الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY

United Arab Emirates

Air Accident Investigation Sector

Serious Incident

- Summary Report -

AAIS Case Nº AIFN/0004/2025

Tail Strike

Operator:	Air India Express
Make and Model:	Boeing B737-800
Nationality and Registration:	India, VT-AXZ
Place of Occurrence:	Ras Al Khaimah International Airport
State of Occurrence:	The United Arab Emirates
Date of Occurrence:	22 April 2025

This Investigation was conducted by the Air Accident Investigation Sector of the United Arab Emirates pursuant to Civil Aviation Law No. 20 of 1991, in compliance with Air Accident and Incident Investigation Regulations, and in conformance with the provisions of Annex 13 to the Convention on International Civil Aviation (Chicago Convention).

This Investigation was conducted independently and without prejudice. The sole objective of the investigation is to prevent future aircraft accidents and incidents. It is not the purpose of this activity to apportion blame or liability.

The Air Accident Investigation Sector issued this Summary Report in accordance with national and international standards and best practice. Consultation with applicable stakeholders, and consideration of their comments, took place prior to the publication of this Report.

The Summary Report is publicly available at:

https://www.gcaa.gov.ae/en/departments/airaccidentinvestigation/Pages/InvestigationReports.aspx

The Air Accident Investigation Sector
The United Arab Emirates

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Investigation Process

The occurrence involved a Boeing B737-800, registration marks VT-AXZ, operated by Air India Express. It was reported to the Air Accident Investigation Sector (AAIS) Duty Investigator by phone call to the Hotline Number +971 50 641 4667.

After the initial/on-site investigation phase, the occurrence was classified as a 'serious incident'.

The AAIS opened an investigation in line with the State's obligations in accordance with *Annex 13* to the Chicago Convention as the United Arab Emirates being the State of Occurrence.

The AAIS notified the Aircraft Accident Investigation Bureau (AAIB) of India, being the State of Registry, and State of the Operator, the National Transportation Safety Board (NTSB) of the United States, being the State of Manufacture and Design.

The scope of this investigation is limited to the events leading up to the occurrence, and no in-depth analysis of non-contributing factors was undertaken.

Notes:

1. Whenever the following words are mentioned in this Report with the first capital letter, they shall mean the following:
   - (Aircraft) – the aircraft involved in this serious incident
   - (Commander) – the commander of this serious incident flight
   - (Copilot) – the copilot of this serious incident flight
   - (Incident) – this investigated serious incident
   - (Investigation) – the investigation into this serious incident
   - (Operator) – Air India Express
   - (Report) – this serious incident investigation Summary Report.
2. Unless otherwise mentioned, all times in this Report are given in 24-hour clock in Coordinated Universal Time (UTC), (UAE local time minus 4).
3. Photos and figures used in this Report are taken from different sources and are adjusted from the original for the sole purpose of improving the clarity of the Report. Modifications to images used in this Report are limited to cropping, magnification, file compression, or enhancement of color, brightness, contrast, or addition of text boxes, arrows, or lines.
4. The structure of this Summary Report is an adaptation of the Final Report format incorporated in *Annex 13* to the Chicago Convention.

Factual Information

History of the Flight

On 22 April 2025, at 1027 UTC, an Air India Express Boeing 737-800, registration marks VT-AXZ, departed for a scheduled passenger flight number IX331, from Calicut International Airport (VOCL[1]), India, to Ras Al Khaimah International Airport (OMRK[2]), the United Arab Emirates. There were 174 people on board, comprising 170 passengers, 2 flight crewmembers, and 2 cabin crewmembers.

The Commander was the pilot monitoring (PM), and the Copilot was the pilot flying (PF).

After takeoff, the Aircraft climbed to FL360 and maintained cruise at that level.

At 1319, the Aircraft commenced to descend and then proceeded with area navigation (RNAV 1) standard arrival for runway 34 at OMRK.

At 1337, during descent through 14,300 feet pressure altitude, the flight crew set both the left and right barometric altimeters to 1011 millibars.

[1] VOCL is the ICAO four letter airport code for Calicut International Airport

[2] OMRK is the ICAO four letter airport code for Ras Al Khaimah International Airport

At 1345:13, the Commander made initial contact with OMRK Approach Surveillance control, informing the Aircraft was descending to 4,000 feet to waypoint NADNI. Approach controller subsequently provided the QNH setting of 1011 millibars, the specific automatic terminal information service (ATIS) broadcast "information Oscar" for OMRK, and advised that runway 34 was active.

At 1345:42, Approach controller issued clearance to IX331 for an instrument landing system (ILS) Zulu approach to runway 34 (Attachment C).

At 1348:56, the Commander informed Approach that the Aircraft was established on the localizer for runway 34. Approach controller subsequently instructed the flight crew to contact Tower control on 118.25 megahertz.

At 1349:25, the Aircraft was 9.6 nautical miles from the threshold of runway 34 when the Commander made initial contact with Tower, reporting that the Aircraft was established on the localizer. Tower controller advised that the surface wind was 300 degrees at 5 knots and cleared the Aircraft to land. The Commander correctly read back at 1349:39, when the Aircraft was 8.9 nautical miles from the threshold at an indicated altitude of 2,520 feet.

At 1353:06, the Aircraft touched down on both main landing gears, bounced once, and on the subsequent touchdown, the Aircraft experienced a tail strike. The Aircraft then continued the landing roll.

At 1353:39, when the Aircraft was rolling on the runway, Tower controller instructed the flight crew to vacate the runway via taxiway Sierra and proceed to parking stand number 2. The Commander then correctly read back.

At 13:55:57, the Aircraft came to a stop at the designated parking stand, after which the engines were shut down. Attachment B of this Report presents the Aircraft's landing track.

The initial inspection at the parking stand found paint scratches and a 1.5-inch skin crack on the bottom fuselage panel. All passengers and crewmembers disembarked from the Aircraft uneventfully.

A subsequent inspection of runway 34 revealed paint marks on the runway.

Damage to Aircraft

The tail strike caused minor damage to the underside of the rear fuselage. Figures 1 and 2 illustrate the damage and its dimensions.

Damage assessment indicated that the tail strike occurred at station (STA[3]) 887 between stringers (STR) 27L and STR 27R. The rub mark was located in section 46, lower skin (STA 867 to STA 887), and section 47, lower skin, measuring 6 inches in length and 2 inches in width. A pinhole puncture with a 1.25-inch crack line was identified between two rivets with no damage to the internal.

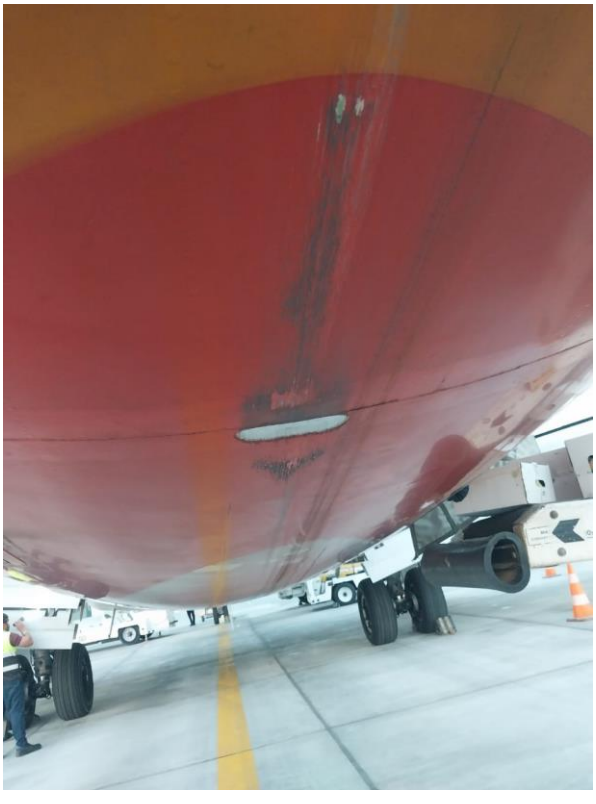

Figure 1. Skin abrasion on the aft lower

Inspection of the section 47 lower skin, between STA 888–904 and STR 27L–27R, revealed only minor rub marks. The markings extended through the red paint and the second-

[3] STA is a shortened term for Station, which refers to a specific location along the length of the aircraft, measured from a reference point (datum) and used to designate positions on the fuselage, wings, and other components.

layer white paint, or to the green primer, which was visible.

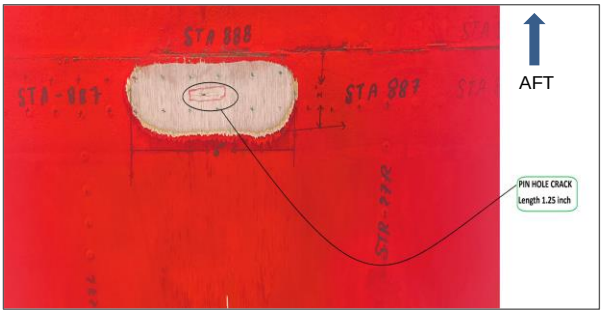

Figure 2. View of STA 887 damage

Hard landing inspections in accordance with B737-800 *AMM Task 05-51-01, Phase IA* and *Phase IB*, were completed with no findings.

Other Damage

The tail strike left paint marks on the runway surface in the touchdown zone of Runway 34, with the color matching the Aircraft and consistent with a tail strike (figure 3). No foreign object debris (FOD) was found. Minor damage was observed on the runway surface at the point of tail contact, located to the right of the Runway 34 centerline.

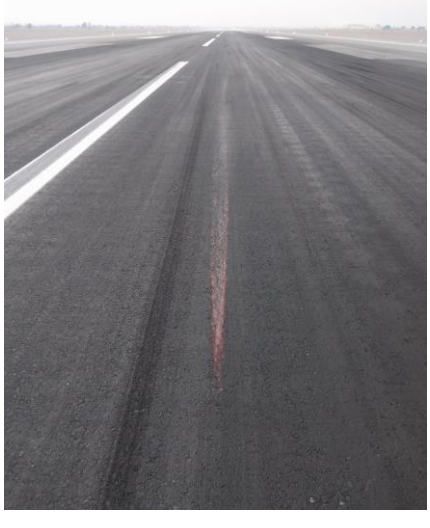

Figure 3. Paint marks on the runway

Personnel Information

The Commander held a valid air transport pilot license (ATPL-A) and Class 1 medical certificate issued by the Directorate General of Civil Aviation (DGCA) of India.

The Copilot held a valid commercial pilot license (CPL-A) and Class 1 medical certificate issued by the DGCA of India.

Both crewmembers were type-rated for the Boeing 737.

Aircraft Information

The Aircraft was a Boeing 737-800, fitted with two CFM56-7B turbofan engines.

The Aircraft, with manufacturer serial number 36336, was manufactured and first flown on 9 January 2009, and delivered to the Operator on 3 February 2009.

At the time of the Incident, the Aircraft had accumulated 57,322 flight hours, 18,519 cycles.

Maintenance history

The last major inspection (PH-47 + 8-year + 9-year + 6-month + 36-month + Bridging check)[4] was carried out on 17 March 2025, at 56,885.6 flight hours, 18,388 cycles.

The last inspection was the weekly check on 22 April 2025 when the Aircraft had accumulated 57,318.75 flight hours, and 18,518 cycles.

The maximum take-off weight of the Aircraft was 79,015 kg, and the maximum landing weight was 66,360 kg. The center of gravity (CG) range was limited between 5% and 36% mean aerodynamic chord (MAC). Based on the load sheet, the Aircraft departed with a take-off weight of 74,890 kg and CG at 23.1% MAC. At landing, the weight was 65,370 kg with CG at 23.5% MAC.

Tail skid assembly

A tail skid assembly is installed on the Aircraft as a protective bumper (figure 4). It absorbs impact energy through a crushable cartridge and wear

[4] The inspection of PH-47 + 8YR + 9Y + 06M0 + 36MO + Bridging check means: Replacement of engine parts based on EASA Airworthiness Directive AD2023-0108; 8 years; 9 years; 6 months; 36 months maintenance; and bridging check (a process to ensure the aircraft meets the new operational requirements, addressing gaps and ensuring compliance)

shoe, and provides a visual indication of strike severity via a warning placard.

The tail skid assembly consists of a cartridge, skid, fairing, and shoe. The fairing encloses the skid, and the shoe is attached to its bottom. The cartridge contains crushable honeycomb that compresses when the skid contacts the runway. Serviceability is shown by a decal: green/red indicates serviceable, full red requires cartridge replacement. The shoe makes runway contact during over-rotation. Wear dimples on its surface serve as reference points for replacement.

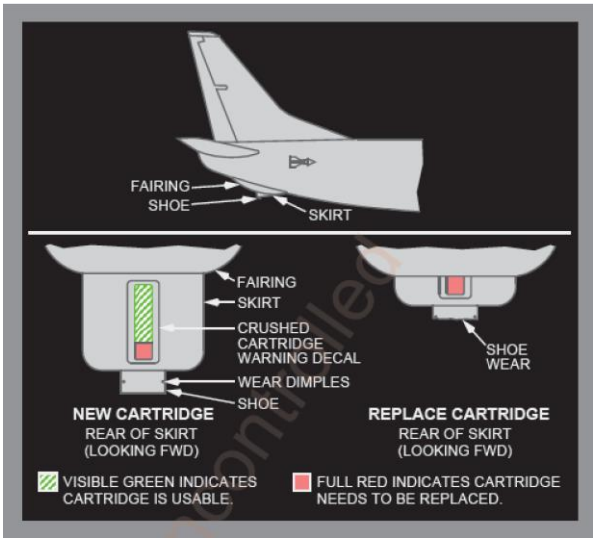

Figure 4. Tail skid [Source: *FCOM*]

Meteorological Information

The meteorological conditions at OMRK around the time of the Incident were: at 1400 UTC, wind from 310 degrees with a speed of 5 knots and variable from 190 to 320 degrees, visibility 10 kilometers or more, temperature 33 degrees Celsius, dewpoint 13 degrees Celsius, QNH barometer setting 1011, no significant clouds, and no significant anticipated changes.

Aerodrome Information

Ras Al Khaimah International Airport (OMRK), coordinates 25°36'48"N 55°56'20"E, is designated at the mid-point of runway 16/34 on the centerline, and is located 11 nautical miles (20.4 kilometers) south of Ras Al Khaimah city. The airport elevation is 94 feet.

OMRK is equipped with one asphalt runway 16/34. Runway 34 has a landing distance available of 3,760 meters.

Runway 34 is equipped with an ICAO Category I instrument landing system (ILS) and serves as the primary runway during reduced aerodrome visibility procedures when visibility is less than 1,500 meters. A precision approach path indicator (PAPI) with a 3.0 degrees glide path is installed on the left side of the runway.

Flight Recorders

The Aircraft was equipped with a flight data recorder (FDR), part number: 980-4750-003, and cockpit voice recorder (CVR), part number: 980-6022-001. Both flight recorders were successfully downloaded at Abu Dhabi Flight Recorders Laboratory (AD-FRL).

The data of the FDR, CVR, and ATC transcripts were examined and synchronized.

Flight data showed that at 13:49:04, the speedbrake handle was set to the ARMED position, and by 1349:13, all landing gear were down.

At 1351:57, during final approach and established on the ILS profile, the autopilot and autothrottle were disengaged as the Aircraft descended through 955 feet indicated altitude (880 feet radio height), approximately 2.8 nautical miles (5.2 kilometers) from runway 34 threshold. At this point, the airspeed was 151 knots, with flaps set at 30 degrees. The V_{ref} was 147 knots.

At 1353:02, the Aircraft crossed about 50 feet above the threshold at an airspeed of 154 knots, with both engines stabilized at N1 58.6% RPM. The Aircraft remained on the ILS profile. The glideslope is shown in Attachment A, and the landing flight data is presented in Attachment D.

The recorded wind varied between 336 degrees at 4 knots at 400 feet radio altitude and 329 degrees at 3 knots at 50 feet radio altitude as the Aircraft crossed the threshold of runway 34.

At 1353:04, the elevator input was near neutral (about 0 degrees), while the Aircraft pitch was approximately 1.6 degrees. One second later, the elevator deflected to a maximum of +12.6 degrees as the control column was pulled back, after which it was pushed forward. This coincided with the moment the Commander took control, indicating that the elevator input to +12.6 degrees was made by the Commander. The Aircraft's height was about 25 feet radio altitude.

About six seconds before touchdown, the rate of descent was about 780 feet per minute, increasing to 1,200 feet per minute in four seconds

later (two seconds before touchdown), as the control column was pulled back reaching a peak pitch rate of 5.3 degrees per second. The rate of descent then decreased to 330 feet per minute one second prior to touchdown.

At 1353:06, the thrust levers were retarded from 51.2 degrees to 26 degrees (idle). Simultaneously, the Aircraft made its first touchdown, with both main landing gears, at an airspeed of 152 knots. The vertical load factor recorded was 1.7G, with a pitch attitude of 6.3 degrees. Within two seconds, the thrust levers reached idle (about 26 degrees), with both engines spooling down to N1 47% RPM. The flight spoilers began to deploy. The elevator deflected to a maximum of -5.2 degrees, generating a nose-down input with a pitch rate of 5.3 degrees per second. At the first touchdown, the recorded wind was 316 degrees at 2.5 knots.

Following the first touchdown, the Aircraft bounced, and as it became airborne again, the elevator was pulled back, producing a pitch rate of 4.9 degrees per second. The elevator reached a maximum deflection of 13.5 degrees at 1353:07.

The Aircraft remained airborne for approximately 1.5 seconds before making a second, firmer contact with both main landing gears at 1353:08. At the same time, the elevator control input was pushed. The flight spoilers continued to extend, and the ground spoilers deployed automatically.

On the second touchdown, the vertical load factor peaked at 2.8G, with the pitch increasing to 9.5 degrees and the airspeed reducing to 146 knots.

At 1353:09, both flight and ground spoilers reached their maximum extension.

At 1353:11, the thrust levers were moved from idle (26 degrees) into the reverse range (11 degrees). The airspeed was 134 knots and continued to decrease.

At 1353:15, the nosewheel contacted the runway, and the Aircraft continued its rollout.

The recorded Aircraft weight was 65,710 kilograms with CG positioned at about 23.5% MAC. The static (outside) air temperature was 33 degrees Celsius.

Organizational and Management Information

The Operator

The Operator commenced operations on 29 April 2005 in compliance with an air operator certificate (AOC) issued by the Directorate General of Civil Aviation of India.

Landing Procedure – ILS

The *B737 flight crew operations manual (FCOM)* described the landing procedure – ILS, as given in table 1.

Table 1. Landing procedure as per *FCOM*

Pilot Flying	Pilot Monitoring
Initially • If on radar vectors ○ HDG SEL ○ Pitch mode (as needed) • If enroute to a fix ○ LNAV or other roll mode ○ VNAV or other pitch mode	Notify the cabin crew to prepare for landing. Verify that the cabin is secure.
Call “FLAPS ___” according to the flap extension schedule.	Set the flap lever as directed. Monitor flaps and slats extension.
When on localizer intercept heading: • verify that the ILS is tuned and identified • verify that the LOC and G/S pointers are shown.	
Arm the APP mode. If a dual channel approach is desired, engage the second autopilot.	
Note When using LNAV to intercept the final approach course, LNAV might parallel the localizer without capturing it.	
Use LNAV or HDG SEL to intercept the final approach course as needed.	
Verify that the localizer is captured. Verify the final approach course heading.	
	Call “GLIDESLOPE ALIVE.”
At glideslope alive, call: • “GEAR DOWN” • “FLAPS 15”	
	Set the landing gear lever to DN. Verify that the green landing gear indicator lights are illuminated. Set the flap lever to 15. Set the engine start switches to CONT.
Set the speed brake lever to ARM. Verify that the SPEED BRAKE ARMED light is illuminated.	

At glideslope capture, call "FLAPS ___" as needed for landing.	Set the flap lever as directed.
Set the missed approach altitude on the MCP.	
Call "LANDING CHECKLIST."	Do the LANDING checklist.
At the final approach fix (LOM, MKR, DME), verify the crossing altitude.	
Monitor the approach. If an autoland is planned, verify the autoland status at 500 feet AGL.	
For a single channel approach, disengage the autopilot and autothrottle no later than the minimum use height for single autopilot operation. For a dual channel approach, disengage the autopilot after touchdown.	

Analysis

The Approach

The disengagement of the autopilot and autothrottle at 955 feet indicated altitude (880 feet radio height), and approximately 2.8 nautical miles from the threshold, is a common point for pilots to assume manual control. At the point of disengagement, the airspeed was 151 knots, 4 knots above the V_{ref} of 147 knots. This is a reasonable speed for this stage of the approach, allowing for some margin. The flaps were set to 30 degrees, a standard landing configuration for the B737-800.

The Aircraft crossed the 50-foot threshold at 154 knots, which is 7 knots above V_{ref}. Both engines were stabilized at N1 58.6%, which was above idle and indicated an excess of energy at this stage of the approach.

The Aircraft remained on the ILS profile (Attachment A). While this indicates accurate lateral and vertical path tracking, the elevated airspeed and engine N1 at the threshold suggest that energy management in the final approach segment was not optimal. Best practice is to cross the threshold at or near V_{ref}, with thrust close to idle, to allow for a timely and controlled flare and touchdown.

The recorded rates of descent in the final moments before touchdown revealed a highly dynamic and unstable vertical profile. The rate of descent increased sharply from approximately 780 feet per minute six seconds before touchdown to 1,200 feet per minute four seconds later. It reached about 1,200 feet per minute below 100 feet radio altitude, exceeding common stabilized criteria. The approach was therefore not stabilized in the final segment. The rate of descent decreased to 330 feet per minute one second prior to touchdown, indicating a late and potentially aggressive flare maneuver to compensate for the preceding high rate of descent. A consistent and controlled rate of descent, typically 700 to 800 feet per minute on a 3-degree glide slope, is a standard stable approach.

The Commander stated that at approximately 70 feet, a high sink rate was perceived, and the control column was pulled back without any adjustment to the thrust levers. The flight data revealed that at about 25 feet radio altitude, the elevator deflected to +12.6 degrees, coincident with the Commander assuming control of the Aircraft. However, as per the CVR recordings, the Commander did not announce the takeover of controls with the standard callout "I have control", nor did the Copilot acknowledge the transfer by responding "You have control", indicating a breakdown in crew resource management.

The Touchdown

The thrust levers were retarded to idle as the Aircraft first touched down on both main landing gears (at 1353:06), at 152 knots (which is V_{ref} +5). The vertical load factor was 1.7G, and the pitch angle was 6.3 degrees, which was lower than the typical landing pitch of 7 to 8 degrees for the B737-800. This combination was consistent with a firm touchdown and indicated that the flare maneuver could not sufficiently reduce the rate of descent. At this moment, the flight spoilers began to deploy.

As a result of excessive airspeed and rate of descent in combination with a delayed flare maneuver, the Aircraft bounced for about 1.5 seconds. At that time, the elevator was pulled to a maximum of +13.5 degrees.

The second touchdown was significantly more severe, with a peak vertical load factor of 2.8G that exceeded the 2.2G hard-landing threshold. Pitch attitude at the second touchdown was 9.5 degrees, reflecting an attempt to correct the bounce with increased nose-up input. However, this correction was too late to reduce the touchdown energy. The airspeed had reduced to 146 knots, which was below V_{ref}, indicating some energy deterioration during the bounce. The flight and ground spoilers reached full extension automatically. The load factor and pitch angle were consistent with a tail strike occurrence, which was confirmed by the post-flight inspection. However, no contact marks were found on the tail skid

assembly. This indicates that the automatic systems for aerodynamic braking, the spoilers, functioned as designed, effectively destroying lift and increasing drag for braking effectiveness.

Thereafter, the thrust levers were timely and effectively moved to the reverse range while the Aircraft was at an airspeed of 134 knots.

The nosewheel contacted the runway 7 seconds after the second main gears touchdown, which was within a reasonable timeframe for the nose to settle, ensuring directional control during the rollout.

The recorded wind conditions (varying between 336 degrees at 4 knots and 316 degrees at 2.5 knots) were light and did not present a significant crosswind component that would inherently complicate the landing. In general, although the static (ambient) air temperature of 33 degrees Celsius may affect an aircraft performance, the energy management and flight crew control inputs during the Incident flight had more relevance to the hard landing than the environmental conditions.

The Incident was primarily the result of excess energy during the final approach, unstable descent rates in the flare, inadequate touchdown control, and incomplete adherence to crew coordination procedures.

Conclusions

Based on the evidence available, 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 particular organization or individual.

Findings

(a) The Aircraft was certificated, equipped, and maintained in accordance with the requirements of the civil aviation requirements of India.

(b) The Aircraft was airworthy when dispatched for the flight.

(c) The flight crewmembers were licensed and qualified for the flight in accordance with the civil aviation requirements of India.

(d) The Commander was the pilot monitoring, and the Copilot was the pilot flying.

(e) Both flight crewmembers stated that they were well-rested and fit for the flight.

(f) The Aircraft remained on the ILS profile laterally and vertically until crossing runway 34 threshold.

(g) The Aircraft crossed the threshold at 7 knots above V_{ref} with thrust above idle.

(h) The rate of descent reached about 1,200 feet per minute below 100 feet radio altitude, exceeding the criteria for normal stabilized touchdown.

(i) At 25 feet radio altitude, no standard PF/PM transfer callouts were made when the Commander assumed control of the Aircraft.

(j) The Aircraft touched down for the first time at V_{ref} + 5 knots with a pitch attitude of 6.3 degrees, which is lower than the typical B737-800 landing pitch.

(k) The touchdown registered 1.7G, consistent with a firm landing and a higher-than-optimal descent rate.

(l) The Aircraft bounced and remained airborne for about 1.5 seconds.

(m) The second touchdown was a hard landing with a maximum pitch attitude of 9.5 degrees and a peak vertical load factor of 2.8G.

(n) The Aircraft experienced a tail strike, but the tail skid assembly did not exhibit marks of contact.

(o) The Aircraft sustained minor damage to the lower surface of the rear lower fuselage.

(p) Weather conditions did not contribute to the circumstances of the Incident.

Causes

The Air Accident Investigation Sector determines that the tail strike Incident was caused by:

(a) A bounce that occurred after an initial firm touchdown (1.7G) at an excessive airspeed and rate of descent, which the flight crew was unable to manage using standard flare inputs.

(b) The excessive energy and firm initial touchdown led to the bounce followed by a hard second touchdown (2.8G) with an increased pitch angle that resulted in a tail strike.

(c) The hard second touchdown occurred because of improper bounce recovery techniques applied by the flight crew.

Contributing Factors

The Air Accident Investigation Sector determines that a contributing factor to the Incident was a breakdown in crew resource management (CRM), as the Commander assumed control at low altitude without the standard PF/PM transfer of control callouts. This resulted in poor coordination, which adversely affected the execution of a stabilized approach and the appropriate flare maneuver.

Safety Recommendation

The Air Accident Investigation recommends that:

Air India Express

SR20/2025

The Aircraft crossed the threshold at V_{ref} +7 knots with engine thrust above idle, and the rate of descent increased to 1,200 feet per minute below 100 feet radio altitude, exceeding common stabilized-approach limits. These conditions contributed to excess energy at flare initiation and prevented adequate arrest of descent, leading to a firm first touchdown, a bounce, and an improper recovery that culminated in a hard second landing.

Therefore, the Investigation recommends that the Operator reinforce with the flight crew adherence to stabilized-approach criteria and energy-management standards during landing, and on bounce recognition and recovery, including mandatory go-around decision points.

SR21/2025

The Commander assumed control at low altitude without the standard PF/PM callouts. This breakdown in crew resource management (CRM) contributed to inadequate flare inputs and inconsistent control actions.

Therefore, the Investigation recommends that the Operator strengthen CRM training to ensure standard PF/PM transfer of control callouts are consistently applied.

Directorate General of Civil Aviation (DGCA) of India

SR22/2025

The Incident demonstrated deficiencies in stabilized approach adherence, energy management, bounce recovery, and CRM application.

Therefore, the Investigation recommends that the DGCA review and enhance regulatory oversight to ensure operators emphasize stabilized approach criteria, precise energy management during landing, and proper bounce recovery techniques in both training and operational procedures.

This Summary Report is issued by the:
Air Accident Investigation Sector
The United Arab Emirates

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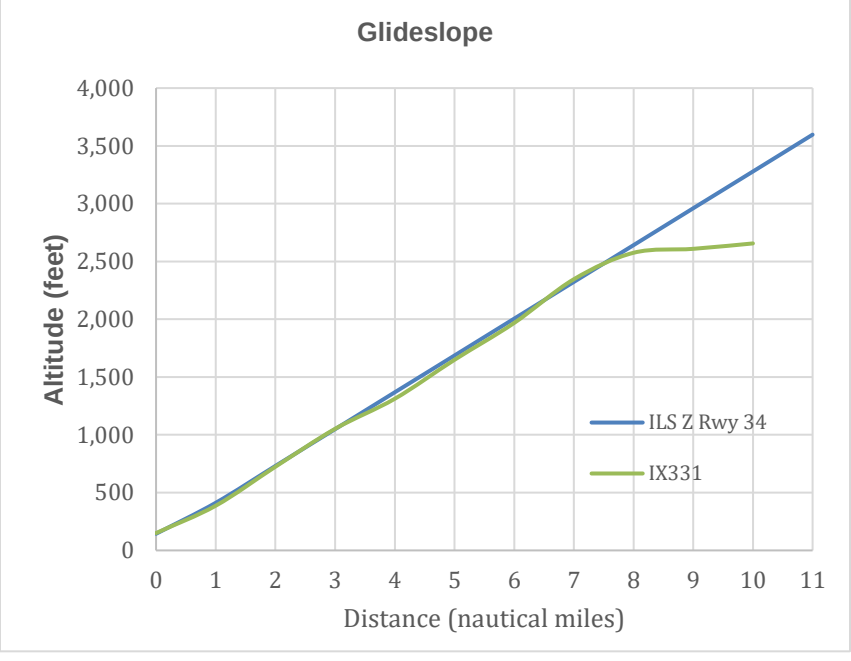
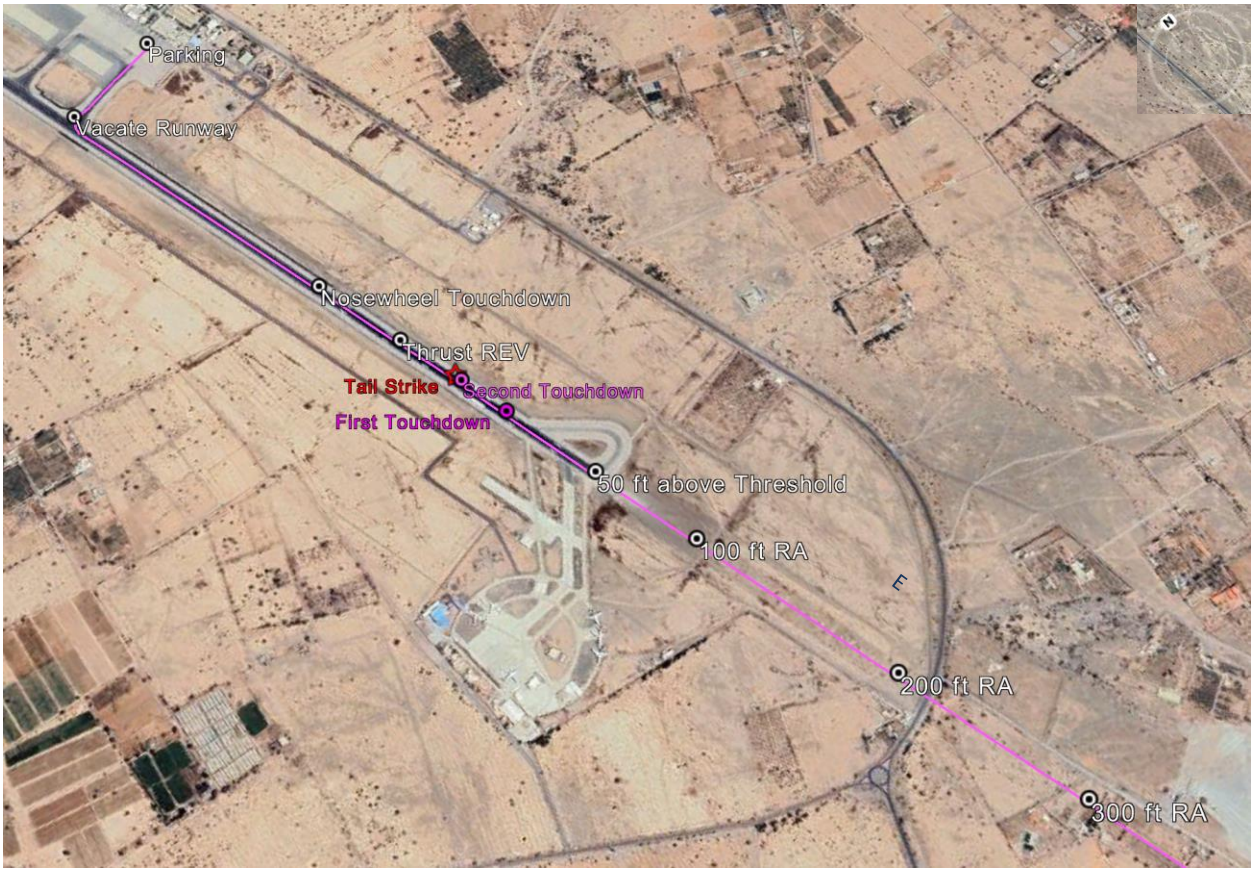
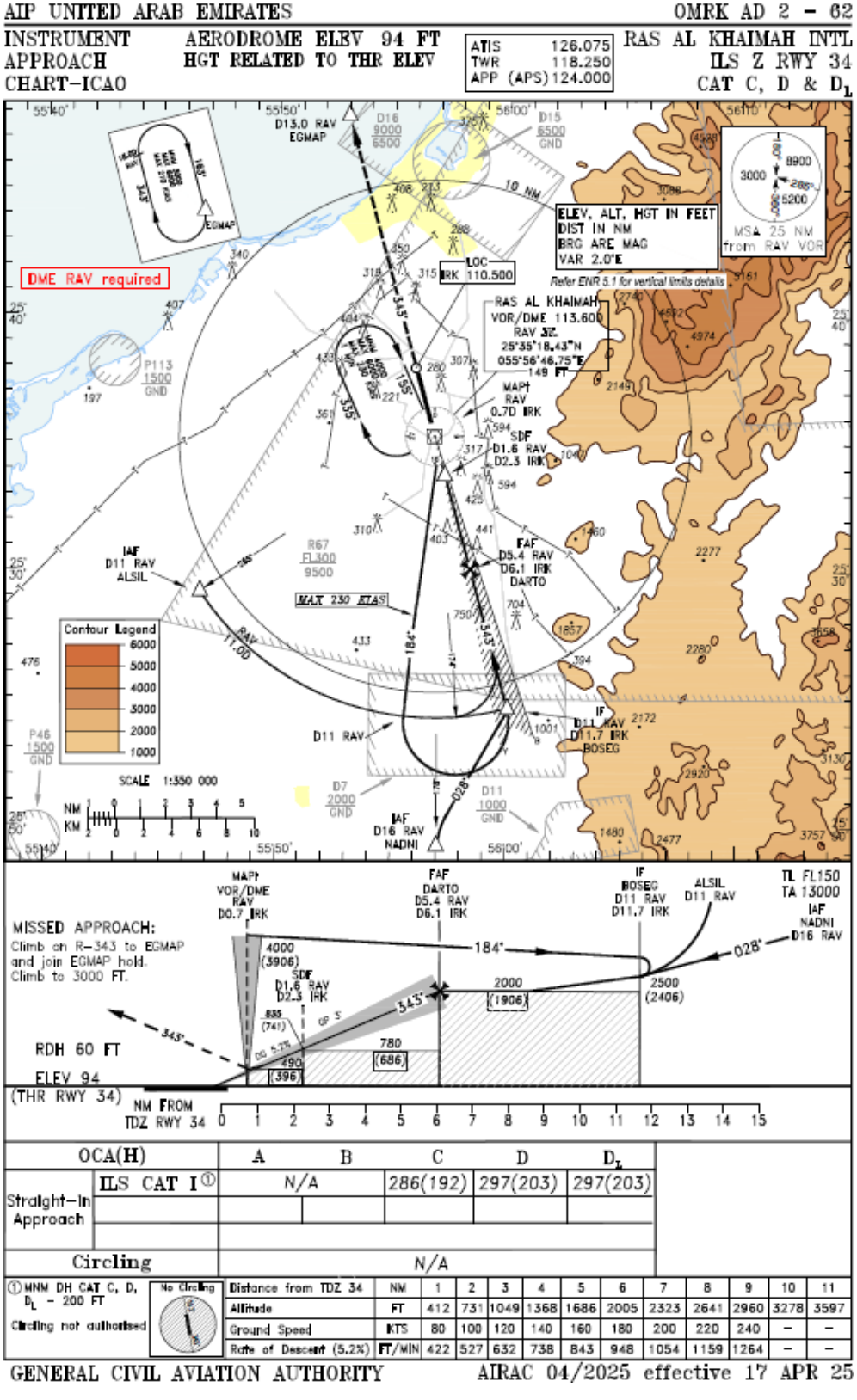
Attachment A. Aircraft Glideslope on Final Approach



Attachment B. Aircraft Track during Landing at OMRK Runway 34



Attachment C. Approach Chart – OMRK ILS Z Runway 34



Attachment D. Fight Data on Landing