<table>
<thead>
<tr>
<th>OCCURRENCE TYPE</th>
<th>Incident</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE AND TIME</td>
<td>30.11.2011 / 07.26 LT; 05.26 UTC</td>
</tr>
<tr>
<td>LOCATION</td>
<td>“Aurel Vlaicu” Bucharest-Băneasa International Airport</td>
</tr>
<tr>
<td>AIRCRAFT</td>
<td>A 320 - 232</td>
</tr>
<tr>
<td>REGISTRATION</td>
<td>HA-LPV</td>
</tr>
<tr>
<td>OPERATOR</td>
<td>WIZZ AIR</td>
</tr>
</tbody>
</table>

NO. A13-05
Date: 27.09.2013
AKNOWLEDGEMENT

This REPORT presents data, analysis, conclusions and recommendations concerning the civil aviation safety, issued by the Civil Aviation Safety Investigation Commission appointed by the General Director of the Civil Aviation Safety Investigation and Analysis Center.

The flight safety investigation was conducted in accordance with the provisions of the Government Ordinance No. 51/1999 concerning the technical investigation of civil aviation accidents and incident, approved with amendments and additions by Law No. 794/2001, of the REGULATION (EU) No. 996/2010 of the European Parliament and of the Council from 20 October 2010 on the investigation and prevention of accidents and incidents occurred in civil aviation and repealing Directive 94/56/EC and the provisions of Annex 13 to the Convention on International Civil Aviation signed at Chicago on 7 December 1944.

The sole objective of civil aviation safety investigation is preventing the occurrence of accidents and incidents, by effective determination of causes and circumstances that led to this occurrence and establishing the necessary recommendations for civil aviation safety and it HAS NOT THE PURPOSE of finding guilty, individual or collective responsibilities.

As a consequence, the use of this REPORT for other purposes than preventing the occurrence of accidents and incidents might generate misinterpretations.
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During take-off the exterior fan cowl of the engine No. 1 nacelle detached. As a consequence of this occurrence the aircraft returned to the takeoff airport, landing normally. There were no victims.

The incident was notified in written to CIAS, being registered with the number 5212/08.12.2011.


The Draft Final Report was submitted for comments to the involved parts, according to the provisions of the international regulatory framework.

This Final Report is including the comments of the French civil aviation safety investigation authority, the Bureau d’Équêtes et d’Analyses pour la sécurité de l’aviation civile - BEA, provided by the French accredited representative.
1 PRELIMINARY INFORMATION

1.1 History of the incident

On 30.11.2011 the aircraft registered HA-LPV was planned for performing a flight from „Aurel Vlaicu” Bucharest – Baneasa International Airport, Romania, to Bergamo – Orio al Serio Airport, Italy (LRBS – LIME).

During takeoff from Bucharest – Băneasa International Airport (LRBS), while the aircraft got airborne, the exterior fan owl of the engine no. 1 nacelle detached. The aircraft behaved normally, the crew being informed by the passengers of this occurrence. The captain, after checking the information, decided to return to the takeoff airport. The return flight and landing went normally, the passengers being disembarked using the normal procedure. The crew did not declare an emergency.

The ATC informed the airport staff of this occurrence. After checking the takeoff/landing runway, there were found the components detached from the aircraft.

At the visual control of the aircraft, conducted after landing, it was noticed the absence of the exterior cowl of the engine no.1 nacelle, broken at the level of the fastening joints on the nacelle (Fig.1 and Fig.2).
1.2 Victims

<table>
<thead>
<tr>
<th>Injuries</th>
<th>Crew</th>
<th>Passengers</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Serious</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minor</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>None</td>
<td>6</td>
<td>157</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6</td>
<td>157</td>
<td>-</td>
</tr>
</tbody>
</table>

1.3 Damage to the aircraft

- Breakage of the exterior cowl of the engine no. 1 nacelle;
- Interior left wing flap - deformed;
- Breakage of the leg and de-icing system valve pin;
- A deep cut in the exterior tire of the main left landing gear;
- Strong contortion of the pillar skin engine no.1;
- Strong contortion of the console structure of the engine no.1 pillar;
- Deformation of engine no.1 edge pillar;
- Left wing underside bounced 0.3 mm;
- Left wing slat no 2 - bended;
- Guideway of the interior left flap - bended;
- Breakage of the rubber strip of the engine no. 1 nacelle interior cowl;
- Cross beam of the engine no. 1 nacelle cowls;
- Carcass of the engine no. 1 equipment gear - broken;
- The engine no. 1 air intake cover - broken.

1.4 Other damage

N/A.

1.5 Crew information

<table>
<thead>
<tr>
<th>Pilot (captain)</th>
<th>Male, 43 Years</th>
</tr>
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<tbody>
<tr>
<td>License</td>
<td>ATPL; Issued: Italy, I-ATPL-A-027741</td>
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<tr>
<td>Working time during the last 24 h</td>
<td>0 FH</td>
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<tr>
<td>Working time during the last 90 days</td>
<td>199:14 h / 81 landings</td>
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</table>

<table>
<thead>
<tr>
<th>Copilot</th>
<th>Male, 39 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>License</td>
<td>ATPL; Issued: UK, UK/AT/301002C/A</td>
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<tr>
<td>Working time during the last 24 h</td>
<td>03:58 FH</td>
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<tr>
<td>Working time during the last 90 days</td>
<td>233:36 h / 95 landings</td>
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1.6 Aircraft information

**Aircraft**

<table>
<thead>
<tr>
<th>Aircraft type and manufacturer</th>
<th>Airbus A320-232</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series number and fabrication year</td>
<td>S/N 3927, 10.06.2009</td>
</tr>
<tr>
<td>State and registration mark</td>
<td>Hungary, HA-LPV</td>
</tr>
<tr>
<td>Owner (Operator)</td>
<td>WIZZ AIR</td>
</tr>
<tr>
<td>Total number of FH</td>
<td>9969:13 h/ 5305 cycles</td>
</tr>
<tr>
<td>Number of FH since the last inspection (as stated by the operator)</td>
<td>9969</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engine type</th>
<th>Engine1</th>
<th>Engine 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine type</td>
<td>International Aero engines (IAE) V2527-A5</td>
<td>International Aero engines (IAE) V2527-A5</td>
</tr>
<tr>
<td>Total number of FH</td>
<td>9969:13 h/ 5305 cycles</td>
<td>9969:13 h/ 5305 cycles</td>
</tr>
<tr>
<td>Number of FH since the last check</td>
<td>9969</td>
<td>9969</td>
</tr>
</tbody>
</table>

1.7 Meteorological information

Wind 3 m/s from 310°, visibility 6 km, clouds NSC, external temperature -4°C, QNH 1027 mmHg; dry runway.

1.8 Navigation aids

N/A.
1.9 Communication

N/A.

1.10 Aerodrome data

The aircraft took-off and then landed on runway 07 of „Aurel Vlaicu” Bucharest – Baneasa International Airport.

1.11 Flight recorders

The FDR and CVR recorded data was decoded and processed under the CIAS Investigation Commission’ supervision. After analyzing the decoded data, there weren’t found any relevant elements for the investigation.

1.12 Wreck and impact information

N/A.

1.13 Medical and pathological information

N/A.

1.14 Fire

N/A.

1.15 Surviving information

N/A.

1.16 Tests and research

N/A.

1.17 Management and organization information

The Wizz Air air operator contracted the performance of some current maintenance works types (Standard Work Package) with the company Lufthansa Technik. The aircraft was taken in the hangar used by the company Lufthansa Technik, in the evening of 29.11.2011, for current works. After performing the works, the aircraft was towed on the airport platform and sealed (according to the works sheet provided by the maintenance organization).
1.18 Additional information

Because of the improper securing, there were registered more incidents with the detachment of the engine nacelle cowls on Airbus A320 aircraft. According to the manufacturer 80% of these events occurred during takeoff. For other aircraft types from the Airbus family, having a similar cowl design (and motorization from the same engine family) there were also recorded incidents, but they was a much more restricted number.

The main landing gear tires presented cuts, without a proper explanation, but it is possible that they might have been produced by the pieces detached from the lost cowl (Fig. 3).

Fig. 3

The weight of each engine nacelle cowl is of around 40 kg.
During the takeoff rolling, but also after the occurrence, all the parameters displayed onboard indicated a normal functioning of the aircraft and no unusual behaviour was recorded.

1.19 Investigation techniques

The investigation commission conducted its investigation based on:

1. Pictures provided to the commission by the aerodrome operator;
2. Documents provided by R.A. ROMATSA - TWR Baneasa;
3. „Air Safety Reports”, issued and provided by the aerodrome and aircraft operators
4. Documents provided by the aircraft operator.
5. Documents provide by the maintenance organization serving the aircraft operator.

2 Analysis

The investigation commission checked the latching system of the cowl and noticed that the component parts of the latching system were functional and showed no structural deformation or material failure (Fig. 4, fig. 5, fig. 6, fig. 7 and fig. 8).
The aircraft was taken over a standard package of maintenance works. This activity was performed during the night before the flight. After finishing the works, at the exit from the hangar, the aircraft was visually inspected, after which it was towed to the airport parking platform, where it was sealed.

In the morning of November 30th, 2013 the aircraft was taken over by the crew planned to perform the LRBS-LIME flight. According to the captain’s report, the exterior walk-around of the aircraft was more difficult to perform because the platform area in which the aircraft was situated was not illuminated, being completely darkened, even though it was used a flashlight for the verification. The commission considers that this motivation is justified and that if as a captain, he considered that he didn’t have the conditions for taking over the aircraft ensured he should have required auxiliary lighting aids or repositioning of the aircraft.

The pre-flight procedures were supposed to be performed according to the Operational Manual of Wizz Air OM, B Chap. 3 Normal Procedures, section 3.4, and the exterior walk-around was conducted according to the section 3.4.3 (Exterior Inspection), applying the indications from the Airbus „Flight Crew Operation Manual” (FCOM), Chap. „Normal Procedures”, „Standard Operational Procedures (SOP)”, sections „Flight Preparation”, „Safety Exterior Inspection”.

The detachment of the nacelle cowls represents a risk and the risk level changes depending on the moment in which the occurrence takes place. Depending on the aircraft speed and according to the weight of the cowls, they can accumulate potential energy which will subsequently convert into kinetic energy that can be dissipated through destruction, in the case of the impact with different parts of the aircraft placed located behind the engine. The loss of these cowls determined the torsion of consoles fixing the engine on the pillar but also damage of the wing slots and skin, which is a serious hazard for the aircraft control in flight. The repairs involved in such a situation might require a long time, immobilizing the aircraft on long-term.

According to the procedure, during the pre-flight check, the crew must also visually inspect the proper engine nacelle cowls latching. The cowl latches are visible only if the person who inspects the aircraft stays on one side of the engine in crouch position, enabling seeing the inferior part of the engine nacelle. But, of course the quality of this visual inspection is influenced by the lighting level of the aircraft parking location. The latches’ position must be checked and these must be folded on the cowl surface and must also be aligned with the fixed cowl. This position means that the latches are correctly closed and secured.

Since 1999, after some similar occurrences, as a first precaution measure, the painting of the IAE engines cowl latches with conspicuous fluorescent colour was made available for production aircraft and for retrofit. Taking into account that in the engine area the ground clearance is very low (around 570-590 mm), the latches are not easily visible during the exterior walk-around, this being also influenced by the environmental lighting level in the area where the aircraft is located. The manufacturer also published «Airbus Safety Magazine „Safety First”», 14th edition
July 2012 that contains safety measures addressed both to the technical staff and to the flight crews.

According to AIP Romania, for the take-off airport, starting with November 29th, the twilight period in the morning starts at 04.56 UTC, 06.56 LT, while the sun will rise at 05.29 UTC, 07.29 LT. As a consequence one can assume that the aircraft take-over by the crew was made in a moment where the visibility was reduced (twilight).

3 CONCLUSIONS

3.1 Findings

The Flight Safety Investigation Commission made following findings:

(1) The cowl fastening latches corresponding to the engine no. 1 nacelle weren’t properly closed and secured.

(2) During the aircraft inspection after the works, performed by the maintenance crew, they didn’t notice the open or closed/not engaged position of the cowl fastening latches of engine no. 1.

(3) During the pre-flight aircraft exterior walk-around, performed by the crew, they didn’t notice either the position of the cowl fastening latches of engine no. 1. The investigation commission interpreted the affirmation from the crew captain’s report, that “the area was completely dark even if the portable torch was regularly used”, as being just a justification, without sustaining the fact that he didn’t notice the cowl position.

3.2 Causes of the occurrence

(1) The engine nacelle cowls weren’t properly closed and secured after the standard maintenance works.

3.3 Favourable causes

(1) During the aircraft check after completing the works there was not properly controlled and noticed that the engine no. 1 nacelle cowls latches were improper closed and fastened.

(2) While taking-over the aircraft the crew didn’t noticed that the engine no. 1 nacelle cowls latches were improper closed and fastened.
4 RECOMMENDATION

As a result of the civil aviation safety investigation, the commission makes following recommendations:

(1) Cowl latches in fully open position should always be left in horizontal position (not engaged) (According to <<Airbus Safety Magazine „Safety First”>>, 14th edition July 2012.)

(2) Engine nacelles cowl doors should always be entirely latched when the cowls are closed. The cowls must not be left in closed position without being properly latched. (According to <<Airbus Safety Magazine „Safety First”>>, 14th edition July 2012.)

(3) During the exterior walk-around, the crew member performing the control has to visually check the correct closure/latching condition of the engine cowls. In order to do this, the crew member must be positioned on the side of the engine and crouch.

(4) Completion of Operational Manuals of the air carrier Wizz Air and of the maintenance organization Lufthansa Technik with provisions showing that regardless of works performed at the aircraft the cowls check is a distinct and permanent point.

(5) The air carriers Wizz Air type may consider the inclusion in the aircraft equipment of a mirror with telescopic handle which will allow the latches inspection as provided by the <<Airbus Safety Magazine „Safety First”>>, 14th edition July 2012.

Note: The documents and the analysis objects used for the elaboration of the Flight Safety Investigation Report are confidential and they are stored at the Civil Aviation Safety Investigation and Analysis Center, according to the legal provisions.