Civil Aviation Safety Investigation

FINAL REPORT

CLASSIFICATION : Accident

Owner: Private
Operator: Private
Manufacturer: Cessna
Aircraft: Cessna 150M
Registration country: Hungary
Registration: HA - SKF
Location: Area of Cheriu locality, Bihor County
Date and time: 04.09.2016 / 19:50 LT(16:50 UTC)

No.: A 17 – 08
Date: 31.05.2017
EMERGENCY LANDING IN UNKNOWN FIELD

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>CESSNA 150M / HA-SKF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date and time</td>
<td>04.09.2016 / 19:50 LT(16:50 UTC)</td>
</tr>
<tr>
<td>Operator</td>
<td>Private</td>
</tr>
<tr>
<td>Flight type</td>
<td>Private flight</td>
</tr>
<tr>
<td>Persons onboard</td>
<td>Pilot and one passenger</td>
</tr>
<tr>
<td>Injuries</td>
<td>-</td>
</tr>
<tr>
<td>Pilot</td>
<td>RO.FCL/PPL...SEP(land), valid, 31 years old</td>
</tr>
<tr>
<td>Damage</td>
<td>The aircraft suffered substantial damage</td>
</tr>
<tr>
<td>Location</td>
<td>Recently plowed field in the area of Cheriu locality, Bihor County.</td>
</tr>
</tbody>
</table>
|                   | Coordinates: Latitude: N 47° 0' 25.095"
|                   | Longitude: E 022° 1' 5.789" |

1. HISTORY OF OCCURRENCE

On 04.09.2016, around 19:20 LT, a Cessna 150M aircraft type, registered HA-SKF, took-off from Ineu airfield, Bihor County, having two persons onboard (the pilot and one passenger), to perform a private flight in the area of CTR Oradea at the altitude of 2000 ft (600 m).

After almost 30 min. of flight southeast from Oradea, near Cheriu locality, the pilot heard abnormal noises produced during engine operation, as well as the decrease of engine rotation. He checked the other engine parameters, without noticing any other anomalies. When operating the throttle, the pilot noticed that the engine rotation did not change.

Because the engine was no longer providing power, the pilot started a slow descent looking for an emergency landing field whereas, under these conditions, the flight to Ineu airfield or Oradea International Airport was no longer possible.

Shortly after that, because the pilot noticed smoke in the cockpit, he decided to perform an emergency landing. Considering the field configuration, as well as the obstacles in the area, he has chosen for landing an agricultural field located in the eastern part of Cheriu locality, Bihor County.

The aircraft slowly touched down the ground on the main wheels of the landing tricycle, but with the speed reduction and lowering of the nose wheel, while touching down the ground, it got sunk in the ground and the aircraft nosed over.

The pilot switched-off all the contacts and together with the passenger vacate the aircraft without injury or assistance.
2. ADDITIONAL INFORMATION

2.1 Meteorological information

According to the weather report received from Oradea International Airport (LROD), in the day and time of the accident, the temperature was 23°C, wind speed 2,5 m/s from south, clear sky with visibility over 10 km.

The weather conditions had no influence on this accident.
2.1 Aircraft information

Cessna 150M is SEP class (Single Engine Piston) airplane with two seats for school, recreational or private flights. It is equipped with a landing tricycle, with upper wings, providing a good visibility from the cockpit.

![Cessna 150M aircraft](image)

**Figure 3. Cessna 150M aircraft**

**Cessna 150M aircraft – performances:**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Continental O-200A engine:</strong></td>
<td><strong>Maximum weight:</strong> 1600 lbs (725 kg)</td>
</tr>
<tr>
<td>100 hp (75 kW)</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum speed:</strong> 109 kts (175 km/h)</td>
<td><strong>Empty plane weight:</strong> 1104 lbs (500 kg)</td>
</tr>
<tr>
<td><strong>Cruise speed:</strong> 106 kts (170 km/h)</td>
<td><strong>Fuel:</strong> 26 gal (98 l)</td>
</tr>
<tr>
<td><strong>Stalling speed:</strong> 42 kts (67 km/h)</td>
<td><strong>Flight distance:</strong> 303 nm (561 km)</td>
</tr>
<tr>
<td><strong>Take-off</strong></td>
<td><strong>Landing</strong></td>
</tr>
<tr>
<td><strong>Length:</strong> 735 ft (224 m)</td>
<td><strong>Length:</strong> 445 ft (135 m)</td>
</tr>
<tr>
<td><strong>Length up to 50 ft:</strong> 1385 ft (422 m)</td>
<td><strong>Length from 50 ft:</strong> 1075 ft (327 m)</td>
</tr>
<tr>
<td><strong>Climb rate:</strong> 670 fpm (3,2 m/s)</td>
<td></td>
</tr>
<tr>
<td><strong>Practical ceiling:</strong> 14000 ft (4267 m)</td>
<td></td>
</tr>
</tbody>
</table>
Engine data

Figure 4. Continental O-200A engine

Main characteristics:

<table>
<thead>
<tr>
<th>Engine Specifications</th>
<th>O-200</th>
<th>C75</th>
<th>C85</th>
<th>C90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement (cu.in.):</td>
<td>201</td>
<td>188</td>
<td>188</td>
<td>201</td>
</tr>
<tr>
<td>Bore:</td>
<td>4 - 1/16&quot;</td>
<td>3 - 7/8&quot;</td>
<td>3 - 7/8&quot;</td>
<td>4 - 1/16&quot;</td>
</tr>
<tr>
<td>Piston Stroke:</td>
<td>3 - 7/8&quot;</td>
<td>3 - 5/8&quot;</td>
<td>3 - 5/8&quot;</td>
<td>3 - 7/8&quot;</td>
</tr>
<tr>
<td>Compression:</td>
<td>7 : 1</td>
<td>6.3 : 1</td>
<td>6.3 : 1</td>
<td>7 : 1</td>
</tr>
<tr>
<td>Power Rating:</td>
<td>100</td>
<td>75</td>
<td>85</td>
<td>90</td>
</tr>
<tr>
<td>Normal Rated RPM:</td>
<td>2750</td>
<td>2275</td>
<td>2575</td>
<td>2475</td>
</tr>
<tr>
<td>Fuel Consumption @ 75%:</td>
<td>6.3</td>
<td>4.8</td>
<td>5.4</td>
<td>5.9</td>
</tr>
<tr>
<td>Fuel:</td>
<td>80/87</td>
<td>80/87</td>
<td>80/87</td>
<td>80/87</td>
</tr>
<tr>
<td>Oil Capacity:</td>
<td>6</td>
<td>4.5</td>
<td>4.5</td>
<td>5</td>
</tr>
</tbody>
</table>

After transporting the damaged aircraft to the airfield from where it took-off in the accident day, the investigation commission assessed its condition, took samples from the gasoline and oil used by the engine and, making an analysis on the engine condition, decided to remove it from the aircraft and transport it to the headquarters of CIAS, in order to perform a specialty expertise.

The gasoline and oil samples were sent to an authorized laboratory to determine their parameters. According to the analysis reports, both the gasoline and the oil were in conformity with the engine manufacturer recommendations.

The engine removed from the aircraft was subject to a technical expertise performed by a maintenance organization approved for this engine type. This expertise was performed in the presence of an investigation commission member.
According to the engine examination report, the cylinder no. 4 was found cracked on approximately 90% of its circumference (fig. 5 and fig. 6). The piston rings were found broken (fig.7). On the cylinder crack there are oxidation/rust traces (fig.8). The oil filter did not contain metallic particles, this indicating that the failure did not happen long before, but during the flight in which the accident occurred.

The crack of cylinder no. 4 initially appeared in an area that is not visible during routine maintenance works, this crack causing insignificant oil leak. During engine operation, the crack was extended along the cylinder circumference and it was enlarged in such way that it blocked the proper operation of piston rings. They entered into the enlarged crack, broke and caused the symptoms described by the pilot: metallic sound, engine lack of power and smoke in the cockpit. As a consequence, the pilot decided to urgently land in unknown field, according to “Cessna 150M Pilot’s Operating Handbook” – Section 3 Emergency procedures.
2.2 Records in aircraft and engine documents

In the aircraft logbook it is noted both the flight activity (no. of takeoffs and the flight time performed in an activity day, but also the total flight time), and the maintenance works performed on the aircraft and its systems, according to the approved maintenance schedule requests.

According to these records:
- the last record of HA-SKF aircraft flight activity was written on 17.10.2012 and no other flight was written after this date;
- in the same year, on 24.05.2012 it is also recorded a maintenance activity, the next one being registered on 15.01.2016.

Note: Between these two records there is no other maintenance activity to prepare the aircraft for an inactivity period (storage).

The records of maintenance activities performed on the engine can be found recorded in the engine logbook.

According to these records:
- the engine was subjected to two overhauls:
  - the first, in 1994, performed after 1710 engine operation hours;
  - the second, in 2002, performed after 2139 operation hours from the last overhaul.
- on 12.05.2006 it is recorded the replacement of cylinder no. 4, but the work was not certified.

Continental Motors, the engine manufacturer, indicates through the Service Information Letter SIL98-9C (initially issued in 1998, revised in 2013), the operating time between two engine overhauls (TBO – Time Between Overhaul): 1800 operating hours or 12 years, whichever occurs first.

Note: the second overhaul was performed after exceeding with 339 hours the maximum operation time specified by the manufacturer between two overhauls.

- on 24.05.2012 it was noted the performance of a technical inspection, and the next maintenance activity was recorded on 15.01.2016. Between these dates no other indication of engine maintenance activity was recorded. Also, there is no specification of any engine preparation operation for an inactivity period (storage).

The analyzed documents show that HA-SKF aircraft did not perform any flights after 17.10.2012. Moreover, there was no record of any maintenance activity preparing the aircraft and its engine for an inactivity period.
In order to restart the flight activity, in 2016, the aircraft undertook maintenance works performed by an approved organization (Part M.F Approved Maintenance Organization No. HU.MF.0100). These works were performed according to work order no. WS-3/2016/1 dated 19.03.2016.

The requested maintenance works were performed according to the approved maintenance schedule and were concluded/confirmed by signing the aircraft CRS (Certificate of Release to Service) no. WS-3/2016/M, issued on 25.07.2016.

A necessary condition for the aircraft to be introduced into service is to demonstrate that it is ready for safe operation (the aircraft is airworthy). In this respect it is necessary an airworthiness review. This review was performed by the same organization which carried out the aircraft maintenance works. The organization is also approved to perform this type of review (approval no. HU.MG.0100). On 25.07.2016, this review is completed with the issuance of Airworthiness Review Certificate, containing the conclusion: "This aircraft is considered airworthy at the time of the review".

Notes:

- within this review, one of the points required to check performance status of scheduled maintenance i.a.w approved maintenance programme– this point was confirmed as checked, even if: (i) the aircraft did not fly since 2012 and (ii) in the maintenance documents (logbooks) there is no record of any operation for inactivity preparation;

- another point of the review was to check the Life Limited Parts status record – and this point was confirm with satisfactory result, even though the records contained in the engine logbook show that at the time of the review, the engine exceeded the maximum calendar time recommended by the manufacturer between two overhauls (according to Service Information Letter SIL98-9C, the next engine overhaul should have been performed not later than 12 years, meaning 2014, if, during this time, the 1800 operating hours would not have been reached).

The investigation commission considers that, according with aircraft and engine logbooks, the Airworthiness Review Certificate should not have been issued in these conditions, but only after performing the mandatory works requested by the manufacturer.
3. CONCLUSIONS

3.1 Findings

1. In the engine logbook, on 12.05.2006 it is recorded the replacement of cylinder no. 4, the work was not certified;

2. Cylinder no. 4 was found cracked on approximately 90% of its circumference;

3. On the cylinder crack there were visible oxidation/rust traces;

4. Rings of piston no. 4 were found broken;

5. No metallic particles were found in the oil filter;

6. According to the analysis reports, both the gasoline and oil used by the aircraft engine comply with the engine manufacturer recommendations;

7. The aircraft pilot had SEP license (land) and medical certificate, both valid and he had a total number of 125 flight hours, out of which 6 hours on Cessna 150M;

8. The pilot acted in accordance with "Cessna 150M Pilot's Operating Handbook " - Section 3 Emergency procedures;

9. During the airworthiness review performed on 25.07.2016 the points referring to:
   - performance status of scheduled maintenance i.a.w approved maintenance programme
   and
   - Life Limited Parts status record

were confirmed as corresponding, but without being in compliance with the records from aircraft and engine maintenance logbooks.

3.2 Cause of accident

The cause of accident is the cracking of cylinder no. 4.

Contributing cause is the non-compliance with the requirements of engine maintenance schedule.
3.3. Recommendations

The investigation commission issued the following safety recommendation:

It is recommended to the National Transport Authority - Aviation Authority in Hungary to perform an additional audit to the organization which carried out the survey for this aircraft (authorizations HU.MF.0100 and HU.MG.0100), in order to verify the way the inspections are conducted and issues the corresponding certificates following inspections (CRS, respectively Airworthiness Review Certificate).

Note: The documents and analysis objects used for the issuance of the flight safety investigation Report are confidential and are archived at the Civil Aviation Safety Investigation and Analysis Center, according to legal provisions.