilot of PPG registered a faster turning left from the direction of take-off. He instinctively tried to change the flight direction by manoeuvring, but failed. When he shot a glance to the left side of the carrying wing surface he saw that ropes of the upper gallery near the wing trailing edge became tangled and that there was an obstacle 30 m in front of him – the grounded aircraft CTSW. He tried to fly over this aircraft to avoid a collision, but registered PPG crashing into the aircraft and falling to the ground beside the aircraft.

The witnesses said that at the very beginning of take-off of PPG they had registered lateral swinging of the PPG wing after its inflation.

Search and rescue operations were not required.

Daytime: day

The air accident was reported by the operator of aircraft CTSW to the Police of SR and the Aviation and Maritime Investigation Authority of MoTCRD SR immediately after the accident.

1.2 Injuries to persons

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

1.3 Damage to aircraft

The aircraft CTSW, registration No. OM-M608, was seriously damaged.

PPG, registration No. OM-P802, was slightly damaged




1.4 **Other damages**

The Aviation and Maritime Investigation Authority was not informed about circumstances with potential application of claims for compensation of damage towards a third party.

1.5 **Personnel information**

Pilot of PPG:

Citizen of SR, aged of 32, holder of the pilot licence for light sports facilities No: 5-043 issued by the Light Aircraft Association of the Slovak Republic („LAA SR").

Qualifications: pilot of light sports facilities - PPG with marked validity until 13.04.2013.

Medical certificate of 2nd class with marked validity until 13.04.2013.

Flying experience:

Total flight hours:	350 h	00 min	and	500 flights
Of which for the previous 90 days:	50 h	00 min	and	70 flights
Of which number of flight hours with PPG:	50 h	00 min	and	70 flights
Flight hours on the date of accident (incl. critical flight):	2 h	00 min	and	3 flights

Other crew members / other persons if their activities related to the accident

Second crew member – his activity did not relate to the accident.

1.6 **Information about PPG**

a) **Airframe** | **Wing (carrying surface)** | **Landing gear**

Type:	CHIRON 340	HORNET 503
Serial No.:	CHN 0610376	Z (P-802)
Year of manufacture:	2006	2006
Manufacturer:	SYCON AIRCRAFT	Miloš Václav

Flight hours since manufacture: 90 h 00 min and 120 flights

Certificate of airworthiness No.: OM-P802 issued on 17.06.2011, with marked validity until 30.06.2012.

PPG–category RPL-2, two-seater, land-based with three-wheel landing gear HORNET 503, controlled front wheel and tandem seating. The wing (carrying surface) CHOPPER 340 handled by handling ropes using a balance lever controlled by the pilot´s feet is connnected to the landing gear. The flight speed of tis PPG usually ranges between 35 – 50 km/h. The wing is tested for estimated maximum take-off weight of 330 kg (DVH test).

The spacing and position of attachment was observed by fixed construction. The take-off weight was respected. The front seat of landing gear serves as the pilot´s seat.

No defficiencies in airworthiness were detected on the day of accident. No defects were recorded before the flight or during two preceding flights.

b) **Engine**

Type:	ROTAX 503
Serial No.:	6479331
Manufacturer:	Bombardier Rotax GMbH, Austria

Year of incorporation into aircraft: 2006
Total operating hours: 90 h 00 min

Fuel-gasoline BA95 Natural with oil Castrol TTS in a ratio of 50:1. Suitable for operation.

c) **Propeller**

Type:	IVO PROP 6LR3G
Serial No.:	562602-1451
Manufacturer:	IVO PROP, CR

Year of incorporation into aircraft: 2006
Total operating hours: 90 h 00 min

d) **Weight of PPG at the time of air accident**:

Weight of empty PPG		121.0 kg
Weight of crew		175.0 kg
Weight of luggage		3.0 kg
Weight of fuel	cca 9 l x 0.72 kg/l	6.5 kg
Weigh of oil	cca 0.3 l x 0.90 kg/l	0.3 kg
Weight of spraying substance	cca 0 l	0.0 kg
Total weight of PPG at the time of accident:		305.8 kg

Maximum permissible weight of PPG for take-off according to the Flight Manual is 315 kg. Weight of PPG at the time of accident was within the permissible range.

1.7 **Meteorological situation**

CAVOK. Wind variable max. 2 m/s.
Natural light conditions at the time of accident - sunlight.

1.8 **Aids to navigation**

Not applicable.

1.9 **Communications**

Not applicable.

1.10 **Aerodrome information**

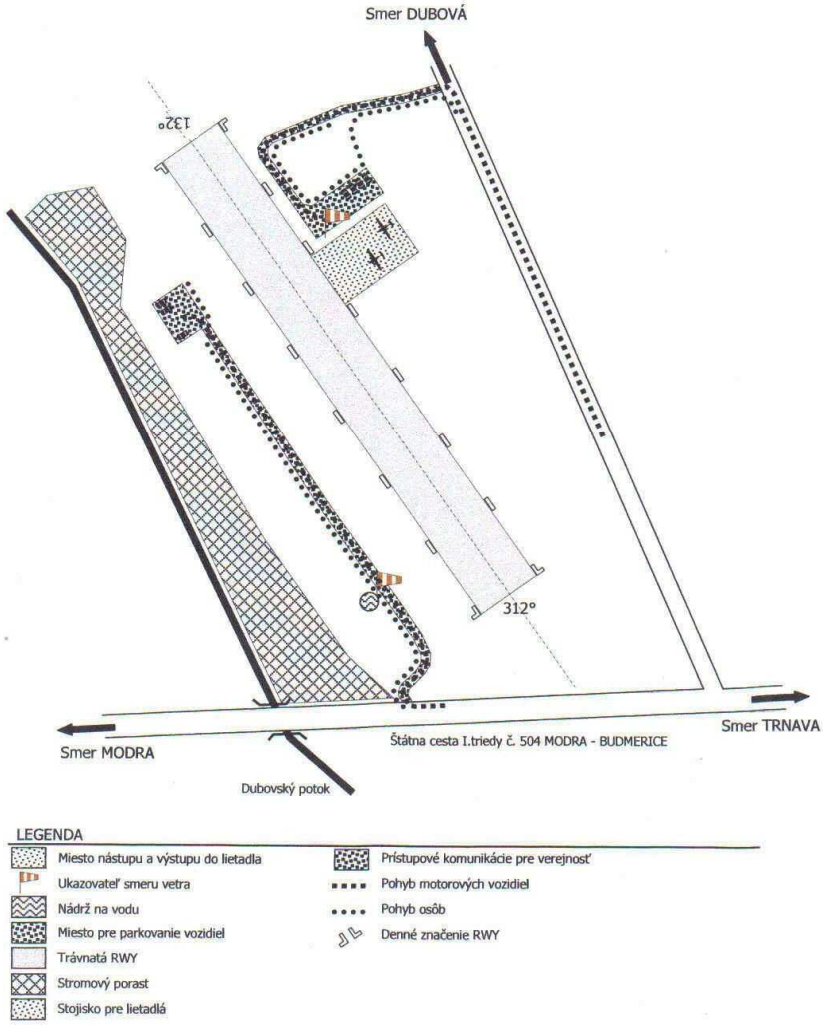
The airport is classified as non-public domestic aerodrome. The licence for operation of the airport was issued by the Civil Aviation Authority of SR on 22.9.2009. The airport had a properly treated and marked grass RWY at the time of accident.

The airport obtained the building permission for construction of operations building. The construction works have just begun.

Data on the airport are published in AIP SR Vol. I., II. AD 1.3 List of airports.

Data on the airport in AIP SR Vol. III. (VFR) in AD (VFR) are not published. According to the Airport Operation Manual – Scheme of movements of aircraft and mobile devices - the airport has an area reserved for aircraft parking left from the threshold of RWY 132°, about 150 m away from the threshold and 50 m away from the edge of RWY. At the time of accident aircraft were grounded outside this area.

SCHÉMA POHYBU LIETADIEL A MOBILNÝCH PROSTRIEDKOV
NA LETISKU DUBOVÁ



1.11 **Flight recorders and other recorders**

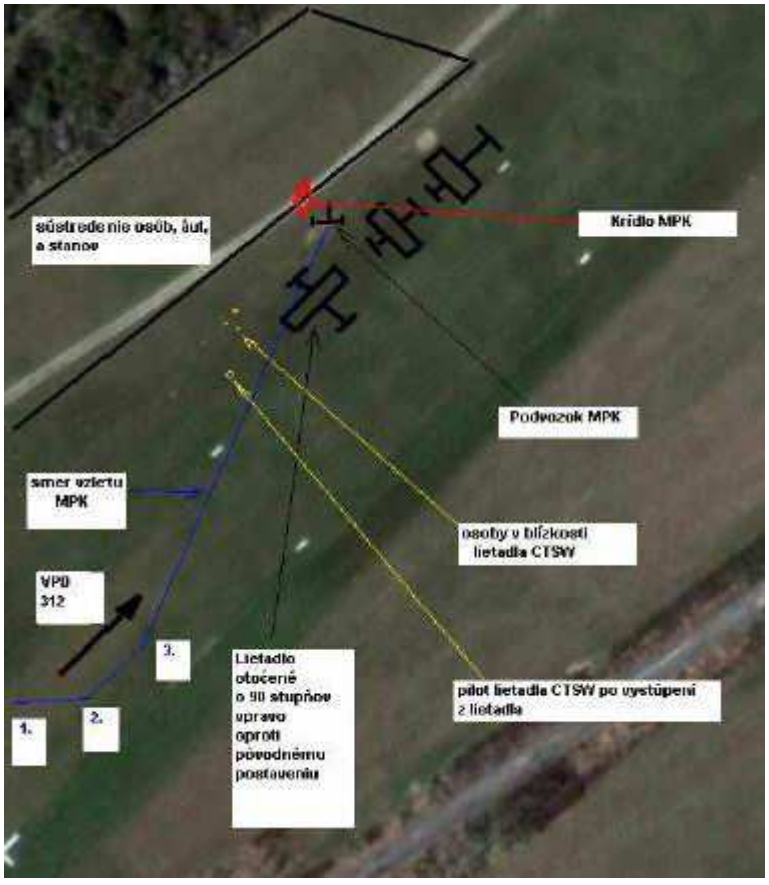
Not applicable.

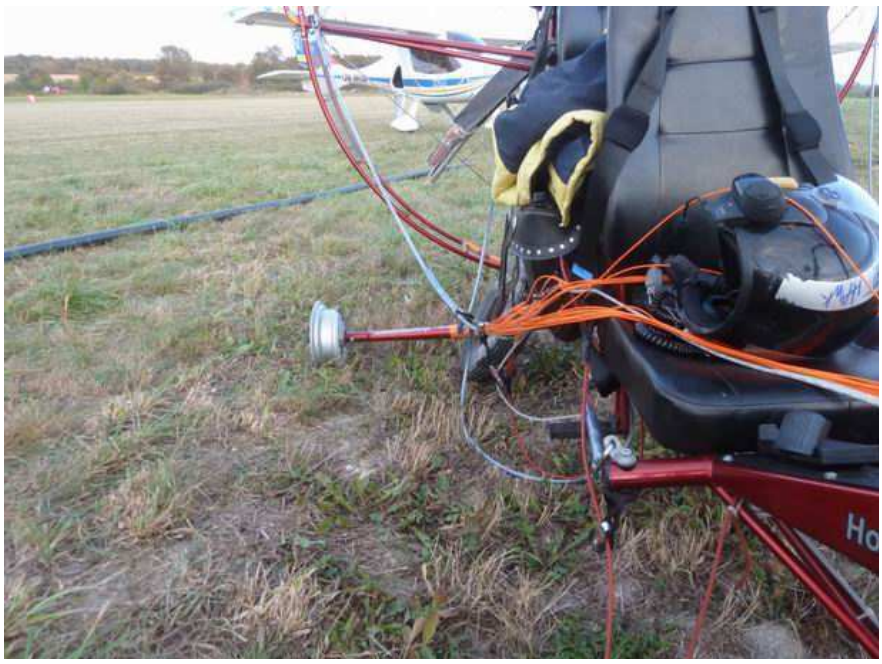
1.12 **Wreckage and impact information**

The place of accident is situated 150 m away from the threshold of RWY 312°, about 15 m away from the left edge of RWY.

Situation before the take-off of PPG

Final position of aircraft after the accident





1.13 **Medical and pathological information**

Immediately after the air accident, the pilot of PPG underwent a breath test for presence of alcohol with a negative result.

1.14 **Fire**

No fire broke out during air accident.

1.15 **Survival aspects**

The search and rescue operations were not required.

1.16 **Tests and research**

On 21.09.2011 the representative of the operator implemented an inspection of aircraft CTSW with special focus on damage to the aircraft.

On 27.09.2011 the representative of the operator implemented an inspection of PPG with special focus on the function and intactness of control systems. No deficiencies related to the occurrence of accident were detected.

On 27.09.2011 the representative of the manufacturer implemented an inspection of aircraft CTSW with special focus on damage to the aircraft.

1.17 **Organizational and management information**

The airport operator was informed about the operations of aircraft at the Airport Dubová in the days of 16.09. and 17.09.2011 and gave verbal approval to these operations at the airport.

Due to a larger number of aircraft present at the airport in the said days a person among participants was appointed to regulate ground movements of aircraft using agreed signals.

1.18 **Additional information**

Not applicable.

1.19 **Useful or effective investigation techniques**

Standard investigation methods were used.

2. ANALYSIS

The pilot of PPG started the take-off from grass RWY 312° in the approximate direction of 360°, following instructions of the ground movement controller, in view of the larger number of aircraft using the airport at that day. Three aircraft were grounded near the edge of RWY 312°.

At the beginning of take-off the wing-carrying surface of PPG became inflated. During inflation the wing started swinging to the sides and banked to the left at the time when the PPG landing gear was moving on the ground. The pilot reacted to this situation by directing the front wheel of landing gear to the left. This intervention of pilot causes the change of the direction of movement from the direction of 360° to the probable direction of axis of RWY 312°.

In this situation the pilot concentrated on adjustment of the direction of take-off and did not pay sufficient attention to the area in front of him. At the same time, he evaluated the situation as suitable and continued the take-off. According to statement of several witnesses, in this flight phase the wind direction was from the right side to the direction of take-off. The initial change of the direction of wing movements at the beginning of its inflation was most probably caused by action of wind.

Once the landing gear got unstuck, the take-off direction continued to change to the left. The initial reaction of the pilot was to stabilize the direction to the axis RWY 312°, so he tried to stabilize the direction by manoeuvring the wing to the right. But the take-off direction did not change, which the pilot evaluated as absence of reaction to manoeuvring, due to the lack of time. When he shot a glance up to the wing of PPG, the pilot registered irregular rope tension – ropes near the left wing trailing edge became tangled, which was most probably caused by capturing of massive free grass cover at the beginning of take-off. These tangled ropes caused a deformation of the left wing trailing edge, which prevented the full stretching of ropes of the upper gallery near the left end of the trailing edge that deflected downwards and caused turning to the left.

But the pilot also noticed an aircraft grounded in a small distance in front of him. The interruption of take-off in this phase was evaluated as unsuitable by the pilot in view of the small distance from the aircraft, because PPG would most probably crashed into the aircraft, judged by the landing run. So he decided to continue the take-off with maximum engine output and to try to fly over the grounded aircraft. According to the witness statements, at that moment PPG approached the grounded aircraft from front under an angle of at least 45° to the longitudinal axis of the grounded aircraft CTSW.

The pilot of PPG continued the flight in a left turn with maximum engine output in the effort to fly over the grounded aircraft. But shortly after that the right wheel of PPG landing gear crashed into the leading edge of aircraft CTSW, approximately in its middle. The leading edge of the wing shows visible traces of black colour of the tire, running from the point of initial contact along the leading edge to the middle section, when, having covered a distance of 0.5 m, the tire slipped on the leading edge coat and perforated the coat of the left wing leading edge.

By action of the uplift force of the PPG wing and due to a partial wedging of tire in the leading edge of CTSW wing the front of the aircraft CTSW was lifted so that its lower tail section hit the ground, which is also proved by trances of grass, earth and slight damage to this tail section of aircraft CTSW.

At the moment of collision with its wing the aircraft CTSW probably not only tilted over to its tail, but also slightly turned to the left from its longitudinal axis. When the action of force from the tire of landing gear was interrupted, the reaction force caused the left wing of aircraft CTSW to move downwards, where the windtip hit the ground, which is proved by traces of grass, earth and damage to the windtip.

Due to the impact the PPG landing gear strongly turns to the right, and the protective frame of propeller hit the front fuselage of aircraft CTSW, which is proved by colour traces on the

aircraft body having the same colour as the protective frame of the propeller. The propeller was also damaged when it hit the damaged deformed protective frame and lost the thrust. The front fuselage of aircraft strongly turned to the right and downwards after the impact. At the same time, the inertial motion and decreasing uplift of PPG wing caused that PPG flew over the cabin of aircraft CTSW and in front of the right wing of aircraft CTSW. After impact of the protective frame of propeller the PPG landing gear turned to the left and got to the initial flight direction. The decline in thrust caused a loss of flying speed of PPG and subsequent decrease of height and contact of PPG landing gear with the ground. PPG did not turn over when it touched the ground, thanks to the unchanged direction of movement and harmonisation of the axis of landing gear with this movement.

Based on the ascertainment of situation at the point of take-off and probable distances and in view of the probable flight speed of PPG we can assume that total time that elapsed between the start of take-off and the collision with grounded aircrafts was 8 – 11 s.

In view of the small distance from obstacle, the pilot of PPG was unable to interrupt the flight at its beginning (period after inflation of PPG wing, when the PPG landing gear was still moving on the ground). After the rise of the landing gear, the interruption of flight would probably cause a collision with an obstacle formed by grounded aircraft or obstacles situated in the area of concentration of vehicles, tents and persons.

The height of leading edge of aircraft CTSW is approximately 1.7 m above the ground. The leading edge of aircraft CTSW was hit by the right tire of PPG landing gear.

During the take-off the pilot did not observe irregular or improper operation of the driving unit.

The aircraft CTSW remained after the accident with its tail turned vertically to the edge of RWY. The complicated movements of aircraft CTSW from the moment of collision to their termination were caused among others by braking of aircraft CTSW to stop using the parking brake.

The wing of PPG fell into the ground left in front of the PPG landing gear, in grass cover, and it probably moved along this grass cover. From this perspective the inspection of ropes for presence of massive grass cover might not be objective.

The PPG landing gear fell into the ground, most probably on its right wheel, and at this moment the tire probably slipped off the right wheel.

3. C O N C L U S I O N S / Cause of air incident

3.1 **Findings**

- the pilot had valid qualifications for making the critical flight
- PPG had valid documentation and did not show any faults before the accident
- PPG fulfilled the conditions of airworthiness before the critical flight
- at the time of accident aircraft were parked outside the area reserved for aircraft parking
- nobody was injured in this accident.

3.2 **Causes of air accident:**

- collision of PPG during flight with an obstacle formed by grounded aircraft CTSW
- mismanagement of safe flying by the pilot of PPG
- deformation of trailing edge of PPG wing caused by foreign object (free grass cover)
- Obstacles formed on the ground in close proximity of RWY
- effects of lateral wind during the take-off.

4. SAFETY RECOMMENDATIONS

On the basis of investigation of causes of the air accident involving:

PPG (**CHIRON 340 / HORNET 503**)
Registration No. **OM–P802**

and

Aircraft type **CTSW**
Registration No. **OM–M608**

Date of accident: **17.09.2011**

We recommend the **Light Aircraft Association of the Slovak Republic** to adopt the following measures:

- to elaborate a binding decision of the Flight Director of LAA SR on a safe performance of flights at airports and in areas reserved for take-off and landing of flying sports facilities with flying sports facilities equipped by a driving unit administered by LAA SR.

  To publish the binding decision on website of LAA SR.

- to conduct an analysis with the flying personnel of LAA SR in the form of publication of this analysis and final report on website of LAA SR.

Bratislava, 31.01.2012