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Accident Investigation Coordinating Committee

Report 2018/02

Final Report on the Serious Incident to
Airbus, A320-251 (VT-EXL)
Velana International Airport, Maldives
7 September 2018

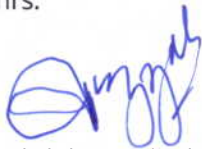
Introduction

Maldives is a signatory to Convention on International Civil Aviation (Chicago 1944) which established the principles and arrangements for the safe and orderly development of international air transport. Article 26 of the Convention obligates Signatories to investigate accidents to civil aircraft occurring in their State.

This investigation has been conducted in accordance with Annex 13 to the Convention on International Civil Aviation and the Civil Aviation Act 2/2012. The sole objective of this investigation and the Final Report is to prevent accidents and incidents. It is not the purpose of this investigation to apportion blame or liability.

AICC investigations are independent, separate and conducted without prejudice to any judicial or administrative action that may be taken to determine blame or liability.

All times in this report are in local time unless stated otherwise. Time difference between local and UTC is +5 hrs.



Mr. Abdul Razzak Idris

Chairperson

Accident Investigation Coordinating Committee



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Aircraft Serious Incident Report No: 2018/02

Aircraft Type and Registration	Airbus A320-251n, VT-EXL	
No. & Type of Engines:	2 x CFMI LEAP-1A26	
Year of Manufacture:	21-12-2017	
Date and Time (LT):	7 September 2018 at 1526 Hrs.	
Location:	Velana International Airport (VIA)	
Type of Flight:	Commercial Air Transport (Passenger)	
Persons on Board:	Crew – 7	Passengers – 107
Injuries:	Crew – Nil	Passengers – Nil
Nature of Damage:	The LH main landing gear tyre damaged	
Commander's Licence:	ATPL issued by Directorate General of Civil Aviation, India	
Commander's Age:	30 years	
Commander's Flying Experience:	4906: 39 Hrs	
Notification Source:	Male' Air Traffic Control (ATC)	

Synopsis

An Airbus A320, aircraft registration VT-EXL, operated by Air India, landed on a runway under construction at Velana International Airport (VIA) after conducting a VOR approach to runway 18 on 7 September 2018 at 1526 Hrs. There was no apparent damage to the aircraft other than those caused to the left hand main landing gear tyre severely damaged. Of the total 114 occupants on-board, no one was injured.

The incident was notified to the Accident Investigation Coordinating Committee (AICC) at 1559 hrs. Investigation began on the same day with inspectors arriving at the scene at 1715 hrs.

1 Factual Information

1.1 History of the flight

Air India flight AIC263, a scheduled daily air service between Trivandrum and Male', entered Male' controlled airspace following an uneventful flight. On initial contact with Male' Control the aircraft was cleared via the flight planned route and standard instrument arrival route designated MUGBA 3B ARR with an expectation for an RNAV approach to runway 18 at Velana International Airport. During read back of the issued ATC clearance, the aircraft requested for a VOR approach to runway 18 and was advised to expect the same.

AIC263 was transferred from Male' Control to Male' Approach while passing through 19,000 feet, on its descent to land at Velana International Airport. Male' Approach cleared the aircraft to continue descent to 10,000 feet with instruction to reduce to minimum speed as it was number two in the arrival sequence. After the aircraft was cleared to descend to 7000 feet it was vectored on heading 290° for spacing, turning the aircraft away from the airport. While on heading 290° the aircraft was cleared to descend to 4000 feet and instructed to turn left direct to waypoint 'URDIV'. Thereafter when AIC263 was cleared for an RNAV approach to runway 18 and instructed to contact Male' Tower, the aircraft again requested for a VOR approach. It was then cleared for a VOR approach to runway 18 and transferred to Male' Tower.

On initial contact with Male' Tower AIC263 was instructed to continue approach to runway 18. Further descent was approved when requested and the aircraft was asked to report seven miles final for runway 18. Landing clearance to AIC263 was issued before the aircraft reported seven miles final with instruction to vacate runway after landing via taxiway 'B'. Approximately three minutes after landing clearance was issued Male Tower noticed AIC263 had landed on a runway that was under construction, located to the east of runway in use and advised the aircraft it had landed on the wrong runway.

1.2 Injuries

None.

I.3 Damage to Aircraft

The LH main landing gear tyre was damaged.

I.4 Other damage

None.

I.5 Personnel Information

Pilot-In-Command

Age	: 30 Years
Licence	: ATPL-6477
Date of Issue	: 31 August 2015
Valid up to	: 30 August 2020
Category	: Aeroplane
Class	: Multi-Engine, Land
Endorsements as PIC	: A320/ A319/ A321, KING AIR C-90, TB-20
Date of Med. Exam.	: 31 January 2018
Med. Exam valid upto	: 01 February 2019
FRT0 Licence No.	: 11322
Date of issue	: 15 April 2008
Valid up to	: 14 April 2023
Total flying experience	: 4906: 39 Hrs
Experience on type	: 4706: 39 Hrs
Experience as PIC on type	: 846: 40 Hrs
Last flown on type	: 07-09-2018
Rest before duty	: 12: 35 Hrs
Total flying experience during last 180 days	: 359: 02 Hrs
Total flying experience during last 90 days	: 177: 25 Hrs
Total flying experience during last 30 days	: 62: 15 Hrs
Total flying experience during last 07 days	: 16: 50 Hrs
Total flying experience during last 24 Hours	: 05: 10 Hrs

First Officer

Age	: 24 Years
Licence	: CPL-13197
Date of Issue	: 28 August 2014
Valid up to	: 27 August 2019
Category	: Aeroplane
Class	: Multi-Engine, Land
Endorsements as PIC	: DA40, DA42
Date of Med. Exam.	: 09 August 2018
Med. Exam valid upto	: 13 August 2019
FRT0 Licence No.	: 19066
Date of issue	: 28 August 2014

Valid up to	: 27 August 2019
Total flying experience	: 1766 Hrs. 10 Min.
Experience on type	: 1566 Hrs 10 Min.
Experience as PIC on type	: NIL
Last flown on type	: 06-09-2018
Rest before duty	: 12 Hrs 35 Min.
Total flying experience during last 180 days	: 398 Hrs 24 Min.
Total flying experience during last 90 days	: 203 Hrs 31 Min.
Total flying experience during last 30 days	: 61 Hrs 56 Min.
Total flying experience during last 07 days	: 24 Hrs 16 Min.
Total flying experience during last 24 Hours	: 05 Hrs 10 Min.

1.5.1 Interview of Crew

1.5.1.1 Pilot-In-Command

The Commander and PF stated the flight from Trivandrum was normal. They approached to land runway 18. During the approach to land, they could see the runway markings were very bright and clear. He stated that at that time, he could not see the old runway, may be because they were coming from the left of the runway, and the markings on the old runway were not conspicuous as those on the new runway. There was a 15 knots cross wind from the right. In addition, due to the nose direction of the aircraft, the new runway was more visible. He never thought that they were aligned towards to the wrong runway. He stated that the cross markings were not close to the threshold. He saw the "cross markings" when the aircraft speed was around 100 knots.

He stated that the touchdown was normal. Around 100 knots, they crossed a white colour cloth and he could feel a slight bump. Right after they crossed the white cloth, ATC informed that they landed on a wrong runway. Then he shut down the engines.

He was not aware that there were two runways. From the chart that he had, there was only one runway.

It was his fourth or fifth time he flew to VIA, however, it was his first time to runway 18. His last flight to VIA was around 3 or 4 months ago.

He was not aware of the NOTAM issued regarding the construction of the new runway.

1.5.1.2 First Officer

The First Officer stated they descended to 2000 Ft before commencing the final approach.

She noticed that '18' was not marked on the runway but the displaced threshold markings were clear. However, it was not so clear whether it was closed or open. She did not see the other runway at all. However, she realised that it was not the correct runway approximately when they were

about to touch down when she saw the white colour thing. She was informed by the Commander that the left main wheel was stuck with something and later they were informed by an engineer that the wheel was damaged.

She stated that dispatch briefing were done remotely. Pilots were given all the documents and they were supposed to study them. She was aware about NOTAM regarding the closed runway.

It was her second or third time she flew into VIA and she has once landed on runway 18. Her last flight into VIA was around 4 months ago.

Both the Commander and the First Officer stated that they were not aware that it was the wrong runway until they were about to land.

1.5.2 Interview of ATC Staff

The tower controller said that he gave clearance to AIC263, to continue approach for runway 18 and report at 7 miles. From the control tower, he could not make-out whether the aircraft was approaching to the runway in use or to the runway under construction. He saw AIC263 after the aircraft touched down on the runway under construction. He stated that he could have called out for a go around had he seen it a little earlier. As the aircraft had already landed, he informed the pilots that they have landed on a wrong runway and asked to hold position.

From the tower it looked like that a white cloth was stuck in the engine but he got confirmation from a ground staff and an airborne TMA aircraft that it was stuck on the wheel. After informing the respective departments, the AIC263 was handed over to them.

He stated that there was no difficulty in controlling the traffic on the day of the incident. There was no communication difficulty with the aircraft.

1.6 Aircraft Information:

Airbus A320 Aircraft bearing MSN 7997 was manufactured in year 2017. It was registered in India under the ownership of M/s ALAFCOIRISH AIRCRAFT LEASING EIGHTEEN LIMITED. The aircraft is registered under category 'A' and the certificate of registration No. 4853.

The Certificate of Airworthiness no. 6956 under "Normal category" subdivision Passenger / Mail / Goods was issued by DGCA on 28/12/2017 and was valid at the time of the incident. The specified minimum operating crew is two while the maximum all up weight is 79000Kgs. The aircraft was holding a valid Aero Mobile License No. A-014/RLO (NR), at the time of incident. This aircraft was operated under Scheduled Operator's Permit No S-9 which was valid up to 31 December, 2022.

As of 07 September, 2018 the aircraft had accrued 2,596:09 Airframe Hours (A/F) and 1,309 cycles. The Airbus A320-251n aircraft and its Engines are being maintained in accordance with the

Maintenance Programme consisting of calendar period / flying Hours or Cycles based maintenance, approved by Regional Airworthiness Office, Delhi.

Accordingly, the last major inspection 3A Check was carried out at 2,149:39 A/F hours and 1,064 cycles on 27 July, 2018.

The aircraft was last weighed on 13 December, 2017 in Toulouse. The weight schedule was prepared and duly approved by the office of Director of Airworthiness, DGCA, India. As per the approved weight schedule the Empty weight of the aircraft is 43,247.67Kgs. Maximum payload with fuel tanks full is 15,452.35 Kgs. Empty weight CG is 18.86 meters aft of datum. There were no major modifications carried out that affect weight & balance since last weighing, hence the next weighing was due on 13 December, 2022. Prior to the incident flight, the weight and balance of the aircraft was well within the operating limits.

I.7 Weather

Weather conditions at the airport at 1000 was reported as:

Surface wind:	260 degrees 12 knots
Visibility:	More than 10km
Cloud:	Scattered towering cumulus at 1,800 Ft, scattered at 12,000 Ft
Precipitation:	Nil

I.8 Aids to Navigation

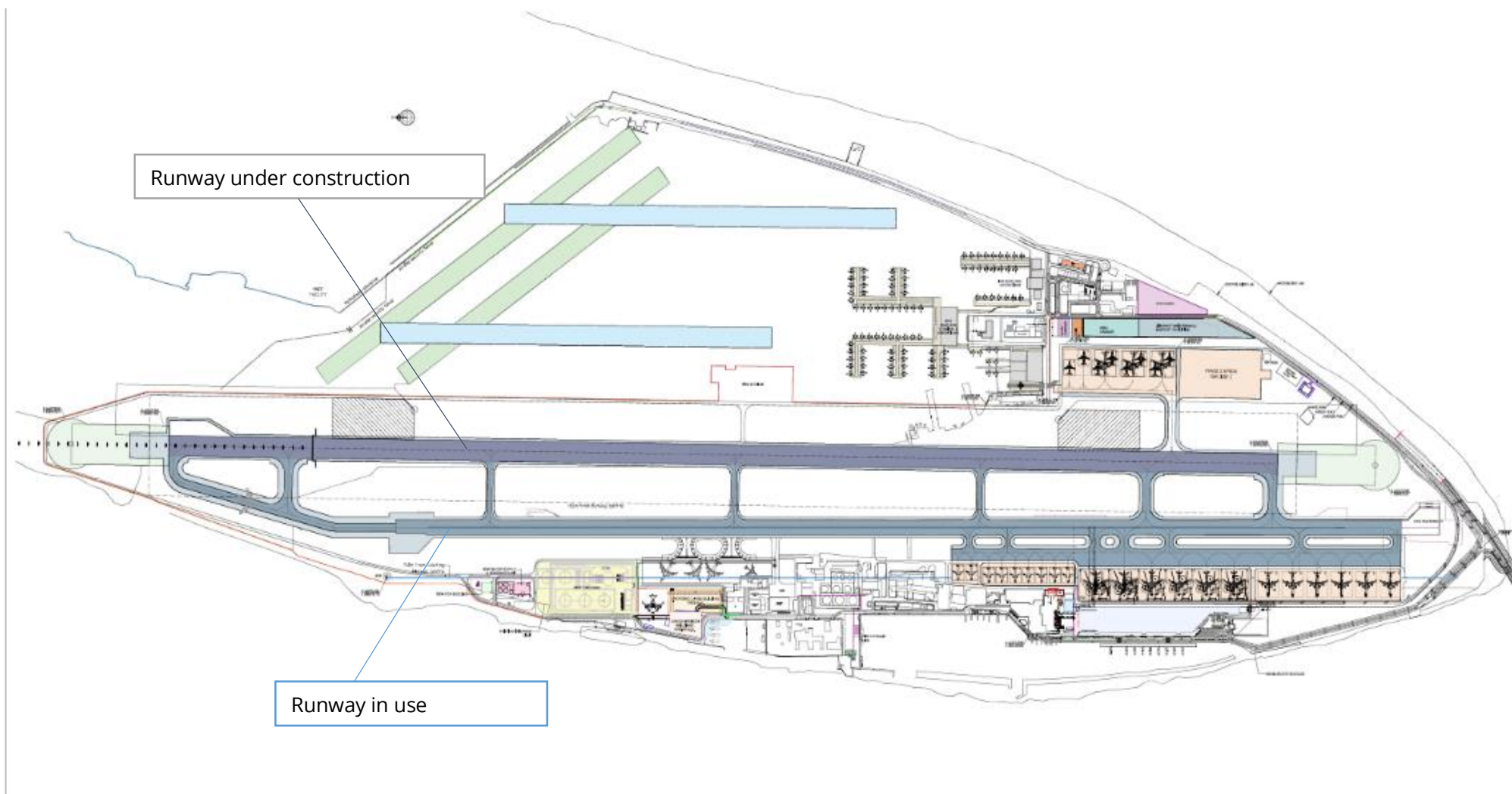
Male' VOR located at Velana International Airport and the Precision Approach Path Indicators (PAPI) for RWY 18 were working normally and as such navigation aids were not a factor in this incident.

I.9 Communication

Communication was not a factor in this incident.

I.10 Aerodrome Information:

Velana International Airport (VIA) is the main international airport in the Maldives. It is located in Hulhule Island, located approximately 2.8 km from the capital, Male'. The airport, with an elevation of 1.73 m, has one asphalt runway designated 18/36 measuring 3200 m length. There was a runway under construction located near-parallel, 190 meters east, to the runway that was in use.



Extract from AIC 04/17 dated 20th July 2017.

I.11 Recordings

1.11.1 Information received on CVR

According to information downloaded from the CVR, the aircraft (AIC 263) requested Male' Radar for a VOR approach to runway 18 and they were advised to expect the same from Approach. At 10,000 feet Male' Approach cleared the aircraft to descend and was instructed to reduce to minimum speed as it was the second aircraft in the sequence. The aircraft started to descend and at 4000 feet, it was transferred to Male' Tower.

On initial contact with Male' Tower the aircraft was instructed to continue approach to runway 18. Male' Tower then cleared the aircraft for a VOR approach to runway 18. The aircraft was asked to report seven miles final for runway 18. Landing clearance to the aircraft was issued before the aircraft reported seven miles final with instruction to vacate runway after landing via taxiway 'B'. Approximately three minutes after landing clearance was issued, Male' Tower noticed the aircraft had landed on a runway that was under construction, located to the east of runway in use and the controller remarked, "You just landed on a wrong runway". That's when the flight crew realised that they had landed on the wrong runway.

I.17 Organisational Information

1.17.2 Air India

Air India is the state-owned flag carrier of India. The airline operates to 37 international and 69 domestic destinations over four continents. The airline operates a fleet of 125 aircraft which includes 76 Airbus aircraft.

1.17.4 CAA Oversight of VIA

VIA is under continuous oversight by the CAA as it holds an aerodrome certificate number ADC/08/2012 issued by the CAA.

However, it was noted that due attention was not given by CAA to ensure compliance with the safety standards and markings of the runway under construction, in accordance with MCAR-139 (Aerodrome Rules) which otherwise could have removed any confusions created among the pilots operating into the VIA.

I.18 Additional Information

1.18.1 Applicable CAA regulations

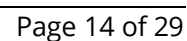
- The primary regulation that governs aerodrome design and operation of aerodromes in the Maldives is MCAR-139 (Aerodrome Rules).
- Air Safety Circular ASC 139-5 contain Standards and Recommended Practices (specifications) that prescribe the physical characteristics and obstacle limitation surfaces to be provided for

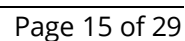
at aerodromes, and certain facilities and technical services normally provided at an aerodrome. It also contains specifications dealing with obstacles outside those limitations surfaces. It is not intended that these specifications limit or regulate the operation of an aircraft.

The clause 7.1 of this Circular prescribes details of the visual aids for denoting the closed runways and taxiways, or parts thereof.

2 Analysis

- 2.1 The flight from Trivandrum to Male' was normal without any technical defects reported on the aircraft and its systems.
- 2.2 The crew had no difficulties in navigating and flying the aircraft until touch down on the Runway under construction at Velana International Airport.
- 2.3 Standard instrument arrival route designated MUGBA 3B ARR is an RNAV route segment that begins at compulsory reporting point named 'MUGBA', located 50 nautical miles from Male' VOR (MLE) on 042° radial and ends at waypoint designated 'URDIV', located 14.2 nautical miles from Velana International Airport runway18 threshold on a magnetic bearing of 002°.
- 2.4 There are two published VOR instrument approach procedures for runway 18 at Velana International Airport designated as VOR Y RWY18 and VOR Z RWY18, both in which the final approach radial is 005° that will correspond to a magnetic track of 185° when conducting the approaches.





- 2.5 The final approach radials of both VOR Y and VOR Z approaches intersects runway extended centreline at an angle of 2°, at a distance of 1.8 NM from the displaced threshold of runway 18 at Velana International airport.
- 2.6 Waypoint 'URDIV' is the designated initial approach fix RNAV approach runway 18 at Velana International Airport.
- 2.7 The initial clearance for the aircraft was to expect an RNAV approach to runway 18 at Velana International Airport. During read back of the ATC clearance, the aircraft requested for a VOR approach to runway 18 and was advised to expect a VOR approach.
- 2.8 The PIC had previous experience in flying into Male' and his last flight operated into Male' was 3 to 4 months ago. This happened to be his first time that he conducted an approach to Runway 18.
- 2.9 The PIC was not aware of the NOTAM issued regarding the Runway that was under construction, located east of the Runway in Use. This runway under construction is almost parallel to the runway in use.
- 2.10 Although the Co-Pilot had previously used Runway 18 at Male', and was aware of the NOTAM regarding the runway under construction, the information was not shared with the PIC who was the pilot flying at the time of the incident.
- 2.11 The runway markings painted on the runway under construction was brighter and more conspicuous than those on the runway in use.
- 2.12 For an aircraft approaching Runway 18, the threshold markings of the runway under construction was closer than those of the runway in use.
- 2.13 The crew seeing the markings of the runway under construction, reported "Runway In Sight" to ATC at 4 miles.
- 2.14 The "closed runway" markings on the runway under construction were not fully in compliance with the recommendations set forth in ICAO Annex 14 as well as MCAR-139 and Air Safety Circular ASC 139-5. The runway markings were not fully obliterated as required.
- 2.15 The current NOTAM (A0360/18) and AIC 04/17 dated 20th July 2017 were the aeronautical information disseminated to make the flight crew aware of the runway under construction.
- 2.16 Investigation revealed that Male' ATC personnel at the Tower were not aware that the Air India flight AIC263 was approaching the runway under construction. The controllers were seen distracted by other activities.

3 Conclusions

- 3.1 This was the first time the PIC made an approach to runway 18 at VIA. He was unaware of the NOTAM with regard to the runway under construction.
- 3.2 The Co-Pilot, although was aware of the NOTAM issued regarding the runway under construction at VIA, did not share the information with the PIC.
- 3.3 The Flight Crew seeing the Markings on the runway under construction, Co-Pilot reported to ATC "Runway In Sight" at 4 miles and continued to approach and landed on the runway under construction. The crew did not realise the mistake until Touch Down and were informed by the ATC.
- 3.4 Standard arrival route via which the aircraft was initially cleared was not revised or cancelled when the aircraft requested for a VOR approach to RWY18.
- 3.5 The aircraft was neither cleared to, nor radar vectored to any of the approach fixes associated with any of the two VOR instrument procedures for RWY18.
- 3.6 Male' Aerodrome Control personnel on duty at the Tower were seen to be completely distracted when Air India flight AIC263 landed on the runway under construction.
- 3.7 Runway markings on runway under constructions were painted but were not obliterated in accordance with Annex 14 and Air Safety Circular ASC 139-5.
- 3.8 From the investigations it becomes clear that this Serious Incident occurred due to confusion of Runway in Operation and the runway under construction.

4 Safety Recommendations

4.1 Recommendation to the Airline

Subsequent to the findings of the investigation of this serious incident, the AICC makes the following recommendations to the Airline:

- a. Determine that airline dispatch procedures are properly adhered to so as to ensure that all crew operating the aircraft are duly briefed on the current NOTAMs, AICs etc.

4.2 Recommendation to Airport Operator

Subsequent to the findings of the investigation of this serious incident, the AICC makes the following recommendations to the Airport Operator:

- a. Determine the procedure established for ensuring the regulatory requirements are met while maintenance, development and upgrading work are in progress.
- b. Ensure that the runway markings on runway in use are kept renewed.
- c. Ensure that the runway lights of runway in use is kept switched on at all times.

4.3 Recommendation to Air Navigation Services

Subsequent to the findings of the investigation of this serious incident, the AICC makes the following recommendations to the Air Navigation Services:

- a. Determine the procedures established for ensuring the staff on duty are not distracted.
- b. Precautionary measures are taken by ATC when developmental and maintenance work are in progress.

4.4 Recommendation to MCAA

Subsequent to the findings of the investigation of this serious incident, the AICC makes the following recommendations to MCAA:

- a. Determine whether or not specific procedures are established and adhered to in ensuring regulatory requirements are met by the Airport Operators during regular maintenance and upgrading works are in progress.

5. Appendices

5.1 List of abbreviation

AICC	: Accident Investigation Coordinating Committee
ASC	: Air Safety Circular
ATC	: Air Traffic Controller
ATPL	: Air Transport Pilot License
CAA	: Maldives Civil Aviation Authority
CG	: Centre of Gravity
CVR	: Cockpit Voice Recorder
DGCA	: Directorate General of Civil Aviation, Government of India
FT	: Feet
FRTTO License	: Flight Radio Telephony Operator's License
HRS	: Hours
ICAO	: International Civil Aviation Organisation
KGS	: Kilograms
LH	: Left Hand
LT	: Local time
MACL	: Maldives Airports Company Limited
MCAR	: Maldives Civil Aviation Regulations
NM	: Nautical Mile
NOTAM	: Notice To Airmen
PAPI	: Precision Approach Path Indicators
PF	: Pilot Flying
PIC	: Pilot In Command
RNAV	: Area Navigation
RWY	: Runway
TMA	: Trans Maldivian Airways
UTC	: Coordinated Universal Time
VIA	: Velana International Airport
VOR	: VHF Omni Range

5.2 Damages



1 Aircraft with white clothing



White Clothing on tyre



In process of removing the clothing



Damage to Tyre



Damage to Tyre



5.2 NOTAMS

(A0169/18 NOTAMN

Q)VRMF/QFAXX/IV/NBO/A/000/999/0412N07332E005

A)VRMM

B)1806031900

C)1809041859

E)PAVEMENT AND ASPHALT LAYING WIP ON NEW RWY AND TWY APRX 190M TO THE EAST OF THE EXISTING RWY18/36 CENTRELINE. NEW RWY AND TWY MARKED AS CLSD AS NEW RWY IS VISIBLE. PILOTS TO EXER CTN. REFER AIC 04/17)

040948 VRMMYNYX

(A0280/18 NOTAMR A0169/18

Q)VRMF/QFAXX/IV/NBO/A/000/999/0412N07332E005

A)VRMM

B)1809040948

C)1812041859

D)PAVEMENT AND ASPHALT LAYING WIP ON NEW RWY AND TWY APRX 190M TO THE EAST OF THE EXISTING RWY18/36 CENTRELINE. NEW RWY AND TWY MARKED AS CLSD AS NEW RWY IS VISIBLE. PILOTS TO EXER CTN. REFER AIC 04/17)

(A0281/18 NOTAMR A0280/18

Q)VRMF/QFAXX/IV/NBO/A/000/999/0412N07332E005

A)VRMM

B)1809041004

C)1812041859

E)PAVEMENT AND ASPHALT LAYING WIP ON NEW RWY AND TWY APRX 190M TO THE EAST OF THE EXISTING RWY18/36 CENTRELINE. NEW RWY AND TWY MARKED AS CLSD AS NEW RWY IS VISIBLE. PILOTS TO EXER CTN. REFER AIC 04/17)

131656 VRMMYNYX

(A0302/18 NOTAMR A0281/18

Q)VRMF/QFAXX/IV/NBO/A/000/999/0412N07332E005

A)VRMM

B)1809131656

C)1812041859EST

E)CONST OF NEW RWY IN PROGRESS. NEW RWY E AND PARALLEL TO CURRENT ACTIVE RWY. ACTIVE RWY EDGE LGT ON DAY AND NIGHT. ALL OPR TO EXER CTN. REFER AIC 04/17)

020453 VRMMYNYX

(A0360/18 NOTAMR A0302/18

Q)VRMF/QFAXX/IV/NBO/A/000/999/0412N07332E005

A)VRMM

B)1812020453

C)1903021859EST

E)CONST OF NEW RWY IN PROGRESS. NEW RWY E AND PARALLEL
TO CURRENT ACTIVE RWY. ACTIVE RWY EDGE LGT ON DAY AND NIGHT.
ALL OPR TO EXER CTN. REFER AIC 04/17)

5.3 AIP

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VELANA INTERNATIONAL AIRPORT PLANNED EXPANSION AND UPGRADING

1. PURPOSE

- 1.1 The purpose of this AIC is to provide information and advice regarding the scope of works and facilities provided pertaining to the planned expansion and upgrading of Velana International Airport (VIA). This AIC will be followed by AIP Supplements and when required NOTAMs that will provide details of the development works, introduction of new facilities and services, relocation of existing facilities and services, and revision to existing procedures.

2. NEW RUNWAY AND ASSOCIATED AIRSIDE FACILITIES

2.1 New Runway

The new runway will be an ICAO Code F runway constructed parallel and east of the present runway, staggered northwards approximately 500m. The runway will be 3400m with a width of 60m and 7.5m paved shoulders on both sides. RESA 420m x 120m will be provided at both ends of the runway.

2.2 Taxiways

- a) Seven new connecting taxiways, 4 code F and 3 code E will connect the new runway with existing runway. A code E taxiway will connect the east apron to the new runway.
- b) The existing runway will be converted to a parallel taxiway once the new runway is completed. 2 Code F and 4 E taxiways will connect the west apron to the parallel taxiway.
- c) Airfield facilities are to be phased to facilitate implementation

2.3 Parking Aprons

- a) The existing apron will be extended to provide space for 21 aircraft stands including 2 code F & 4 code E Multi Aircraft Ramp Stands (MARS) with passenger boarding bridges (PBB), and 15 remote stands
- b) The new Eastern apron will provide space for 5 Code E.
- c) New high mast lighting will be installed for every aircraft parking stand.

3. AIRSIDE CONFIGURATION

3.1 Runway Designations

The new runway has almost the same orientation with current runway.

3.2 New Taxiway Designations.

The proposed taxiways will be designated as per International standards.

4. VISUAL AIDS

The aerodrome lighting system for New Runway and associated taxiways at VIA will be based on ICAO CAT I recommendations.

4.1 General

The aerodrome lighting system will be fully compliant with ICAO Annex 14 for Category I lighting system.

4.2 Approach Lighting System

The approach lighting system will be based on ICAO CAT I precision approach lighting system. The length of the approach shall be 900m with barrettes spaced at intervals of 30m. The approach centreline barrettes will be composed of five lights and the length will be 4m. Crossbar will be located at a distance of 300m from the threshold with 30m in length. The centreline and crossbar lights will be fixed lights showing variable white. Lights located from the displaced threshold to the end of the runway will be inset lights and the rest will be elevated lights which will be mounted on frangible structures.

Both ends of the runway will be equipped with ICAO CAT I precision approach lighting systems.

4.3 Runway Edge Lights

Runway edge lights will be installed along the full length of the runway at intervals of 60m. The edge lights will be elevated except on taxiways where the light will be inset. The edge lights will show white on both sides except for the final 600m from the end of the runway which will show yellow. On the approach direction the edge lights between displaced threshold and the end will show red.

4.4 Threshold and Wing Bar Lights

Inset runway displaced threshold lights and wing bar lights will be installed at both displaced thresholds. Threshold lights will be installed in a row at right angles to the axis at the displaced threshold with spacing of not more than 3m.

Wing bar lights will be symmetrically disposed about the runway centre line at the displaced threshold in two groups. Each wing bar will be formed by at least 5 lights extending at least 10m outward from both sides of the displaced threshold lights. Both displaced threshold and wing bar lights will show green in the direction of approach.

4.5 Runway End Lights

Runway end lights will be installed on a line at right angles to the runway axis at 2m from outside the end of runway. Runway end light will be fixed unidirectional lights showing red in the direction of the runway. They runway end lights are elevated and frangible.

4.6 Runway Centre Line Lights

The runway will be equipped with inset centreline lights installed at equal longitudinal intervals of 30m. The runway centreline lights will emit white until 900m from the runway end where alternative lights will emit red/white light until 300m from the runway end where the lights will emit red light until the runway end.

4.7 Precision Approach Path Indicator (PAPI)

PAPI will be installed for both ends of the runway. The PAPI will be installed on the left side of the runway.

4.8 Runway Guard Lights

Runway Guard Lights will be installed at each taxiway associated with the runway. A pair of unidirectional, flashing yellow lights will be located at each side of the taxiway in line with the runway-holding position.

4.9 Taxiway Guidance / Mandatory Signs

Signage will be in accordance to ICAO Annex 14. The signs include mandatory instruction signs and information signs.

4.10 Wind Direction Indicator

Two illuminated wind direction indicators will be installed in the vicinity of the aiming points at both end of the runway, with external lighting system. Mounting parts for the wind direction indicator will be frangible.

5. RADIO NAVIGATION AIDS

5.1 Instrument Landing System (ILS)

Both ends of the new runway will be equipped with ILS which conforms to ICAO CAT I.

6. REVISION OF INSTRUMENT APPROACH CHARTS

6.1 The introduction of the new runway and landing aids necessitate the need to revise the existing instrument approach charts and procedures. This will be detailed out in subsequent AIP Supplements to follow.

6.2 Standard Instrument Departures (SID) and Standard Instrument Arrival Routes (STAR) will be published in a timely manner to improve efficiency of airspace utilization and safety to arriving and departing aircraft.

7. BUILDINGS

7.1 New Passenger Terminal Building (NPTB)

The New Passenger Terminal Building (NPTB) is for 7.5 million passengers per year when completed. The NPTB will be built south of the present International Terminal Building. The NPTB will be a three storey building with a total floor space of approx. 74,000 sq. meters.

7.2 Air Cargo Terminal Complex

The new cargo complex will be built in the north west of the island. The new cargo complex is designed to handle 120,000 tons annually.

7.3 Aerodrome Rescue and Fire Fighting Building (ARFF)

An additional ARFF facility will be built on the eastern side of the new runway. This facility will house ARFF vehicles mainly to cater for the new runway and marine rescue craft to serve the land aerodrome as well as the water aerodrome.

7.4 Seaplane Terminal Building

The existing water aerodrome at Velana International Airport is located in the lagoon and associated land on the eastern side of the existing runway. This lagoon has a variety of facilities

along the shore used by the two main seaplane operators for their operations. Each seaplane operator has separate facilities along the southern end of the lagoon.

The main operator operates from 3 Terminals. These terminals and other facilities must be relocated to give way for the new runway.

A new multi-level seaplane terminal will be constructed on reclaimed land on the north of the control tower. The new terminal will be designed to accommodate more than one operator. The terminal will be associated with approximately future 70 docking positions for seaplanes.

8. FUEL FARM

A new fuel farm with a storage capacity of 45 million litres of Jet A1 fuel will be built along with fuel hydrant system for refueling all types of aircraft parked at designated parking positions.

- *Appendix A attached shows the layout plan of Velana International Airport.*

9. This AIC will remain current until superseded by subsequent AIP Supplement on the expansion and upgrading work.

