



AIRCRAFT SERIOUS INCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:		CA18/3/2/1460	
Aircraft Registration	ZS-ZWY	Date of Serious Incident	27 October 2024		Time of Serious Incident	1058Z	
Type of Aircraft	Boeing 737-800		Type of Operation		Air Transport Operation, Passenger (Part 121)		
Pilot-in-command Licence Type	Airline Transport Licence (ATPL)		Age	34	Licence Valid	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		6 534		Hours on Type	3 400	
Last Point of Departure	Cape Town International Airport (FACT), Western Cape Province						
Next Point of Intended Landing	Lanseria International Airport (FALA), Gauteng Province						
Damage to Aircraft	Minor						
Location of the incident site with reference to easily defined geographical points (GPS readings if possible)							
Runway 07 at Lanseria International Airport (FALA) at Global Positioning System (GPS) co-ordinates determined to be 25°56'22.89" South 027°55'32.07" East, at an elevation of 4521 feet (ft)							
Meteorological Information	Surface wind: 320°/24.34Gkts; Temperature: 26°C; Dew point: 12°C; CAVOK						
Number of People On-board	2+4+184	Number of People Injured	0	Number of People Killed	0	Other (On the Ground)	0
Synopsis							
<p>On Sunday, 27 October 2024, a crew of six members on-board a Boeing 737-800 aircraft with registration ZS-ZWY took off on a scheduled commercial flight SFR313 from Cape Town International Airport (FACT) in Western Cape province to Lanseria International Airport (FALA) in Gauteng province. One hundred and eighty-four (184) passengers were on-board the aircraft. After landing at FALA during taxi, the right-side outboard wheel bearing ceased to function. As a result, the flight crew increased thrust to maintain taxi speed. Later, the aircraft was brought to a complete stop in the designated parking bay.</p> <p>During the post-flight walk-around inspection, the aircraft maintenance engineer (AME) noticed smoke that was emanating from the right main wheel assembly. Later, further examination revealed evidence of metal deposits in the affected assembly, indicating potential overheating or mechanical failure.</p> <p>The investigation determined that the failure was likely caused by the disintegration of the inner bearing mount due to thermal embrittlement of the base material caused by exposure to extreme heat. The extreme heat was caused by frictional heating brought about by bearing sleeve rotation within the wheel hub bearing bore. The sleeve rotation within the bearing bore was caused by the inner wheel bearing that had ceased to function.</p>							

Probable Cause

The failure was likely caused by the disintegration of the inner bearing mount due to thermal embrittlement of the base material. This embrittlement resulted from exposure to extreme heat, which was generated by friction due to rotation of the bearing sleeve within the wheel hub bearing bore. The sleeve rotation occurred because of a ceased inner wheel bearing.

Contributory Factors

- Pre-existing bearing surface damage, including spalling and rolling contact fatigue, might have caused or exacerbated the loss of pre-load during operation.
- Absence of component level tracking for on-condition items, such as limited visibility into the bearing's prior service history and condition.
- Unknown maintenance history of the wheel assembly prior to induction into service, which introduced uncertainty of the initial state of the bearing.

SRP Date

9 December 2025

Publication Date

10 December 2025

Occurrence Details

Reference Number : CA18/3/2/1460
Occurrence Category : Category 1 (Serious Incident)
Type of Operation : Air Transport Operation, Passenger (Part 121)
Name of Operator : Safair
Aircraft Registration : ZS-ZWY
Aircraft Make and Model : Boeing 737-800
Nationality : South African
Place : Lanseria International Airport, Gauteng Province
Date and Time : 27 October at 1058Z
Injuries : None
Damage : Minor

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 that happened on 27 October 2024 at 1058Z. 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 States did not appoint an accredited representative and/or advisor. Investigators were not dispatched to the site for this serious incident.

Notes:

- Whenever the following words are mentioned in this report, they shall mean the following:
Serious Incident — this investigated serious incident
Aircraft — the Boeing 737-800 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*
- 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 South African Civil Aviation Authority (SACAA), which are reserved.

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Abbreviation	Description
°	Degrees
°C	Degrees Celsius
AGL	Above Ground Level
AIID	Accident and Incident Investigation Department
AME	Aircraft Maintenance Engineer
AMO	Aircraft Maintenance Organisation
AOC	Air Operating Certificate
ATC	Air Traffic Control
ATPL	Airline Transport Licence
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CRS	Certificate of Release to Service
CVR	Cockpit Voice Recorder
FACT	Cape Town International Airport
FALA	Lanseria International Airport
FCTM	Flight Crew Training Manual
FDR	Flight Data Recorder
FDM	Flight Data Monitoring
FO	First Officer
Ft	Feet
GPS	Global Positioning System
hPa	Hectopascal
IATA	International Air Transport Association
kg	Kilogram/s
kt	Knot/s
m	Metre/s
METAR	Meteorological Aerodrome Report
MTOW	Maximum Take-off Weight
PF	Pilot Flying
PIC	Pilot-in-command
PSI	Pounds per square inch
QAR	Quick Access Recorder
QNH	Altitude Above Mean Sea Level
SACAA	South African Civil Aviation Authority
SAWS	South African Weather Service
TBO	Time Between Overhauls
Vref	Landing Reference Speed or the threshold crossing speed
UTC	Co-ordinated Universal Time (GMT)
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, a Boeing 737-800 aircraft with registration ZS-ZWY was on a scheduled domestic flight SFR313 from Cape Town International Airport (FACT) in Western Cape province to Lanseria International Airport (FACT) in Gauteng province. Two pilots, four cabin crew and 184 passengers were on-board the aircraft. The flight was conducted under the provisions of Part 121 of the Civil Aviation Regulations (CAR) 2011, as amended.
- 1.1.2. The pilot-in-command (PIC) was the pilot monitoring (PM) and the first officer (FO) was the pilot flying (PF). The crew reported that the aircraft took off from FACT with no defects recorded in the aircraft's technical logbook (TL).
- 1.1.3. Upon reaching FALA, the crew performed a normal landing on Runway 07 after an uneventful flight from FACT. Once on the taxiway, the crew noticed that to maintain the normal taxi speed, a thrust of 40% N1 which was higher than normal, was required. With the increased thrust, there was no noticeable difficulty in maintaining the aircraft in a straight line until the aircraft reached the parking bay. Normally, an aircraft should be able to taxi using minimal engine thrust.

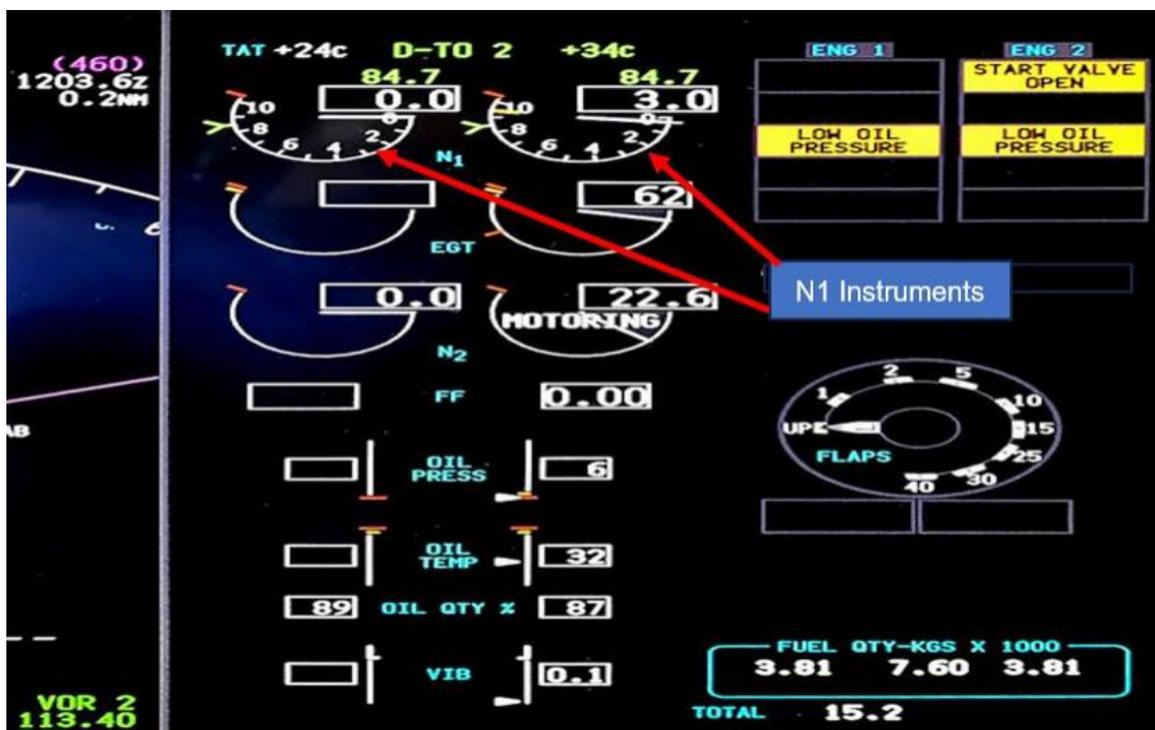


Figure 1: Boeing 737 sample of cockpit instruments. (Source: <http://www.b737.org.uk/powerplant.htm#engin>)

- 1.1.4. Only the Number 4 main wheel assembly and the bearing were damaged; no person was injured.

1.1.5. The serious incident occurred during the day whilst the aircraft was taxiing at FALA at Global Positioning System (GPS) co-ordinates determined to be 25°56'22.89" South 027°55'32.07" East.



Figure 2: The approximate serious incident site (red star) on Runway 07 at FALA. (Source: Google Earth)

1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	2	4	184	190	-
Total	2	4	184	190	-

Note: Other means people on the ground.

1.3. Damage to Aircraft

1.3.1. The Number 4 main wheel assembly sustained significant damage, specifically to the inboard hub and the inner bearing. The inboard hub exhibited structural fracturing and surface discolouration, indicative of thermal and mechanical distress. The inner bearing showed signs of overheating, material degradation, and physical damage consistent with excessive friction or possible bearing stoppage. The extent of the damage rendered both components unserviceable and necessitated their removal for further analysis.



Figure 3: The red circle highlights the area of damage.

1.4. Other Damage

1.4.1. None.

1.5. Personnel Information (Pilot-in-Command)

Nationality	South African	Gender	Male	Age	34
Licence Type	Airline Transport Pilot Licence (ATPL)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Instrument, Flight Instructor Grade 3				
Medical Expiry Date	31 January 2025				
Restrictions	VDL (valid only with correction for defective distant vision)				
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	6 534
Total Past 24 Hours	4.06
Total Past 7 Days	11.17
Total Past 90 Days	144.58
Total on Type Past 90 Days	144.58
Total on Type	3 400

- 1.5.1. The pilot-in-command (PIC) was initially issued an Airline Transport Pilot Licence (ATPL) on 19 August 2016 under the provisions of Part 61 of the CAR 2011. The licence was revalidated on 17 March 2024 with an expiry date of 31 May 2025.
- 1.5.2. The PIC had a Class 1 medical certificate that was issued on 17 January 2024 with an expiry date of 31 January 2025.
- 1.5.3. The PIC completed a Crew Resource Management (CRM) course on 20 April 2024 after which a CRM Certificate was issued with an expiry date of 30 April 2025.

First Officer (Pilot Flying)

Nationality	South African	Gender	Male	Age	36
Licence Type	Airline Transport Pilot Licence (ATPL)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Instrument, Flight Instructor Grade 3				
Medical Expiry Date	31 January 2025				
Restrictions	VDL (valid only with correction for defective distant vision)				
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	6 204.6
Total Past 24 Hours	4.1
Total Past 7 Days	10.7
Total Past 90 Days	109.1
Total on Type Past 90 Days	109.1
Total on Type	1 585.7

- 1.5.4. The first officer (FO) had an ATPL that was issued on 24 June 2016 under the provisions of Part 61 of the CAR 2011. The licence was revalidated on 7 January 2024 with an expiry date of 28 February 2025.
- 1.5.5. The FO had a Class 1 medical certificate that was issued on 22 January 2024 with an expiry date of 31 January 2025.
- 1.5.6. The FO completed the CRM course on 2 January 2024 after which a CRM Certificate was issued with an expiry date of 31 January 2025.
- 1.5.7. The operator’s aircraft maintenance engineer (AME) who inspected, removed and install the main wheel assembly, had an Aircraft Maintenance Engineer (AME) Licence that was issued on 24 March 2023. His licence was renewed on 1 May 2024 with an expiry date of 30 April 2026.

1.6. Aircraft Information (Source: Boeing 737 Maintenance Manual)

1.6.1 *The Boeing 737-800 is a low-wing, narrow-body, single-aisle commercial aircraft powered by two high bypass CFM56-7B26 turbofan engines mounted on pylons beneath the wings. The aircraft is fitted with tricycle retractable landing gear with two wheels fitted to each landing gear leg. All the wheels can rotate independently of each other. The aircraft is designed to operate with two pilots and six cabin crew on-board. The aircraft is designed to carry a maximum of 189 passengers.*

The ZS-ZWY aircraft, a Boeing 737-8K5 passenger aircraft, was built in 2011 and had accrued approximately 43 104.37 flight hours; it had a valid Airworthiness Review Certificate.



Figure 4: The file picture of the ZS-ZWY aircraft.
(Source: <https://www.jetphotos.com/registration/ZS-ZWY>)

Airframe:

Manufacturer/Model	Boeing 737-800	
Serial Number	40247	
Year of Manufacture	2011	
Total Airframe Hours (At Time of Serious Incident)	4 3104.37	
Last Inspection (Date & Hours)	20 September 2024	42817.40
Airframe Hours Since Last Inspection	286.97	
CRS Issue Date	20 September 2024	
C of A (Issue Date & Expiry Date)	16 August 2019	31 August 2025
C of R (Issue Date) (Present Owner)	15 September 2022	
Operating Category	Commercial (Part 121)	
Type of Fuel Used	Jet A1	
Previous Incidents	None	

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

1.6.2. Aircraft Examination

The operator's AME stated that he conducted a transit check (walk-around) after the aircraft was parked and noticed smoke emanating from the Number 4 main wheel assembly, as well as that the wheel was orientated at an angle (misaligned) in relation to the axle, which was an anomaly.



Figure 5: Vertical misalignment of the Number 4 main wheel. (Source: Operator)

1.6.3. The main wheel assembly was removed by the AME; it was discovered that the inboard wheel half-hub had fractured into several pieces. After removing the wheel assembly, the AME found that the inboard bearing was noticeably damaged and was stuck on the axle, and that the brake assembly was abnormally hot; the measured temperature was approximately 240°C. It was also noticed that the misaligned wheel had damaged the brake unit, and that it would need to be replaced. The bearing and the damaged brake assembly were then removed, and the axle was inspected in accordance with the requirements of the aircraft maintenance manual (AMM), and it was found serviceable. A new brake and the wheel assembly were installed and the aircraft was released to service on the same day.

1.6.4. Maintenance Requirements

In accordance with the Honeywell Component Maintenance Manual (CMM) 32-40-14, B737 wheel assemblies are required to undergo inspection at every tyre change, and complete overhaul at every sixth tyre change. Specific attention is directed to the wheel bearings and bearing sleeves, which are to be inspected using the bearing damage reference guide as outlined in the Honeywell Standard Practices Manual (SPM) 32-49-01.

1.6.5. Maintenance Management

The subject wheel assembly forms part of an aircraft fleet operated by a commercial airline. The fleet's wheel, brake and tyre components are managed by a contracted service provider which, in turn, engages a third-party maintenance organisation to conduct overhauls and tyre replacements in accordance with the approved maintenance procedures and manufacturer documentation.

1.6.6. Component Identification and History

The subject wheel assembly comprised:

- Outer wheel half-hub: Serial Number B2272
- Inner wheel half-hub: Serial Number BH0127

Maintenance tracking is conducted with reference to the outer wheel half-hub Serial Number B2272. According to available records, the wheel assembly was among a batch of 1000 unserviceable units purchased by the operator from a United States-based supplier on 16 August 2021. The assemblies were transferred to an approved local maintenance organisation for overhaul. No prior usage or service history was recorded at the time of acquisition. The first documented overhaul of the subject wheel assembly by the maintenance organisation was completed on 12 January 2023, following delivery by the contracted service provider. Since its induction into service, the assembly had undergone two overhauls and eight tyre replacements in accordance with standard maintenance intervals. (*Refer to Appendix C for full maintenance records.*)

1.6.7. Maintenance History

Examination of the maintenance records over a 20-month period prior to the inboard wheel-half-hub failure confirmed that inspections and overhauls were conducted in accordance with the manufacturer's specifications.

1.6.8. The bearing installed on the wheel assembly was classified as an on-condition component. As such, it was not tracked as a life-limited or hard-time component and was to be replaced only if deemed unserviceable upon inspection. Maintenance records confirm that no bearing replacements were made during any tyre change or overhaul procedures on this assembly.

1.6.9. The most recent overhaul was completed in mid-August 2024. This overhaul was conducted in full compliance with CMM 32-40-14, and included the following inspections:

- Visual inspection of the assembly and its subcomponents
- Eddy current inspections of the bead seat, tube-well outer diameter, and other designated areas
- Ultrasonic inspection of the wheel halves

1.6.10. The last tyre change was undertaken towards the end of September 2024. These two maintenance events were considered the most relevant to this serious incident.

1.6.11. After the serious incident, the bearing was removed and sent to the local manufacturer for a detailed analysis (see 1.16. Test and Research).

Engine 1:

Manufacturer/Model	CFM International 56-7B26
Serial Number	960161
Hours Since New	48 054
Hours Since Overhaul	Modular overhauls and hot section inspections conducted at approved intervals

Engine 2:

Manufacturer/Model	CFM International 56-7B26
Serial Number	960195
Hours Since New	39182
Hours Since Overhaul	Modular overhauls and hot section inspections conducted at approved intervals

1.7. Meteorological Information

1.7.1. The weather information below was obtained from the Meteorological Aerodrome Report (METAR) that was issued by the South African Weather Service (SAWS) for FALA on 27 October 2024 at 1058Z.

Wind Direction	320°	Wind Speed	24,34 kts	Visibility	9999
Temperature	26°C	Cloud Cover	Nil	Cloud Base	Nil
Dew Point	12°C	QNH	1009hPa		

1.8. Aids to Navigation

1.8.1. The aircraft was equipped with standard navigational equipment as approved by the Regulator. 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 aircraft took off from FACT to FALA; it landed on Runway 07 at FALA.

Aerodrome Name	Lanseria International Aerodrome (FALA)
Aerodrome Location	Lanseria, Gauteng Province
Aerodrome Status	Licensed
Aerodrome GPS coordinates	25°56'22.89"South, 027°55'32.07" East
Aerodrome Elevation	4, 517ft
Runway Headings	73°/25°
Dimensions of Runway Used	07/25
Heading of Runway Used	73°
Surface of Runway Used	Asphalt
Approach Facilities	Tower and Approach control service: 24 hours. Ground movement control service: [05h45 – 19h00] daily. Instrument approaches include VOR/DME, NDB and RNAV. Tower Frequency: 124.00MHz.
Radio Frequency	Tower 124.00-MHz Apron 122.85-MHz Ground 121.65-MHz

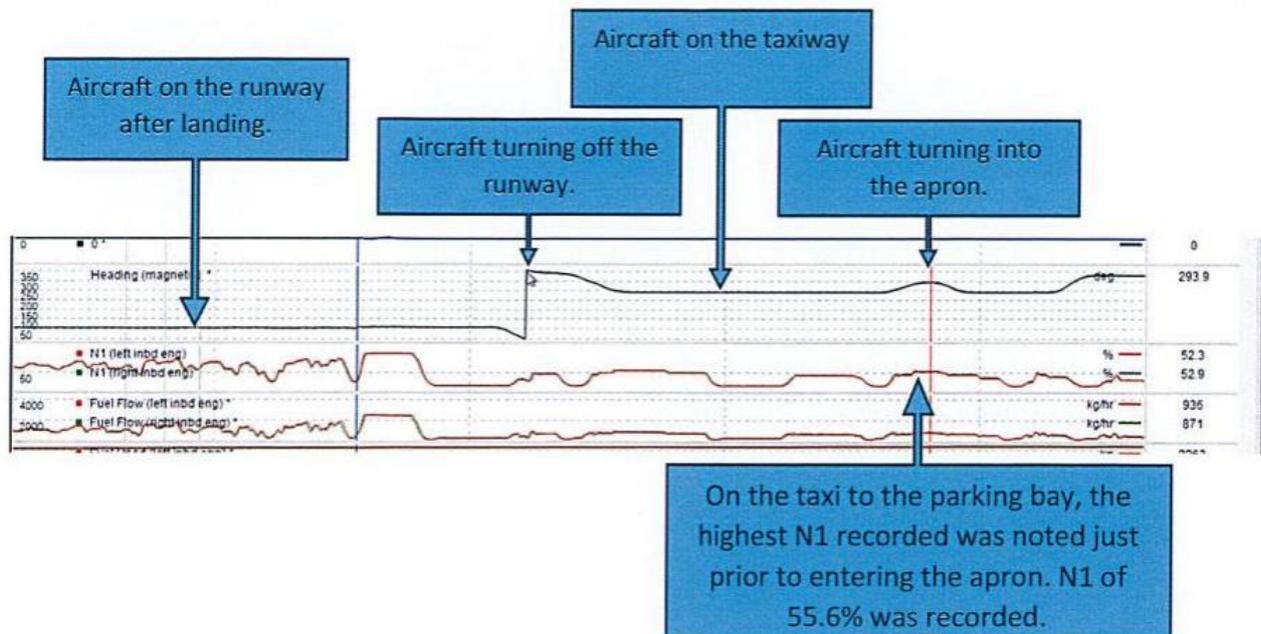
1.10.2. The FALA layout chart is attached as Appendix A.

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 the Regulator. The FDR and CVR were not retrieved from the aircraft after the serious incident as it was reported to the Regulator seven days after the occurrence; moreover, the aircraft had already been returned to service. The Quick Access Recorder (QAR) was retrieved from the aircraft and the data was downloaded. The data was as follows:

At touchdown

- *Landing Reference Speed or the threshold crossing speed (Vref): 143kts*
- *Speed at touchdown: 149.1kts*
- *Wind: Headwind component 8.1kts
Crosswind component 21kts*
- *Crosswind technique applied: Touchdown in Crab (reference Boeing FCTM 6.47 Crosswind Guidelines). Based on the technique, the Number 1 main wheel touched down first.*
- *Vertical force of gravity (G's) at touchdown: 1.24G (FDM Lv1=1.68G Lv2=2.25G and IATA = 1.7G) (The aircraft landed smoothly with no indications of a hard landing.)*
- *Taxi N1- 36% to 56% - normal for an undulated taxiway and turns to apron (see Graph 1).*



Graph 1: The downloaded QAR data.

1.12. Wreckage and Impact Information

1.12.1. The AME noticed smoke emanating from the outboard main wheel assembly during the transit check. Thereafter, the main wheel assembly was removed, and the following observations were made: the tyre was under inflated; the inner hub had broken off from the wheel rim with metal deposits observed in the affected area; the brake unit showed slight damage; and the wheel inboard bearing exhibited signs of overheating and had also stopped rotating. The outer hub and the exterior bearing showed no signs of damage.

1.12.2. The Number 4 tyre exhibited visible signs of deflation, particularly along the shoulder region. The deformation pattern observed suggested that the tyre may have lost pressure prior to or during the occurrence. No obvious penetration damage or complete structural separation was noted during the initial visual inspection.



Figure 6: The marks on the Number 4 main tyre shoulder.

1.12.3. The fractured hub components exhibited multiple cracks as well as a distinct yellowish discolouration on several surfaces. The presence of cracks was indicative of structural failure, likely initiated or exacerbated by thermal or mechanical overstress. The yellowish discolouration was a characteristic of heat exposure and might have suggested localised overheating, possibly resulting from frictional contact or bearing stoppage.

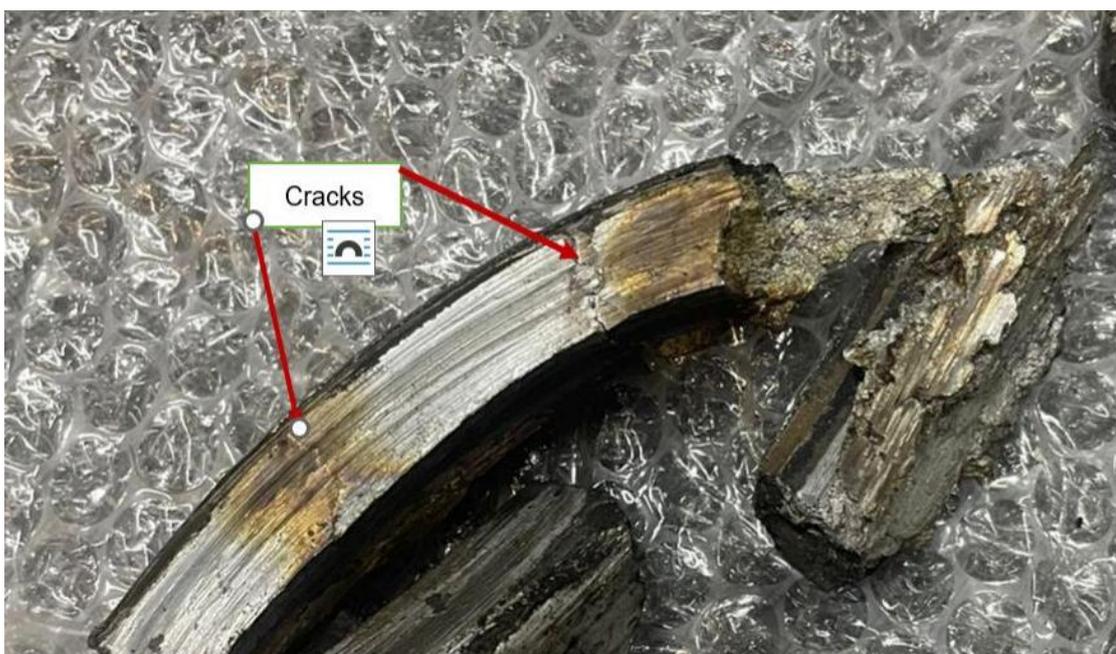


Figure 7: The pieces of the fractured hub.

1.12.4. The Number 4 inner bearing exhibited clear indications of thermal distress, including visible discolouration and surface damage consistent with overheating. The observed discolouration suggested exposure to elevated temperatures beyond normal operating conditions, whilst the surface damage was likely indicative of material degradation such as micro-cracking, hardening or spalling. These findings were consistent with excessive friction.



Figure 8: The Number 4 inner bearing.

1.12.5. The main wheel assembly sustained extensive damage and was assessed as beyond economical repair. As a result, it was removed from service and scrapped in accordance with the applicable maintenance and disposal procedures. The Number 4 brake assembly, although damaged, appeared repairable. A detailed inspection and functional assessment would be required to confirm its suitability for continued service, pending compliance with the manufacturer's repair and overhaul specifications.



Figure 9: Scoring damage on the brake assembly components.

1.13. Medical and Pathological Information

1.13.1. None.

1.14. Fire

1.14.1. There was no evidence of a pre-or post-impact fire.

1.15. Survival Aspects

1.15.1. The serious incident was considered survivable as there was no damage to the cockpit and cabin areas that would have caused serious injuries to occupants.

1.16. Tests and Research

1.16.1. Background

The Number 4 main wheel sustained bearing damage during landing. The affected bearing, installed in the inboard (IB) position and identifiable as Part Number M224749/M224710 (20629) was removed from aircraft and submitted to the local manufacturer for a detailed analysis. The purpose of the analysis was to determine the probable causes of the bearing failure during operation.

1.16.2. Test and Research Findings

Cause of the Inner Bearing Mount Disintegration

The inner bearing mount disintegrated due to thermal embrittlement of the base material caused by exposure to extreme heat. The extreme heat was caused by frictional heating brought about by bearing sleeve rotation within the wheel hub bearing bore. The sleeve rotation within the bearing bore was caused by the ceased inner wheel bearing.



Figure 10: The inner wheel half bearing mount with signs of thermal embrittlement.



Figures 11 and 12: The ceased inboard wheel bearing.

Cause of the Inboard Bearing Lock-up and Sleeve Rotation

The root cause of the bearing failure was determined to be cage entrapment and breakage, which led to roller skewing and sliding. This, ultimately, caused the bearing to stop, resulting in the rotation of the outer bearing cup and sleeve within the hub, thereby, generating extreme frictional heat.



Figure 13: The Number 4 inboard bearing cage stretch and damage from roller sliding.

Cause of the Cage Entrapment and Breakage

The cage wear, elongation (stretch) and entrapment were likely caused by an insufficient preload setting. Preload refers to a manufacturer-specified axial force applied to a tapered roller bearing during installation to reduce or eliminate internal clearance (end play) between the rollers and bearing races. The preload may not have been correctly set during the wheel installation by the operator's AMO. Alternatively, the damage could have resulted from spalling (Figure 14), which is typically caused by rolling contact fatigue. This type of fatigue can result from a variety of underlying factors which, in this case, could not be conclusively identified due to the severity of the damage to the rolling surfaces.

Potential causes of deterioration and premature bearing failure, which could not be confirmed due to the nature and extent of the damage, included:

- Improper or abusive handling
- Incorrect adjustment
- Insufficient lubrication
- Contamination
- Poor or inconsistent maintenance practices

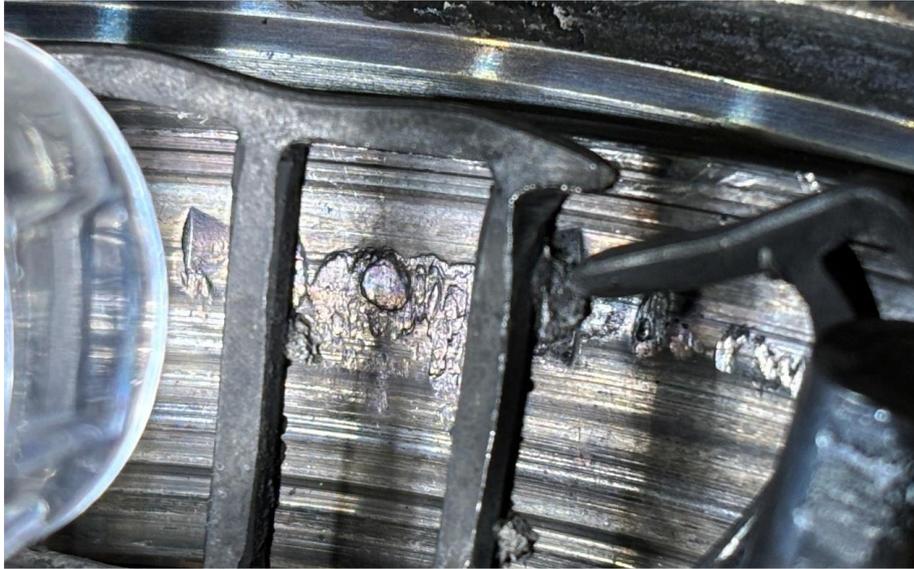


Figure 14: Spalling damage observed on the bearing rolling surface.

Inboard Cone Part Number M224749-20629

The inboard bearing damage was concentrated on one side of the bearing. The cage had broken, and one roller skewed 90° and got wedged between the bearing cage and the cone race (inner ring race).



Figure 15: The inboard bearing cone race and bearing cage.

The cone race area with minimal damage showed indications of consequential heat, and minimal race damage, as well as minimal large-end rib damage (highlighted) (see Figure 16).



Figure 16: Inboard cone race.

The IB cone race showed severe heat damage including plastic deformation of the race and rib where rollers have 'dug in', as well as indications of roller skewing. The one skewed and welded roller is also visible in Figure 17.



Figure 17: Cone with skewed roller.

Some roller bodies suffered relatively little damage – other than sliding on the cup race – and the roller large ends were still in good condition. As a result of this, lubrication is not suspected as deficient. See Figures 18 and 19. The roller sliding was a major source of the generated heat.



Figure 18: The overheated rollers.



Figure 19: The top part of the rollers

The cage breakage showed narrowing of the material at the breakage site (highlighted yellow in Figure 20) – this is known as ‘necking’, and showed the cage broke due to tension (see Figure 20). This is most likely due to the cage which was trapped by a portion of rollers – roller skewing and sliding with resultant extensive heat generation would have resulted from this. Cage entrapment in this scenario would be due mainly to stretch that took place as a result of cage bridge impacts, as well as cage bridge wear caused by roller skewing. This comes from insufficient preload.

Figure 20 also shows an area of spalling approx. 1-2cm² (highlighted red).

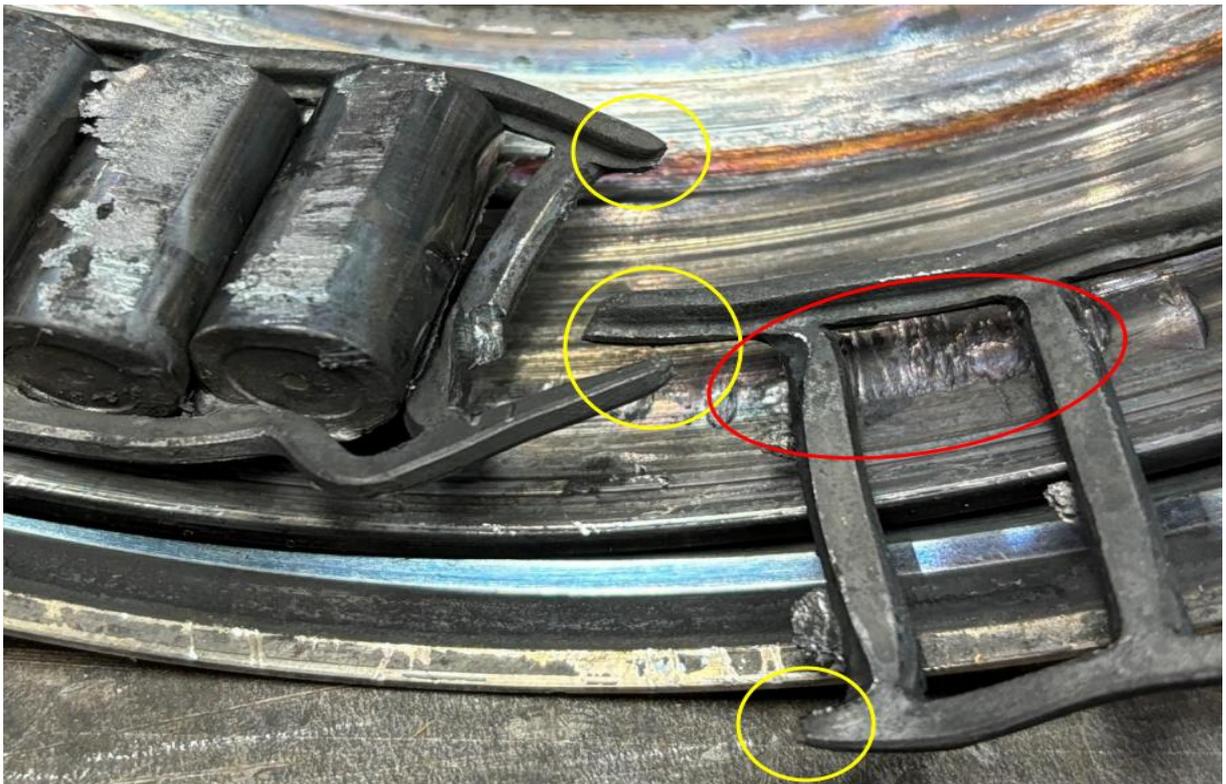


Figure 20: Skewed rollers.

Spalling results from metal fatigue due to rolling contact but can be initiated/aggravated by thin lubricant films. In this case, lubrication was not suspected to have any influence, and the bearing damage progression also did not support a lubrication deficiency.

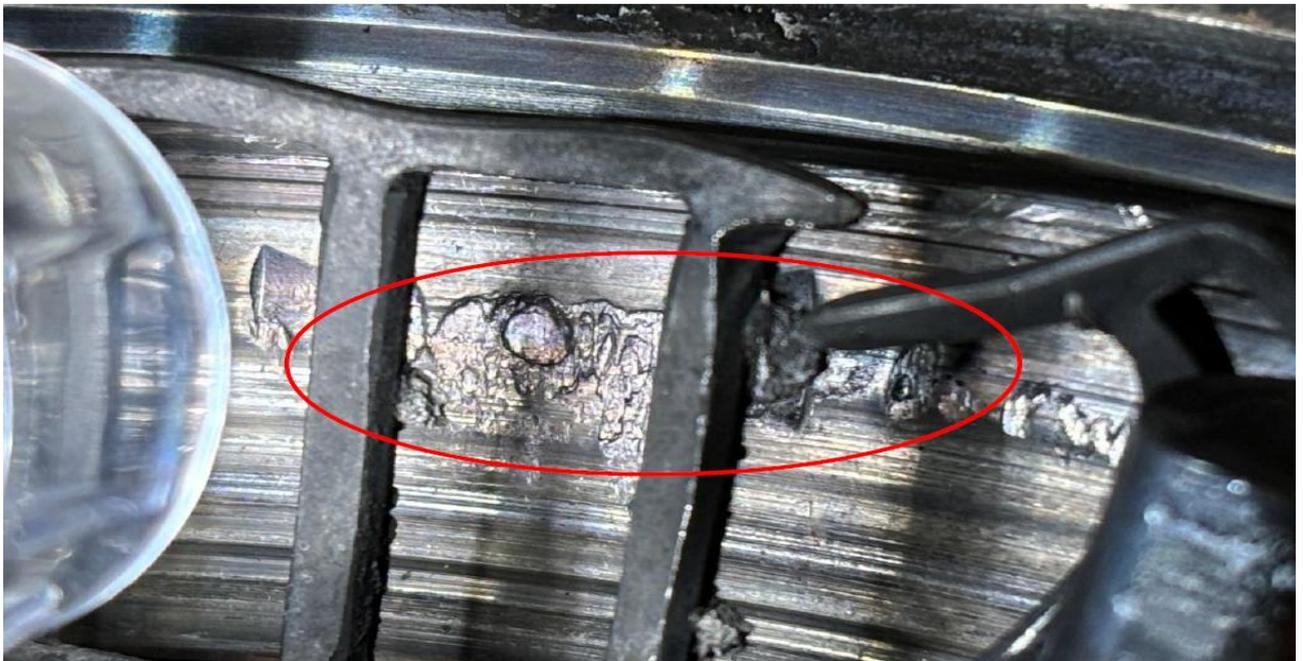


Figure 21: The red oval shape highlights the spalled area in greater detail.

In-board Cup M224710-20629

Severe damage to the cup race occurred due to roller sliding. There were also significant axial lines of plastic deformation visible in Figure 22 / Figure 23 (arrowed) – these are not brinels, but plastic deformation from roller contact due to the extreme heat levels after the aircraft came to a halt. It was, thus, purely consequential damage.

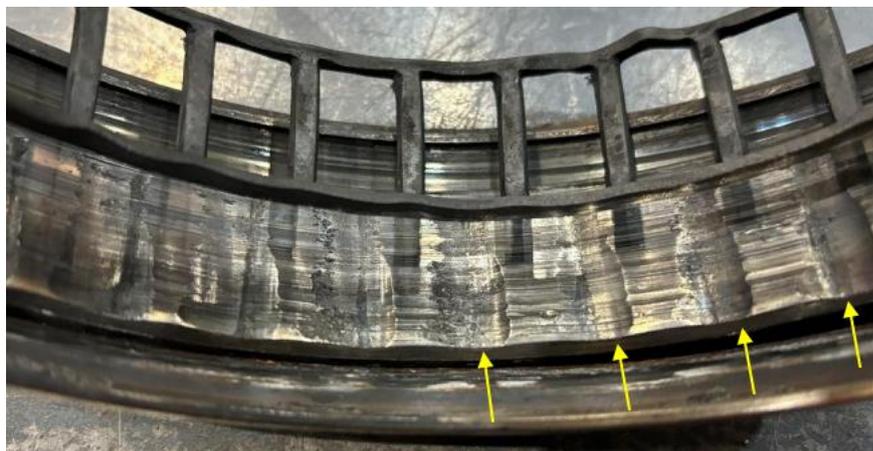


Figure 22: Roller contact.

The cup was still securely mounted in the hub sleeve, and the sleeve had turned in the hub. This is likely due to the loss of fit between the sleeve and hub as a result of differing expansion rates (different materials).

Outboard Cone LM522549-20629

This cone was still intact with no significant damage, as shown in Figure 22.



Figure 23: Outboard cone.

Some contact marks were visible on the cage

- Figure 24 shows handling marks – these could have been caused at any stage of operation (mounting/failure/dismounting), and are not significant,*
- Figure 25 shows cage bridge contact marks over 4 rollers only – under magnification these marks appear to have been made by abrasion in the direction of rotation (Figure 26). Cage deformation and radial movement was limited (that is, not abnormal), and this was most likely caused by isolated contamination.*

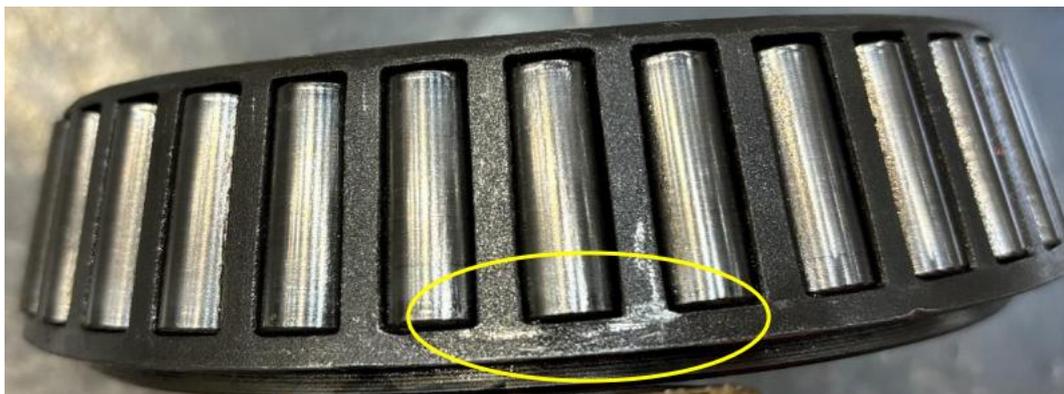


Figure 24: Rollers with contact marks.

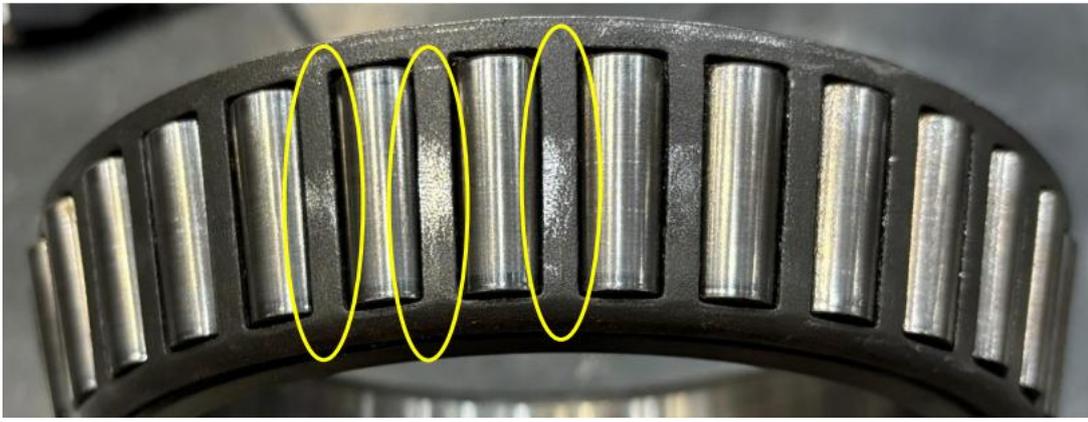


Figure 25: The inner contact marks

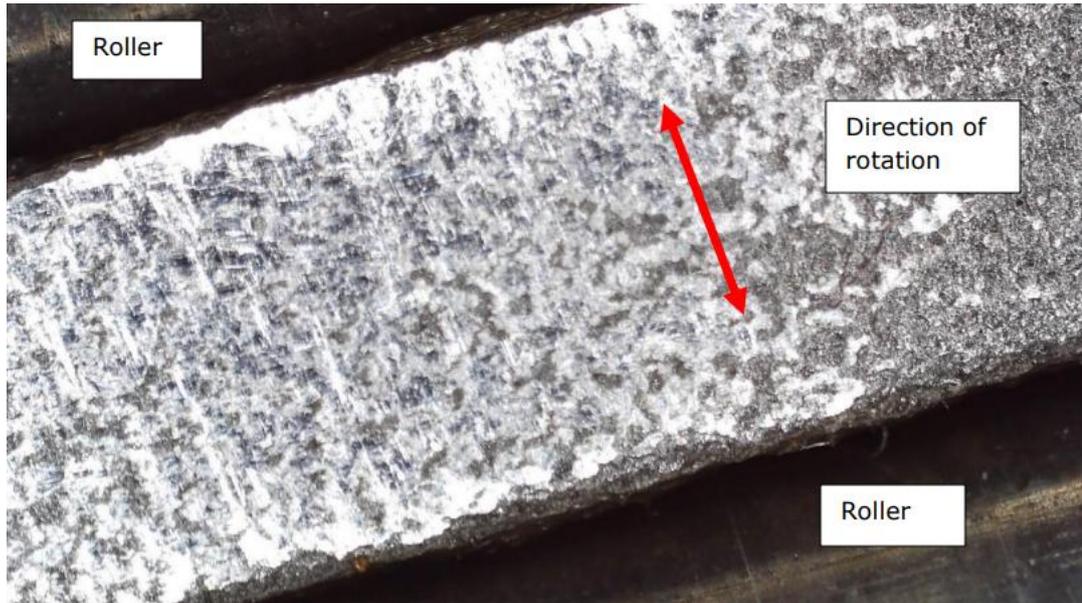


Figure 26: Roller with abrasion.

Roller large ends were in good condition with minimal scoring and no evidence of heat generation (Figure 26). This also indicated that lubrication was not suspected to have been deficient.

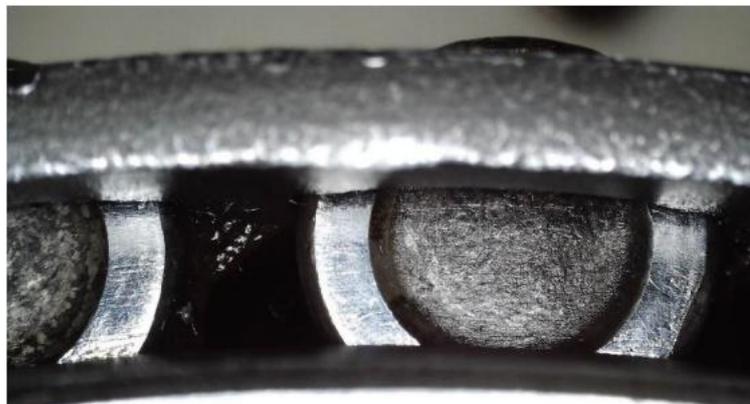


Figure 27: Roller ends with minimal scoring.

Root Cause Identification

From the observations made from the components, it was apparent that the cage entrapment and breakage occurred first, which led to roller skewing, sliding and significant heat generation, which caused the cup and sleeve to rotate in the hub, causing its final destruction. Cage wear, stretch and entrapment – in this application – could be attributed to insufficient preload setting.

However, the spalling observed is typically caused by rolling contact fatigue and cannot be caused by the roller sliding and final-stage damage progression. This means the spalling was there before the final-stage damage occurred. This gives an indication of the condition of the bearing prior to the final stage damage progression, and the condition of the bearing may have contributed to a loss-of-preload setting, and the onset of cage damage.

1.16.3. Description: Failed Items (Hub)

A damaged Inboard Wheel Hub Number 4 wheel assembly Part Number 2615480, Serial Number B-H0527, as part of the Right-Hand Main Gear Outboard Wheel assembly originating from a Boeing 737-800, aircraft registration ZS-ZWY was sent to the University of Pretoria (UP) to determine (a) the fracture mode and (b) the most probable Failure Sequence of Events (SoE).

Hub A (SNB-H0127 and SNB-2272):

The investigation results revealed that the damage to the outboard wheel half (SNB-2272) could be attributed to the failure of the inboard wheel bearing assembly during operation. The failure of the inboard bearing assembly resulted in the failure of the inboard wheel hub bearing bore during operation.

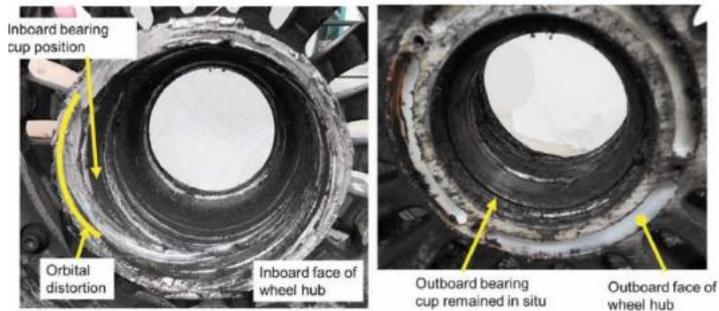
The Most Probable Contributing Factors ranked from high to low:

(a) Incorrect Preload.

If tested, the break torque relating to the relevant wheel nut was not disclosed. Incorrect pre-loading of the wheel assembly would result in undue stresses on the bearing assembly during operation.

Inadvertent/incorrect preloading could be due to the fitment process not following the Original Equipment Manufacturer (OEM) prescriptions, the calibration of the torque wrench being out of limits, and/or operator training shortcomings.

Incorrect pre-load during fitment as a contributory factor towards bearing failures is not uncommon (refer to AAIB Bulletin 26323, G-TAWG). The AAIB investigation revealed comparable damage to the bearing bore and bearing assembly (Appendix D, Extract AAIB), while the conclusion referred to the possible incorrect pre-loading during fitment.



Figures 28 and 29: Hub damage around the inboard and the outboard bearing cup area.

1.17. Organisational and Management Information

- 1.17.1. This was a scheduled passenger commercial flight that was operated under the provisions of Part 121 of the CAR 2011, as amended.
- 1.17.2. The operator had a Class I Air Service Licence that was issued by the Air Service Licensing Council on 26 March 2014 for Category A1 aircraft. The operator also had a Class II Air Service Licence that was issued on 17 August 2011 for Category A1 aircraft, as well as Class III Air Service Licence that was issued on 17 August 2011 for Category A1 aircraft.
- 1.17.3. The operator had a valid Air Operating Certificate (AOC) that was issued by the Regulator on 4 June 2024 with an expiry date of 30 April 2025.
- 1.17.4. The aircraft was maintained by a SACAA-approved aircraft maintenance organisation (AMO). The AMO was issued an AMO Certificate on 9 October 2024 with an expiry date of 31 October 2025.
- 1.17.5. The operator contracted a local service provider to manage the wheels and brakes of the aircraft. The service provider, in turn, contracted another SACAA-approved AMO to maintain the wheels and brakes; this AMO was issued an AMO Certificate on 28 November 2023 with an expiry date of 30 November 2024.

1.18. Additional Information

- 1.18.1. Landing Gear, Wheels and Brakes (Source: Boeing 737 Maintenance Manual)

Main Wheels

The main wheels, designed to allow easy replacement, are fitted to fixed stub axles and held in place by a single wheel nut and washer. The wheel nut is secured by locking bolts.

The wheels are of a split hub design with the hubs containing the inboard and outboard tapered roller bearings (see Figure 12). The outer bearing component is known as the cup and the inner bearing component as the cone. The cup-bearing raceway is an interference

fit within the hub, and the cone is a sliding fit on the stub axle. The rollers run on tracks in the cone and cup. The track on the cone is defined by a rib around its edges; there are no ribs on the cup. The inboard and outboard bearing assemblies are fitted with external grease seals which are held in place by spring steel retaining rings located in grooves in the wheel hub.

The bearings are provided as part of the wheel assembly. When fitted to the axle, a nut and washer are used to apply pressure to the bearings, which is known as the preload. The preload ensures the bearing cups and cones are correctly seated, and the rollers correctly aligned. This is achieved by applying a torque to the nut using a suitable torque wrench. Once the bearing assembly has been pre-loaded, the nut is loosened slightly, whilst maintaining a tight contact between the cup, cone and rollers, then retightened to this service torque, which is usually about 20-25% of the preload torque. Both these procedures are done whilst slowly rotating the wheel clockwise to ensure that the large roller ends are seated against the cone rib.

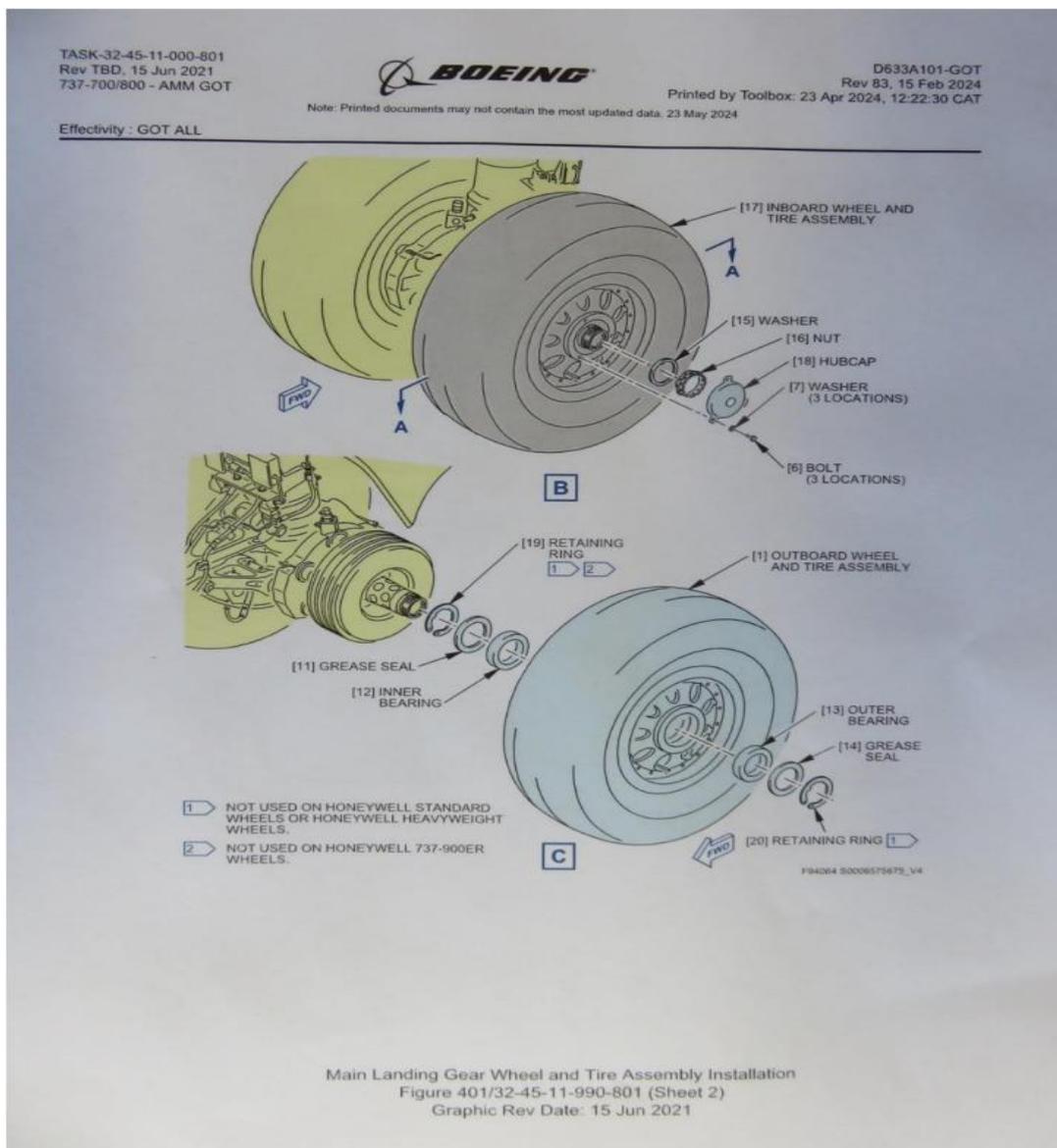


Figure 30: Landing gear mainwheel general arrangement. (Source: Boeing 737 Maintenance Manual)

Note: Printed documents may not contain the most updated data. 23 May 2024

Effectivity: GOT 309, 311, 321, 328, 329, 334, 337, 339, 342, 350, 352, 355, 356, 362-364, 367, 368, 370, 371, 373-399, 410, 430, 431, 434, 440, 444-899; GOT 101-199, 201-210, 213-217, 219-244, 247-250, 304 POST SB 737-32-1408 OR POST SB 737-32-1433; GOT 211, 212, 303, 305-308, 312, 313, 315-317, 319, 320, 322, 323, 327, 330-333, 335, 336, 338, 340, 341, 343, 346-348, 351, 353, 354, 357-361, 365, 369, 372, 401, 403, 405-407, 409, 415, 416, 438, 439, 442 POST SB 737-32-1429 OR POST SB 737-32-1441; GOT 404, 408 PRE SB 737-32-1494 AND (POST SB 737-32-1429 OR POST SB 737-32-1441); GOT 417-419 PRE SB 737-32-1494; GOT 441 PRE SB 737-32-1494 AND (POST SB 737-32-1408 OR POST SB 737-32-1433)

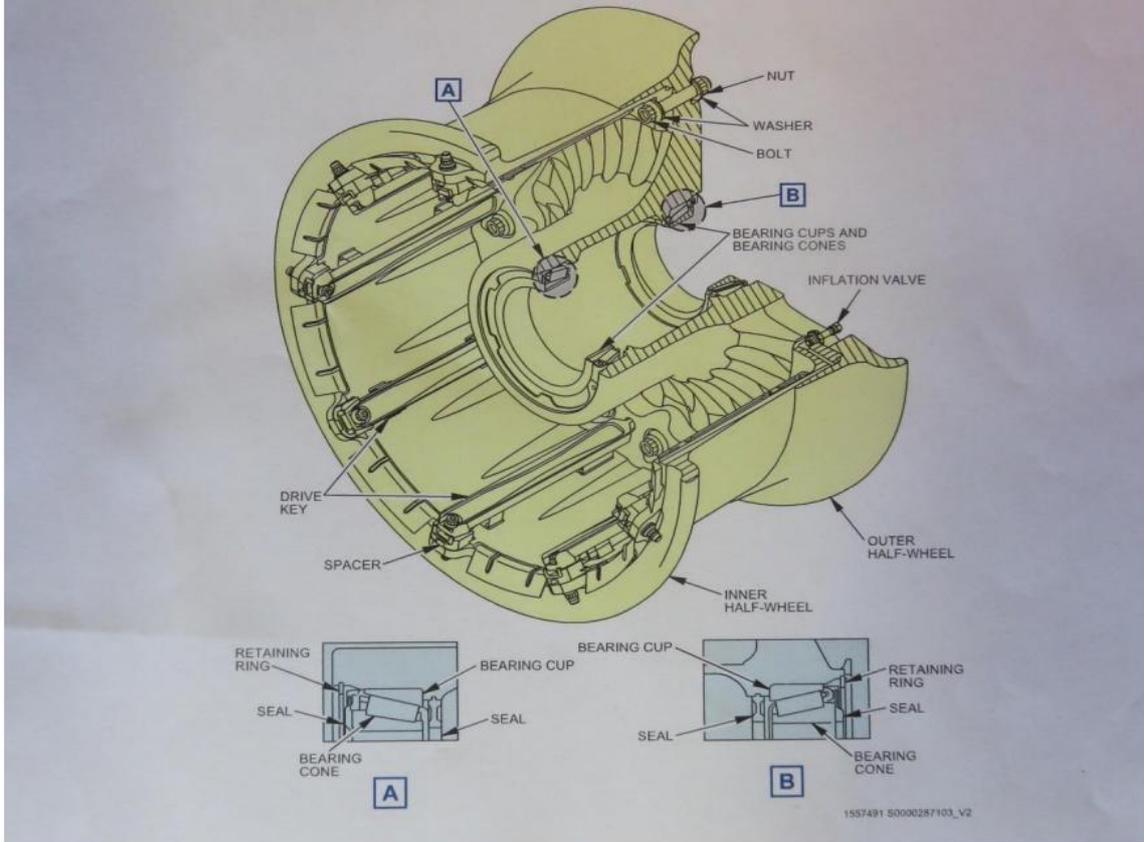


Figure 31: The inner [A] and outer [B] bearing arrangement. (Source: Boeing 737 Manual)

Tapered Roller Bearing

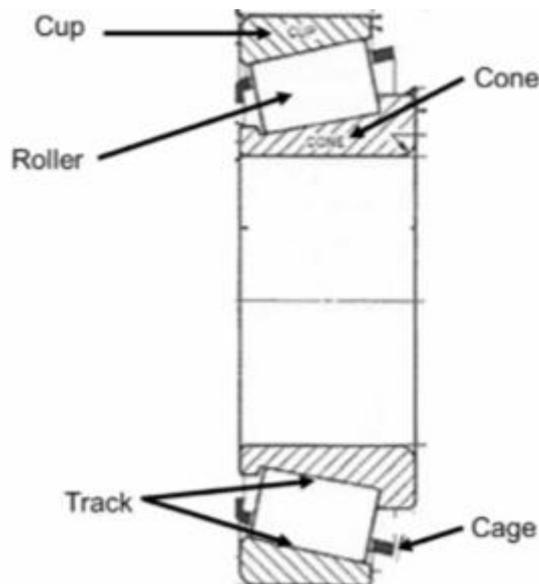


Figure 32: Bearing preload – explanation and function

Setting bearing preload is the process of applying a manufacturer specified axial load (force) to a taper roller bearing to reduce or eliminate internal clearance (endplay) between the rollers and bearing races, thereby, ensuring correct operation and maximum bearing life. The installer of the wheel assembly used the Boeing specified method and a calibrated torque wrench to set the Boeing specified preload force. The Bearing Sleeves themselves are inserted into the Hub Bearing bores with an interference fit. It is at this interface that the rotation took place, causing the extreme frictional heating.

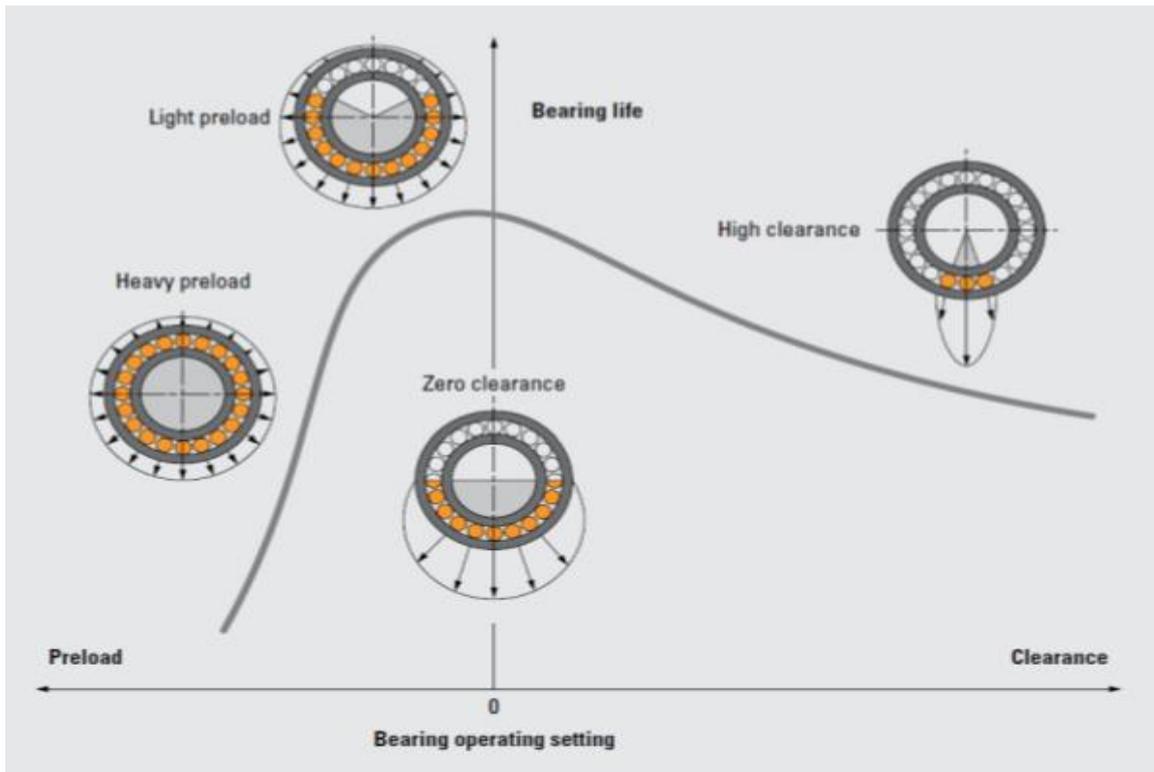


Figure 33: Bearing life vs bearing operating setting (preload).

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 incident. This shall not be read as apportioning blame or liability to any organisation or individual.

2.2. Analysis

Pilots

- 2.2.1. The flight crew's licences and medical certificates were valid, and they met all regulatory requirements for operating the aircraft, including type endorsements and medical fitness.
- 2.2.2. The aircraft maintenance engineer who removed and installed the main wheel assembly had a valid licence and met all regulatory requirements to conduct maintenance on the aircraft.

Mission

- 2.2.3. This was a passenger flight conducted under the provisions of Part 121 of the CAR 2011, as amended. The operator had valid certificates to operate and maintain the aircraft.

Aerodrome

- 2.2.4. FALA is a licensed aerodrome with a single runway (Runway 07/25) capable of accommodating larger aircraft types such as Boeing 737-800. The serious incident aircraft landed on Runway 07.

Weather

- 2.2.5. The weather was not considered a contributing factor to the serious incident. The recorded crosswind at the time of the occurrence was 22 knots (kts), gusting up to 32 kts. The aircraft was certified for a maximum demonstrated crosswind component of 34.5 knots, indicating that the encountered wind conditions remained within the aircraft's certified operational envelope.

Aircraft (Wheel Assembly)

- 2.2.6. The wheel assembly was originally part of a batch of unserviceable wheels procured in August 2021 and overhauled locally. Although there was no available pre-induction history for the bearing, subsequent maintenance records indicated adherence to required maintenance standards. However, the absence of component-level tracking for on-condition parts such as bearings may represent a vulnerability in maintenance oversight, particularly for components subjected to cyclic loading and high stress.
- 2.2.7. Since entering service, the wheel assembly underwent eight tyre replacements and two scheduled overhauls, consistent with the prescribed maintenance schedule outlined in the Honeywell Component Maintenance Manual (CMM 32-40-14). The most recent overhaul, conducted in mid-August 2024, included eddy current and ultrasonic non-destructive testing,

and no defects were reported.

2.2.8. The last tyre change was performed on 3 October 2024 with no anomalies noted during fitment. Quick Access Recorder (QAR) data confirmed that the approach, landing and brake application were normal, and there were no indications of a heavy landing that could have contributed to the bearing failure. Therefore, excessive landing loads were ruled out as a contributing factor.

2.2.9. The bearing is classified as an on-condition component and is not subject to hard-time replacement. As such, its condition was only assessed during inspections, tyre changes or overhaul events. Maintenance records showed no anomalies or indications of concern regarding the bearing prior to the serious incident, and it had not been replaced at any time during its service life.

Wheel Hub Failure

2.2.10. A detailed metallurgical and mechanical analysis was conducted by the University of Pretoria on Hub A (Serial Number SNB-H0127 and SNB-2272). Findings confirmed that the failure of the outboard wheel-half (Serial Number SNB-2272) was a secondary result of the primary failure of the inboard wheel bearing assembly during normal operation. The inboard bearing failure led to progressive damage of the inboard wheel hub bearing bore.

2.2.11. No evidence of foreign object debris, thermal overload or inherent material defects was found that could have contributed independently to the failure. The most probable contributing factor was determined to be incorrect preload of the bearing assembly during fitment. Potential causes included non-adherence to OEM assembly procedures, use of an uncalibrated torque wrench, or insufficient training or supervision during installation.

2.2.12. Incorrect preload is known to introduce abnormal stress on bearing components. The torque values applied during the most recent wheel installation could not be confirmed as no break torque data or installation records were available. Whilst a latent component defect could not be fully excluded, procedural factors related to bearing installation were assessed as the most probable contributors.

Wheel Assembly Failure

2.2.13. Bearing Damage and Wheel Detachment Sequence

The right outer main wheel (Number 4) wobbled in its axle during taxi which was attributed to the failure of the inboard wheel bearing. This failure subsequently led to the degradation of the inboard hub.

The inboard bearing was severely damaged, whilst the outboard bearing and hub remained intact, indicating that the failure initiated at the inboard position. The severity of the damage suggested that the bearing had been operating in a distressed condition for some time, generating excessive heat. Elliptical wear marks around the hub bore where the inboard bearing cup is seated, supported the conclusion that the bearing had become loose which caused the wheel to wobble on its axle.

Thermal discolouration and surface damage observed on the inboard hub were consistent with frictional heat resulting from bearing stoppage. The damage sequence likely began with cage entrapment and breakage, followed by roller skewing and sliding, which further increased internal heat. This culminated in the destruction of the bearing cup and sleeve.

3. CONCLUSION

3.1. General

From the available evidence, the following findings, causes and contributing factors were made with respect to this 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 incident. The findings are significant steps in this 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 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 incident occurring, or would have mitigated the severity of the consequences of the 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

Pilots

- 3.2.1. The pilot-in-command (PIC) had an Airline Transport Pilot Licence (ATPL) that was issued on 19 August 2016 under the provisions of Part 61 of the CAR 2011. The licence was revalidated on 17 March 2024 with an expiry date of 31 May 2025.
- 3.2.2. The PIC was issued a Class 1 medical certificate on 17 January 2024 with an expiry date of 31 January 2025.

- 3.2.3. The PIC conducted his Crew Resource Management (CRM) course on 20 April 2024 with an expiry date of 30 April 2025. The PIC was properly qualified and medically fit to conduct the flight.
- 3.2.4. The first officer (FO) was initially issued an ATPL on 24 June 2016 under the provisions of Part 61 of the CAR 2011. The licence was revalidated on 7 January 2024 with an expiry date of 28 February 2025.
- 3.2.5. The FO was issued a Class 1 medical certificate on 22 January 2024 with an expiry date of 31 January 2025.
- 3.2.6. The FO conducted his CRM course on 2 January 2024 with an expiry date of 31 January 2025. The FO was properly qualified and medically fit to conduct the flight.
- 3.2.7. The aircraft maintenance engineer (AME) was properly licensed.

Aircraft

- 3.2.8. The aircraft was issued a Certificate of Registration (C of R) on 15 September 2022.
- 3.2.9. The aircraft was issued a Certificate of Airworthiness (C of A) on 16 August 2019. The most recent C of A was valid until 31 August 2025.
- 3.2.10. The last maintenance inspection prior to the serious incident flight was certified on 20 September 2024 at 42 817.40 airframe hours. At the time of the serious incident, the aircraft had accumulated 286.97 airframe hours since the said inspection.
- 3.2.11. The Number 4 main wheel inboard bearing (Part Number M224749/M224710) sustained significant thermal and mechanical damage consistent with prolonged distress and eventual stoppage (see Appendix C for the removal and installation history).
- 3.2.12. The failure of the inboard bearing resulted in secondary damage to the inboard hub which caused the wheel to wobble on its axle during taxi.
- 3.2.13. The outboard bearing and hub remained intact, indicating that the failure originated in the inboard bearing assembly.
- 3.2.14. Pre-installation inspection by maintenance personnel did not reveal any abnormalities. The bearing was reported to have been greased appropriately in accordance with the applicable maintenance procedures.

- 3.2.15. The bearing is classified as an on-condition component and was not subject to hard-time replacement. It had not been flagged for any concern during previous inspections or overhaul events.
- 3.2.16. The wheel assembly had undergone eight tyre changes and two overhauls since entering service. All maintenance actions were performed in accordance with the Honeywell CMM 32-40-14.
- 3.2.17. The most recent overhaul of the wheel assembly was completed in August 2024. The overhaul included non-destructive testing (NDT), and no anomalies were recorded.
- 3.2.18. The affected wheel assembly was part of a batch of unserviceable units procured in 2021 and overhauled locally. Due to a lack of prior history, the initial condition of the component could not be fully established. The maintenance records from the time of component induction onward showed no deviations from applicable maintenance standards.
- 3.2.19. The bearing had not been replaced during its service life. No component-level tracking was in place for this on-condition item, which may represent a systemic vulnerability in the maintenance management system.
- 3.2.20. The aircraft had not experienced any reported hard landings or operational events that could have induced excessive loads on the landing gear or wheel assembly prior to the serious incident.
- 3.2.21. Data from the Quick Access Recorder (QAR) confirmed that the approach, landing and brake application were within normal operational parameters, effectively ruling out excessive landing loads as a contributing factor.

Hub

- 3.2.22. The failed component was the right-side main gear outboard wheel hub part of the Number 4 wheel assembly with: Part Number 2615480 and Serial Number B-H0527.
- 3.2.23. The associated wheel hub assembly, specifically Hub A (Serial Number SNB-2272), exhibited mechanical damage consistent with in-service operational failure.
- 3.2.24. Metallurgical examination confirmed that the inboard wheel bearing assembly failed during service, which led to secondary damage of the inboard wheel half bearing bore.
- 3.2.25. No evidence of material defects, manufacturing anomalies or foreign object ingestion was found in the failed components.

- 3.2.26. The break torque applied during the most recent wheel installation was not recorded or documented in the maintenance records.
- 3.2.27. Incorrect preload during wheel assembly is known to introduce abnormal stresses in bearing assemblies, leading to premature failure. Previous similar occurrences—such as the Aircraft Accident Investigation Bureau (AAIB) Bulletin 26323 (G-TAWG)—have linked bearing bore failures to improper preload settings.

Aerodrome

- 3.2.28. Lanseria International Airport (FALA) is a licensed aerodrome with one runway. It can accommodate larger aircraft such as the Boeing 737-800. The aircraft landed on Runway 07.

Environment

- 3.2.29. The crosswind speed at the time was 22 knots (kts) with gusts reaching 32 kts. The aircraft was certified to withstand a maximum crosswind component of 34.5 kts which meant that the recorded wind conditions were within the aircraft's operational limits.

3.3. Probable Cause

- 3.3.1. The failure was likely caused by the disintegration of the inner bearing mount due to thermal embrittlement of the base material. This embrittlement resulted from exposure to extreme heat, which was generated by friction due to rotation of the bearing sleeve within the wheel hub bearing bore. The sleeve rotation occurred because of the ceased inner wheel bearing.

3.4. Contributory Factors

- 3.4.1. Pre-existing bearing surface damage, including spalling and rolling contact fatigue, might have caused or exacerbated the loss of preload during operation.
- 3.4.2. Absence of component-level tracking for on-condition items, such as bearings limited visibility into the bearing's prior service history and condition.
- 3.4.3. Unknown maintenance history of the wheel assembly prior to induction into service, which introduced uncertainty about the initial state of the bearing.

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 Recommendations

- 4.2.1. The operator's AMO should review and enhance its inspection procedures for wheel bearings and associated components, with a specific focus on early indicators of bearing stoppage, overheating and sleeve movement within the wheel hub bore.
- 4.2.2. The operator's AMO should enhance inspection techniques such as precision bore measurements, and surface condition assessments should be considered during tyre changes, particularly for high-cycle wheel assemblies.
- 4.2.3. The operator and contracted maintenance service provider should evaluate the feasibility of tracking the condition and service history of on-condition components, such as wheel bearings, to improve traceability and enable early detection of degradation.

Safety Action

- 4.2.4. The operator's AMO maintenance personnel received refresher training focused on identifying signs of excessive heat, abnormal wear and symptoms of bearing stoppage or thermal damage within wheel hub assemblies during both overhaul and routine inspections.

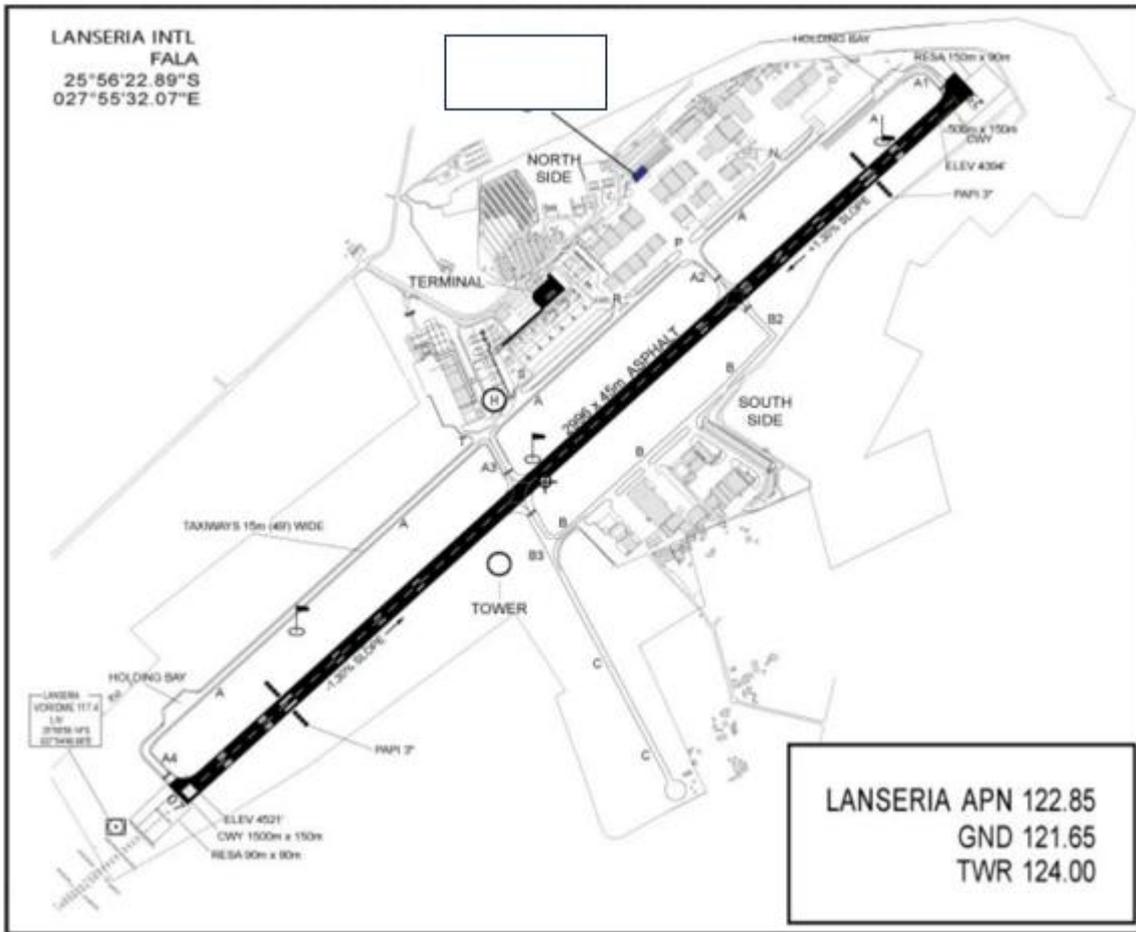
5. APPENDICES

- 5.1. Appendix A: FALA Aerodrome Chart
- 5.2. Appendix B: Honeywell Standard Practices Manual
- 5.3. Appendix C: Tyre Service History
- 5.4. Appendix D: Aircraft Accident Investigation Bureau (AAIB) Report Extract

This report is issued by:

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

Appendix A: FALA Aerodrome Chart



Appendix B: Honeywell Standard Practices Manual:

Topic	Definition and/or Instructions
Tire Change Inspection Interval	<ul style="list-style-type: none"> • Minor disassembly, cleaning, and inspection of wheel components performed at all tire removals. - If verifiable inspection history is not available, all wheel assemblies and wheel halves must be overhauled immediately to ensure compliance with the service limits of the applicable Component Maintenance Manual (CMM).
Overhaul Inspection Interval	<p>Major disassembly, cleaning, and inspection of wheel components.</p> <ul style="list-style-type: none"> • Wheel assemblies must be overhauled every 24 months or 1,800 landings, whichever occurs first. At operator option, overhaul timing may be managed based on accumulated tire changes that are equivalent to the 1,800 landing criteria (for example, if the average fleet landings per tire is 230, 1,800/230 or 7 tire changes are permitted between overhauls). • A wheel assembly that reaches the end of its 24 month overhaul cycle or accumulates 1,800 landings while installed on the aircraft does not require immediate removal. In this case, to accommodate tire wear, the assembly may remain in service for up to an additional four months. • A wheel assembly that reaches the end of its 24 month overhaul cycle without being installed on an aircraft may be disassembled and inspected per the tire change inspection criteria. Successful completion of the minor inspection restarts the overhaul inspection interval. Any evidence of corrosion requires an overhaul to be performed. - As a wheel accumulates more landings, it may become necessary to shorten the timeframe between overhaul inspections or increase the frequency of Non-Destructive Testing (NDT) inspections. These decisions may be made by operators based on their documented service history.

Appendix C: Tyre Service History

Removed ZS-ZWS 11 Jan 2023 for overhaul, carried out and Released to Service on 26 Jan 2023
Removed ZS-ZWS 3 Mar 2023 for 1st tyre change, carried out and RTS on 10 Mar 23 installed ZS-SJV 15 Mar 2023
Removed ZS-SJV 6 April 2023 for 2nd tyre change, carried out and RTS on 18 Apr 23 installed ZS-ZWV 21 Apr 2023
Removed ZS-ZWV 17 May 2023 for 3rd tyre change, carried out and RTS on 19 May 23 installed ZS-SJO 4 July 23
Removed ZS-SJO 26 July 2023 for 4th tyre change, carried out and RTS on 2 Aug 23 installed ZS-ZWM 5 Aug 23
Removed ZS-ZWM 30 Aug 23 for 5th tyre change, carried out and RTS on 8 Sept 23 installed ZS-FGS 17 Sept 23
Removed ZS-FGS 18 Oct 23 for overhaul, carried out and RTS 15 Nov 23 installed on ZS-FGH 19 Nov 23
Removed ZS-FGH 10 Dec 23 1st tyre change, carried out and RTS 14 Dec 23 installed ZS-FGA 23 Dec 23
Removed ZS-FGA 18 Jan 2024 for 2nd tyre change, carried out and RTS 25 Jan 24 installed ZS-FGC 28 Jan 24
Removed ZS-FGC 8 April 2024 for 3rd tyre change, carried out and RTS on 11 April 24 installed ZS-FGX 17 April 24
Removed ZS-FGX 25 April 2024 for 4th tyre change, carried out and RTS on 30 April 24 installed ZS-ZWV 4 May 24
Removed ZS-ZWV 2 June 2024 for 5th tyre change, carried out and RTS on 6 June 24 installed ZS-FGY 14 June 24
Removed ZS-FGY 18 July 2024 for overhaul, carried out and RTS on 16 Aug 24 installed ZS-FGE 20 Aug 24
Removed ZS-FGE 25 Sept 2024 for 1st tyre change, carried out and RTS on 1 Oct 24 installed ZS-ZWY 3 Oct 24
Failed on ZS-ZWY 27 October 2024

Appendix D: An Extract AAIB Report

Extract 1: AAIB Report images⁷

(b) Incorrect Fitment.

Incorrect fitment of the bearing assembly will allow for undue stresses during operation.

However, due to the extent of the damage to the complete bearing assembly, this possibility could not be conclusively asserted.

(c) Bearing Failure.

Due to the extent of the damage to the complete bearing assembly, the possibility of a bearing failure due to manufacturing defects could not be conclusively asserted.