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. : SKA2011014

F I N A L R E P O R T

on investigation of air accident

of hand glider **RELIEF 14S**

registration No. **OM–H456**

Date: 11.09.2011

Place: area for take-off and landing - Straník near Žilina

A. INTRODUCTION

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, in accordance with the Regulation (EU) No. 996/2010 of the European Parliament and of the Council on investigation and prevention of civil aviation accidents and incidents, governing the investigation of civil aviation accidents and incidents.

The final report is issued in accordance with the Regulation L 13 that is the application of the provisions of ANNEX 13, 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:	flying sports vehicle („FSV"), type hang glider „RELIÉF 14S" („HG")
Registration No.:	OM-H456
Flight phase:	finding flight performance of HG
Place of accident:	area for take-off and landing of FSV – Straník near Žilina

Date and time of detection of accident: 11.09.2011, 09 h 58 min

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

B. INFORMATIVE SUMMARY

On 11.09.2011 the pilot of HG with registration No. OM-H456 planned to make a flight for individual mission of finding some of the flying qualities (stall speed and maximum flight speed).

Just after the take-off HG started to stall from low altitude and collision with the ground.

The pilot was seriously injured in the air accident.

Person appointed for investigation of causes of the air accident:

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

The pilot started the flight by take-off from the area for take-off and landing of FSV of Straník near Žilina at 09:57. The take-off occurred without negative manifestations. Before the take-off the pilot changed the wing geometry to 1/3 of the tension position. Just after the take-off he changed the wing geometry to full tension.

The pilot continued the flight in the west direction in an altitude of 50 - 60 m above the ground. The altitude of HG steadily decreased towards the altitude of the take-off site and first signs of low-speed flight could be seen. The pilot reacted to the situation by increasing the flight speed of HG with slightly descending flight, that continued again by flat climb. However the pilot did not stop this climb and the flight speed decreased again, making the right descending turn with HG. When the glider turned at least by 360° against the initial flight direction, it stalled and clashed with the ground.

During the collision with the ground the pilot was seriously injured and HG substantial damaged.

Daytime: Day

Time of air accident: 09:58

Geographic coordinates of the place of accident:

N: 49°14´ 09,31´´
E: 018°49´ 15,24´´

The accident was reported to the Aviation and Maritime Investigation Authority of the Ministry of Transport, Construction and Regional Development of the Slovak Republic on 12.09.2011.

1.2. Injuries to persons

Injury	Crew	Passengers	Other persons
Fatal	-	-	-
Serious	1	-	-
Minor	-	-	-
None	-	-	-

1.3. Damage to HG

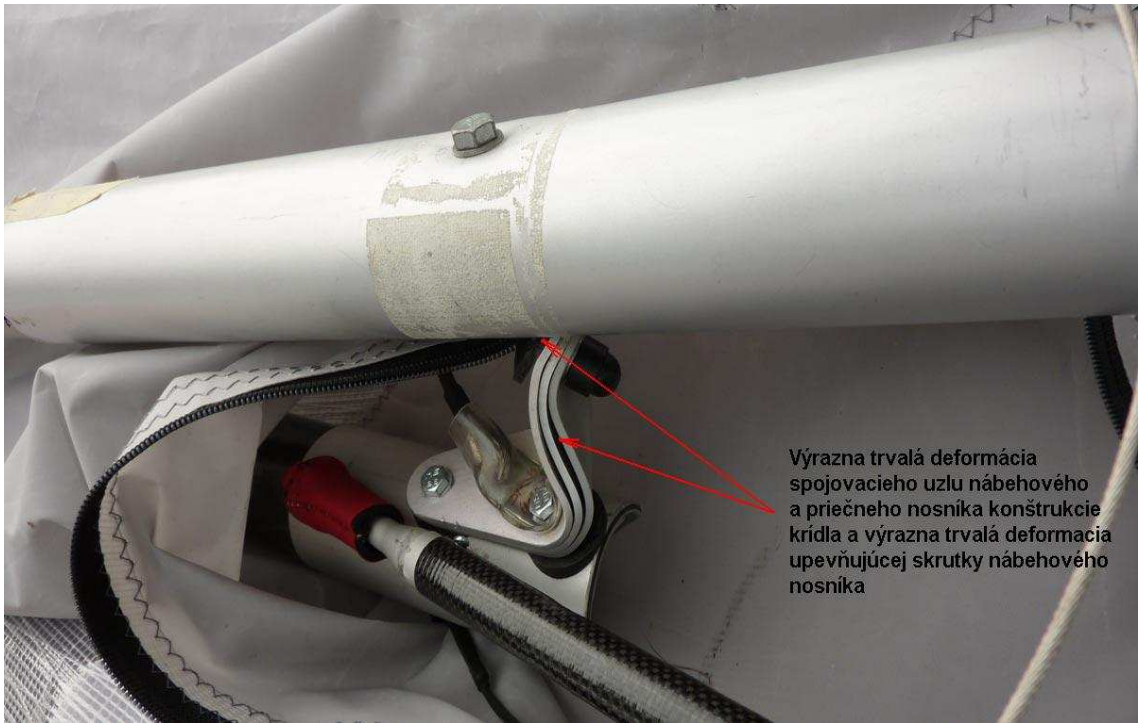
HG was substantial damaged.

Detected damages:

- destruction of and damage to leading and cross spars, keel spar, left-hand trapeze tube,
- permanent deformation of some connection pieces and spars of HG body,

- permanent deformation of wing canvas reinforcement, damage to the wing canvas on several places, damage to suspension harness of the pilot and permanent deformation of pilot´s attachment.

- the character of damage indicates that these damages occurred after the collision of HG with the ground at approximate flight speed of 61 km/h during descent at a speed of 4 m/s.



1.4 **Other damages**

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

1.5 **Personnel information**

Pilot:

Citizen of the Slovak Republic, aged of 40 years, holder of the FSV pilot licence No. 3-031, issued by LAA SR on 18.10.1993.

Medical certificate with marked validity until 31.03.2012.

Qualifications: pilot of FSV – HG B, instructor of HG with marked validity until 31.03.2012.

Flying experience:

Total flight hours:	494 h	00 min	and	606	flights
Total flight hours for previous 90 days:	22 h	00 min	and	40	flights
Total flight hours for previous 90 days with this type:	00 h	01 min	and	1	flight
On the day of accident (including the critical flight):	00 h	01 min	and	1	flight

1.6 **Information about HG**

a) Type: RELIEF 14S
Serial No: H456
Year of manufacture: 2005
Manufacturer: Quasar, Czech Republic

Total operating hours since manufacture: 205 h 00 min and 173 flights

Certificate of airworthiness OM-H456, issued on 27.04.2005 with marked validity until 15.05.2012.

Sporting class FAI	O - HG
Safety category	3
Stall speed	28 km/h
Maximum flight speed	97 km/h
Minimum take-off weight	95 kg
Maximum take-off weight	135 kg

On the date of accident no deficiencies in airworthiness were found before the flight and no negative manifestations in flight performance were registered during the flight.

b) Take-off weight of HG at the time of air accident:

Empty weight	34,0	kg
Weight of crew	92,5	kg
Weight of equipment and baggage	18,1	kg
Total take-off weight at the time of air accident:	144,6	kg

Maximum permissible takeoff weight of HG for flight according to the Flight Manual is 135 kg.

The take-off weight of HG was exceeded by 7.11% at the time of air accident.

1.7 **Meteorological situation**

High-level clouds (2/8), south/south-east wind with speed of 2 m/s, slightly convective activity of the atmosphere.

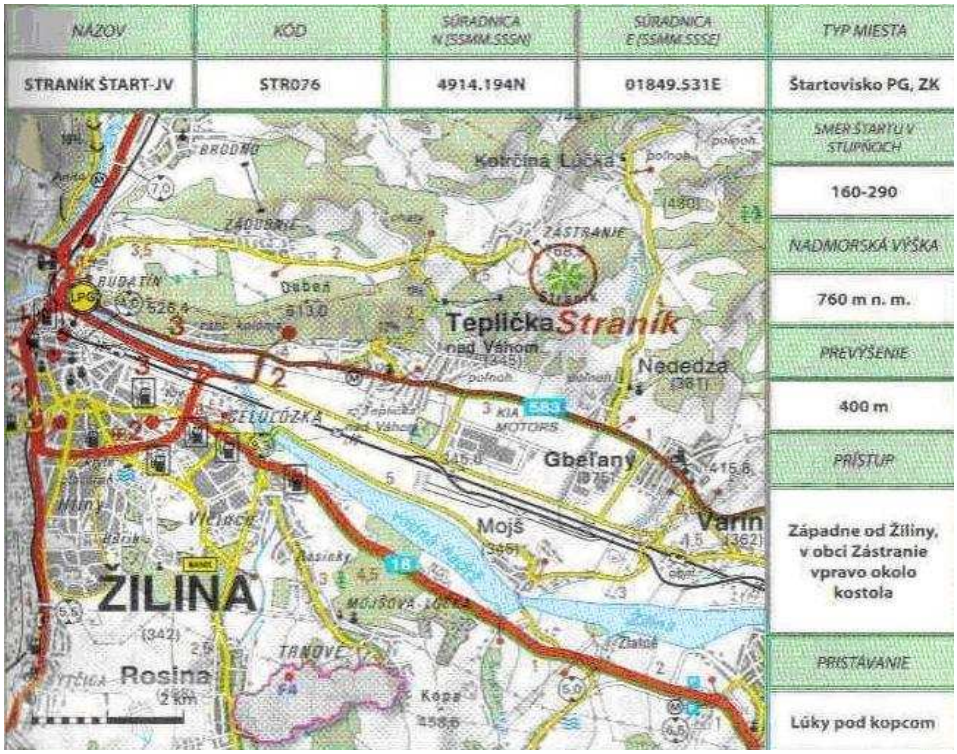
1.8 **Aids to navigation**

Not applicable.

1.9 **Communications**

Not applicable.

1.10 **Information about area for take-off and landing of FSV – Straník near Žilina**



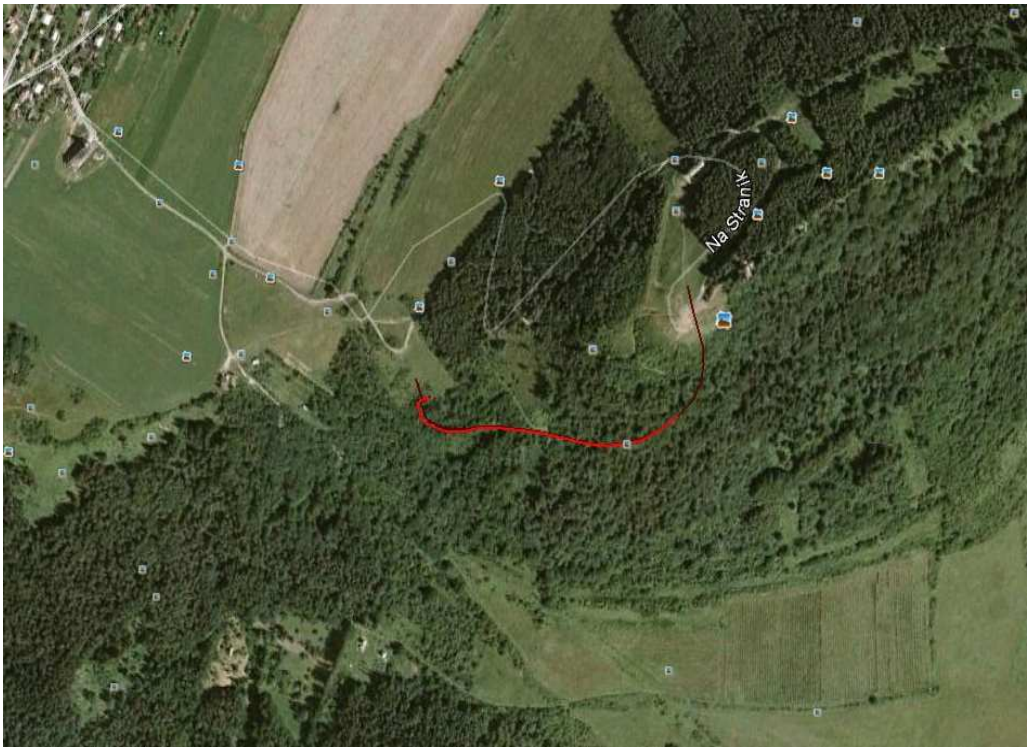
1.11 Flight recorders and other recording systems

The pilot submitted the flight record from GPS - Brauniger Compeo+ (combined device with flight speed measurement, total air pressure scanning through the pilot tube and measurement of the rate of descent and climb with navigation function GPS).

The owner of HG submitted an amateur video record from mobile telephone.

1.12 Wreckage and impact information

The place of air accident is situated in a proximity of the take-off site – area for take-off and landing of FSV Straník, north-west of the take-off site. The place of impact is a grass sloping area.



1.13 **Medical and pathological information**

The pilot of HG was seriously injured in the air accident.

He sufferred fractures of both collar bones, fractures of ribs, fractures of vertebrae processes, bilateral fluidothorax, right-side pneumothorax, interruption of surface nerve on the right arm and blackout.

1.14 **Fire**

No fire broke out.

1.15 **Survival aspects**

The search operations were not necessary. The rescue operations were implemented by the air rescue service.

1.16 **Tests and research**

The analysis of GPS flight record was implemented.

1.17 **Organizational and management information**

Not applicable.

1.18 **Additional information**

1.18.1 The pilot used for the critical flight HG of other owner following mutual agreement.

1.18.2 The wing canvas was replaced for an innovated one by the manufacturer in 2012. The manufacturer made a test flight for verification of flight performance – without deficiencies. Since replacement of the canvas HG had flown 6 hours without deficiencies.

1.18.3 The manufacturer personally instructs the owner on the rules of use of HG after innovation.

1.18.4 The owner of HG instructed the pilot on the use of HG on the day of accident.

1.18.5 According to established rules, the change of wing geometry to full tension is used exclusively for flyover passages in altitude of at least 300 m GND.

1.18.6 On the basis of the GPS record the selection of values of some flight parameters of the critical flight were processed. The lowest flight speed of 27 km/h was recorded during the critical flight.

The selection is shown in the following table:

Flight time [hh mm ss]	GPS altitude [m]	Flight speed TAS [km/h]
09 57 12	734	0
09 57 14	733	30
09 57 16	729	38
09 57 18	728	37
09 57 20	728	37
09 57 22	728	34
09 57 24	727	40
09 57 26	724	42
09 57 28	726	35
09 57 30	728	32
09 57 32	727	38
09 57 34	726	36
09 57 36	724	36
09 57 38	721	36
09 57 40	719	35
09 57 42	716	38
09 57 44	714	31
09 57 46	711	**27**
09 57 48	705	40
09 57 50	702	36
09 57 52	699	39
09 57 54	688	40
09 57 56	666	61
09 57 58	647	0

1.18.7 The flight phase, in which the flight speed of 27 km/h had been recorded, was achieved at the flight course of 270°. According to the video record the visible indicator of wind direction situated on the takeoff site showed actual variable wind direction ranging between 140 and 200°. In this phase HG flew with wind blowing from the left or left rear side on the flight direction.

1.18.8 In case of south-east wind, movement of HG can be expected to be slightly influenced by lee-side ground effects.

1.18.9 Based on simple theoretical analysis of the increase of MTOM of 7.11%, the increase of required flight speed by 3.5% can be expected.

1.18.10 The organization managing the selected type of FSV – hang gliders was not required to make a test flight for verification of flight performance of HG and it did not issue the the test flight permission.

1.18.11 The pilot held the licence for test flights of hang gliders according to the Regulation LZ-1 for operation of FSV, Article 8.9.6.2.

1.18.12 On the previous day, the pilot on the basis of his individual decision made 3 flights to ascertain the stall speed and the maximum flight speed of FSV type Moyes with flight performance similar to HG Reliéf.

1.19 **Useful or effective investigation techniques**

Standard investigation methods were used.

2. ANALYSIS

The pilot of HG made the take-off from the surface of Straník at 09:57.

Meteorological conditions were suitable for the flight in question.

The pilot individually decided to make a flight to ascertain the maximum flight speed and the stall speed of HG. He initially planned to implement this verification in an open area in a higher flight altitude as follows: first the verification of stall speed and then the verification of the maximum flight speed. On the previous day he implemented such individual verification with FSV of type Moyes. No deficiencies were identified.

Just after the take-off the pilot however decided to change the wing geometry to maximum tension and continued the flight to an open area with course of 270°, instead of 180°.

With regard to the ground the flight altitude was within the range of 50 - 60 m GND.

When the pilot changed the wing geometry to the maximum value, the video record showed the first signs of minimum-speed flight, followed by slight descent and then by slight ascent. In this phase of flight HG achieved the flight speed of 27 km/h, which is below the stall speed required in the certificate of airworthiness.

Afterwards the wing of HG distinctly sank and started to turn right.

The pilot reacted to the new situation by changing the geometry to smaller level of tension.

The flight of HG continued by right descending turn of about 360° against the flight direction.

In view of the ground near the top of the take-off site and lateral rear wind direction, HG got into a leeward air environment.

In this phase the flight occurred in a low altitude above a ground which is characterized by significant slope.

During the flight of HG the maximum take-off weight was exceeded by 7.11%, which means the need of the increase of flight speed of 3.5%.

These factors probably affected the altitude and time required for restoration of normal flight, which due to the parallel occurrence of these negative effects resulted in the critical phase of flight and fall of HG to the ground.

3. C O N C L U S I O N S / CAUSE OF AIR INCIDENT

3.1 **Findings**

- the pilot had valid qualifications of pilot of FSV,
- the pilot did not have qualifications of test pilot,
- the pilot was authorized to make test flights of FSV – hang gliders within the scope of provision of Article 8.9.6.2. of Regulation LZ-1,
- the organization managing this type of FSV was not applied for and did not issue the permission for test flight,
- HG had valid documentation and did not show any faults before the air accident,
- MTOM was exceeded by 7.11% during the flight,
- the flight speed of 27 km/h was achieved during the flight, this speed is lower than the prescribed stall speed,
- the pilot was seriously injured in the air accident,
- HG suffered substantial damage in the air accident.

3.2 **Causes of air accident:**

- error of flying technique of HG by the pilot at a loss of speed of advance at low flying altitude.

4. SAFETY RECOMMENDATIONS

The final report from investigation of the air accident does not contain any recommendations.

Bratislava, 23.07.2012