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## **Accident Investigation Coordinating Committee**

### **Report 2018/01**

Preliminary Report on the Serious Incident to  
Airbus, A330-300 (9M-XXC), A350-900 (A7-ALL)  
Velana International Airport, Maldives  
7 July 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 Preliminary Report is to prevent accidents and incidents. It is not the purpose of this investigation to apportion blame or liability.

This investigation is independent of, separate from and without prejudice to any judicial or administrative proceedings to apportion blame or liability. Accordingly, it is inappropriate that this report should be used to assign fault or blame or determine liability, since neither the safety investigation nor the reporting process has been undertaken for that purpose.

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

The report is released on 16 August 2018.



Mr. Abdul Razzak Idnis

**Chairperson**

**Accident Investigation Coordinating Committee**



## **Aircraft Accident Report No: 2018/01**

<b>Aircraft Type and Registration</b>	1. Airbus A330-300, 9M-XXC 2. Airbus A350-900, A7-ALL
<b>No. &amp; Type of Engines:</b>	1. 2 x RR Trent 772B-60 2. 2 x RR Trent XWB
<b>Year of Manufacture:</b>	1. 2009 2. 2016
<b>Date and Time (LT):</b>	7 July 2018 at 0950 Hrs.
<b>Location:</b>	Velana International Airport (VIA)
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	1. Crew – 10 Passengers – 306 2. Crew – 14 Passengers – 20
<b>Injuries:</b>	Crew – Nil Passengers – Nil (on either aircraft)
<b>Nature of Damage:</b>	1. A dent approximately 3" x 1" on right hand winglet. 2. Left hand horizontal stabiliser bent at approximately 18" from tip.
<b>Commander's Licence:</b>	1. ATPL issued by Department of Civil Aviation Malaysia 2. ATPL issued by Qatar Civil Aviation Authority
<b>Commander's Age:</b>	1. 42 years 2. 52 years
<b>Commander's Flying Experience:</b>	1. 12,640 hours (of which 532 were on type) 2. 8,610 hours (of which 1,471 were on type)
<b>Notification Source:</b>	Male' Air Traffic Control (ATC)

## Synopsis

Airbus A330, aircraft registration 9M-XXC, collided with a stationary Airbus A350, aircraft registration A7-ALL, whilst entering the international apron at Velana International Airport (VIA) via taxiway C on 7 July 2018 at 0948 Hrs. The right hand winglet of the 9M-XXC was slightly damaged while the left horizontal stabiliser of A7-ALL was significantly damaged. There were no injuries.

The incident was notified to the Aircraft Accident Investigation Committee (AICC) at 1010 hrs. Investigation began on the same day with inspectors arriving at the scene at 1115 hrs.

## 1 Factual Information

### 1.1 History of the flight

The Airbus A330 (9M-XXC) had landed after an uneventful flight from Kuala Lumpur and was instructed by the control tower to back track and vacate the runway via Taxiway C. The aircraft was guided by a marshaller and a wing walker from Taxiway C.

The Airbus A350 (A7-ALL), standing on the apron immediately to the right of the A330 entering the Taxiway C, was preparing to depart to Doha.

### 1.2 Injuries

None.

### 1.3 Damage to Aircraft

The RH winglet of 9M-XXC sustained a 3 inch dent while the LH stabiliser of A7-ALL was bent at approximately 18 inch from the tip.

### 1.4 Other damage

None.

### 1.5 Personnel Information

#### 1.5.1 Interview of 9M-XXC Crew

The Commander and PF of 9M-XXC stated the flight from Kuala Lumpur was normal. They landed on runway 36 and attempted to vacate the runway via taxiway C as instructed by the ATC. He stated, once they entered Taxiway C, the ATC instructed them to follow the marshaller. There was no further contact with the ATC until the occurrence.

He slowed the aircraft speed to approximately 4-6 knots as it entered taxiway C. The aircraft A7-ALL was on his right hand side while an Aeroflot A330 on the left hand side. At this time, he had visual of the wing walker (who was near the left hand side of the A7-ALL) and the marshaller (who was at the parking bay).

He stated the parking area was very tight but normal for VIA based on his five years of coming to the airport. He therefore concluded parking with the assistance of marshallers was manageable.

He then turned the aircraft left at the instructions of the main marshaller. The first officer was in charge of monitoring the right wing. They felt a sudden jolt while negotiating the turn. He

immediately stopped the aircraft. It was only after the impact the wing walker showed the stop sign. He knew there was an impact with A7-ALL but was not aware of the extent of the impact. Both engines were then shut down and ATC informed. Five to ten minutes later they were towed in by the ground crew.

The First Officer stated his duty was to ensure wing tip clearance on the right hand side. He stated this was not possible in VIA without the assistance of marshallers. This was because the parking space is very 'tight' and the lack of lead-in lines.

Both the Commander and the First Officer stated VIA is unique in two aspects. Firstly, parking area is very crowded and aircraft are parked in different manners at different times. Secondly there are no lead-in lines that guide the pilots.

Both pilots stated parking in VIA cannot be done alone and was manageable with the assistance of the marshallers. This is especially true in the case of a wide body or when making a turn.

#### 1.5.2 Interview of A7-ALL Crew

The Commander of A7-ALL stated he was preparing for departure when the aircraft moved. This suggested a collision had taken place. He then left the flight deck and went to the back of the aircraft and saw the 9M-XXC had collided with A7-ALL.

The A7-ALL was parked by a different crew but he felt it was parked at a normal position based on his experience of coming to VIA for six years. It was not possible for him to state exactly if the aircraft was parked at the correct location since there were no stands or taxi lines.

The Commander stated unlike other airports, at VIA, that they are falsely but 'completely reliant' on marshallers for wing tip clearance. The First Officer also stated that they were '100% reliant' on the marshallers.

Both pilots highlighted the crowded nature of parking coupled with the lack of stands or taxi lines as the cause of this reliance.

#### 1.5.3 Interview of Ground Staff

The Marshaller stated he arrived at Taxiway C ten minutes prior to the arrival of 9M-XXC to ensure the area was sterile and there was sufficient space. He would call OCC by phone if it was judged the parking area is insufficient.

In this particular case he judged there was sufficient space. He also thought the A7-ALL was in the normal position but could not be sure if it was the correct position as there are no parking stands.

The aircraft 9M-XXC was marshalled in from the entry of Taxiway C. He was at the primary service road. It was not possible to judge the clearances for the whole aircraft from this position due to the limited space, distance and the angle of aircraft. Therefore, he had to work together with the wing walker to bring in the aircraft.

He stated he signalled the 9M-XXC to turn left once it had sufficiently entered the taxiway. But the aircraft continued to enter the taxiway before commencing the turn.

He then saw wing walker show the stop sign. He immediately followed with his stop sign. But the aircraft continued to move forward before coming to a halt. He was not aware of the collision until the wing walker came and told him of it.

He stated lack of parking stand make marshalling difficult but the collision would have been avoided in this case had the pilot started the left turn at the time he signalled the turn.

The wing walker was at the left hand side of A7-ALL and was in charge of monitoring that there was sufficient clearance between 9M-XXC and that A7-ALL. He stated the aircraft was moving too much into the taxiway before turning. Therefore, he showed the sign to indicate the location of the marshaller just in case the pilot did not see the marshaller's instructions.

At this point the aircraft appeared very close so he showed the stop sign. But the aircraft continued to move forward and stuck the A7-ALL. He stated the aircraft moved about 10 feet after the stop sign was shown.

## 1.6 Aircraft Information

The A330-300 is a twin-engine twin-aisle wide-body that can carry between 277 to 440 passengers. The airframe features a low-wing cantilever monoplane with wings that are swept back at 30 degrees. The wing span is 60.3 m with a 1.59 m tall winglet on each wing. The two engines are suspended on pylons under the wings. A two-wheel nose undercarriage and two four-wheel bogie main legs support the airplane on the ground.

### 1.6.1 Cockpit visual angles

On the A330-300, the visual angle in the horizontal plane through the co-pilot's normal eye position and looking towards the wingtip is 115°. If the pilot moves his head to the side, the visual angle in the horizontal plane increases to 135°, and the wing tip becomes visible.

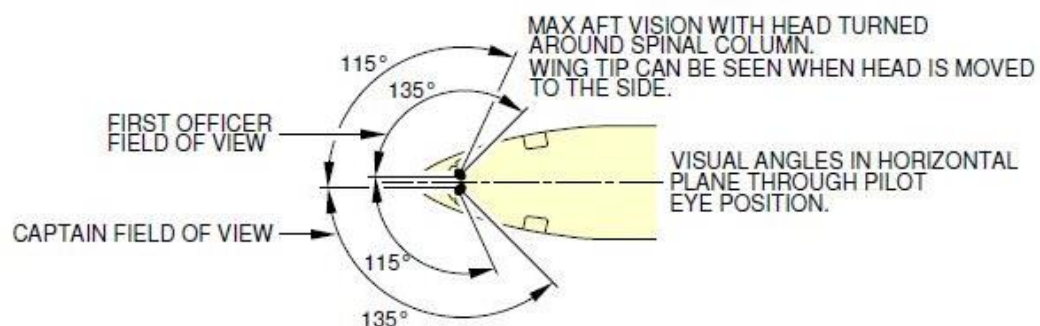


Figure 1 – A330-300 visibility from cockpit in static position

### 1.6.2 Ground Maneuvering

The clearances required for a 90 degree turn on the A330-300 are given in figure below. This example is on a 90 degree turn from runway to taxiway using "Cockpit Over Centerline Method".

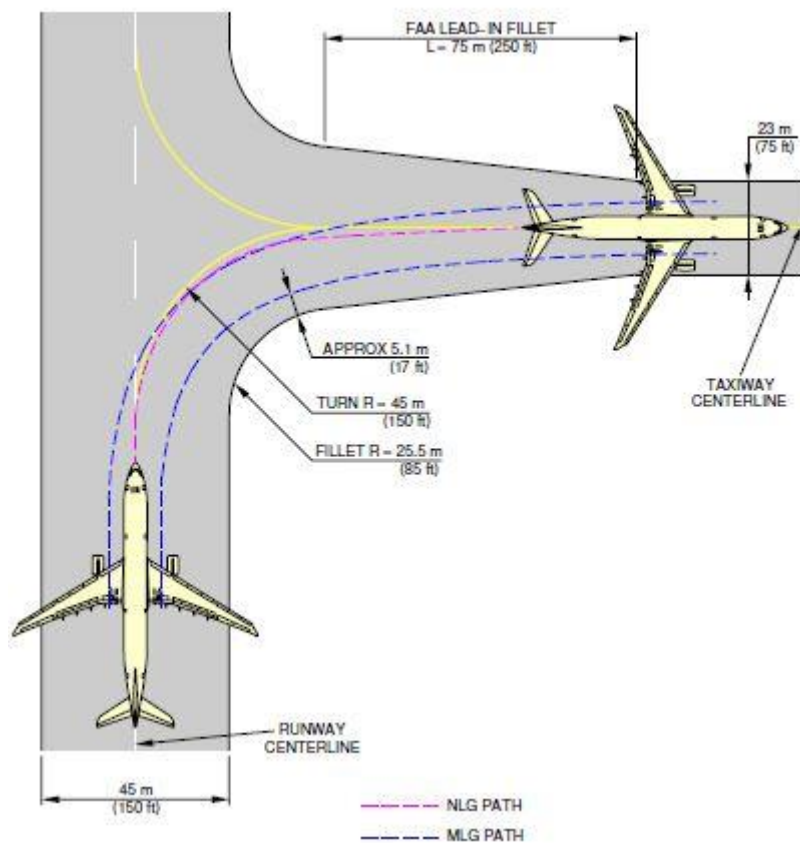


Figure 2 – 90 degree turn: runway to taxiway

### 1.6.2 Swept wing growth

The A330 like most modern large transport aircraft have swept wings that are subject to a phenomenon known as 'swept wing growth' or 'wing creep'. This occurs during a turn when the wing tip describes an arc greater than the normal wingspan due to the geometry of the aircraft and the arrangement of the landing gear<sup>1</sup>.

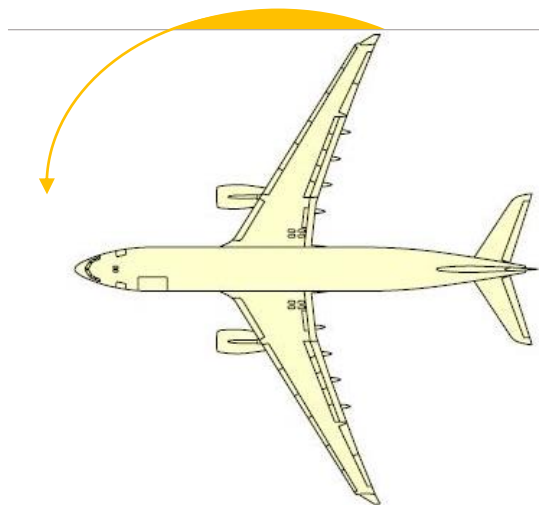


Figure 3 – Swept wing growth

<sup>1</sup> [https://www.skybrary.aero/index.php/Wing\\_Tip\\_Clearance\\_Hazard](https://www.skybrary.aero/index.php/Wing_Tip_Clearance_Hazard)

## 1.7 Weather

Weather conditions at the airport at 0900 was reported as:

Surface wind:	290°/17 knots
Visibility:	10 km or above
Cloud:	Few at 1,700 feet, Scattered at 2,200 feet and Overcast at 10,000 feet
Precipitation:	Nil

## 1.8 Aids to Navigation

Navigation was not a factor in this incident.

## 1.9 Communication

### 1.9.1 Marshalling

Marshalling is a means of communicating between ground personnel and pilots with internationally recognised hand signals. The standard marshalling signals are in ICAO Annex 2 – Rules of the Air.

The procedure for marshalling is given VIA Standard Operating Procedure “Ramp Services – Operations” section 3-1. Paragraph 3-1.3(k) states:

*When you are marshalling an aircraft into position on a tight ramp, never assume that you have enough room, in such situation; two extra personnel (wing walkers) will be required to complete the marshalling team. They would walk on either side of the aircraft, ahead of the wing tips and signal to the pilot and the marshaller, there is sufficient clearance for the aircraft to pass the obstructions by giving thump up. Always allow reasonable wingtip clearance. If something is not right, stop the aircraft and ask for help.*

In this particular serious incident two aspects of this procedure were not followed. Firstly there was one wing walker instead of two. Secondly the wing walker (who should walk ahead of the wing tips of 9M-XXC) was positioned near the left hand wing tip of the stationary A7-ALL.

## 1.10 Aerodrome Information

Velana International Airport is the main international airport in the Maldives. It is located on Hulhule island 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.

### 1.10.1 Compliance with International Standards

The aerodrome is certified by the Maldives CAA as Code 4E on 3 October 2010. Further AIP AD 1.1 paragraph 2 states:

*The Standards and Recommended Practices of ICAO Annex 14, Volumes I and II, are applied together with the differences mentioned in GEN 1.7.*

AIP GEN 1.7 states, among others:

[...]  
14. Annex 14 – Aerodromes  
Maldives has not promulgated regulations or requirements on electronic terrain and obstacle data (ETOP). ETOP is currently not provided in Maldives.



### 1.10.2 The International Apron and Taxiways

The international apron is a concrete apron with a PCN of 55, accessible via taxiways A to E. Taxiway C is 23 m wide with a PCN of 57.

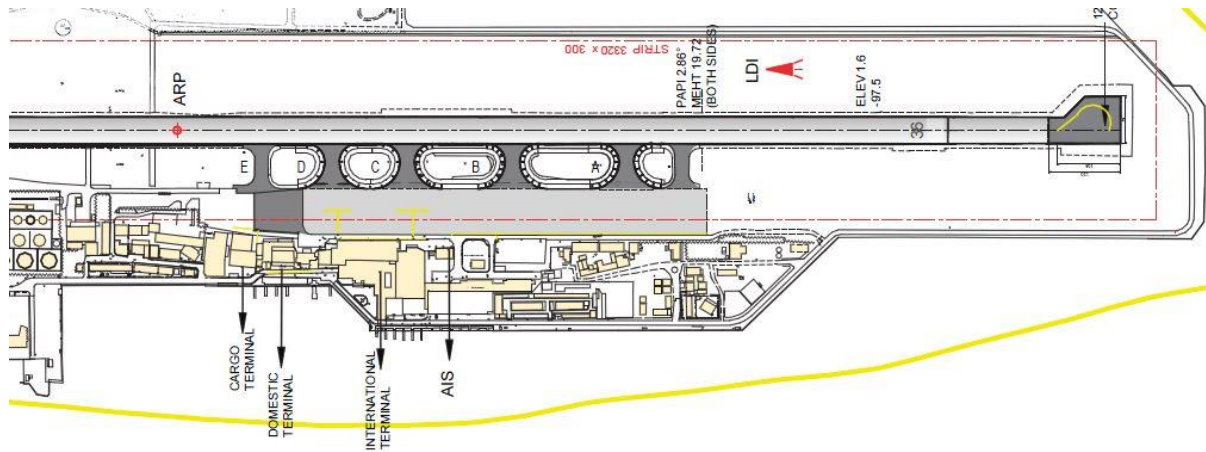


Figure 4: VIA international apron and associated taxiways.

Surface movement guidance and control is through taxiway sign boards and lights at all intersections with taxiways and runway.

### 1.10.3 Local Traffic Regulations

AIP Maldives provides, among other things, under VRMM AD 2.20 the following local traffic regulations for ground movement of aircraft:

1. *Parking Procedures*
  - 1.1 *No aircraft stands are available. All aircraft will be guided to the respective parking spots by marshallers and wing walkers.*

The AIP does not give specific guidance on who (i.e. the flight crew or the ground staff) has the final responsibility for wingtip clearance.

### 1.10.4 Aircraft Parking Allocation

Aircraft parking positions are allocated by the VIA Operational Control Center. The general layout is provided in "Ramp Services – Operations" SOP paragraph 2.1.5 with daily variations controlled using a Microsoft Excel document. On the day of the serious incident, 16 different parking allocations were created on this document.

"Plan-4" was generated for the arrival of 9M-XXC (flight number D7178), among other aircraft. In this plan 9M-XXC was to be parked near taxiway C between A7-ALL (flight number QR673) and another A330 (flight number SU 320).

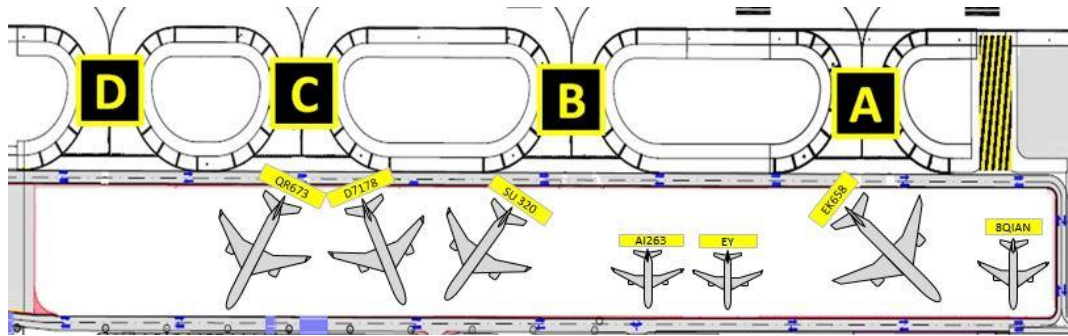


Figure 5 – Parking allocation for 9M-XXC

The Duty In-charge is responsible to brief the marshaller on where and how the aircraft should be parked based on this allocation scheme. At the same time, the SOP states 'parking is solely based on the experience of the marshaller' as the apron is not marked.

Given the parking bays are not marked, the allocation (i.e. number, type and orientation) of aircraft varies depending on the traffic. For example, the parking allocation with the most number of aircraft, for the day, was "Plan-6". In this arrangement 10 aircraft are parked.

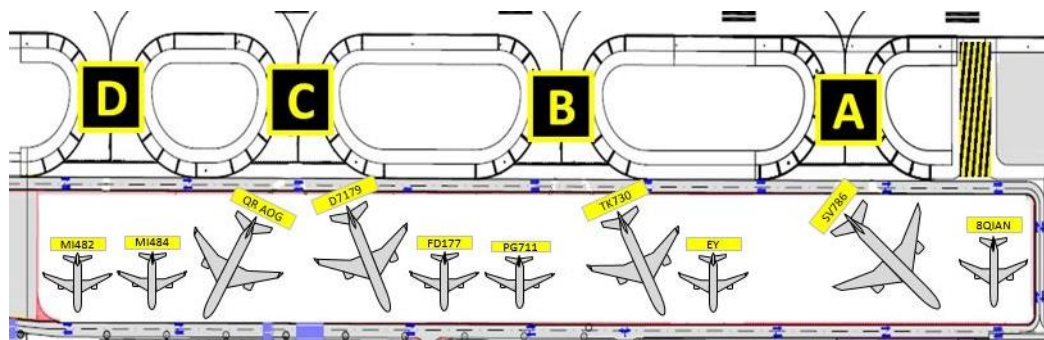


Figure 6 – Parking Allocation with the most aircraft

It is estimated the maximum number of aircraft that could be accommodated, when the clearance distances specified in ASC 139-5 para 3.13.6 (refer section 1.18) are applied, is six aircraft.

## 1.11 Recordings

### 1.11.1 CVR Recordings

CVR recordings from the aircraft 9M-XXC were provided by AirAsia X. The recordings indicate the cockpit environment was relaxed throughout the flight. Four minutes fifteen seconds after landing, ATC instructs the aircraft "VACATE VIA CHARLIE. FOLLOW MARSHALLER". Thirty seconds later, the co-pilot could be heard saying "THIS IS VERY CLOSE". At this point the Captain shows the marshaller and the wing walker to the co-pilot.

Four minutes fifty nine seconds after landing, a thud could be heard on channel 3 of the CVR. This is immediately followed by "OI. [EXPLETIVE]. I THINK WE HIT THE WING" from the co-pilot. The Captain then asks whether the ground staff was showing the clear sign. The co-pilot states "HE WAS CLEARING US. I SAW THAT". The Captain then states the "SPEED WAS FOUR KNOTS".

Seven minutes and eight seconds after landing the aircraft was asked to shutdown engines. The crew were unaware of what had happened until they were informed by the ground crew, after engine shutdown.

#### 1.11.2 FDR Recordings

FDR recordings from the aircraft 9M-XXC were provided by AirAsia X. These were not analysed as the Maldives does not have the capability to analyse FDR data.

#### 1.11.4 Security Camera footage

Video footage from two surveillance cameras installed around the runway were provided by the airport operator. These proved useful in establishing the sequence of events for this occurrence and position of key staff.

The first video shows the aircraft entering the taxiway C. It enters taxiway C up to the taxiway holding line before starting the left turn. Moments after, it comes to a sudden halt. However, in this view the aircraft collision is hidden by the aircraft A7-ALL.

The second video shows the parking area immediately before the collision. The aircraft entry and most of the A7-ALL are hidden in this view. The marshaller was also not visible as he was blocked by the roof of the terminal. The wing walker could be seen at the left hand wing tip area of the A350.

The aircraft could be seen to make a left turn before coming to a sudden halt. It was not possible to determine, definitively, if the wing walker gave a signal from the video, either to indicate the position of the marshaller or stop the aircraft.

#### 1.11.5 Flight Data System

The aircraft 9M-XXC is fitted with an aircraft flight data system that records the GPS position of the aircraft. This data was provided by AirAsia X. The mapping of this data together with the position of A7-ALL (measured on ground) is shown below. Scale drawing of the aircraft are superimposed on this data to reconstruct the movement of 9M-XXC.

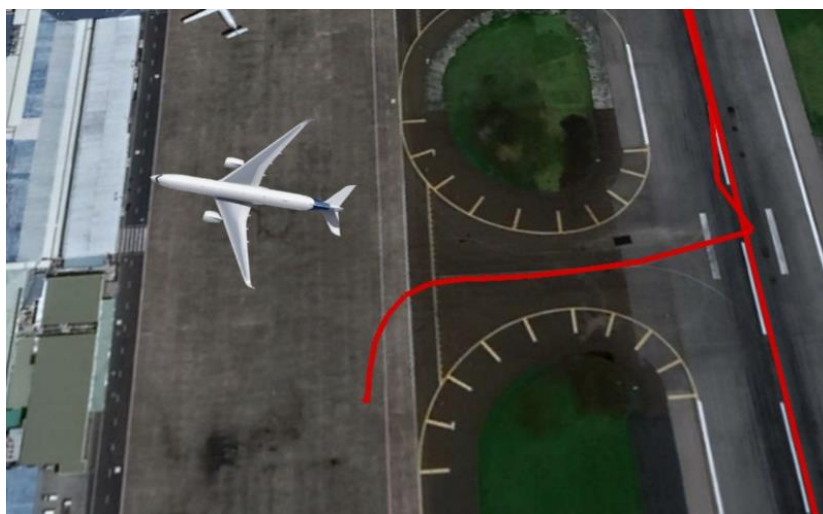


Figure 7 – The path (red line) taken 9M-XXC

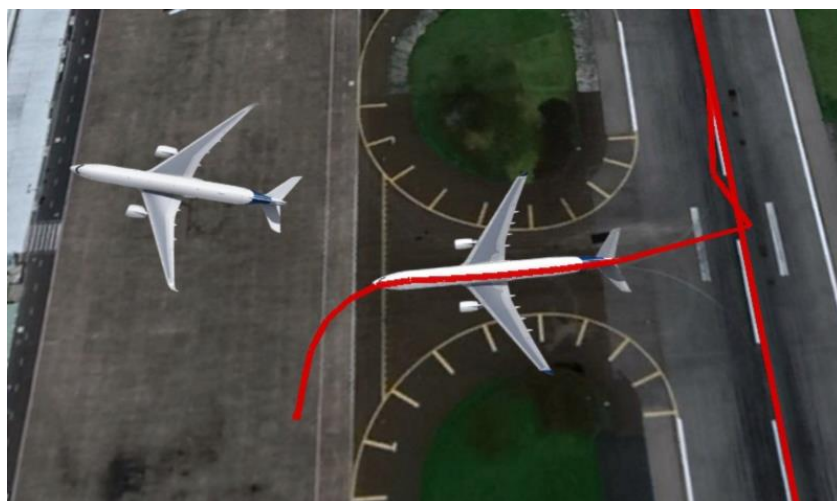


Figure 8 – 9M-XXC at taxiway C



Figure 9 – 9M-XXC making the left turn



Figure 10 – Position of both aircraft prior to collision





Figure 11 – Position of both aircraft at collision.

## 1.17 Organisational Information

### 1.17.1 Air Asia X Berhad

AirAsia X Berhad is a long-haul, low-cost airline operating primarily in the Asia-Pacific region. The AirAsia X fleet consists of Airbus A330-300s.

AirAsia X conducted a risk assessment of VIA on 16 October 2018 prior to start of operations.

The risk assessment identified, among other things, “congested taxiways and aprons” as a hazard. This was given a “3B” score. This was reduced to a category “2B” with two mitigation actions. These were “flight crew should exercise extra vigilance when operating within the apron area, taxiway intersections and runway holding positions” and “maintain good crew resource management and situational awareness”.

A further mitigation action “If unfamiliar with the aerodrome layout or loss of situation awareness while taxiing, immediately stop the aircraft and inform ATC (OMA 8.3.1.8)” was also included.

The Station Audit also includes another hazard “No bay marking at Velana International Airport”. The pre- risk mitigation score given to this was 1 (for likely), 3 (for impact) and M (for level). The mitigation action specified in the report was “arrival are carry out by 2 wings and 1 main marshaller as per ground handler SOP”. The post- risk mitigation score was 1 (for likely), 1 (for impact) and L (for level).

There were no other specific procedures when operating at VIA.

#### 1.17.2 Qatar Airways

Qatar Airways, is the state-owned flag carrier of Qatar. It operates to over 150 international destinations using a fleet of more than 200 aircraft of which 27 are A350-900s.

Qatar Airways holds IATA operational audit programme (IOSA) since 2003 and did not conduct its own audit into VIA prior to start of A350-900 operations. It relied on the IATA ISAGO programme. VIA is approved by IATA under the ISAGO programme. Under this, the last station audit was carried out by a member airline as part of the IATA pool audits.

Qatar Airways parking procedures that are unique to VIA are:

##### *Apron/Parking Stands*

- *TWY lines and parking stands are not marked on the apron.*
- *Aircraft will be guided to the parking stand by marshallers and wing walkers.*
- *Exercise caution due to close proximity of terminal and associated buildings within maneuvering area.*
- *Avoid tight turns using excessive power while taxiing to/from apron.*
- *If taxiing to/from Apron is deemed unsafe by ATC, aircraft will be towed to/from Apron. Expect ATC instructions to shut down engines on RWY for tow-in.*
- *If taxiing to/from the Apron is deemed unsafe by the Commander, the Flight Crew may request towing to/from the Apron. Follow ATC instructions to shut down engines.*

#### 1.17.3 Velana International Airport (VIA)

VIA is the main international airport in the Maldives and has seen significant growth spurred by the increase in tourism. For example, the airport recorded the highest number of air traffic movements on 7 January 2018, which was a 14% increase from that of 2017. This coupled with limited space on the airport island has made congestion at the airport a serious limitation – both in terms of safety and further growth.

The limitations on the apron became apparent and VIA applied for an exemption to use the apron without parking bay markings on 19 May 2014. The main mitigation action for the potential risks was the introduction of wing walkers and marshallers. This exemption was issued by the CAA based on the risk assessment and work schedule. The date of validity for the exemption was set for 31 December 2016.

VIA is currently undergoing major upgrading to meet these regulatory requirements and cater to the increased traffic. This includes a new runway, new taxiways and aprons with parking stands. At the same time current apron was not brought in line with the regulation when the exemption expired on 31 December 2016.

#### 1.17.4 ISAGO

MACL, the owner of VIA, is an IATA ISAGO service provider. IATA's Safety Audit for Ground Operations (ISAGO) has been built upon a 'backbone' of audit standards applicable to all ground handling companies worldwide, coupled with a uniform set of standards relevant for the specific activities of any ground handler.

#### 1.17.4 CAA Oversight of VIA

VIA is under continuous oversight from the CAA as it holds an aerodrome certificate number ADC/08/2012 issued by the CAA. The last compliance audit against MCAR-139 – Aerodrome Rules was on 9 November 2017 and eight findings were raised.

The focus of the audit was on the major expansions such as the new runway and did not detect the non-compliance with the stand marking requirements of MCAR-139 and the fact the CAA exemption had expired.

It is noted the AICC in its report on the 8Q-MAG accident of 2 June 2009 recommended the CAA to publish all exemptions issued in its website. This exemption was not published on the CAA website nor does the CAA have an adequate system to monitor the validity of such exemptions.

### 1.18 Additional Information

#### 1.18.1 Applicable CAA regulations

##### MCAR-139 Aerodrome Rules

The primary regulation that governs aerodrome design and operation of aerodromes in the Maldives is MCAR-139.

*139.07 Certification, states among other things:*

*[...]*

*b. Before granting an aerodrome certificate, the Director must be satisfied that the aerodrome facilities, services and equipment are in accordance with the standards and practices specified in regulations.*

*[...]*

- 1. the aerodrome operating procedures make satisfactory provision for the safety of aircraft; and*
- 2. an acceptable Safety Management System is in place at the aerodrome.*

*139.22 Compliance with standards*

*The aerodrome operator shall comply with the standards and practices specified in these regulations and with any conditions endorsed in the certificate pursuant to regulation 139.08 and 139.90.*

*139.90 Exemptions*

*The Maldives Civil Aviation Authority may exempt in writing, an aerodrome operator from complying with specific provisions of these regulations.*

*Before the Director decides to exempt the aerodrome operator, the Maldives Civil Aviation Authority must take into account all safety related aspects.*

##### ASC 139-5 Aerodrome Standards

This Circular specifies the standards as required in MCAR-139.22

*Section 3.13 states, among other things:*

*3.13.1 It is recommended that aprons should be provided where necessary to permit the on- and off-loading of passengers, cargo or mail as well as the servicing of aircraft without interfering with the aerodrome traffic.*

*3.13.2 It is recommended that the total apron area should be adequate to permit expeditious handling of the aerodrome traffic at its maximum anticipated density.*

3.13.3 *It is recommended that an aircraft stand should provide the following minimum clearances between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects:*

Code A/B	3 m clearance
Code C	4m clearance
Code D/E/F	7.5 m clearance

*Section 5.2.13 states, among other things:*

5.2.13.1 *It is recommended that aircraft stand markings should be provided for designated parking positions on a paved apron.*

5.2.13.2 *It is recommended that aircraft stand markings on a paved apron should be located so as to provide the clearances specified in 3.13.6, when the nose wheel follows the stand marking.*

*Note. — Guidance on the layout of aircraft stand markings is contained in the ICAO Aerodrome Design Manual, Part 4.*

*Section 5.2.14 states:*

*Apron safety lines should be provided on a paved apron as required by the parking configurations and ground facilities.*

*Section 9.5.1 states:*

9.5.1 *It is recommended that when warranted by the volume of traffic and operating condition, an appropriate apron management services should be provided [...] in order to:*

- a. *regulate movement with the objective or preventing collisions between aircraft, and between aircraft and obstacles*
- b. *regulate entry of aircraft into, and coordinate exit of an aircraft from, the apron with the aerodrome control tower; and*
- c. *ensure safe and expeditious movement of vehicles and appropriate regulation of other activities.*

#### ASC 00-2 Safety Management System

The regulation that governs safety management at aerodromes is ASC 00-2.

5.1 *The service provider shall establish, maintain and adhere to a safety management system (SMS) that is appropriate to the size, nature and complexity of the operations authorized to be conducted under its operations certificate and the safety hazards and risks related to the operations.*

#### **1.18.2 Exemptions from CAA regulations**

On 7 May 2015, Maldives CAA exempted the airport from the requirements of ASC 139-5 Chapters 5.2.13 (aircraft stand markings) and 5.2.14 (apron safety lines). This was based on a risk assessment, a master plan and revised Aerodrome Manual submitted by the airport operator. This information was published on the AIP.

This exemption was on the condition that a work plan should be submitted to the CAA and the airport would be in conformance with the requirements by 31 December 2016, the date on which the exemption expired.

The non-conformance with the regulations was not rectified at the time of the serious incident. Further it was not detected that the exemption issued by the CAA had expired.



#### 1.18.3 Traffic growth at VIA

International passenger traffic at VIA grew by approximately 4.3% in the last five years. The growth in aircraft movements, for the same period, was approximately 1.13%.

This indicates there is healthy growth coupled with a tendency by the airlines to use larger aircraft.

## **2 Analysis**

[Reserved]

## **3 Conclusions**

[Reserved]

## **4 Safety Recommendations**

[Reserved]

..... END .....