General Civil Aviation Authority

Air Accident Investigation Department

Abu Dhabi, UAE

09/2009

FINAL REPORT

On

AIRCRAFT INCIDENT INVESTIGATION

Ayk Avia Airline
IL 76 TD, EK76754
Sharjah International Airport
United Arab Emirates

October 19th, 2009

OBJECTIVE

This investigation is performed in accordance with the UAE Federal Act No 20 of 1991, promulgating the Civil Aviation Law, Chapter VII, Aircraft Accidents, Article 48, and in conformity with ICAO Annex 13 to the Chicago Convention.

The sole objective of this investigation is to prevent aircraft accidents and incidents. It is not the purpose of this activity to apportion blame or liability.

As per paragraph 6.1 in Annex 13, the format of this report is adapted from the Final Report Format as laid down in the Appendix to Annex 13, certain subheadings in the Factual Information heading were skipped since they are either not investigated or not been considered as contributing factors.

FINAL REPORT

on the Investigation into

IL 76 TD, EK76754 Aborted Takeoff Incident

FACTUAL INFORMATION

HISTORY OF THE FLIGHT

On October 19th 2009, at approximately 0120 UTC, the Pilot-in-Command (PIC) of Ayk Avia operating IL 76 TD, EK76754 requested to return to the departure stand 56 at Sharjah International Airport after an aborted takeoff at Runway 12 due to heavy vibration during the aircraft roll.

The Aircraft continued the taxi and entered the takeoff runway, the crew started the takeoff checklist, and after the engines warming was completed; the PIC advanced the engines' power. The aircraft started to accelerate normally until a heavy vibration started to be felt by the PIC when he announced aborting the takeoff at approximately 155 km/hr; he retarded the throttles and advanced the thrust reversers when the aircraft started to decelerate normally.

The aircraft vacated the runway via Taxiway D, and the PIC requested an ATC clearance to return to his departure stand 56 due to technical problem. Upon arrival, the crew disembarked the aircraft normally and the ground engineer, who was onboard the aircraft, requested the Airport Fire Services to cool down the axel of the left aft inboard main landing gear by dry air where a wheel had separated leaving part of its hub attached to the axel.

During the runway inspection, the disintegrated wheel tyre was found at about 100 m from the aircraft stop point at the runway.

INJURIES TO PERSONS

Injuries	Crew	Passengers	Total in Aircraft	Others
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	7	0	7	0
TOTAL	7	0	7	0

DAMAGE TO AIRCRAFT

After the wheel disintegration from the axel, its debris impacted the L/H wing root fairing causing a deep dent of about 20x30 cm and a cut beneath it of about 20 cm in length and 3 cm in width (figures 1 and 2).

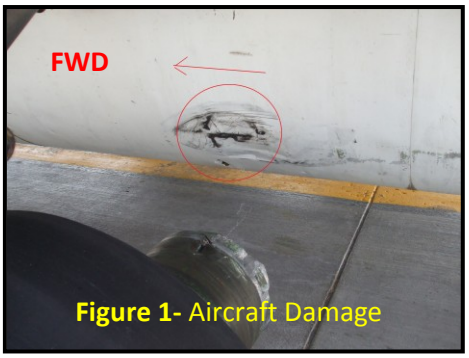

Figure 1- Aircraft Damage

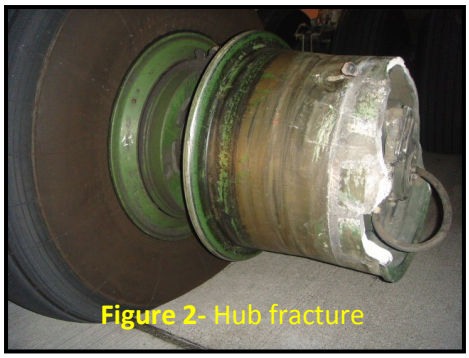
Figure 2- Hub fracture

OTHER DAMAGE

None

PERSONNEL INFORMATION

Pilot in Command

Date of Birth: May 19th 1960.

License No.: LP No.00352, issued on April 07th 2006 and expires on Jan 28th 2010, (Kyrgyz Republic)

Certificate of Validation: issued on April 07th 2006, Exp date Jan 28th 2010, (Republic of Armenia)

Medical certificate: issued on Jan 28th 2009, and expires on Jan 28th 2010, (Kyrgyz Republic)

Total FH: 10030.20

Total FH on IL76: 620.00

Base check: January 2009

Line check: valid to December 31st 2009.

Co-pilot

Date of Birth: 1966

License No.: LLP No. 001345 issued April 17th 1997 and expires on June 04th 2010. (Russia).

Certificate of Validation: issued on July 10th 2009, expiry date Jan 28th 2010, (Republic of Armenia)

Flight Engineer

Date of Birth: June 10th 1960

License No.: I BI 002685

Certificate of Validation: issued on June 20th 1997, expiry date July 20th 2010, (Republic of Armenia).

Navigator

Date of Birth: June 26th 1976.

License No.: I III 000089

Certificate of Validation: issued on October 15th 1996, expiry date July 20th 2010, (Republic of Armenia).

AIRCRAFT INFORMATION

Type:	IL 76 TD
MSN:	093421637
Registration:	EK76754
State of Registration:	Republic of Armenia
Date of C of R Issue:	Sept. 1st, 2009
C of A Validity:	November 01st 2009

AERODROME INFORMATION

Runway Specification

Takeoff runway	12.
Takeoff run available	4060 m.
Accelerate-Stop distance available	4060 m.
Landing distance available	3760 m
Width	45 m.
Magnetic variation	1.3°E.
Threshold elevations from sea level	116 ft
RWY slope	Variable at the whole length from 0.62% to 0.07%.1.3°E.
RWY pavement	Asphalt covering with 300 m. Concrete surfacing at the threshold.

Runway Inspection

The last completed "Sharjah Daily Movement Area Inspection Form", which includes items that are pertinent to Foreign Objects Debris "FOD", did not reveal any of such items before the incident flight.

FLIGHT RECORDERS

The following items were sent to Volga Dnepr Company at Sharjah Free Zone for readout and analysis.

Vertical Load & Vibration

Type: K3-63

S/No. 60040

Case No. 10945

Visually inspected and revealed:

- The instrument case number and type didn't match.
- The device is out of order per vertical load parameters.
- Vertical damper is not attached to the case and loose.
- Tape is not properly inserted nor accompanied with due documentation.
- No parameters were recorded in the tape.

Cockpit Voice Recorder

- MC-61B, Serial No. 865037, Reel No. 7517719
- No recordings pertinent to the incident flight.

Flight Data Recorders

Main

Type: MLP-14-5

S/No. 30104

Auxiliary

Type: KC-13

S/No. 120679

The FDR readoutout revealed the following (Time in UTC):

00:03:18 start takeoff roll (speed increase)

00:03:24 start of lateral G (increase "+", to the right)(75 km/hr)

00:03:33 start of vibration (120 km/hr)

00:03:42 end of lateral G (155 km/hr)

00:03:46 engines 1 and 4 thrust reversers turned ON- 1st (155 km/hr)

00:03:52 engines 1 and 4 thrust reversers turned OFF- 1st (140 km/hr)

00:04:04 engines 1 and 4 thrust reversers turned ON- 1st 2nd (110 km/hr).

00:04:08 engines 1 and 4 thrust reversers turned OFF- 2nd (90 km/hr).

The Indicated airspeed channel 04 parameters were unreliable, channel 25 unserviceable (N1 RPM of engine 3) (code =0).

The recorded times of the FDR's events are not synchronised with the actual time of the incident. FDR time is earlier of about 1 hr: 30 minutes.

WRECKAGE AND IMPACT INFORMATION

The Aircraft was intact except the left aft inboard MLG wheel which had disintegrated and its tyre separated and settled at a distance of about 100m from the aircraft final sop point.

SURVIVAL ASPECTS

The crew disembarked the aircraft normally.

ORGANIZATIONAL AND MANAGEMENT INFORMATION

Operator's Information

AOC. No.:	034
Effective date:	17/10/2009
Validity:	17/10/2010
Operation Specifications:	Authorised to operate IL-76 TD.

ADDITIONAL INFORMATION

The visual inspection of the hub fracture surface shows two zones adjacent to each other (figure 3):

- Zone A of the fracture surface exhibited beach marks with dark and soft texture.
- The rest of the fracture surface (Zone B) was shiny and coarse.

The beach mark is generally a shape formed by fatigue failure, while the shiny shape is a result of sudden overload failure.

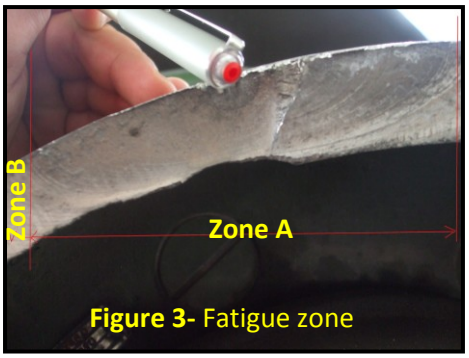

Figure 3- Fatigue zone

ANALYSIS

FLIGHT RECORDERS

The Information Bulletin (IB) 17/2006 that was published by the GCAA on August 7th, 2006, requires foreign operators operating or intending to operate in the territory of the UAE or the airspace above its territory to comply with the requirements of Article 6 of the UAE Civil Aviation Law No. 20 of 1991. In the same regard, the aircraft must satisfy the airworthiness requirements of ICAO Annex 6, Part I.

The same IB states that:

> *"As a minimum, the aircraft shall be equipped with the following equipment which shall be operative on arrival in the UAE:*
>
> - *Flight Data Recorder (FDR), Cockpit Voice Recorder (CVR)".*

In the incident Aircraft, the vertical load and vibration recorder, and the cockpit voice recorders were not containing any pertinent data to the incident flight. The FDR was not able to record the airspeed and N1 of engine 3.

To assure their reliability, the flight recorders should go through a pre-determined inspection and maintenance program that shall be adequate to prevent them from failure or malfunctioning. The failure of the CVR, vertical and vibration recorder and the partial functionality of the FDR deprived the investigation from certain necessary data that could have been of strong contribution to the investigation.

WHEEL SEPARATION

The L/H INBD Aft wheel tyre was found approximately 100m before the aircraft stop point, the damage of the aircraft adjacent structure revealed that the tyre had departed the axel while it was spinning at high speed.

Examining the surface of fracture revealed that the inboard part of the hub was in place whereas the outboard part was fractured circumferentially except an intact portion of approximately 15%. The rim was totally defragmented into five pieces. The surface of fracture exhibited marks of fatigue failure.

Fatigue is a kind of material cyclic loading, the load wave, amplitude and frequency determine the life of the material before its failure. In regard to metals, fatigue cracks are usually initiated at the edge of the metal and propagates until the metal part is unable to hold the applied loads when the metal will suddenly fail due to overloading since the remaining area after the fatigue crack elongation will be weaker to resist the stress.

Fatigue cracks could be detected if the metal is exposed frequently to Non-Destructive Testing (NDT) according to a pre-determined program. The program shall be contained in the operator's relevant maintenance manuals.

The age of the fatigue was old enough thus fatigue cracks could be detected prior to reaching its final phase. An adequate inspection program shall encompass the following elements:

- well determined inspection frequency that is to be based on the operational experience of the operator
- efficient inspection techniques
- well functioning equipment

- competent inspection personnel.

The hub of the incident Aircraft fractured without prior detection. The length of the fatigue fracture surface indicates that the fatigue was old and the hub should have been detected before the final phase of fatigue is reached.

CONCLUSIONS

FINDINGS

(a) The crewmembers were possessing the licences required by the ICAO Annex 1.

(b) The aircraft has proper documents related to its airworthiness and registration.

(c) The fracture of left inboard aft hub was not detected due to inefficient hub's inspection.

(d) Aborting the takeoff was performed with no safety consequences.

(e) There were no clues of presence of FOD at the used taxiway (TWY A) nor the takeoff runway (RWY 12).

(f) Inspection and maintenance of flight reorders were not sufficient to assure continuous functionality of the recorders.

PROBABLE CAUSE

The Investigation Department determined that the probable cause of the Ayk Avia Airline "aborted takeoff incident" was the fracture and disintegration of left hand inboard aft wheel due to progressive undetected fatigue stress. The cause of why the fatigue was undetected is not determined.

RECOMMENDATIONS

The Air Accident Investigation Department recommends that:

THE OPERATOR (AYK AVIA AIRLINES) SHOULD-

SR 01/2011

Take the necessary actions to assure that the flight recorders are always operational, and no actions are committed by the maintenance personnel to burden their functionality by any means.

SR 02/2011

Establish adequate wheel hubs' inspection program containing all the necessary program's elements.

ILYUSHIN DESIGN BUREAU-

SR 03/2011

To provide the IL76TD operators with a maintenance planning data/document for wheels' hubs' NDT Inspection.

THE ARMENIAN CIVIL AVIATION AUTHORITY-

SR 04/2011

To enhance its oversight on the Operator to ensure that:

(a) The aircraft maintenance manual contains wheel's hub inspection program and the Operator has the appropriate inspection program elements.

(b) Flight recorders are properly installed and maintained on Armenian registered or operated Aircarft.

THE UAE GCAA-

SR 05/2011

To expedite its ongoing project of regulating the operations of foreign operators in the territories of the UAE. The regulations should contain a provision of assessing the history of safety performance of applicants to GCAA's Foreign Air Operators' Approval/Authorisation.

SR 06/2011

To Broaden its SAFA program to assure the continuing compliance of the foreign operators with the pertinent UAE requirements and conformity with the relevant Standard and Recommended Practices (SARPs) set forth in the ICAO Annexes.

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