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COMISIÓN DE
INVESTIGACIÓN
DE ACCIDENTES
E INCIDENTES DE
AVIACIÓN CIVIL

Second Interim Statement IN-005/2014

Serious incident occurred on 9 March 2014 at Tenerife South / Reina Sofía airport (Santa Cruz de Tenerife, Spain) to aircraft Boeing MD-11, registration PH-MCU

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Edita: Centro de Publicaciones
Secretaría General Técnica
Ministerio de Fomento ©

NIPO: 161-16-192-3

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Important notice

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

ºC	Degrees centigrades
ATC	Air Traffic Control
ATPL(A)	Airline Transport Pilot License (Aircraft)
FL	Flight Level
h	Hour (s)
HPT	High Pressure Turbine
LPT	Low Pressure Turbine
n.º	Number
N2	Rotation speed of the HP turbine/compressor assembly

DATA SUMMARY

LOCATION

Date and time	**Sunday, 9 March 2014; 00:30 local time[1]**
Site	**Tenerife South/Reina Sofía airport (Santa Cruz de Tenerife, Spain)**

AIRCRAFT

Registration	**PH-MCU**
Type and model	**Boeing MD-11**
Operator	**Martinair Cargo**

ENGINES

Type and model	**Pratt & Whitney PW4000**
Number	**3**

CREW	Captain	First Officer
Age	**47 years**	**40 years old**
License	**ATPL (A)**	**ATPL (A)**
Total flight hours	**15520 h**	**11620 h**
Flight hours on the type	**8304 h**	**3880 h**

INJURIES	Fatal	Serious	Minor / None
Crew			**2**
Passengers			**1**
Third persons			

DAMAGE

Aircraft	**Minor**
Third parties	**None**

FLIGHT DATA

Opeation	**Commercial Air Transport - Scheduled - International - Cargo**
Phase of flight	**Take-off**

REPORT

Date of approval	**24 February 2016**

[1] At the date of the accident the local time is the same as UTC.

1. SUMMARY OF THE FLIGHT

Aircraft Boeing MD-11, registration PH-MCU, was scheduled from Amsterdam (The Netherlands) to Viracopos (Brazil), with a step-over at Tenerife South/Reina Sofía airport (Spain)

During the take-off at Tenerife South, when the aircraft was at initial climb, the crew heard an anomalous noise and noticed that the aircraft yawed to the right. Shortly afterwards they felt vibrations and observed the engine indications, seeing that the parameters corresponding to engine n.º 3 were not normal. N2 was at 105% and the exhaust temperature was about 875ºC.

They concluded that engine n.º 3 had suffered severe damage. They started to apply the pertinent procedure, and while doing it, they observed that the engine n.º 3 fire alarm activated.

The crew kept applying the procedure they were performing (applied when there is severe damage or engine fire). The fire alarm went off after discharging the first fire extinguishing bottle.

They decided to return to departure airport. They assessed the situation, and considering that the fire alarm had gone off and that they were in good condition to control the aircraft, they decided to discharge fuel in order to diminish weight at landing, before returning the Tenerife South airport.

They asked authorization to ATC to discharge fuel at FL070, being cleared to do so.

They climbed to FL070, and once the necessary fuel load was discharged, they proceeded to return to Tenerife South airport, where they landed without further notice.

Once in the platform a visual inspection was made, realizing that the engine n.º 3 had suffered an uncontained break, originated by a blade breakage. No fuel, hydraulic liquid or oil leaks were observed.

As a consequence of the breakage and the subsequent material output from the engine some damage was produced affecting:

- Pylon and engine n.º 3 nacelle.
- Right wing
- Horizontal stalibizer

2. STATUS OF THE INVESTIGATION

The investigation has focused in establishing the damage suffered in engine n.º 3, trying to identify their sequence. On that purpose the engine was detached and sent to the maintenance shop in Singapore, where the last overhaul was performed. There the engine was disassembled and inspected.

All the damage of the engine, mainly affecting the four stages of the Low Pressure Turbine (LPT) have been identified and documented, and first hypotheses of the failure sequence have been established.

The second stages of the High Pressure Turbine (HPT) as well as all stages of LPT were sent to manufacturer facilities to further inspect them and perform the necessary metallographic analyses.

Measurements were made on the second stage disk of the LPT, as well as metallographic analysis of airfoils and vanes of the fourth stage of the LPT, in order to determine what the sequence of the fractures was, as well as its root cause.

3. NEXT STEPS

The investigation has been finished and the final report will be published shortly.