



CÓPY

MINISTÉRIO DAS OBRAS PÚBLICAS, TRANSPORTES E COMUNICAÇÕES
GABINETE DE PREVENÇÃO E INVESTIGAÇÃO DE ACIDENTES COM AERONAVES
GPIAA

AIR INCIDENT INVESTIGATION – FINAL REPORT

Date/time : 27 th January 2009 @ 14:30 Hours (UTC)				Proc. nr: 05 / SUM / 09	
Operator: HiFly		Owner: International Lease Finance Corp.			Type of incid.: TECN
Local: 350NM West YPDN			Phase of flight: Cruise		Type of flight: N-S F
POB:	Injuries to persons:	Crew	Pax	Other	Damage to the aircraft:
Crew: 2+9	Fatal	0	0	0	None
Pax: 64	Serious	0	0	0	Other damage:
	Minor/None	0	0	-	None
Aircraft Id.: Airbus A-330-322, CS-TMT, MSN 96, 1996, MTOM 215 000KG					
Pilots	PIC: Australian, Swiss, male, born 1962 F/O: Australian, male, born 1959				
Licenses	PIC: ATPL CH-23733/JAA		F/O: UK JAA ATPL 46682IJ		
Flight Experience (PIC)	Total	14 000 hrs		In the previous 90 days	86 hrs
	On incident type	1 850 hrs		In the previous 90 days	86 hrs
Flight Experience (F/O)	Total	N/A		In the previous 90 days	75 hrs
	On incident type	180 hrs		In the previous 90 days	75 hrs



Fig. #1 - The Airbus A330-322 CS-TMT ("Photo copyright by Orry Dryver, www.jetphotos.net")



History of the Flight

The Airbus A330-322, – Portuguese registration CS-TMT –, operated by HiFly, a private company Strategic Aviation Group hired by Australian Defense Force, took off from Darwin International Airport (YPDN), Australia, to Malé International Airport (VRMM), in Hulhulé island – Maldives, with 11 crew members and 64 passengers on board.

Before passengers boarding, the crew noticed a strange smell in whole cabin likened to dead animal rotting evident and reported the episode to maintenance. After inspection nothing abnormal was found, the smell was related to external atmosphere pollution and the crew decided to continue the flight.

Shortly after reaching FL370 and establishing cruise conditions (about 1:10 hours after takeoff), the Annunciator Panel displayed “SMOKE LAV” warning light (LAV 2RH/LH and 3RH). The crew members carried out a visual inspection but found everything normal in lavatories.

Meanwhile, strong odours smell became evident all over the cabin and an extensive inspection was performed but could not reveal its source.

Ten minutes later, “PACK #2 OVERHEAT” caution was exhibit on ECAM, followed by “CPC1 FAULT” indication. Crew performed the recommended corrective checklist action to Pack #2 situation with no success and this pack was kept OFF for the remaining of the flight. CPC1 was successfully reset. Nevertheless, the smell became stronger although no smoke, burning or toxic fumes were ever been noticed during the extensive search accomplished by crew members. Cargo area was inspected by an engineer also aboard and his report reflected normal situation. So the flight crew decided to return to Darwin Airport, performed a holding at FL100 between 20 and 30 NM north of DRW burning fuel to reduce gross weight do MLM (177 000 Kg), - considering an immediate landing if situation required - and the aircraft made an uneventful landing with 183 920 Kg at 16:39¹ hours.

After landing, three of the crewmembers, which were affected by having smelled around the cabin, and also a few passengers, felt unwell and placed on oxygen.

Medical assistance was required and medic reported patient’s symptoms were very common but considered a non serious situation due to the fact they were stable and fine. Nevertheless, those crew elements were admitted in the Royal Darwin Hospital as a precautionary measure and were released following initial medical attention.

¹ The hours mentioned in this report are UTC.

Investigation

The ATSB (Australian AAIB) notified by e-mail the Portuguese AAIB (GPIAA) about the incident on 2009, 2nd February. An investigation according to ICAO Annex 13 was opened on the same day.

The aircraft never experienced similar abnormalities before the flight under analysis.

The Investigator found out that the airplane has just left a Jordanian's aircraft maintenance and engineering company (which offers a range of maintenance, repair and overhaul services for Airbus, Boeing and Lockheed aircrafts) and where the CS-TMT has completed a scheduled C check before the incident flight.

During the subsequent inspection, Hifly engineers detected oil at APU intake and inside the pneumatic ducts from APU to both packs.

It was found a leak of APU oil upward of the bleed duct and to APU Air Intake. No other leaks were detected in the area.

An overfilling of the APU reservoir was suspected.

Downstream Pack #2, the seal connecting two duct sections was sealed incorrectly (Fig. #2).



At Pack #1, the plenum was found partially broken, and the missing part was not found (Fig. #3).



Following the corrective maintenance action, operation of both APU and Bleed System revealed normal behavior on the subsequent flights and the smell in the cabin disappeared.

Hifly Maintenance also inspected the aircraft following the overweight landing in accordance to the AMM Task 05-51-11 PB 601 and nothing abnormal was found.



Analysis

- 1- *The Hifly engineers detected oil at APU intake and also inside the pneumatic ducts from APU to both Packs.*

It is believed that oil travelled to the Packs, pulverize and mix with air, entered into the pax cabin and activated Lavatory Smoke Warning, - although there was no visible smoke -, which explains the strange odor felt by crew and passengers and the dizzy effect caused to the crewmembers that sniff it around the mist.

- 2- *Downstream Pack #2, the seal connecting two duct sections was sealed incorrectly.*

The deficient sealing allowed hot air to escape and creating conditions for the related DUCT OVERHEAT.

- 3- *Pack #1 plenum was found partially broken.*


It is understood that this condition could lead to the Pack instability and, eventually, result into CPC #1 FAULT.


Findings

- All crew members held valid licenses;
- The CS-TMT was registered to the National Aeronautical Record (RAN) and held valid documentation;
- The aircraft had no story of Pressurization and Air Conditioning problems;
- The aircraft has completed a scheduled C check, shortly before the incident flight;
- “SMOKE LAV” warning light and the dizzy effect experimented by crewmembers and some passengers were caused by the degraded cabin atmosphere due to the APU oil pulverized and mixed with the air upcoming into the cabin;
- “PACK #2 OVERHEAT” and “CPC1 FAULT” warnings were perfectly identified by the Hifly Maintenance: incorrect two duct sections sealing, inducing air leak on the downstream Pack #2, in the first case, and pack #1 instability due to the absence of the related plenum, in the second situation;
- The detected abnormalities were supposed to be originated on an incorrect maintenance servicing (APU Oil System overfill may have contributed to the event, as no other leak sources were positively identified in the area);
- The overweight landing didn't affect the aircraft integrity.

Causes

- Lavatory Smoke Detection Warning, as well the strong odor felt by crew and pax, was caused by oil particles vaporization vented through the Bleed ducts from the APU to the Packs and, thus, to the passenger cabin.
- “PACK #2 OVERHEAT” was caused by defective two duct sections sealing (downstream Pack #2), which allowed inducing air leak;
- “CPC1 FAULT” warning was triggered by pack #1 instability originated by the absence of the related plenum.

<u>The Investigator-in-charge</u>	
<u>Date:</u> 10 / 11 / 2009	Artur A. Pereira

ESTÁ CONFORME O ORIGINAL
<u>09 / 09 / 2010</u>


GPIAA
Homologo nos termos do n.º3 do art.º26º do D.L. 318/89, de 11/08
<u>09 / 09 / 2010</u>
O Director

Fernando Ferreira dos Reis

Acronyms

@	At
#	Number
AAIB	Air Accident Investigation Bureau
APU	Auxiliary Power Unit
AMM	Aircraft Maintenance Manual
ATSB	Australian Transport Safety Bureau
ATPL	Air Transport Pilot License
CPC	Cabin Pressure Controller
DRW	IATA code for Darwin International Airport
ECAM	Electronic Centralized Aircraft Monitor
Fig	Figure
FL	Flight Level
F/O	Flight Officer
GPIAA	Portuguese AAIB
Hrs	Hours
ICAO	International Civil Aviation Organization
INCID	Incident
JAA	Joint Aviation Authorities
Kg	Kilograms
LAV	Lavatory
LH	Left Hand
MLM	Maximum Landing Mass
MSN	Manufacturer Serial Number
MTOM	Maximum Take Off Mass
N/A	Not Available
NM	Nautical Miles
N-S F	Non-Scheduled Flight
PAX	Passenger
PIC	Pilot In Command
POB	People On Board
Proc	Process
RAN	National Aeronautical Record
RH	Right Hand
TECN	Technical
UTC	Universal Time Coordinate
VRMN	ICAO code for Malé International Airport
YPDN	ICAO code for Darwin International Airport