AIRCRAFT SERIOUS INCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:		**CA18/3/2/1458**	
Aircraft Registration	**ZS-SXJ**	**Date of Incident**	27 October 2024			**Time of Incident**	0715Z
Type of Aircraft	Airbus A330-300			**Type of Operation**		Commercial (Part 121)	
Pilot-in-command Licence Type	Airline Transport Pilot Licence (ATPL)			**Age**	53	**Licence Valid**	Yes
Pilot-in-command Flying Experience		**Total Flying Hours**		21872.3		**Hours on Type**	809.6
Last Point of Departure	Cape Town International Airport (FACT), Western Cape Province						
Next Point of Intended Landing	O.R. Tambo International Airport (FAOR), Gauteng Province						
Damage to Aircraft	None						
Location of the incident site with reference to easily defined geographical points (GPS readings if possible)							
Five (5) nm west of Loxton, Western Cape province, at Global Positioning System (GPS) co-ordinates determined to be 31°29'19.7"S 022°14'33.4"E, at an elevation of 41000 feet							
Meteorological Information	Surface Wind: 235˚- 244˚ at 21kts; Temperature: 10.1˚C; Dew Point: 2˚C; QNH: 1007hPa						
Number of People On-board	2+10+211	**Number of People Injured**	4	**Number of People Killed**	0	**Other (On Ground)**	0
Synopsis							

On Sunday morning, 27 October 2024, two pilots, 10 crew members and 211 passengers on-board an Airbus A330-300 aircraft with registration ZS-SXJ were on a scheduled flight from Cape Town International Airport (FACT) in Western Cape province to O.R. Tambo International Airport (FAOR) in Gauteng province when the serious incident occurred. Visual meteorological conditions (VMC) by day prevailed at the time of the flight which was conducted under the provisions of Part 121 of the Civil Aviation Regulations (CAR) 2011 as amended.

The crew reported that whilst en route to FAOR at flight level (FL) 410, the aircraft started to oscillate between pitch-up and pitch-down movements. The first officer, who was the pilot flying (PF), immediately noticed the speed trend vector increasing to approximately 40 knots (kts) into overspeed (red barber pole) protection area. To prevent overspeed, the PF disconnected autopilot (AP) to arrest the up and down pitch movements. Thereafter, the PF instructed the pilot monitoring (PM) to request a descent from the air traffic control officer (ATCO) so as to increase the margins between the high- and low-speed protections. The PM turned ON the seatbelt sign and requested a descent to FL 390. The aircraft descended to FL390 without further incident. The oscillation, which was followed by overspeed, and vertical indicators occurred within a few seconds of each other. There was no indication of turbulence on the synoptic charts or predictions in the Aviation Routine Weather Report (ARMS).

The cabin crew was serving breakfast at the time of the serious incident; the food and hot beverages fell from the trolleys and spilled on the floor. As a result, four cabin crew members sustained minor to serious injuries. A structural inspection of the aircraft was performed after the serious incident; no damage was found.

Probable Cause and/or Contributory Factors			
The aircraft flew into clear air turbulence which led to the up and down oscillation of the aircraft; as a result, the cabin crew members incurred injuries as they were serving breakfast, including hot beverages, at the time. **Contributing Factor** The PF disregarded the Airbus Pilot's Operating Handbook (POH) and disengaged the autopilot without proper communication to the PM at the time of the incident. The aircraft weather radar did not show any significant weather in the vicinity. Poor Crew Resource Management.			
SRP Date	14 October 2025	Publication Date	15 October 2025

Occurrence Details

Reference Number	**:** CA18/3/2/1458
Occurrence Category	**:** Serious Incident
Type of Operation	**:** Part 121 (Commercial)
Name of Operator	**:** South African Airways
Aircraft Registration	**:** ZS-SXJ
Aircraft Make and Model	**:** Airbus A330-300
Nationality	**:** South African
Place	**:** Loxton 31°29’19.7"S 022°14'33.4"E
Date and Time	**:** 27 October 2024 at 0715Z
Injuries	**:** 4
Damage	**:** None

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to apportion blame or liability.

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Investigation Process

The Accident and Incident Investigations Division (AIID) of the South African Civil Aviation Authority (SACAA) was notified of the occurrence on 24 October 2024 at 0715Z. The occurrence was classified as a serious incident according to the CAR 2011 Part 12 and the International Civil Aviation Organisation (ICAO) STD Annex 13 definitions. The notifications were sent to the State of Registry, Operator, Design and Manufacturer in accordance with the CAR 2011 Part 12 and the ICAO Annex 13 Chapter 4. The State of design and manufacture appointed an accredited representative and advisor. The investigator did not dispatch to the serious incident site.

Notes:

1. *Whenever the following words are mentioned in this report, they shall mean the following:*
   Serious Incident — this investigated serious incident
   Aircraft — the Airbus A330-300 involved in this serious incident
   Investigation — the investigation into the circumstances of this serious incident
   Pilot — the pilot involved in this serious incident
   Report — this serious incident report

2. *Photos and figures used in this report were taken from different sources and may have been adjusted from the original for the sole purpose of improving clarity of the report. Modifications to images used in this report were limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or addition of text boxes, arrows, or lines.*

Disclaimer

This report is produced without prejudice to the rights of the SACAA, which are reserved.

Table of Content

Abbreviation	Description
°	Degrees
°C	Degrees Celsius
AIID	Accident and Incident Investigations Division
AMM	Aircraft Maintenance Manual
AP	Autopilot
BKN	Broken (clouds)
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CAS	Calibrated Air Speed
CAT	Clear Air Turbulence
CCM	Cabin Crew Member
CCMM	Cabin Crew Members Manual
CEO	Chief Executive Officer
CRS	Certificate of Release to Service
DFO	Director of Flight Operations
DQS	Director Quality and Safety
ERP	Emergency Response Plan
FACT	Cape Town International Airport
FAOR	O.R. Tambo International Airport
FC	Flight Courier
FDCM	Flight Deck Crew Member
FEW	Few (clouds)
FEW	Few Clouds
FL	Flight Level
FO	First Officer
ft	Feet
hPa	Hectopascal
IAW	In Accordance With
kt	Knots
m	Metres
METAR	Meteorological Aerodrome Report
MMO	Maximum Mach Operating
MSG	MeteoSat Second Generation
QNH	Altitude Above Mean Sea Level
QRG	Quick Response Guide
SAA	South African Airways
SAAT	South African Airways Technical
SACAA	South African Civil Aviation Authority
SAWS	South African Weather Service
SCCM	Senior Cabin Crew Member
SCT	Scattered Clouds
TOL	Time Over Limit
Vls	Lowest Selectable Speed
VMO	Maximum Operating Speed
Z	Zulu (Term for Universal Co-ordinated Time - Zero Hours Greenwich)

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1. On Sunday morning, 27 October 2024 at 0620Z, two pilots, 10 crew members and 211 passengers on-board an Airbus A330-300 aircraft with registration ZS-SXJ and operating as SAA314 took off on a scheduled flight from Cape Town International Airport (FACT) in Western Cape province to O.R. Tambo International Airport (FAOR) in Gauteng province. Visual meteorological conditions (VMC) by day prevailed at the time of the flight which was conducted under the provisions of Part 121 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.1.2. According to the first officer (FO) who was the pilot flying (PF), 33 minutes into the flight whilst at flight level FL 410, the speed trend arrow suddenly increased and the aircraft started to gain momentum slowly. The FO stated that she immediately noticed the speed trend vector increasing to approximately 40 knots (kts) into overspeed (red barber pole) protection area. During this time, the seat belt sign was OFF, and the cabin crew was serving breakfast to passengers.

1.1.3. The FO immediately disconnected the autopilot (AP) and flew manual, gently pitching the aircraft down to approximately 1.5 to 2 degrees, which stopped speed acceleration. The speed trend vector then indicated a trend toward the vertical indicator/vertical protection (Vls/Vprot) range as the aircraft descended; this was a 40 to 50 kts change in the speed trend vector. The oscillation, which was followed by the rapid approach of the speed trend vector to overspeed and vertical indicators, occurred within a few seconds of each other.

Figure 1: The ZS-SXJ position during clear air turbulence. (Source: SAA)

1.1.4. The FO instructed the captain, who was the pilot monitoring (PM), to request a descent from the air traffic control officer (ATCO). Therefore, the captain turned ON the seat belt sign and requested a descent to FL 390. The aircraft descended to FL 390 without further incident. Later, the purser (chief flight attendant) came into the cockpit to explain that four of the 10 cabin crew members had sustained injuries, and that none of the passengers was injured. The cockpit crew made a public address announcement about the incident and that they would conduct an aircraft inspection at FAOR. According to the cockpit crew, there was no indication of turbulence on the synoptic charts or predictions in the Aviation Routine Weather Report (ARMS).

1.1.5. The serious incident occurred near Loxton, Western Cape province, during daylight at Global Positioning System (GPS) co-ordinates determined to be 31°29’19.7" South 022°14'33.4" East, at an elevation of 41000 feet (ft).

1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	-	1	-	1	-
Minor	-	3	-	3	-
None	2	6	211	219	-
Total	**2**	**10**	**211**	**223**	**-**

Note: Other means people on the ground.

1.2.1. The injured crew was taken to a medical centre for treatment; they were discharged later the same day.

1.3. Damage to Aircraft

1.3.1. The aircraft structure did not sustain any damage. According to Airbus, an inspection must be carried out after severe turbulence encounter in accordance with (IAW) A330-300 AMM 05-51-17-200-801-A PAR 4A, 4D REV 57 dated 1 October 2024. The inspection was undertaken, and no structural defects were found.

1.4. Other Damage

1.4.1. None.

1.5. Personnel Information – Captain (Pilot Monitoring)

Nationality	South African	Gender	Male	Age	53
Licence Type	Airline Transport Pilot Licence (ATPL) Aeroplane				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Night, Instrument and Flight Instructor Grade 1				
Medical Expiry Date	31 January 2025				
Restrictions	Yes				
Previous Incidents	None				

Note: Previous incidents refer to past serious incidents the pilot was involved in, when relevant to this serious incident.

Flying Experience:

Total Hours	21872.3
Total Past 90 Days	187.8
Total on Type Past 90 Days	45.2
Total on Type	809.6

Personnel Information – First Officer (Pilot Flying)

Nationality	South African	Gender	Female	Age	55
Licence Type	Airline Transport Pilot Licence (ATPL) Aeroplane				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Night, Instrument and Flight Instructor Grade 2				
Medical Expiry Date	31 May 2025				
Restrictions	Yes				
Previous Incidents	None				

Note: Previous incidents refer to past serious incidents the pilot was involved in, when relevant to this serious incident.

Flying Experience:

Total Hours	14706.23
Total Past 90 Days	129.23
Total on Type Past 90 Days	123.23
Total on Type	1838.05

1.5.1. The captain was first issued a Private Pilot Licence (PPL) on 17 February 1997. At the time of the serious incident, he had an Airline Transport Pilot Licence (ATPL) that was reissued on 31 January 2024 with an expiry date of 31 January 2025. The aircraft type was endorsed on the ATPL.

1.5.2. The captain had a Class 1 aviation medical certificate that was issued on 16 January 2024 with an expiry date of 31 January 2025 with restrictions.

1.5.3. The FO was first issued a PPL on 5 April 2001. At the time of the serious incident, she had an Airline Transport Pilot Licence (ATPL) that was reissued on 22 April 2024 with an expiry date of 31 May 2026. The aircraft type was endorsed on the ATPL.

1.5.4. The FO had a Class 1 aviation medical certificate that was issued on 13 May 2024 with an expiry date of 31 May 2025 with restrictions.

1.5.5. All cabin crew members on duty had valid cabin crew licences on the aircraft type and valid medical certificates. Their licences indicated that they had current validity in live firefighting, wet ditching, first aid and safety and emergency procedure ability training.

1.6. Aircraft Information

(Source: https://www.airbus.com)

1.6.1. *The SAA's A330-300 are configured in a comfortable two-class cabin layout with 46 seats in Business Class and 203 in Economy class seats.*

1.6.2. *SAA has selected the latest 242-tonne Maximum Take-off Weight variant of the A330-300, which incorporates a new aerodynamic package enabling the aircraft to cover distances of up to 6350 nautical miles (11750km) in flights up to 15 hours in duration. This payload/range capability allows the aircraft to be deployed across SAA's long-haul, intra-Africa and peak domestic routes. The A330-300s share the same cockpit configuration, operating philosophy and procedures with SAA's existing fleet of Airbus widebody jetliners. This high degree of commonality across the fleet is fundamental to achieving low operating, maintenance and training costs.*

Airframe:

Manufacturer/Model	Airbus A330-300	
Serial Number	1754	
Year of Manufacture	2016	
Total Airframe Hours (At Time of Serious Incident)	16139.25	
Last Inspection (Date & Hours)	09 October 2024	15958.36
Airframe Hours Since Last Inspection	180.89	
CRS Issue Date	24 September 2024	
C of A (Issue Date & Expiry Date)	14 December 2023	13 December 2025
C of R (Issue Date) (Present Owner)	14 December 2023	
Operating Category	Part 121	
Type of Fuel Used	Jet A1 Fuel	
Previous Incidents	None	

Note: Previous incidents refer to past serious incidents the aircraft was involved in, when relevant to this serious incident.

Engine: Number 1

Manufacturer/Model	Rolls Royce LTD 772C-60
Serial Number	42739
Hours Since New	16270.05
Hours Since Overhaul	TBO

Engine: Number 2

Manufacturer/Model	Rolls Royce LTD 772C-60
Serial Number	42769
Hours Since New	16270.05
Hours Since Overhaul	TBO

1.7. Meteorological Information

1.7.1. The weather information below was extracted from the aircraft incident report that was drafted and issued by the South African Weather Service (SAWS) recorded at De Aar Military Base (FADY) on 27 November 2024 between 0600Z and 0800Z. The serious incident site was 101 nm from FADY.

Wind Direction	235˚ - 244°	Wind Speed	21kt	Visibility	9999m
Temperature	10°C	Cloud Cover	BKN	Cloud Base	3000ft
Dew Point	2°C	QNH	1007hPa		

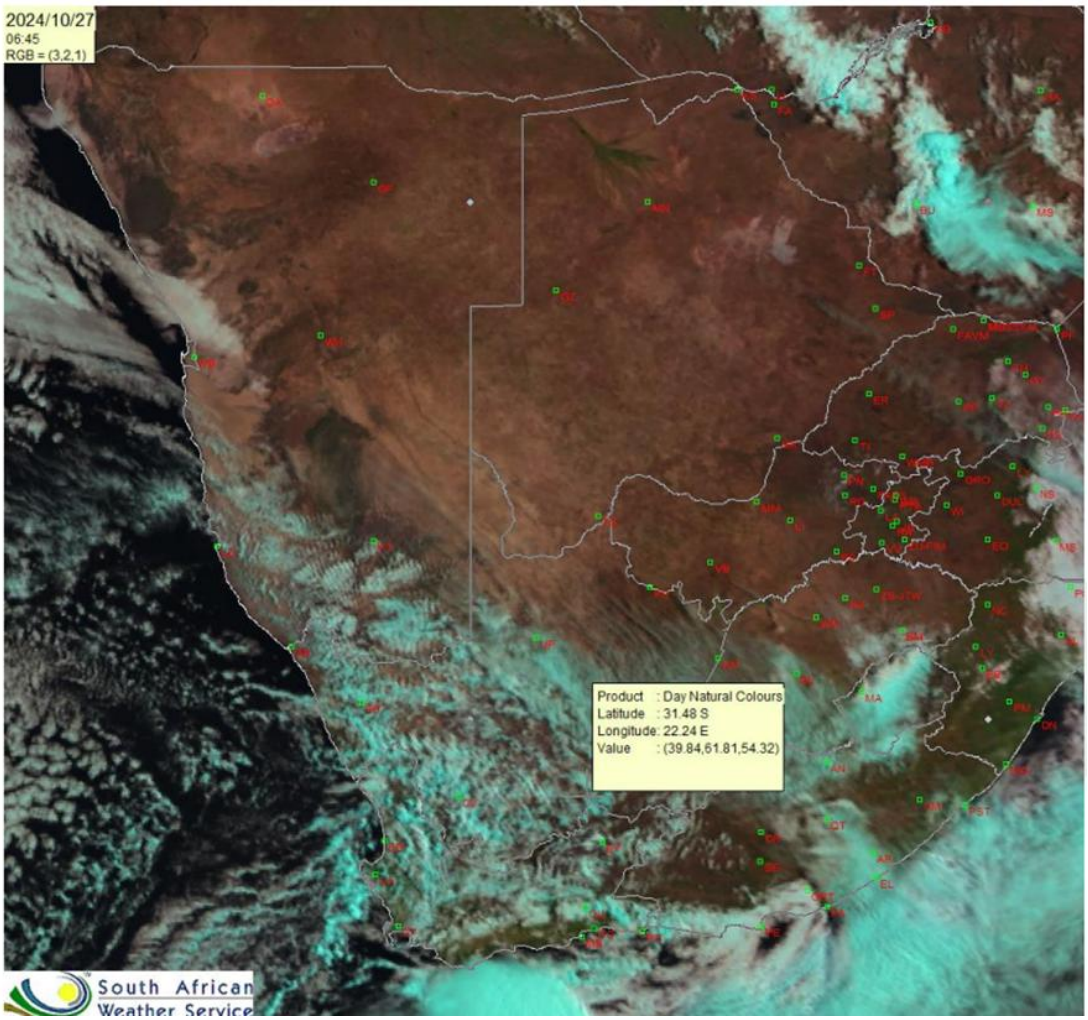


Figure 2: Day natural colours satellite image. (Source: EUMETSAT)

1.7.2. The day natural colours satellite image (below) of the MeteoSat Second Generation (MSG) taken at 0645Z indicated low clouds below the serious incident area (at 0645Z). Based on the satellite image, the low-level turbulence was evident in the cloud structure. Also, high-level turbulence was observed in the high-level clouds (see Figure 2).

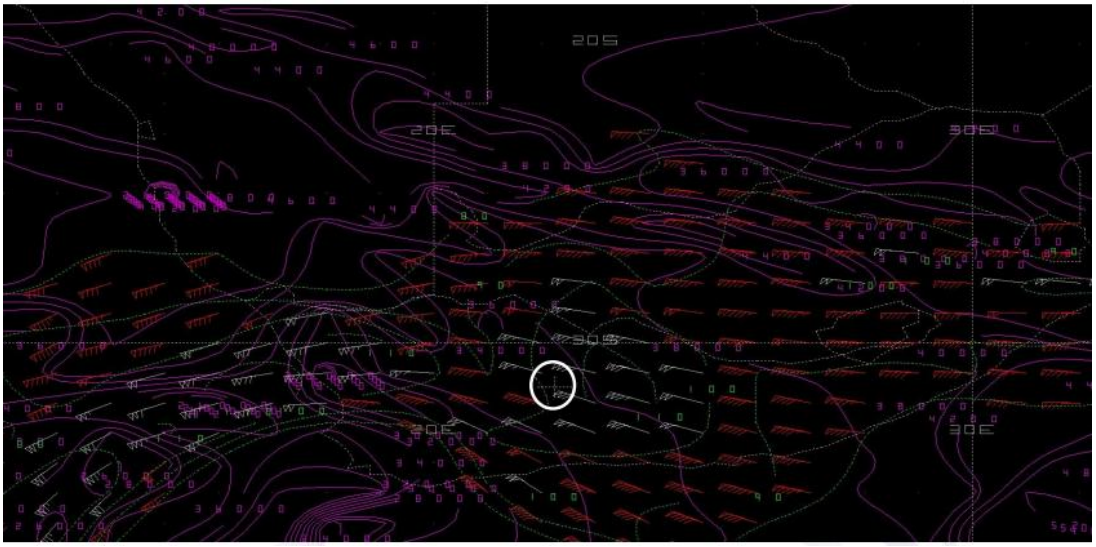


Figure 3: Forecast model output showing the area of jet stream over the serious incident area. (Source: SAWS)

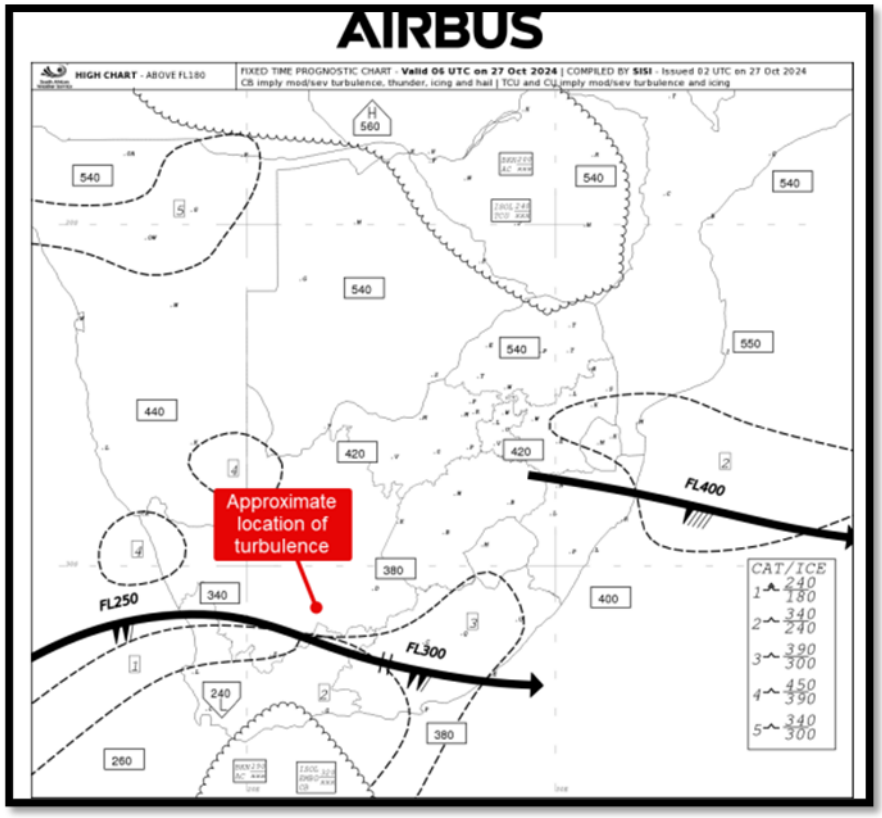


Figure 4: Weather interpretation by Airbus. (Source: Airbus)

1.7.3. The satellite imagery and synoptic message at 0600Z indicated the strong winds reported at the surface corresponded with the strong winds observed on the global forecast model between FL 340 and FL 450. The report also noted that at certain areas close to the serious incident area, the winds were greater than 60 kts. The winds also decreased from 100 kts at FL 360 to 80 kts at FL 410. Figure 3 indicates strong jet stream over the serious incident area.

1.8. Aids to Navigation

1.8.1. The aircraft was equipped with standard navigational equipment as approved by the Regulator (SACAA). There were no records indicating that the navigational equipment was unserviceable prior to the serious incident.

1.9. Communication

1.9.1. The aircraft was equipped with a standard communication system as approved by the Regulator. There were no recorded defects with the communication system prior to the serious incident.

1.10. Aerodrome Information

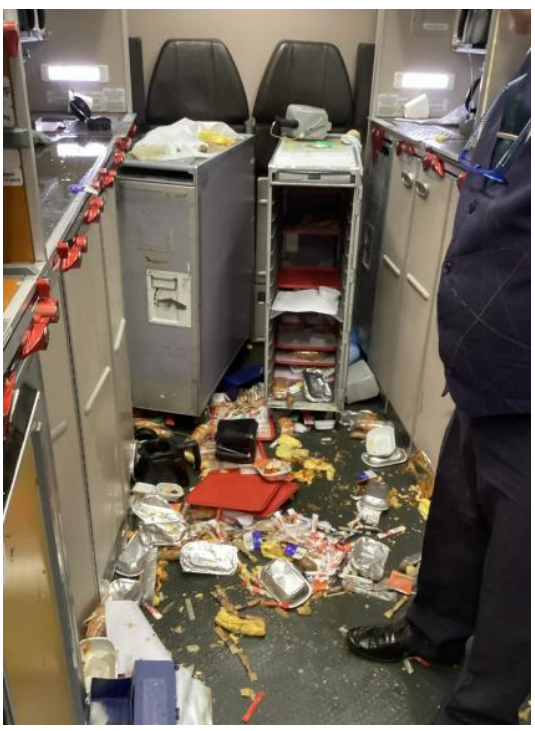
1.10.1. The serious incident occurred at FL 410 near Loxton, Western Cape province.

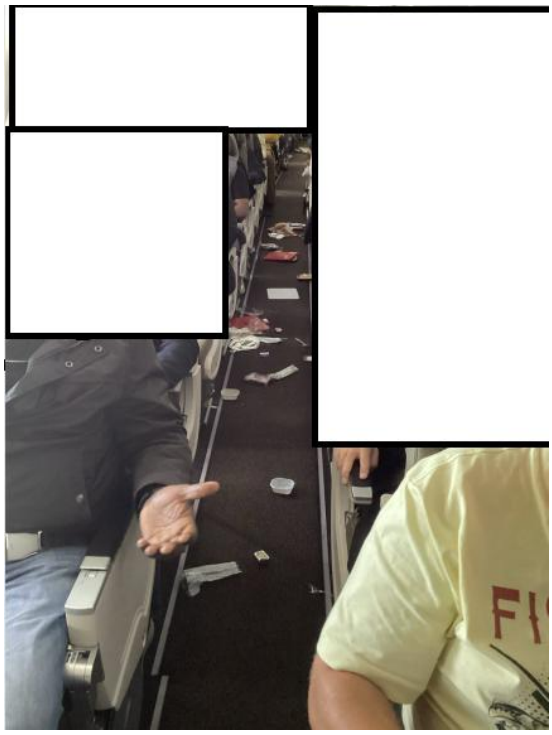
1.11. Flight Recorders

1.11.1. The aircraft was equipped with a flight data recorder (FDR) and a cockpit voice recorder (CVR) as required by regulation. The serious incident was reported on 29 October 2024 through AIID Inbox and, therefore, the FDR data of 27 October 2024 had already been overwritten. The quick access recorder (QAR) data was available; it was downloaded at the South African Airways Technical (SAAT) on 12 November 2024.

1.12. Wreckage and Impact Information

1.12.1. The aircraft encountered clear air turbulence whilst cruising at FL 410; the seat belt sign was OFF, and all passengers were seated. At the time, the cabin crew was serving breakfast. There was no turbulence warning from the cockpit crew as the weather radar did not detect it. The aircraft lost height rapidly and there was an increase in airspeed which led to the cabin crew in the aft galley sustaining injuries after losing balance. Some of the cabin crew members hit against the ceiling and other parts of the aircraft whilst others were burnt by hot beverages. Contents in the food trolleys spilled to the floor and some trolleys and other catering equipment fell to the cabin floor. Of the 10 cabin crew members, three sustained minor injuries, and one had serious injuries. During the occurrence, cabin crew members had instructed the passengers to fasten their seat belts and stow away lose items.





Figures 5 and 6: Food that had spilled to the floor (right). Most passengers had their seat belts on (left). (Source: SAA)

1.13. Medical and Pathological Information

1.13.1. The four cabin crew members were assessed at the medical centre in Kempton Park near FAOR; they were released the same day.

1.14. Fire

1.14.1. None.

1.15. Survival Aspects

1.15.1. The occurrence was severe but survivable. The cabin area was affected with four cabin crew members sustaining injuries; the event lasted 56 seconds before the aircraft levelled off at FL 390.

1.16. Tests and Research

1.16.1. The following content was extracted from the Airbus report that was produced on 28 March 2025 using QAR data and uploaded by SAAT:

"We can observe that the turbulence was located close to the jet stream which was below the aircraft. Such areas are known to be prone to clear air turbulence (CAT). Wind components were recomputed based on the provided QAR data. The analysis of the wind components indicated significant wind variations on the three axis (longitudinal, lateral and vertical) and was consistent with the crew report of CAT event."

1.16.2. *Load Overspeed Report*

Load overspeed report which was generated by the aircraft during the serious incident was shared by SAAT to Airbus. It contained the following information:

- Max Calibrated Air Speed (CAS): 262 kts vs Maximum operating speed (VMO) = 330 kts.
- Max (Mach number) Mn: 0.875 vs (Maximum Mach Operating) MMO = 0.86. (ΔMn = 0.015) and duration (9s).
- Time Over Limit (TOL): 9s
- Load factors variations (during the overspeed window): 0.738G to 1.588G
This load report confirmed an overspeed (MMO) event of limited amplitude (ΔMn = 0.015) and duration (9s).

1.16.3 Overspeed Prevention Technique

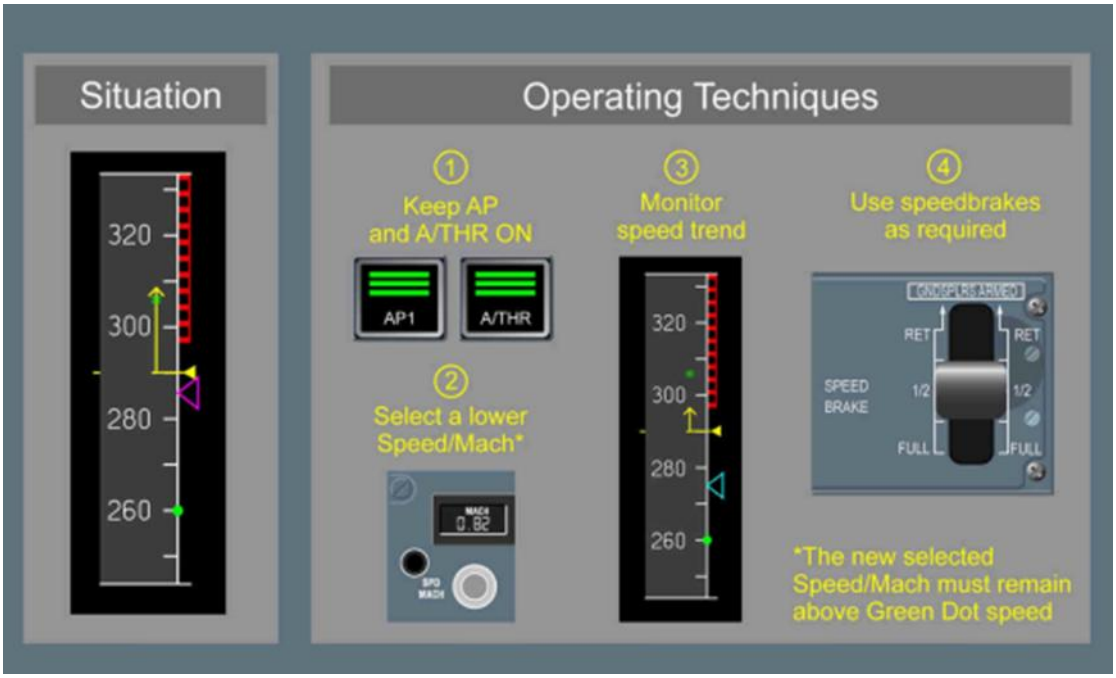


Figure 7: Instrument set up to prevent overspeed.

If the aircraft encounters significant speed variations close to VMO/MMO during the flight, the following operating techniques apply: It is recommended to keep the auto pilot (AP) and autothrust (A/THR) engaged. This enables to keep the intended flight path while thrust reduces to idle, if necessary. The flight crew selects a lower target speed to increase the margin to VMO/MMO.

However, the flight crew should not reduce the target speed below Green Dot, which is the minimum recommended speed during the flight. After the selection of the lower target speed, the flight crew monitors the speed trend arrow on the primary flight display (PFD). If the aircraft continues to accelerate, and if the speed trend arrow approaches or exceeds VMO/MMO, the flight crew uses the appropriate position of speed brakes depending on the rate of acceleration. The length of the speed trend arrow is a good indication of the rate of acceleration.

Note: The use of speed brakes is an efficient deceleration, meaning that it is certified for the whole flight envelope. However, the use of speed brakes results in a reduction of the speed envelope. The use of speed brakes increases VLS (lowest selectable speed) and reduces the buffet margin at high altitude. The use of speed brakes results in a pitch-up effect, but the AP and the normal law compensate for it.

1.16.4 Overspeed Recovery Technique

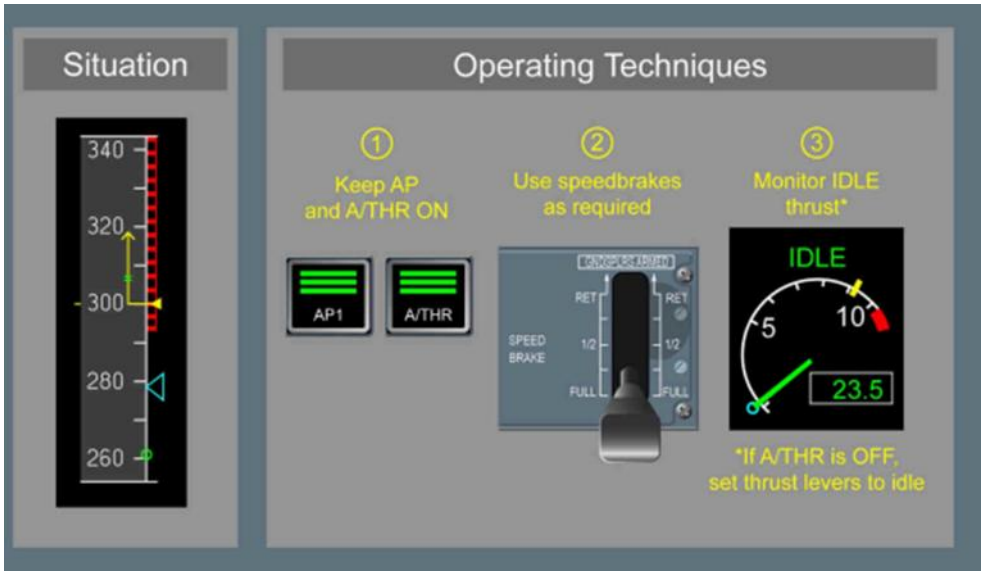


Figure 8: Instrument set up to recover from overspeed.

The flight crew must apply the overspeed recovery technique if the speed/Mach exceeds VMO/MMO. The OVERSPEED alert is triggered if the speed/Mach exceeds VMO +4 kt/MMO+M 0.006 and lasts until the speed is below VMO/MMO. The flight crew should keep the AP engaged. To minimise overspeed, the flight crew should extend the speed brakes to the most appropriate lever position depending on the overspeed situation. If the A/THR is ON, keep it engaged and check that the thrust is reducing to idle. There is no operational advantage in manually setting all thrust levers to idle for overspeed recovery. The engine thrust reduction is the same in both cases. If the A/THR is OFF, set all thrust levers to idle. In the case of severe overspeed, the AP automatically disengages and then the high-speed protection activates (except in direct law). As a result, the aircraft encounters an automatic pitch up. Note: The AP does not automatically disengage as soon as the speed reaches the green bars (that represent the threshold when the high-speed protection activates) on the PFD. The AP disengagement depends on the speed variations and the high-speed protection logic.

1.16.5 Simulation with AP ON

A simulation has been performed to assess the aircraft behaviour if the AP had been kept engaged, as recommended by the (Flight Crew Technique Manual) FCTM.

First, the event has been replayed to establish a reference simulation (blue curves below). Once this simulation was found satisfactory in terms of comparison with the event flight, a back-to-back simulation was conducted with the AP ON (red curves). The airspeed (CAS)

excursion above VMO/MMO would have been slightly increased with the AP ON (+5kts, +1.5s), but it would still have remained limited in amplitude (less than 10 kts) and duration.

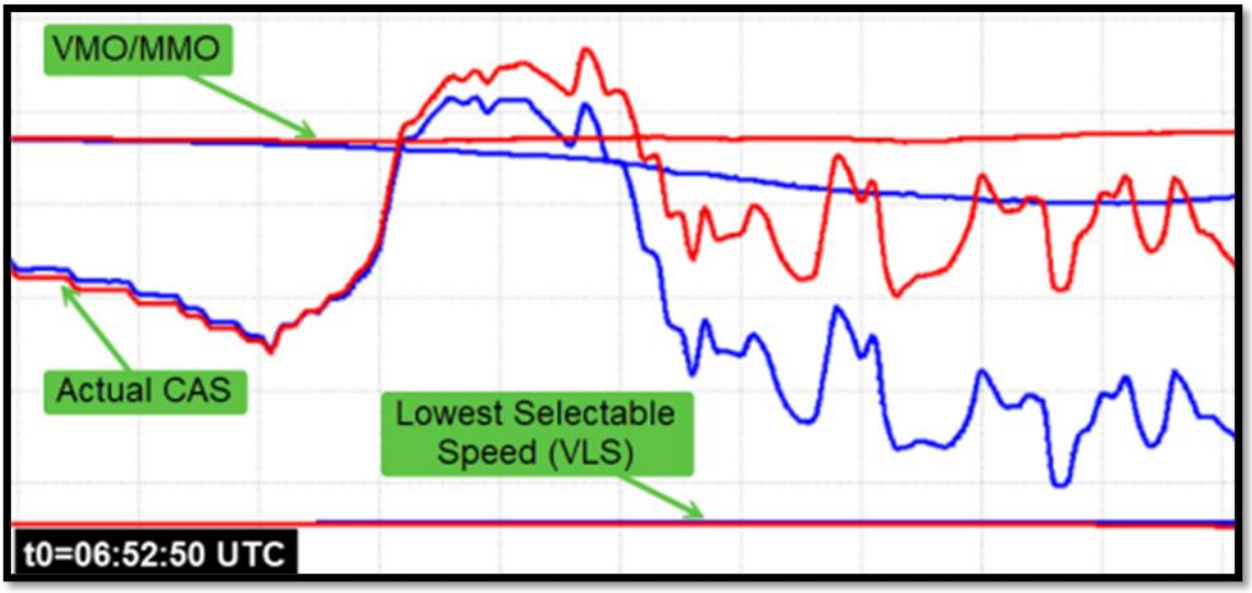


Figure 9: The red line indicates the handling of the aircraft with AP ON.

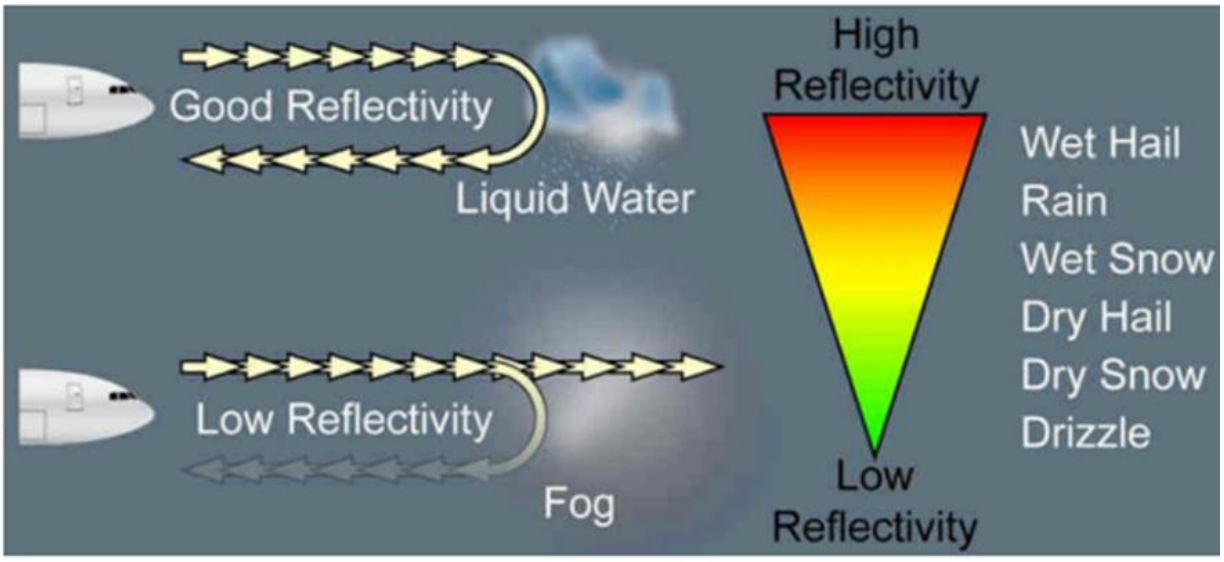


Figure 10: Aircraft weather detection.

Weather detection is based on the reflectivity of water droplets. The weather echo appears on the navigational display (ND) with a colour scale that goes from red (high reflectivity) to green (low reflectivity). The intensity of the weather echo is associated with the droplet size, composition and quantity (e.g. the reflectivity of a water particle is five times more than an ice particle of the same size). The flight crew must be aware that the weather radar does not detect weather that has small droplets (e.g. clouds or fog), or that does not have droplets (e.g. clear air turbulence).

The settings of the weather radar were consistent with the operational guidance (FCOM section 34-20-30-30):

MULTISCAN switch AUTO: Activates Multiscan mode. Multiscan controls the tilt automatically and combines two scans done at different tilt angles to optimise weather detection and minimise ground clutter.

Display Mode selector on 'WX+T+HZD': Weather, Turbulence and Hazard mode (recommended position): The ND indicates precipitation, turbulence areas in magenta (within 40 NM) and hazard prediction risk areas. Hazard prediction function is available when the MULTISCAN switch is set to AUTO.

1.16.6 Interviews were conducted with the cockpit crew to establish why the AP was disengaged when the Airbus Pilot's Operating Handbook (POH) recommends keeping it engaged. The first interview was with the captain. He indicated that when the turbulence started and the trend vector (shows what the speed will be in 10 seconds) was pointing towards overspeed, he assumed the FO would deploy speed brakes to arrest the situation. Instead, the FO disengaged the AP without mentioning anything to him (captain). The FO instructed him (captain) to request FL 390 due to turbulence. The captain stated that he knew the procedure and felt the situation was still under control, which is why he did not intervene. He further stated that the instruments were still legible and felt it was not severe. He indicated that the AP cannot be re-engaged if there are warning sounds that have been triggered. After levelling off at FL 390, he checked with the cabin crew members and that is when they (cockpit crew) were advised that four of the 10 cabin crew members were injured and that food trolleys had fallen over, spilling food onto the floor.

1.16.7 The second interview was a week later with the FO. The Airbus report and the official weather report were shared with the FO prior to the interview. Her response was as follows:

"The actual speed remained steady, only the speed trend vector increased into the overspeed regime as the aircraft porpoised downwards and the speed trend vector, likewise, showed a trend downwards towards Vls, as the aircraft porpoised upwards. The speed trend vector (not the actual speed) was fluctuating between Vls and overspeed as the aircraft porpoised.

At no point during this time did the overspeed warning trigger. That is simply inaccurate.

The AP was disconnected to hold a level attitude to stop the porpoising of the aircraft (up and down) and, thereby, settle the speed trend vector.

The high angle-of-attack warning was never triggered. That is simply not true. In fact, there were no exceedances experienced on the flight deck.

Speed brake was not used as we were at 41 000 feet, and the speed trend was showing fluctuations both between Vls and overspeed as it porpoised upwards and downwards. Extending speed brake at this high altitude would have compromised the margin between VLS and our actual speed. The plane descended to 39 000 feet to increase the margin

between overspeed and Vls, and no further unstable air, as experienced.
A speed trend vector entering either the overspeed area for a few seconds or likewise, towards the VLS area, does not constitute an overspeed event."

1.16.8 The FO insisted that the aircraft never exceeded the MMO or the 18˚ pitch up angle-of-attack and that no master warning was triggered; she further stated that the data used to compile the Airbus report did not come from the aircraft in which she was flying. The investigator requested the FO to explain the circumstances regarding the four injured cabin crew members and the trolleys that fell during the flight. The FO stated that she did not know.

1.16.9 The operator's safety manager confirmed that the data used was downloaded from the affected aircraft and was sent to Airbus for further analysis.

1.17. Organisational and Management Information

1.17.1. The flight was conducted in accordance with the provisions of Part 121 (Commercial) of the CAR 2011 as amended.

1.17.2. The aircraft maintenance organisation (AMO) which certified the last maintenance inspection (annual inspection) prior to the accident flight had an approved AMO Certificate that was issued by the Regulator on 9 October 2024 with an expiry date of 31 October 2025.

1.17.3. The operator had an approved Class 1 Air Service Licence for domestic and international schedule flights, which was issued on 16 June 2025 by the Department of Transport. The licence authorised the carrier to operate under the following categories: Type S1 – transport of passengers between two or more specified points, and Type S2 – transport of cargo or mail between two or more specified points.

1.17.4. The operator had an Air Operator Certificate (AOC) that was issued on 16 June 2025 by the Regulator with an expiry date of 31 July 2026. The aircraft was duly authorised to operate under the AOC.

1.18. Additional Information

1.18.1. Standard Operating Procedures (Source: Cabin Crew Member Manual – CCMM REVISION: 21.2 | Dated 4 February 2022 SAA)

Duties On-board 4
Cabin Crew Roles and Responsibilities

1.18.2. *Based on the level of turbulence described, cabin crew members (CCMs) must be aware of*

the appropriate actions to be taken regarding service duties and passenger management.

1.18.3. *In preparation for and/or when encountering turbulence in-flight and the 'Fasten Seat Belt' signs are switched on; the senior cabin crew member (SCCM) shall immediately make an announcement to instruct passengers to securely stow all loose items and/or baggage and immediately return to their seats and fasten their seatbelts. It is the responsibility of the CCMs to ensure passengers comply with the 'Return to Your Seat' and 'Fasten Seat Belt' light instruction.*

1.18.4. *At all times during turbulence and especially during moderate levels and above, the most appropriate response for CCMs is self-preservation. Flight deck crew members (FDCM) should inform CCMs of anticipated turbulence and if the CCMs experience uncomfortable turbulence without notification from the FDCMs, they may discontinue non-safety related duties, secure themselves in their seats, and inform the flight crew.*

1.19. Useful or Effective Investigation Techniques

1.19.1. None.

2. ANALYSIS

2.1. General

From the available evidence, the following analysis was made with respect to this serious incident. This shall not be read as apportioning blame or liability to any organisation or individual.

2.2. Analysis

2.2.1. The pilots' ATPL licences and their medical certificates as well as those of the affected cabin crew members were valid. The first officer (FO) was the pilot flying (PF), and the captain was the pilot monitoring (PM).

2.2.2. The flight departed from Cape Town International Airport (FACT) in Western Cape province and was scheduled to stop at O.R. Tambo International Airport (FAOR) in Gauteng province. The aircraft took off at 0620Z and climbed to FL 410. The autopilot (AP) was engaged during the climb phase and cruise phase at FL 410. The cabin crew members had started serving breakfast at the time the serious incident occurred and the seat belt sign was OFF. *The cabin crew always advises passengers to keep their seat belts on even if the sign is OFF*.

2.2.3. According to the aircraft's data report at 06:53:09Z, the aircraft was cruising at 243.3 kts (Mach 0.816) and the vertical speed was 0. At 06:53:21Z, the aircraft encountered clear air turbulence (CAT); as a result, the speed trend arrow suddenly increased and the aircraft started to gain momentum slowly. The increase and decrease occurred a few times which prompted the FO to disengage the AP at 06:53:29Z and, thereafter, she informed the captain to request a descent to FL 390 whilst she (PF) was manually engaged in recovering the aircraft from the turbulence. The aircraft recorded a maximum airspeed of 258 kts (Mach 0.860) and a vertical speed of -2176 ft/min. During this period, the aircraft's level fluctuated from 41176 ft to 40404 ft. The AP was engaged again at 06:54:13Z. The height fluctuations continued until the aircraft descended to FL 390 at 06:55:29Z.

2.2.4. As the cabin crew members were serving breakfast at the time of the serious incident, they suffered most injuries because they were standing. Moreover, there was no turbulence warning issued. The crew members who were in the aft galley were thrown around the cabin with food spilling off from the trolleys. Some of the injuries involved burns caused by hot beverages. Even though the passengers were startled and some screamed, none of the passengers was injured. The seat belt sign was switched to ON before the descent to FL 390.

2.2.5. According to the official weather report, jet streams were predicted in the vicinity of the flight. Jet streams are preferred by pilots as they save time and fuel. The report also noted that at certain areas close to the serious incident area, the upper winds were greater than 60 kts. The winds also decreased from 100 kts at FL 360 to 80 kts at FL 410. The weather radar which was set to weather, turbulence and hazard mode ('WX+T+HZD') within 40 nm in the aircraft did not show any clouds even though at lower levels there were broken clouds at a base of 3000 ft; hence, they were not aware of the turbulent condition. As a result, the cockpit crew did not alert the cabin crew about the turbulence or change the seat belt sign to ON.

2.2.6. The Airbus report indicated that there was a load overspeed during the turbulence but did not exceed the manufacturer limits:

- Max Calibrated Air Speed (CAS): 262 kts vs Maximum operating speed (VMO) = 330 kts.
- Max (Mach number) Mn: 0.875 vs (Maximum Mach Operating) MMO = 0.86. (ΔMn = 0.015) and duration (9s).
- Time Over Limit (TOL): 9s
- Load factors variations (during the overspeed window): 0.738G to 1.588G
This load report confirmed an overspeed (MMO) event of limited amplitude (ΔMn = 0.015) and duration (9s).

2.2.7. When the aircraft encountered turbulent conditions, the trend vector initial indication was towards overspeed and that is when the aircraft pitched down and, a few seconds later,

pitched up, changing the trend towards Vls. The FO thought the aircraft would stall; it seemed as though the FO did not immediately recognise that they had flew into clear air turbulence (CAT). During the interview, the FO insisted that the aircraft was porpoising like riding a wave, and not in turbulence. Without confirming with the captain, the FO disengaged the AP and tried to settle the aircraft on her own, which resulted in her chasing the aircraft (chasing the aircraft means that the pilot's reaction is not matching the aircraft's movement). In the Airbus report, there were four instances where the angle-of-attack was triggered and, at those times, the PF's *side stick was in the nose-down direction*. The report also indicated that the aircraft experienced a 0 G-load factor during that period which was likely the period when some of the cabin crew members were injured.

2.2.8. The captain indicated that he was unable to see the FO's input as the side stick was on his right-hand side. The FO did not follow the Airbus' Flight Crew Technique Manual (FCTM) Overspeed Prevention Technique which recommends keeping the AP engaged and deploying appropriate speed brakes level if an overspeed condition is impending. The aircraft exceeded MMO for 9 seconds and triggered an overspeed warning which lasted 4 seconds but the FO said she did not hear any warnings. The captain confirmed that they received the warnings; however, due to protocol, he did not see the need to intervene since the situation was still contained. The captain may have not intervened since the FO was more experienced on the aircraft type and he may have been complacent when he assumed the PF would complete the actions required in line with the AFM. This was evident in his statement "He indicated that when the turbulence started and the trend vector was pointing towards overspeed, he assumed the FO would deploy speed brakes to arrest the situation".

2.2.9 The simulation conducted by Airbus demonstrated that the aircraft recovers faster and the turbulence fluctuations are less when speed brakes are deployed and AP is engaged.

3. CONCLUSION

3.1. General

From the available evidence, the following findings, causes and contributing factors were made with respect to this serious incident. These shall not be read as apportioning blame or liability to any organisation or individual.

To serve the objective of this investigation, the following sections are included in the conclusion heading:

- **Findings —** are statements of all significant conditions, events, or circumstances in this serious incident. The findings are significant steps in this serious incident sequence, but they are not always causal or indicate deficiencies.
- **Causes —** are actions, omissions, events, conditions, or a combination thereof, which led to this serious incident.

- **Contributing factors —** are actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the serious incident occurring, or would have mitigated the severity of the consequences of the serious incident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil, or criminal liability.

3.2. Findings

Personnel Information

3.2.1. The captain was first issued a Private Pilot Licence (PPL) on 17 February 1997. At the time of the serious incident, he had an Airline Transport Pilot Licence (ATPL) Aeroplane. The ATPL was reissued on 31 January 2024 with an expiry date of 31 January 2025. The licence had the aircraft type endorsed on it.

3.2.2. The captain had a Class 1 aviation medical certificate that was issued on 16 January 2024 with an expiry date of 31 January 2025 with restrictions.

3.2.3. The first officer was first issued a PPL on 5 April 2001. At the time of the serious incident, she had an ATPL Aeroplane. The ATPL was reissued on 22 April 2024 with an expiry date of 31 May 2026. The licence had the aircraft type endorsed on it.

3.2.4. The first officer had a Class 1 aviation medical certificate that was issued on 13 May 2024 with an expiry date of 31 May 2025 with restrictions.

3.2.5. All cabin crew members on duty had valid cabin crew licences on the aircraft type and valid medical certificates. Their licences also indicated that they had a current validity in live firefighting, wet ditching, first aid and safety and emergency procedure ability training.

3.2.6. The PF deviated from the Airbus procedure and disengaged the autopilot during the overspeed condition. The PM did not intervene.

Aircraft

3.2.7. The last A-ADHOC check inspection of the aircraft was conducted and certified on 23 September 2024 at 15 822.4 airframe hours. The serious incident occurred at 16 139.25 airframe hours. The aircraft accrued 316.85 hours since the last inspection. The Certificate of Release to Service (CRS) was issued on 23 September 2024 with an expiry date of 21 November 2025 or at 16 822.4 airframe hours, whichever occurs first.

3.2.8. The aircraft had a valid Certificate of Airworthiness (C of A) that was issued by the Regulator on 14 December 2023 with an expiry date of 13 December 2024. The aircraft was airworthy when it was dispatched for the flight.

3.2.9. The aircraft Certificate of Registration (C of R) was issued to the present owner on 14 December 2023.

3.2.10. The operator had an Air Operator Certificate (AOC) which was issued on 16 June 2025 by the Regulator with an expiry date of 31 July 2026. The aircraft was duly authorised to operate under the AOC.

3.2.11. The aircraft structure was inspected as per the aircraft maintenance manual (AMM) section 05-51-17 and it followed Airbus recommendations: Amber Inspection of the Aircraft - Red Inspection of the Trimmable Horizontal Stabilizer and Elevator were found to be in good condition.

3.2.12. The aircraft reached Max (Mach number) Mn: 0.875 vs Maximum Mach Operating (MMO): 0.860. The difference was 0.875-0.860=0.015) for 9 seconds.

3.2.13. Simulation exercises conducted with the autopilot (AP) set to ON indicated that the overspeed situation would have remained within limits and the recovery faster.

Weather

3.2.14. Weather radar in the aircraft does not detect weather that has small droplets or clear air turbulence. On the day of the serious incident, the sky was clear; this meant that the navigational display was green and could not detect clear air turbulence around it.

3.2.15. The reported strong winds at the surface corresponded with the strong winds on the global forecast model (GFS) between FL 340 and FL 450. According to the weather report, the wind speed was greater than 60 kts. The wind speed decreased from 100 kts at FL 360 to 80 kts at FL 410.

3.3. Probable Cause/s

3.3.1 The aircraft flew into clear air turbulence which led to the up and down oscillation; as a result, the cabin crew members incurred injuries as they were serving breakfast, including hot beverages, at the time.

3.4. Contributory Factor/s

3.4.1. The PF disregarded the Airbus Pilot's Operating Handbook (POH) and disengaged the autopilot without proper communication to the PM at the time of the incident.

3.4.2. The aircraft weather radar did not show any significant weather in the vicinity.

3.4.3. Poor Crew Resource Management.

4. SAFETY RECOMMENDATIONS

4.1. General

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report. The AIID expects that all safety issues identified by the investigation are addressed by the receiving States and organisations.

4.2. Safety Recommendation/s

4.2.1. None.

5. APPENDICES

5.1. None.

This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa