

“In the name of God”



Islamic Republic Of Iran
Civil Aviation Organization
Aircraft Accident Investigation Board

Final Report

Basic Information:

State File Number: I980305MNV

Type of occurrence: Incident

Date of occurrence: 26 May 2019

Place of occurrence: Republic of Armenia

Aircraft Model: A310-300

Registration: EP-MNV

Operator: MAHAN AIR

Date of Issue: 22 Feb, 2020

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SYNOPSIS:

On Sunday May 26, 2019, the Aircraft Accident Investigation Board (AAIB) of I.R of Iran was notified that an A310, EP-MNV, operated by MAHAN Air with flight No; IRM1150 from the Mehrabad International Airport (OIII) to the Zvartnots International Airport (UDYZ) /Republic of Armenia has landed on RWY09 and involved over run from defined displaced Runway (runway excursion).

The Civil Aviation Committee of the Republic of Armenia has initiated the investigation and according to Annex 13, chapter 5, the " Notification" was sent to the Civil Aviation Organization (CAO) of I.R of Iran as State of Registry/Operator. Due to formal request of the State of Occurrence, the investigation was delegated to the Aircraft Accident Investigation Board (AAIB) of I.R of Iran.

The Flight Data Recorder has been removed from the aircraft. Downloading of FDR was performed in Tehran under the supervision of CAO.IRI representatives.

The **cause** of incident was cockpit crew misunderstanding about related "**NOTAM and displaced runway**".

1.1 History of the flight:

On May 26, 2019, Mahan Air aircraft A310-300 with EP-MNV registration was scheduled for a 4 leg flight with one set crew as mentioned below;

Imam Khomeini Int'l Airport, Sulaymaniyah Int'l Airport (Iraq), Imam Khomeini Int'l Airport, Zvartnots Int'l Airport, Imam Khomeini Int'l Airport (IKA – ISU – IKA – EVN – IKA).

Mahan Air Flight 5056 departed Imam Khomeini Int'l Airport (IKA) at 02:49 UTC and landed at Sulaymaniyah Int'l Airport (ISU) at 03:49 UTC

In the Flight No; IRM 5057 , aircraft took off from Sulaymaniyah Airport (ISU) at 05:02UTC to the Imam Khomeini INTL. Airport ; (IKA) and landed at 05:53 UTC. The aircraft was connected to Air Bridge and passengers were disembarked. The crew leaved the aircraft and was attended in the dispatch for second flight due to national security regulation and received flight documents for the next flight and returned to the aircraft. The crew allowed passengers to board and got ready to perform third flight. A short time dispatch briefing regarding EVN airport about RWY 27 threshold displacement by 1,450 meters to the center of runway was accomplished by dispatcher verbally and associated NOTAM(s) for departure and arrival airports were delivered to cockpit crew by means of soft copy via IPAD (EFB).

In the Flight No; IRM 1150 , aircraft took off from Imam Khomeini INTL Airport (IKA) at 08:05 UTC (5 minutes delay) to destination Zvartnots INTL Airport (EVN) and landed at 09:23 UTC .

Prior to top of descent (TOD), cockpit crew listened to ATIS which was emphasizing NOTAM about RWY 27 threshold displacement by 1,450. Then the flight made a contact with Yerevan Approach on 126.0 MHz and was vectored to join final for ILS DME for RWY 09 approach and after landing to clear RWY 09 via TWY "B". In addition, on the final approach, cockpit crew were advised by the approach controller about the RWY 27 displacement by 1,450 meters and in reply first officer as a pilot monitoring just had acknowledged it "**copied**". The captain who was acting as a pilot flying, made a mistake about the runway displacement and imagined displacement on the beginning of RWY 09 and perform long flared landing and approximately 80 to 100 ft prior to the end of RWY09 (RWY 27 displacement threshold), he observed the (RWY end lights) threshold lights of RWY27 so, he made a full braking action accompany with a late thrust reverser cancellation were applied by him, to avoid crossing of lights, but it was too late and unfortunately passed over the threshold lights and the tire wheels No;5 and No;6 tires were damaged. Due to serious damage of No.5 and No.6 tires as a deep cut, the aircraft grounded at Zvartnots INTL Airport and No.5 and No.6 tires were changed by the new onboard tires on the aircraft cargo. Finally, the aircraft was released for return flight and landed at Imam Khomeini INTL Airport safely.

1.2 Injuries to persons:

The flight was serving a scheduled passenger flight with 2 cockpit crew, 9 cabin crew and carrying 169 passengers. No injuries were reported.

1.3 Damage to aircraft:

No; 2, No; 5 and No; 6 tires were damaged

1.4 Other Damages:

One elevated RWY end lights was damaged by impacting the wheel of the aircraft.

1.5 Personnel Information:

Captain

Male, 62 years old, ATPL 1045.

License validity: October 23, 2019.

Proficiency check validity: October 23, 2018.

Medical examination validity: October 13, 2020.

Total flying hours: 13,117 hours.

Current type as a captain 3,375 hours.

First Officer:

Male, 34 years old. CPL 4080

License validity: March 06, 2020.

Proficiency check validity: June 09, 2019.

Medical examination validity: April 19, 2019.

Total flying hours: 1,938 hours.

Current type as a first officer: 948 hours .

1.6 Aircraft information:

Type of A/C: A310-304, S/N.567 with registration EP-MNV was manufactured in 1991. All certificates of the aircraft were valid at time of incident.

Number of crew: 02 cockpit crew + 09 cabin crew + 02 additional crew

Number of Passengers: 157Adults + 08 Childs+ 02 Infants

Cargo weight: 2,922 kg.

Aircraft Performance:

The aircraft had not any limitation on the brakes and engine thrust reversers at the time of incident. Based on the “Flight Crew Operating Manual” the landing distance on the dry runway was calculated for 1,460 meters. The available runway was 2,400 meters that was suitable for normal landing.

REQUIRED LANDING DISTANCE (RLD) - CONF 30/40

The RLD in the first table considers : Sea Level (SL), ISA, no wind, no slope, no engine reverse thrust, manual landing and VAPP = VLS.

Required Landing Distance (m)					
Runway State	Dry	Wet	Compacted snow	Slush	Water
Weight (1000 kg)					
80	1110	1270	1380	1560	1760
90	1200	1380	1450	1660	1880
100	1290	1480	1570	1840	2090
110	1370	1580	1690	2030	2310
120	1460	1680	1810	2220	2530
124	1510	1730	1860	2290	2620

Corrections on Landing Distance (m)						
Runway State		Dry	Wet	Compacted snow	Slush	Water
Altitude	Per 1 000 ft ABOVE SL	+ 100	+ 110	+ 130	+ 230	+ 230
Speed	Per 5 kt	+ 310	+ 360	+ 350	+ 470	+ 540
Wind	Per 5 kt TW	+ 280	+ 310	+ 320	+ 540	+ 620
Reverse	REV AVAIL (ONE/TWO)	-	-	- 110 / -160	- 130 / -190	- 190 / -280

Note : RLD for runway covered with compacted snow, slush and standing water are not certified, but advisory data.

1.7 Meteorological Information:

Issued METAR for UDYZ was:

UDYZ 260830Z 28003kt 210V360 9999 Few 040 TCU 29/01 Q1012

UDYZ 260900Z 31002kt 9999 FEW030 TCU 29/01 Q1011

The weather condition had no effects on this event.

1.8 Aids to Navigation:

Serviceable: ILS DME RWY 09, CAT II, RNP (LNAV/VNAV) RWY 09, VOR DME RWY 09, RNP Z (LNAV) RWY 27 and RNP Y (LNAV) RWT 27.

Unserviceable: center line, touchdown zone and PAPI lights for RWY 27.

1.9 Communications:

All Zvartnots INTL Airport (Yerevan) VHF radio frequencies were serviceable.

ATIS: 119.5 MHz

Tower: 120.9 MHz

Ground: 119.0 MHz

Approach: 116.0 MHz

The flight crew did not report any technical communication problem. Also, whole transcript of recorded communications of the air traffic control units were delivered to CAO IRI and used for the incident analysis.

Area Control Centre (ACC):

08:47:36 UTC:

P- Yerevan Control hello Mahan-Air1150 FL 360 Information A 1011

C- Mahan-Air1150 Yerevan Control Good day radar contact

08:56:47

P- Yerevan Control Mahan-Air1150 request descend

C- Mahan-Air1150 descend FL 200

P- FL 200 Mahan-Air1150

09:00:53

C- Mahan-Air1150 are you able to turn to the left heading 300

P- Affirm Sir left heading 300 Mahan-Air1150

09:01:22

P- Yerevan Mahan-Air1150 request further descend

C- Mahan-Air1150 descend FL 160

P- FL160 Mahan-Air1150

09:05:47

C- Mahan-Air1150 expect radar vectoring for ILS/DME approach RWY 09

P- ... Mahan-Air1150

09:07:52

C- Mahan-Air1150 descend to FL150 contact Yerevan Approach 126.0 Good day

P- Descend 150 126.0 Mahan-Air1150

Approach(APP):

09:08:10

P- Approach hello Mahan-Air1150 descending FL150

C- Mahan-Air1150 Yerevan Approach hello identified descend continue descend FL140

P- Descend FL140 Mahan-Air1150 and information A 1011

C- Mahan-Air1150 again for information threshold RWY 27 is displaced to the aerodrome reference point by 1450 meters maintenance work in progress

P- Information copied

09:11:33

C- Mahan-Air1150 maintain present heading for ILS approach RWY09

P-Present heading 260 vectoring for ILS approach RWY 09 Mahan-Air1150

09:12:26

C- Mahan-Air1150 descend altitude 5100 QNH 1011

P- Descend altitude 5100 QNH 1011 Mahan-Air1150

09:20:53

C- Mahan-Air1150 turn right heading 040 cleared ILS approach RWY09 report established, distance from touch down 10 miles

P- Right heading 040, call you established ILS RWY09 Mahan-Air1150

09:21:44

P- Mahan-Air1150 established localizer RWY09

C- Mahan-Air1150 contact TWR 120.9 Bye-bye

P- 120.9 Mahan-Air1150 bye-bye thank you Sir

Tower (TWR):

09:21:59

P- Yerevan Tower hello, Mahan-Air1150 established ILS RWY 09

C- Mahan-Air1150 Yerevan TWR cleared to land RWY09 wind 20 degrees 4kn.

P- Cleared to land RWY09 Mahan-Air1150

C- Mahan-Air1150 expect vacate via TWY B

P- Expect vacate via TWY B Mahan-Air1150

09:23:03

P- Tower Mahan-Air1150

C- Go ahead Mahan-Air1150

P- Sir unable to vacate via B

C- Sir our only TWY in-use B now

P- Sir we have to make 180 turn vacate via B

C- Affirm

09:25:19

C- Mahan Air 1150, make 180 degrees and vacate via TWY B to the left

P- Make 180 vacate B Mahan-Air1150

1.10 Airport Information:

ZVARTNOTS International Airport (UDYZ/EVN) located 10 km west from city of Yerevan. RWY Dimension is 3850×56 m/ Asphalt. At the time of incident, the available RWY length was 2400m (3850 meters excluding displaced threshold 1450m from beginning of RWY 27). There was white arrow marking as well as lined threshold sign marking with elevated lights on the displaced threshold.

In accordance with NOTAM A0058/19 RWY declared distance are as below: RWY 09: TORA 2400M TODA 2850M ASDA 2850M LDA 2400M

RWY 27: TORA 2400M TODA 2850M ASDA 2800M LDA 2400M



1.11 Flight Recorders:

FDR:

The aircraft was equipped with a "Solid State" FDR (SSFDR) i with P/N; 980-4700-042 And S/N: 08179 which recorded flight parameters up to 100 hours.

The flight data information was picked up by SSFDR successfully and analyzed by Flight Data Monitoring (FDM) program.

CVR:

The aircraft is equipped with a CVR (Cockpit Voice Recorder) installed in pressurized area after bulk cargo which can record Cockpit's communications up to 2 hours (120 minutes) in mixed channels and individual cockpit crew's communications can be recorded up to 30 minutes.

The CVR audio files were downloaded read out successfully and stored.

1.12 Wreckage and Impact Information:

After landing of aircraft in the destination, the aircraft and RWY threshold was visually inspected with the following results:

- There was not any deflection on the airframe and control surfaces.
- There were signs of impact of elevated threshold light as well as deep cuts on the main landing gear tires which did not permit the aircraft to continue more flights.



1.13 Medical and Pathological Information:

The Alcohol tests were done for both pilot and Pilot Monitoring by request of Armenian Authority immediately after the occurrence and the result of analysis were negative.

1.14 Fire:

No fire occurred for the aircraft.

1.15 Survival Aspects:

Nobody was injured in this incident.

1.16 Organizational and Management Information:

Mahan Air is registered airline in I.R of Iran and was established on 1992, the company designation code is **IRM** and its ICAO registered code is: **W5**

2. ANALYSIS:

Reviewing of information:

On 26 May 2019, the aircraft was planned to do four short time flights IKA-ISU-IKA and IKA-EVN-IKA with one set crew. The planned flight time for whole four flights was about 4 hours flight which was permitted for crew duty according to Mahan Air Operations Manual. The aircraft performed two flights to/from Sulaymaniyah /Iraq and passengers were disembarked at Tehran Imam Khomeini Airport (IKA). The aircraft and its crew should be prepared for another two flights to/from Yerevan airport (EVN) for two hours later. The crew had left the aircraft due to national security law and attended in the dispatch office to receive flight documents and be ready for next flights (IKA – EVN – IKA). According to cockpit crew's statements, flight crew analyzing, dispatch briefing was accomplished by dispatcher including related NOTAM briefly and associated NOTAM for departure and arrival airports delivered to cockpit crew in soft copy via iPad. Cockpit crew had not enough time to review associated information regarding destination aerodrome but both of them were experienced pilots for flying to Zvartnots Int'l Airport (EVN). The aircraft departed from Imam Khomeini Int'l Airport (IKA) to destination Zvartnots INTL Airport (EVN). In accordance to pilot statement and FDR analysis, immediately after departure, the crew was awarded of enroute bad weather condition so the pilot decided to change flight route for purpose of Circumnavigation to avoid weather. By the fact, it was short time flight and due to prevailing situation of the cockpit, the pilots reviewed the issued NOTAM but not focused on the Runway limitation.

Prior to top of descent (TOD), cockpit crew listened to ATIS which was emphasizing Rwy 27 threshold displacement by 1,450 meters. As well as ATIS, Rwy 27 threshold displacement by 1,450 meters had been advised to cockpit crew by approach controller and the first officer as a pilot monitoring acknowledged it. Crew briefing was accomplished by captain but all of required items had not been covered.

After approaching TMA, the Flight 1150 made a contact with Yerevan Approach on 126.0 MHz and 1150 was vectored to join final for ILS DME RWY 09 approach. The cockpit was awarded about displaced threshold of RWY 27 by the ATIS and also by the approach controller while approaching RWY 09. The crew made a mistake by focusing on emphasized subject of displacement to imagine the runway displacement for RWY 09.

The Captain as a pilot flying executed the approach with the confusion of runway threshold displacement because of wrong perception in his mind. First officer, as a pilot monitoring was also confused about the runway threshold displacement so, he didn't advise the captain about the displacement which not included the beginning of RWY 09 for landing. Captain made a long flare for landing to find new displaced threshold of RWY 09 and the CVR audio files showed that first officer made a note to the captain. He could request go around for the flight but landing performed and approximately 80 to 100 ft prior to end of RWY09 (RWY 27 displacement threshold), captain observed the threshold lights of RWY27 (RWY 09 end lights) so, he made a full braking action and late thrust reverser cancellation, to avoid crossing of lights, but it was too late and unfortunately passed over the threshold lights and tires of main landing gears as No.5 and No.6 were damaged.

Because of cockpit crew's confusing and mistake, captain thought, after landing he can't clear the runway by TWY "B" so, told the first officer to contact with the controller and request 180° turn after landing to clear the runway via TWY "B".

FDR analyzing confirms that aircraft accomplished an ILS approach and disengaged both autopilots while descending through 660 feet AGL (3,560 feet MSL) and while descending through 180 feet AGL(3,070 feet MSL), pilot flying didn't follow the glide slope information anymore and flew above the glide path intentionally to make a landing behind the runway displacement which had in mind mistakenly which was not for RWY 09 threshold .

Due to serious damage of No.5 and No.6 tires by a deep cut, the aircraft grounded at Zvartnots INTL Airport and tires were changed by the new serviceable ones and aircraft was released and returned to Imam Khomeini INTL Airport/Tehran safely.

3. CONCLUSION:

3.1 Findings:

- The flight crew was properly certified and qualified in accordance with applicable regulations to conduct the flight.
- There was no evidence of an aircraft structural or system failure that would have either been causal or contributing to the incident.

- Planning of two international flights without consideration of enough time caused time pressure for the crew to not perform effective briefing before departure to EVN.
- NOTAM of destination airport was delivered in soft copy format on EFB prior to departure to the flight crew and details of restrictions pertinent to EVN airport such a displaced threshold and declared distances had been informed by flight dispatcher.
- The cockpit crew has not analyzed NOTAM about RWY threshold displacement while performing descend, approach and landing check list completely and made mistake about the runway displacement and imagined displacement on the beginning of RWY 09 .
- The Captain had been followed the localizer information (course and glide slope) and disregarded to follow the glide slope information while descending through 300 feet AGL intentionally to make a long landing flare to reach imaginary displaced threshold on RWY 09.
- The first officer as pilot monitoring had advised Captain about his wrong decision and losing the beginning of the RWY but did not recommend Go Around to the captain.
- The crew did not anticipate elevated lights on the displaced threshold (end of runway) via standard NOTAM so encountered to the lights in insufficient time for braking action.
- Capitan made a full braking action and late thrust reverser cancellation, to avoid crossing of lights, but it was too late and unfortunately passed over the threshold.
- The elevated lights across the runway as a RWY end light caused a hazard for the flight which caused damage on the aircraft tires.

3.2 Probable causes:

The investigation of available evidences such as; crew statements, ATC communication, FDR data, site visit and airport CCTV observation; the **Main Cause** of incident was wrong perception of the flight crew regarding issued NOTAMs of displaced threshold of RWY27.

The **Contributing Factors** to the incident were:

- 1) Insufficient risk assessment for flight time planning between two international flights.
- 2) Lack of CRM about communication between cockpit crew and commanding Go around.
- 3) Cockpit crew failure to perform related approach briefing effectively.

4. SAFETY RECOMMENDATIONS:

As a result of the investigation of this incident, Accident Investigation Department of I.R of Iran Civil Aviation Organization (AAIB) issues the following recommendations:

SR 980305MNV:

To I.R of Iran Civil Aviation Organization:

1. To ensure that risk assessment on new routes for none scheduled flights are kept/focused on airline operations manuals.
2. To Require all operators to accomplish arrival landing distance assessments before every landing based on standardized methodology involving approved performance data, actual arrival conditions, a means of correlating the airplane's braking ability with runway conditions and be confirmed on before landing check list.
3. To review airline training programs and manuals to ensure they incorporate the revised guidelines concerning "Runway Overrun Prevention".

To Mahan Air:

4. To ensure proper planning for two successive flights with one set crew to perform flight preparation completely.
5. to review flight crew training programs and manuals to ensure training in landing on displaced Runway as (1) Dispatch Briefing; (2) take off/ Landing distance (3) Engine reverser/Brake limitation.
6. To revise approach check list for crew to confirm /review condition of planned landing airport.