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INVESTIGACIÓN
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AVIACIÓN **C**IVIL

Interim Statement IN-003/2011

Incident involving an Airbus
330 aircraft, registration
EC-LKE, operated by Air Europa,
at FL240 near VOR/DME Toledo
on 13 February 2011



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COMISIÓN DE INVESTIGACIÓN
DE ACCIDENTES E INCIDENTES
DE AVIACIÓN CIVIL

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Foreword

This document constitutes the interim statement envisioned in Article 16.7 of Regulation (EU) no. 996/2010 of the European Parliament and of the Council, as well as in paragraph 6.6 of Annex 13 to the Convention on International Civil Aviation. The statement includes the details of the progress of the investigation and the most important operational safety issues revealed to date. The information provided herein is subject to change as the investigation proceeds.

Pursuant to the contents of Regulation (EU) no. 96/2010 of the European Parliament and of the Council and of Annex 13 to the Convention on International Civil Aviation, the investigation is purely technical in nature and is not intended to determine or apportion blame or liability. The investigation is being conducted without necessarily resorting to evidentiary procedures and for the sole purpose of preventing future accidents.

Consequently, the use of this information for any purpose other than to prevent future accidents may result in faulty conclusions or interpretations.

Abbreviations

00°	Degrees
AAIB	Air Accident Investigation Board (UK)
ATC	Air Traffic Control
ATPL	Airline Transport Pilot License
BEA	Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile
CSN	Cycles Since New
FBO	Fan Blade Off
FL	Flight Level
ft	Feet
h	Hour(s)
kt	Knot(s)
LH	Left hand
N1	Low-pressure spool rpm
RH	Right hand
S/N	Serial Number
UTC	Universal Time Coordinated
VOR/DME	Very high frequency omnidirectional range/distance measure equipment

DATA SUMMARY

LOCATION

Date and time	Sunday, 13 February 2011; 16:16 local time¹
Site	FL240 in the vicinity of the Toledo VOR/DME

AIRCRAFT

Registration	EC-LKE
Type and model	AIRBUS 330-243
Operator	Air Europa

Engines

Type and model	Rolls-Royce Trent 772B-60
Number	2

CREW

	Pilot in command	Copilot
Age	47 years old	38 years old
Licence	ATPL	ATPL
Total flight hours	14,757 h	5,386 h
Flight hours on the type	1,880 h	2,084 h

INJURIES

	Fatal	Serious	Minor/None
Crew			11
Passengers			333
Third persons			

DAMAGE

Aircraft	Minor (limited to right engine)
Third parties	None

FLIGHT DATA

Operation	Commercial air transport – Scheduled – International – Passenger
Phase of flight	En route

INTERIM STATEMENT

Date of approval	29 February 2012
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¹ All times in this report are local. To obtain UTC, subtract one hour from local time.

On Sunday, 13 February 2011, an Airbus 330 aircraft, registration EC-LKE, operated by Air Europa, was on a scheduled flight from Madrid (Spain) to Cancun (Mexico). Onboard were 333 passengers, eight cabin crew and three flight crew (the captain and two copilots), the expanded crew being required by the duration of the flight (over 11 hours).

The pilot flying was one of the copilots, seated in the RH seat. The captain was in the LH seat acting as the pilot monitoring. The second copilot was in one of the jump seats in the cockpit.

The first communication with the Madrid control tower took place at 15:26 h, with the crew requesting start-up clearance. At the time the wind was from 210° at 13 kt, gusting to 29 kt.

At 16:02 h, the aircraft was at the runway 15R threshold for takeoff. After this the aircraft executed a CCS 1AS standard instrument departure, as it had been cleared to do.

At 16:13 h the aircraft was cleared to climb to FL240, and a minute later to FL270.

At 16:16:03 h, the number 2 engine experienced a partial fan blade release event (FBO fan blade off), resulting in a loud “bang” followed by strong vibration in the aircraft that persisted for the remainder of the flight. At the time the aircraft was at 24,100 ft and climbing. Its ground speed was 378 kt. The operating parameters for both engines were normal before the fault occurred.

At 16:16:25 h the aircraft declared an emergency (MAYDAY MAYDAY MAYDAY) and its intention to return to Madrid.

At 16:16:38 h, 35 seconds after the event, the crew performed a commanded number 2 engine shutdown.

At 16:17:05 h the aircraft informed ATC of the nature of the emergency, reporting the engine failure. The crew was in constant contact with ATC from that moment on and was given the option to land on the runway of its choice. The crew requested the presence of firefighting teams on the ground during the landing as a preventive measure. As a result of the emergency, the local alarm was activated at the Madrid-Barajas Airport at 16:21 h.

At 16:36:32 h, 20 minutes after the FBO event, the aircraft conducted an overweight landing on runway 18R. The wind was from 240° at 16 kt, gusting to 24 kt. The landing took place without incident.

The aircraft left the runway via taxiway Z10 and then proceeded along taxiways W, MZ, M16, M17 and R7. During the taxi phase a brake overheat warning appeared and there

was a small fire on the number 4 wheel on the left main landing gear. The fire was extinguished by firefighters, who had been notified of the emergency and applied water to the entire undercarriage. The aircraft came to a stop at 16:42 h on taxiway R7.

There was no emergency evacuation and the passengers were deplaned normally starting at 17:10 h via the numbers 2 and 4 left doors. By 17:20 h all of the passengers were off the airplane, at which time they were transported to the T4 terminal on shuttle buses. At 17:41 h the local alarm was deactivated. The passengers were boarded on another flight that same evening.

A subsequent inspection of the engine revealed that the event in the number 2 engine (S/N 41222) had resulted from the detachment of a section of the number 4 fan blade airfoil (S/N RGF18472). The total number of cycles since new (CSN) was 4370 and there were no indications of problems with this component in the maintenance records. The blade exhibited a loss of about 80% of the blade material. The adjacent blade showed damage stemming from the detachment of this blade, with about a 50% loss of material. The nose cowl inlet panel was also perforated.

Analysis of the fracture surfaces on the number 4 fan blade indicates that the release of the section of the blade resulted from a fatigue crack which appears to have initiated in the region of a very small (200 µm) area of unbonded material at the bond line between the aerofoil panel and the internal membrane of the blade. The material either side of the feature was noted to be fully bonded and stress analysis of the blade suggests that this lack of bond feature in itself would be too small to cause a crack to form. Whilst very slight changes in the material microstructure at a microscopic level around the lack of bond area were identified, these were also not significant enough in isolation to account for the crack initiation. The feature is likely to have occurred during the original manufacture of the blade.

The investigation is analyzing the operational and technical aspects of the engine failure. As regards the operational aspects, the handling of the emergency by the flight crew and by airport personnel is being assessed. As for the technical aspects, the investigation is focusing on two issues: a full understanding of the fracture process itself, and the mitigative measures for the remaining blades.

The engine manufacturer, Rolls-Royce, has prepared a plan that introduces periodic inspections to detect fatigue cracks in fan blades, like the one that occurred on blade S/N RGF18472 before they propagate to a critical size.

The investigation is continuing with the participation of investigative authorities in the United Kingdom (AAIB), France (BEA) and the airplane and engine manufacturers. A final report will be published at the conclusion of the investigation.