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MINISTRY OF TRANSPORT, CONSTRUCTION AND REGIONAL DEVELOPMENT OF THE SLOVAK REPUBLIC

Aviation and Maritime Investigation Authority
Námestie slobody 6, P.O.BOX 100, 810 05 Bratislava 15



Reg. No. : SKS2013009

FINAL REPORT

on investigation of serious incident of

aircraft type **Cessna 182P**

Registration No. **G-BMUD**

Date: 01.09.2013

Place: landing surface of the Airport Sládkovičovo / VPP SK

The investigation of occurrence 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) 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 Aircraft Accident and Incident Investigation to the Convention on International Civil Aviation.

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

A. INTRODUCTION

Type of operation:	general aviation / sport and recreational flying
Type of aircraft:	Cessna 182P
Registration No:	G-BMUD



Operator:	AVIA-Rent Kft, Hungary	
Owner:	Csongor Latky 1132 Budapest Kresz G16 Hungary	Katalin Tothne Oszvald 6500 Baja Jelky A62 Hungary
Take-off site:	Airport Kráľova pri Senci / LZKS	
Planned landing site:	LZKS	
Flight phase:	climb	
Date and time of incident:	01.09.2013, 09:30	

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

B. INFORMATIVE SUMMARY

In the phase of climb to FL 110 for parachuting, in a height of 7000 ft, the engine thrust cut off.

The parachutists bailed out in a height of 6000 ft and the pilot made a forced landed with the aircraft on the landing surface VPP SK without further damage. Nobody was injured in the incident.

The commission composed of the following members was appointed for investigation of the serious incident:

Ing. Juraj GYENES
Ing. Zdenko BIELIK

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 1 September 2013 at 09:09 the pilot was prepared for his second takeoff on that day from LZKS with the intent to drop the parachutists. After the takeoff from the grass runway („RWY“) 28 of airport LZKS he climbed at a course of 280° to the height of 2000 ft and then turned right to Galanta. The climb phase ran smoothly. In the area at the level of Sládkovičovo, in a height of 7000 ft, the pilot registered vibrations from the engine compartment, followed by engine cut-off. Having performed all necessary operations the pilot directed the aircraft to Sládkovičovo and in the descent phase in a height of 6000 ft five parachutists bailed out.

After termination of the parachuting the pilot with the aircraft made a forced landing on VPP SK without further damage. Nobody was injured in the incident.

Daytime: day
Flight rules: VFR

1.2 Injuries to persons

Injury	Crew	Passengers	Other persons
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	1	5	

1.3 Damage to aircraft

The aircraft was not damaged in the serious incident, except for the engine.



1.4 Other damage

No circumstances with potential claims for compensation of other damage toward a third party were notified to the Aviation and Maritime Investigation Authority.

1.5 Personnel information

Pilot of aircraft :

National of the Slovak Republic, aged of 29 years,

holder of the CPL(A) commercial pilot licence No. SK 03120148 issued by the Civil Aviation Authority of the Slovak Republic on 13.02.2013.

Medical certificate of 1st class with marked validity until 21.05.2014.

Limited certificate of competency for operation of aircraft radio station No. OFS II-68/2007 issued by the Telecommunications Office of the Slovak Republic.

Qualifications:

FI(A)	with marked validity until 31.07.2015
MEP(L)	with marked validity until 31.07.2014
SEP(L)	with marked validity until 30.09.2014
TMG	with marked validity until 31.08.2014

Flying experience:

Total flight hours:	876 h 20 min
For the last 30 days:	47 h 10 min
For the last 90 days:	140 h 10 min
With the aircraft type:	25 h 05 min
On given day:	1 h 10 min

1.6 Information about aircraft

a) Airframe

Type:	Cessna 182P
Registration No:	G-BMUD
Serial No:	182-61786
Year of manufacture:	1973
Manufacturer:	Cessna Aircraft Company, USA

Total operating hours since manufacture: 5241 h 30 min

The certificate of airworthiness No. FD/LA/NS/B/702/3/2012, issued by the National Transportation Authority of the Republic of Hungary on 28.03.2012.

b) Engine

Type: O-470R
Serial No: 132339-6-R
Year of manufacture: 1966
Manufacturer: Teledyne Continental

The general overhaul was performed in the company DUKERIES AVIATION, Netherthorpe Airfield, Netherthorpe, Worksop, Nottinghamshire, No. DA/G-BMUD-OO, on 18.09.2000.

Total operating hours of engine since GO: 766 h 02 min

Third-party insurance: QBE Insurance (Europe) Limited No.1430000002.

1.7 Meteorological situation

Clouds 3/8, wind 320°/ 2-4 m/s.

1.8 Aids to navigation

N/A

1.9 Communication

The aircraft was equipped by radiocommunication equipment enabling two-way radio communication with all air stations at every moment of flight.

1.10 Information about airport

VPP SK is used for take-offs and landings of flying sport devices. The direction of the landing area: 14/32, dimensions 800 x 80 m, grass.

1.11 Flight recorders

N/A

1.12 Wreckage and impact information

N/A

1.13 Medical and pathological information

N/A

1.14 Fire

No fire broke out.

1.15 Aspects of survival

N/A

1.16 Tests and research

A sample of **motor petrol** was sent for expertise to EUROFINS BEL/NOVAMANN s.r.o – accredited testing laboratory in Bratislava. The sample of motor petrol fulfilled the requirements of the Slovak standard STN EN 228.

A sample of taken **oil** was subject to tests in the company for production, distribution and servicing of lubricants, MOL-LUB - laboratory WEARCHECK. The expertise confirmed a very high content of abrasion metals (Al, Cr, Cu, Fe, Pb, Sn) in the oil with recommendation for prompt oil replacement.

The engine was dismantled and partially disintegrated. During this operation the broken part of **connecting rod** (shank) and a fragment of the connecting rod head were found.

The shank of the damaged **connecting rod** and the fragment of the connecting rod head with a part of the broken connecting rod screw from the engine were sent for expertise to the Institute of Criminology and Forensic Science of the Police Corps which issued the expert opinion.

The shank of the damaged connecting rod (position 1 on photo No. 1) and the fragment of the connecting rod head with a part of broken connecting rod screw (position 2 on photo No.1) were subject to expert examination at the Institute of Criminology and Forensic Science of the Police Corps with the aim to detect the cause of damage to the connecting rod and of rupture.



Photo No.1 Submitted parts of damaged connecting rod

The presence of fatigue failure, starting from at two points on the external surface and extending inwards to the connecting rod pivot (see the direction shown by yellow arrows on photo No. 2) was detected on the rupture surface of the fragment of the connecting rod head. The leading smooth part of the rupture surface by its character corresponded to high-cycle fatigue. In this phase the rupture progressed very slowly. In the other area, undulated, but with visible progress and relaxation belts (area marked by blue arrow on photo No 2), the rupture progressed much faster. The area without progress and relaxation belts (area marked by red arrow on photo No. 2) represented the area of so-called final rupture of material. The mirror rupture surface of this fatigue rupture was also observed on the connecting rod shank (photo No. 3) and other identified parts of the rupture showed marks of secondary deterioration.



Photo No. 2 Visible fatigue rupture on the fragment of connecting rod head



Photo No. 3 Mirror image of rupture on the connecting rod shaft

Another parallel partial rupture was detected on the connecting rod head in the vicinity of the identified fatigue rupture (photo No. 4). Such strain on the connecting rod head may occur e.g. when the connecting rod pivot of crankshaft in the connecting rod head (fig. 1) comes off due to the connecting rod screws become loose or due to the wear of bearing caps. Such strain is caused by inertial dynamic forces which at high revolutions often prevail over forces from the working space of cylinder. The highest axial stress at this point is formed at the top dead-center position of piston and to a lesser extent in the suction phase.

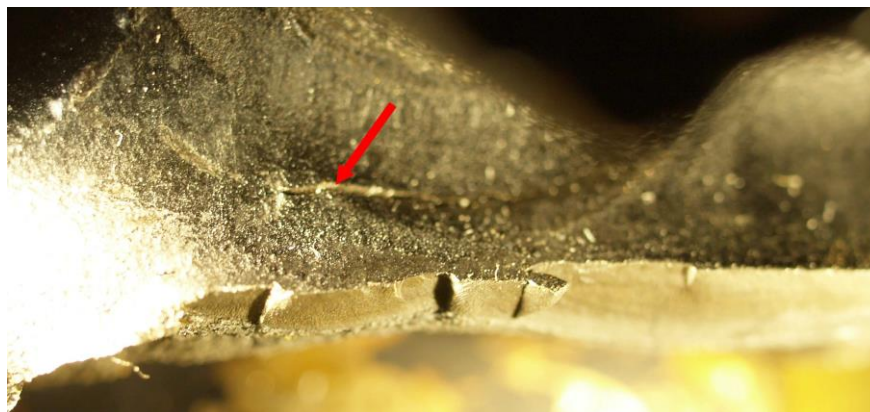


Photo No. 4 Further parallel partial rupture of material

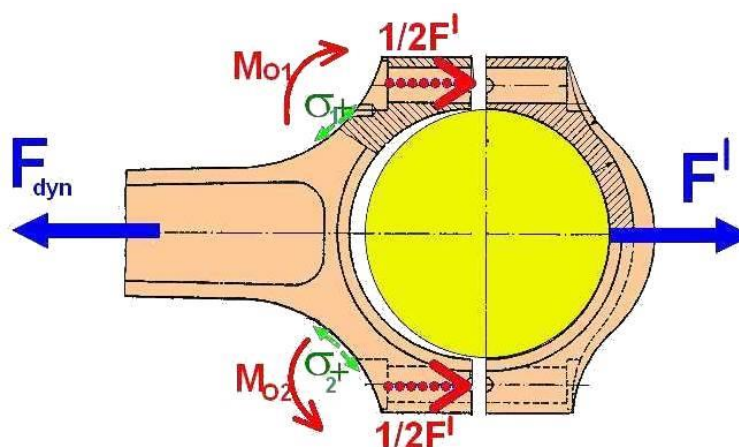


Fig.1 Schematic representation of axial stress formation on external surface of connecting rod head

No traces of fatigue mechanism of damaging the material (photo No. 5) were detected on the rupture surface of connecting rod screw. The crown nut of connecting rod screw was not secured by safety pin against potential detachment during engine operation (photo No. 6).



Photo No. 5 Rupture of connecting rod screw



Photo No.6 Missing safety pin on crown nut

1.17 Organizational and management information

The flight operations were conducted in accordance with aeronautical standards valid in the territory of the Slovak Republic.

1.18 Additional information

N/A

1.19 Useful or effective investigation techniques

Standard investigation techniques were used.

2. ANALYSIS

When the engine thrust cut off during the flight the pilot of aircraft correctly evaluated the situation and solved it by forced landing on VPP SK with immediate drop of parachutists from the aircraft cabin and landed with the aircraft on VPP SK without further damage.

On the basis of submitted documentation the commission did not detect performance of such works on the engine after general overhaul where the missing safety pin could have been manipulated.

3. CONCLUSIONS / CAUSE OF SERIOUS INCIDENT

3.1 Findings

- The pilot had valid qualifications for the critical flight.
- The aircraft had valid documentation and did not show any faults before the serious incident.
- The aircraft fulfilled the airworthiness conditions before the critical flight.

3.2 Causes of serious incident

- Formation of fatigue rupture of the connecting rod followed by engine thrust cut-off.
- Crown nut of connecting rod screw was not secured by safety pin against potential detachment during engine operation, which caused the initiation and development of fatigue mechanism of damaging the material on the external side of the connecting rod head.

4. SAFETY RECOMMENDATIONS

The final report from investigation of the serious incident does not contain any recommendations.

Bratislava, 31.01.2014