



FINAL REPORT

SRI LANKAN AIRLINES AIRBUS A330-300, 4R-ALQ COCKPIT & CABIN SMOKE INCIDENT DURING CLIMB FROM MEL TO CMB AT FL 220, 60NM NORTH-WEST OF MEL AIRPORT ON 12TH FEB 2024

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ABBREVIATIONS AND DEFINITIONS

| | |
|--------|--|
| AAIB | Aircraft Accident Investigation Board |
| ACM | Air Cycle Machine |
| AMSL | Above Mean Sea Level |
| AOC | Airline Operator Certificate |
| ATC | Air Traffic Controller |
| ATPL | Airline Transport Pilot License |
| ATSB | Australian Transport Safety Bureau |
| BEA | Bureau d'Enquetes et d'Analyses |
| CAASL | Civil Aviation Authority of Sri Lanka |
| C of A | Certificate of Airworthiness |
| C of R | Certificate of Registration |
| CMB | Bandaranayake International Airport Colombo |
| CSN | Cycles Since New |
| CVR | Cockpit Voice Recorder |
| DFDR | Digital Flight Data Recorder |
| DGCA | Director General of Civil Aviation |
| EASA | European union Aviation Safety Agency |
| ECAM | Electronic Centralized Aircraft Monitor |
| FC | Flight Cycles |
| FH | Flight Hours |
| FL | Flight Level |
| ft | Feet |
| IATA | International Air Transport Association |
| ICAO | International Civil Aviation Organization |
| LT | Local Time |
| MEL | Melbourne Airport IATA Code |
| METAR | Meteorological Aerodrome Report |
| MOR | Mandatory Occurrence Report |
| MPD | Maintenance Planning Document |
| MRO | Maintenance & Repair Organization |
| MSN | Manufacturers' Serial Number |
| NITS | Nature, Intentions, Time, Special Instructions |
| OFO | Operating First Officer |
| PIC | Pilot in Command |
| RWY | Runway |
| t | Ton |
| TSM | Trouble Shooting Manual |
| TSN | Time Since New |
| UTC | Universal Coordinated Time |
| YMML | Melbourne Airport ICAO Code |



SYNOPSIS

On 12th February 2024 aircraft A330-300, bearing registration 4R-ALQ, UL 605 operated by SriLankan Airlines, departed at 07.16 UTC from Melbourne International Airport (YMML), Australia to Bandaranayake International Airport (VCBI), Colombo, Sri Lanka as a scheduled commercial passenger flight.

During climb at about FL220, 60NM North-West of Melbourne International Airport a strong burning smell and visible smoke in cockpit was observed by the cockpit crew. Smoke was entering the cockpit through air conditioning ducts above the glare shield. The presence of metal dust was also observed with smoke. As it was evident by the Pilot in Command (PIC) that the smoke was emanating from the air conditioning system, PIC switched off both air conditioning packs and halted the climb and initiated a rapid descent to FL90.

In the meantime, Operating First Officer (OFO) announced the “MAY DAY”. At the same time the purser informed the flight deck about the cabin smoke and a cabin emergency call also received in flight deck. The aircraft was levelled off at FL90 and turned towards Melbourne (MEL) and requested the tower to descent further to burn more fuel since the weight was over the Maximum Landing Weight. Clearance was taken and descended to FL70. Passengers were briefed by the PIC and informed them of the decision taken to return to MEL.

Meanwhile Melbourne air traffic control (ATC) has requested the status of the incident and asked whether crew need full emergency or a local priority. The PIC informed that the smoke was under controlled, and they need only a local priority since the smoke is no longer a threat. Since the weight was over the maximum landing weight of the aircraft the aircraft was prepared for an overweight landing, after all the checklists were completed and briefed. The aircraft was landed uneventfully at MEL at 08.23 UTC.

The incident was notified to the Civil Aviation Authority of Sri Lanka (CAASL) by Sri Lankan Airlines Ltd, on 12th February 2024 through an email followed by a Mandatory Occurrence Report (MOR), which was subsequently received by this office.

Pursuant to the Section 56 of Civil Aviation Act, No. 14 of 2010, the CAASL appointed an Aircraft Accident Investigation Board (AAIB) on 26th February 2024 to investigate this incident. The Incident Notification was sent to the Bureau of Enquiry and Analysis for Civil Aviation Safety (BEA- France) and Australian Transport Safety Bureau (ATSB), Australia and the International Civil Aviation Organization (ICAO). Accordingly, Bureau d’Enquetes et d’Analyses (BEA) of France appointed an Accredited Representative with the assistance provided by Airbus and EASA technical advisers. Australian Transport Safety Bureau (ATSB) appointed an accredited representative.

The report is based upon the investigation carried out by the appointed AAIB in accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO) and the Sri Lanka Civil Aviation Act, No. 14 of 2010.

The sole purpose of this investigation is to enhance aviation safety. It is not intended, under any circumstances, to apportion blame or liability.

This report was released by the Civil Aviation Authority of Sri Lanka on the date of 18.09.2024.



1. FACTUAL INFORMATION

1.1 History of Flight

On 12 February 2024, Airbus A330-300 aircraft bearing registration 4R-ALQ, MSN 1687 operated by Sri Lankan Airlines, for scheduled commercial passenger flight UL 605, took off with 211 passengers and 15 crew members from Melbourne International Airport (MEL) to Colombo (CMB) at 07.16 UTC. The aircraft was released by maintenance staff after carrying out the transit check with nil defect from MEL and there was no deferred defect before take-off the flight from MEL as per the technical logs.

The flight proceeded normally from push-back, departure and initial climb from Melbourne International Airport (MEL). During climb at about FL220, 60NM north-west of Melbourne Airport, Victoria a strong burning smell and visible smoke in cockpit was observed by the cockpit crew. Smoke was visible entering the cockpit through air conditioning vents above the glare shield. Presence of the metal dust particles were also observed with smoke. Visibility was reducing at a considerable rate and within a few seconds cockpit was full of smoke.

As it was evident to the Pilot in Command (PIC) that the smoke was emanating from the air conditioning system PIC switched off both air conditioning packs. The cockpit crew donned oxygen masks. PIC halted the climb and immediately initiated a rapid descent to FL90. In the meantime, Operating First Officer (OFO) was requested to declare the “MAY DAY” by the PIC. He announced the “MAY DAY”. At the same time the purser informed the flight deck about the cabin smoke and a cabin emergency call was also received in flight deck.

OFO did the ECAM and executed the QRH smoke check list. Since the packs were off and smoke had dissipated, ram air was turned on to ventilate the cabin. The aircraft was levelled off at FL90 and turned towards MEL and requested the tower to descent further to burn more fuel since the aircraft weight at the time was over the Maximum Landing Weight. Clearance was taken and descended to FL70. Crew removed the masks.

Once settled down, NITS briefing was given by the purser. Passengers were briefed by the PIC and informed them of the decision taken to return to MEL. Meanwhile Melbourne ATC has requested the status of the incident and asked whether crew need full emergency or a local priority. PIC informed that the smoke was under controlled and they need only a local priority since the smoke was no longer a threat.

Since the take-off weight was 223t at MEL and when it was turning back again to MEL it was 218t. The maximum landing weight of the aircraft was 187t. Hence, the aircraft was prepared for an overweight and unscheduled landing after all the checklists were completed and briefed. The aircraft was approached and landed safely at Melbourne International Airport without an incident at 08.23 UTC. Touchdown was at 400ft/min with no auto breaks. The aircraft was vacated via taxiway J and taxied to gate D4 safely at 08.30 UTC.

The circumstances leading to the incident was the failure of the Air Cycle Machine (ACM) of the pack no.1 of the aircraft air conditioning system.



Figure 01: Aircraft path during and after landing

1.2 Injuries to Persons

| INJURIES | CREW | PASSENGERS | OTHERS |
|-------------------|-------------|-------------------|---------------|
| FATAL | 0 | 0 | 0 |
| SERIOUS | 0 | 0 | 0 |
| MINOR/NONE | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 0 |

There were no injuries or fatal to persons as a result of this occurrence

1.3 Damage to Aircraft

No damage to the aircraft other than the damage of the No.1 Air Cycle Machine (ACM) of the aircraft air conditioning system.

1.4 Other Damages

No other damages were sustained by objects other than the aircraft as a result of this incident

1.5 Personnel Information

Personnel qualifications and flying experiences of the flight crew were as follows:



1.1.1. Pilot-In-Command (PIC)

The PIC was forty (40) years old Sri Lankan male, held a valid Airline Transport Pilot License (ATPL), CAASL-72-A-10154, type rated to A320/330 with valid instrument rating which was valid up to 30th November 2024. The medical certificate was a class 1 and valid up to 18 August 2024. Last proficiency check was performed on 09th November 2023 and valid up to 30th November 2024. He was flying within the Flight time limitations and rest time requirements

Flying experience : Total 10194 hrs
: Total as PIC: 5234 hrs
: Total as PIC on A330: 2884 hrs

1.1.2. First Officer

Operating First Officer (OFO) at the time of incident.

The OFO was thirty-four (34) years old Sri Lankan male, held a valid Airline Transport Pilot License (ATPL), CAASL-72-A-10455, type rated to A320/330 with valid instrument rating which was valid up to 31st May 2024. The medical certificate was a class I and was valid up to 04th February 2025. Last proficiency check was performed on 20th May 2023 and valid up to 31st May 2024. He was flying within the Flight time limitations and rest time requirements

Flying experience : Total: 4496 hrs
: Total as PIC: 2820 hrs
: Total as PIC on A330: 2367 hrs

1.1.3. Other pilots: (Relief Pilot)

The Relief Pilot was forty-seven (47) years old Sri Lankan female, held a valid Airline Transport Pilot License (ATPL), CAASL-72-A-10182, type rated to A320/330 with valid instrument rating which was valid up to 30th November 2024. The medical certificate was a class I and was valid up to 19th September 2024. Last proficiency check was performed on 12th November 2023 and valid up to 30th November 2024. She was also on duty as the relief pilot and within the flight time limitations and rest time requirements. She was having a total of 12051:63 hrs. flying experience.

1.6 Aircraft information:

- a) Type and Model : Airbus A330-343
- b) Manufacturer's Serial No. : 1687
- c) Certificate of Registration (C of R) : Registered in Sri Lanka Civil Aircraft Register
C of R - No. 286. Reg. No. 4R-ALQ,
- d) Certificate of Airworthiness (C of A) : No.240 and valid till 20th December 2024
- e) Total Airframe Hours : FH 39237.79 / FC 6820
(as at 12th February 2024)
- f) No. of Engines & Type : 02 numbers of Trent 772B Engines



| | Serial Number | Total Hours |
|-----------------|---------------|-------------------------|
| Engine 1 | 42558 | TSN 31687.68 / CSN 6735 |
| Engine 2 | 42535 | TSN 31208.61 / CSN 6697 |

- g) Operated by : Sri Lankan Airlines Ltd.
- h) Air Operator Certificate No : 01/2004
- i) Validity of AOC : 29th January 2025
- j) Maintained by : Approved schedule maintenance work of the aircraft was being carried out by Sri Lankan Airlines Ltd which was an approved AMO by CAASL and the line maintenance of the aircraft at Melbourne International Airport (MEL), Australia was carried out by Heston MRO, which was an approved maintenance organization by the CAASL and valid till 24th November 2024.

1.7 Meteorological information:

Meteorological conditions were not affected to the incident

1.8 Aids to navigation:

Aids to navigation were not affected to the incident

1.9 Communication:

During the flight two-way communication was established with Melbourne (North) tower and no communication problems were reported by the crew with any of the ATC facilities that handled the incident flight.

1.10 Aerodrome Information

- Airport type : Public
- Owner : Australia Pacific Airports Corporation
- Operator : Australia Pacific Airports Melbourne
- Location : Melbourne Airport VIC 3045
- Elevation AMSL : 434 ft / 132 m
- Time zone : Local Time - UTC+ 10.00
- Coordinates : 37°40'24"S, 144°50'36"E
- ICAO Code : YMML
- IATA Code : MEL



Runways : 16/34 & 09/27
Length : 3,657m & 2,286m
Surface : Asphalt

1.11 Flight Recorders :

DFDR and CVR were installed in the aircraft, and they were in serviceable and satisfactory condition to obtain the information.

1.12 Wreckage and Impact Information:

No wreckage were there due to the incident

1.13 Medical And Pathological Information:

As a result of this occurrence, no medical or pathological investigations were required.

1.14 Fire

Since the full emergency status were not requested and only the local priority was requested by the crew because the smoke was under controlled, fire services of Melbourne airport were on standby and followed the aircraft to the stand.

1.15 Survival Aspect:

Nil

1.16 Test And Research:

No.1 Air Cycle Machine (ACM) of the air condition system was removed and sent to the manufacturer for investigation. Investigation report was received by the AAIB.

1.17 Organizational And Management Information

Operator : SriLankan Airlines Ltd
Address of the Operator : Airline Centre, Bandaranayake International
Airport, Katunayake, Sri Lanka
Registered Owner (as per C of R) : Sapphire leasing I (AOE 5) Limited.
C/O PAFS Ireland Limited
Address of Registered Owner : Unit J, block 1, Shannon Business Park,
Shannon Co. Clare, VI4EV57, Ireland
Air Operator Certificate : No. 01/2004, issued by the Director General
of Civil Aviation & Chief Executive Officer
of Civil Aviation Authority of Sri Lanka,
valid till 29th January 2025.



1.18 Additional Information:

Nil

1.19 Useful or Effective Investigation Techniques:

DFDR readings, CVR readings and ACM manufacturer's investigation reports were reviewed and obtained the relative information.

2. ANALYSIS

2.1. Post-incident emergency procedure

2.1.1. The PIC halted the climb and initiated a rapid descent from FL220 to FL90. In the meantime, Operating First Officer (OFO) was requested to declare the "MAY DAY" by the PIC. He announced the "MAY DAY".

2.1.2. OFO did the ECAM and started the smoke check list. Since the packs were off and smoke had dissipated RAM air was turned on to ventilate the cabin.

2.1.3. NITS briefing was given by the purser. Passengers were briefed by the PIC and informed them the decision taken to return back to MEL.

2.1.4. Even it was announced the "MAY DAY" finally the full emergency status were not requested by the crew because the smoke was under controlled. Because of only local priority was requested, MEL airport fire services were on standby and followed the aircraft to the stand.

3. CONCLUSION

3.1 Findings

3.1.1. Aircraft had valid Certificate of Airworthiness and Certificate of Registration.

3.1.2. The aircraft was properly maintained and airworthy to conduct commercial operation

3.1.3. The Pilot in Command and the First Officer held valid pilot license and medical certificates.

3.1.4. Overweight landing has been performed.

3.1.5. At the post flight troubleshooting and inspections as per applicable TSM it had been observed that Pack 1 - ACM had seized and metal particles were inside the ducts.

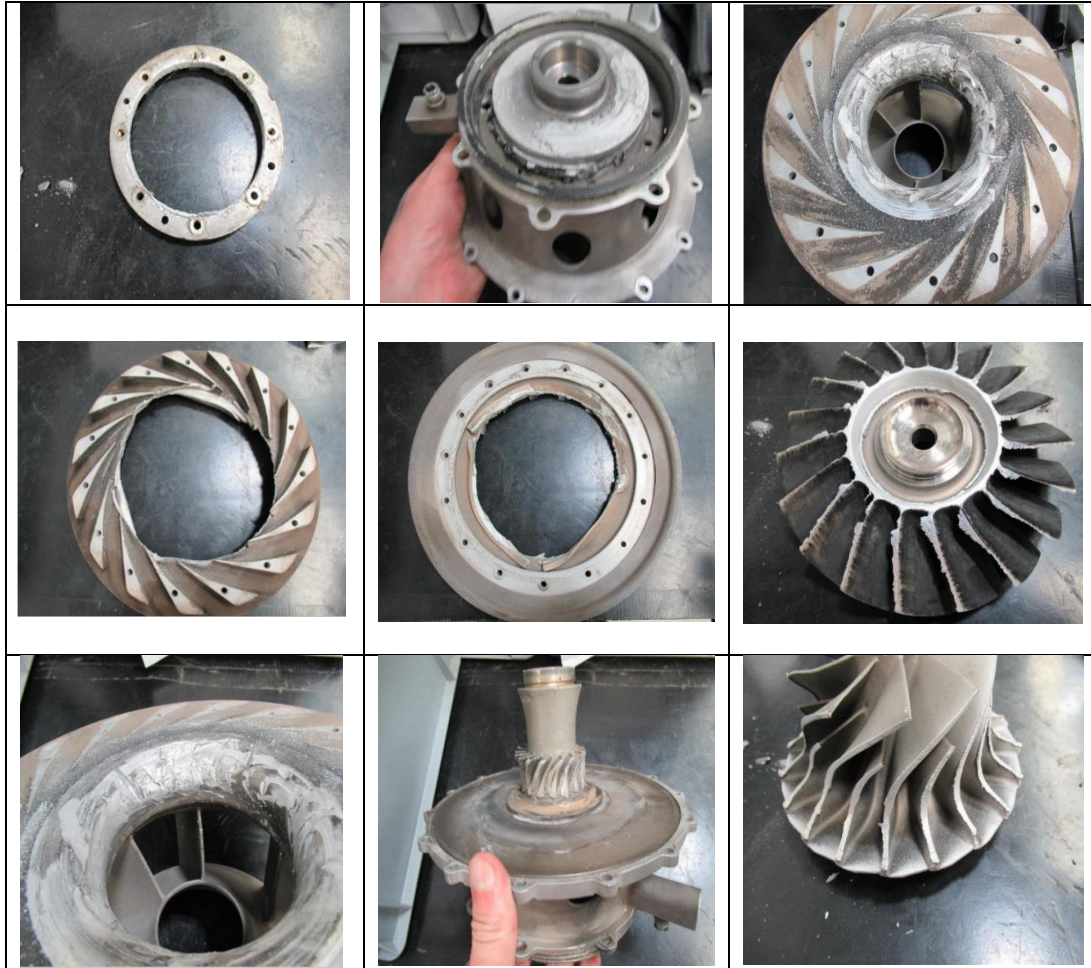


Figure 02: Pictures of Damaged parts of the ACM

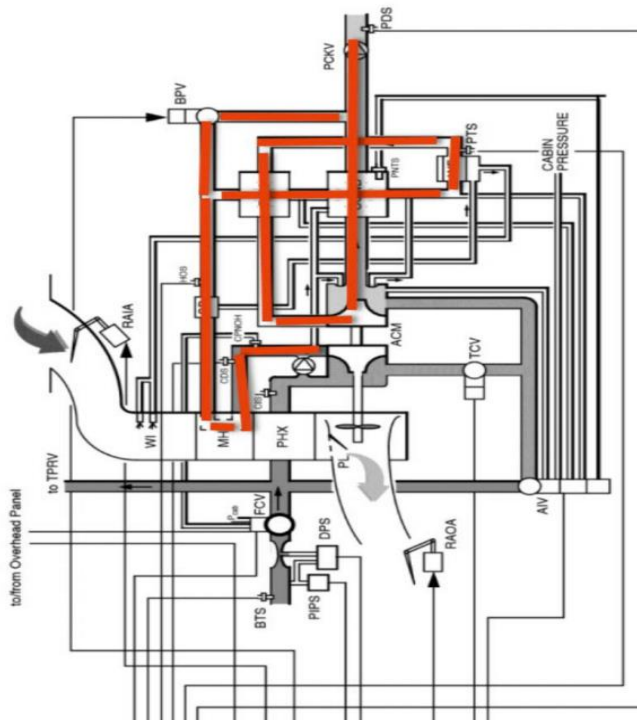


Figure 03: Air conditioning System diagram with ACM location



- 3.1.6. Affected ACM was found with rotating assembly has been seized with excessive internal damage.
- 3.1.7. There were no MPD tasks related to the ACM.
- 3.1.8. The ACM had been installed at the time of delivery of the aircraft from the manufacturer Airbus in December 2015. No inspection, cleaning, or removals had been performed until the occurrence of the incident since there were no MPD tasks related to the component.
- 3.1.9. The Pack-related MPD tasks
- MPD 215354-01: Cleaning and detailed inspection for the erosion of Pack water injector had performed on 2 nd November 2023.
 - MPD 215200-24-1: Discard of flexible hose (each 18000FH) from air cycle machine between compressor and turbine had performed on 10th September 2023
- 3.1.10. The ACM manufacturer evaluation reports that the component failure cannot be detected due to the level of disintegrations of the unit.

3.2. Causes / Contributing Factors

- 3.2.1. Seizure of the ACM was the most probable cause of this incident.
- 3.2.2. But the ACM manufacturer's evaluation reports that the component failure cannot be detected due to the level of disintegration of the unit.

4. SAFETY RECOMENDATIONS

- 4.1. A task against the ACM has to be introduced to the operator's reliability programme.
- 4.2. A customized soft time interval for inspection, cleaning and overhaul of the ACM shall be introduced by the operator with their reliability figures.

-END-