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Accident Investigation Coordinating Committee

Report 2018/01

Final Report on the Serious Incident to
Airbus, A330-300 (9M-XXC), A350-900 (A7-ALL)
Velana International Airport, Maldives
7 July 2018

Introduction

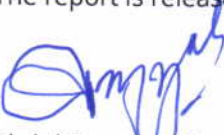
Maldives is a signatory to Convention on International Civil Aviation (Chicago 1944) which established the principles and arrangements for the safe and orderly development of international air transport. Annex 13 to the Convention on International Civil Aviation obligates contracting states to investigate accidents and serious incidents 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, Republic of Maldives. The sole objective of this investigation and the 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 5 February 2020.


Abdul Razzak Idris

Chairperson

Accident Investigation Coordinating Committee



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Aircraft Accident Report No: 2018/01

Detail	Air Asia	Qatar Airways
Aircraft Type and Registration:	Airbus A330-300, 9M-XXC	Airbus A350-900, A7-ALL
No. & Type of Engines:	2 x RR Trent 772B-60	2 x RR Trent XWB
Year of Manufacture:	2009	2016
Persons on Board:	Crew – 10 Passengers – 306	Crew – 14 Passengers – 20
Injuries:	Crew – Nil Passengers – Nil	Crew – Nil Passengers – Nil
Nature of Damage:	A dent measuring approximately 3" x 1" on starboard (right hand) winglet.	Port (Left hand) horizontal stabiliser bent up and torn at approximately 18" from tip.

Commander's Licence:	ATPL issued by Department of Civil Aviation Malaysia	ATPL issued by Qatar Civil Aviation Authority
Commander's Age:	42 years	52 years
Commander's Flying Experience:	12,640 hours (of which 532 were on type)	8,610 hours (of which 1,471 were on type)

Date and Time (LT):	7 July 2018 at 0950 Hrs.
Location:	Velana International Airport (VIA)
Type of Flight:	Commercial Air Transport (Passenger)
Notification Source:	Male' Air Traffic Control (ATC)

Synopsis

The right winglet of an Air Asia Airbus A330, whilst taxiing in under marshalling guidance at Velana International Airport (VIA) came in contact with the left horizontal stabilizer of a parked Qatar Airways Airbus A350 aircraft. The starboard (right hand) winglet of the Airbus A330 was slightly damaged in the incident while the left horizontal stabiliser of the Airbus A350 was significantly damaged. There were no injuries to any of the passengers, crew on-board or persons on ground.

The incident was notified to the Accident Investigation Coordinating Committee (AICC) at 1010 hrs on 07 July 2018. 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) landed at VIA after an uneventful flight from Kuala Lumpur and was instructed by the control tower to back track and vacate the runway via Taxi-way C. From taxiway 'C' the aircraft was guided by a marshaller and a wing walker.

The Airbus A350 (A7-ALL), parked on the apron immediately to the right of the A330 entering the Taxi-way 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 inches long dent while the LH horizontal stabiliser of A7-ALL was bent and torn at approximately 18 inches from the tip.

1.4 Other damage

None.

1.5 Interviews with Flight Crews and Airport ground Staff

1.5.1 Interview of 9M-XXC Crew

The Commander, taxiing the Air Asia aircraft, stated that the flight from Kuala Lumpur was normal. It landed on runway 36 and vacated the runway via Taxi-way C as instructed by ATC. Once the aircraft entered Taxi-way C, ATC instructed them to follow the marshaller. There was no further contact with ATC until the incident occurred.

He slowed the aircraft speed to approximately 4-6 knots as it entered Taxi-way C. The Qatar Airways aircraft was parked on his starboard (right hand) side whilst an Aeroflot A330 was parked on the Port (Left hand) side. At this time, he had visual of the wing walker who was near the Port (Left hand) side of the Qatar Airways aircraft and the marshaller (who was at the parking bay).

He also stated that the parking area was very tight but normal for VIA based on his five years of coming to the airport. He therefore concluded that 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 the Qatar Airways aircraft 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 starboard (right hand) side. He stated this was not possible in VIA without the assistance of marshalls. This was because the parking space is very tight and lacks 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 marshalls. This is especially true in the case of a wide body aircraft when making a turn.

1.5.2 Interview of A7-ALL Crew

The Commander of Qatar Airways aircraft 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 Air Asia aircraft had collided with Qatar Airways aircraft.

The Qatar Airways aircraft 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 his aircraft was parked at the correct location since there were no stands and lead-in lines.

The Commander stated unlike other airports, at VIA, that they are 'completely reliant' on marshalls. The First Officer also stated that they were '100% reliant' on the marshalls.

Both pilots highlighted the crowded nature of parking, coupled with the lack of designated stands and lead-in lines at VIA as the cause for reliance on marshalls.

1.5.3 Interview of Ground Staff

The Marshaller stated he arrived in front of Taxi-Way C ten minutes prior to the arrival of Air Asia aircraft 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 to manoeuvre in the aircraft from taxiway to the designated parking position. He also thought the Qatar Airways aircraft was in the normal position but could not be sure if it was in the correct position as there are no parking stands.

The Air Asia aircraft was marshalled in from the entry of Taxi-way 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 that the appropriate hand signal was indicated to the Air Asia aircraft to turn left once it had sufficiently entered the apron. But the aircraft continued to taxi in, along the path of the entry, into the apron, before commencing the turn

He then saw the wing walker show the stop sign and immediately followed 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.

He stated that lack of parking stands 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 Port (Left hand) side of Qatar Airways aircraft and was in charge of monitoring that there was sufficient clearance between the Air Asia aircraft and the Qatar Airways aircraft. He stated that the aircraft was moving too far into the apron before turning. Therefore, he used hand signals to indicate the location of the marshaller just in case the pilot did not see the marshaller's instructions. This hand signal appeared to be misleading to the crew members, as the crew members considered it as an instruction to continue taxiing in.

At this point the Air Asia aircraft appeared very close to the Qatar Airways aircraft, so he showed the stop sign. But the Air Asia aircraft continued to move forward and came in contact with the Qatar Airways aircraft. He stated that the Air Asia aircraft moved about 10 feet after the stop sign was shown.

I.6 Training of Ground Staff

The Marshaller had successfully completed "Basic Airside Safety Training" and "Aircraft Marshalling Training" on 1 February 2017 and 19 December 2016, respectively. The wing walker had successfully completed "Basic Airside Safety Training" and "Aircraft Marshalling Training" on 25 April 2018 and 24 August 2015, respectively.

These courses were provided by Maldives Airports Company Ltd.

I.7 Aircraft Information

The A330-300 (9M-XXC) is a twin-engined, wide-body aircraft configured to carry 12 business class passengers and 365 economy class 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 landing gears support the airplane on the ground.

The A350-900 (A7-ALL) is a twin-engined, wide-body aircraft configured to carry 36 business class passengers and 247 economy class passengers. The airframe features a low-wing cantilever monoplane with wings that are swept back at 31.9 degrees. The wing span is 64.75 m with a 2.4 m tall sharklet on each wing. The two engines are suspended on pylons under the wings. A two-wheel nose undercarriage and two four-wheel bogie main landing gears support the airplane on the ground.

1.7.1 Cockpit visual angles

On the A330-300 aircraft, 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, as summarised in Figure 1.

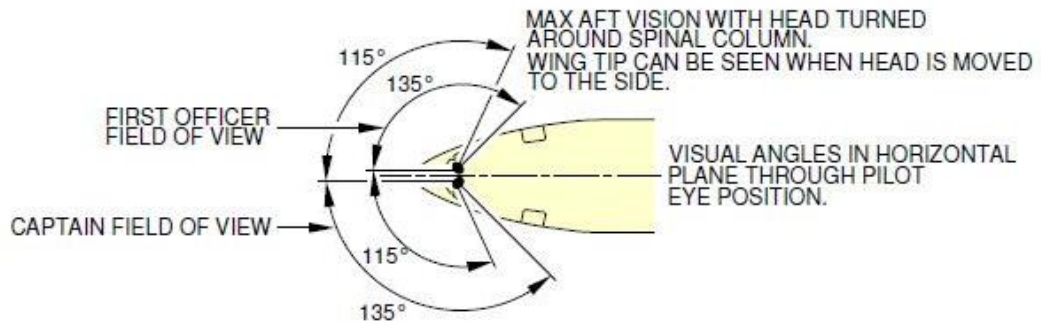


Figure 1 – A330-300 visibility from cockpit in static position

1.7.2 Ground Manoeuvring

The clearances required for a 90 degree turn on the A330-300 are given in the figure below. This example is on a 90 degree turn from runway to Taxi-way using “Cockpit Over Centreline Method”.

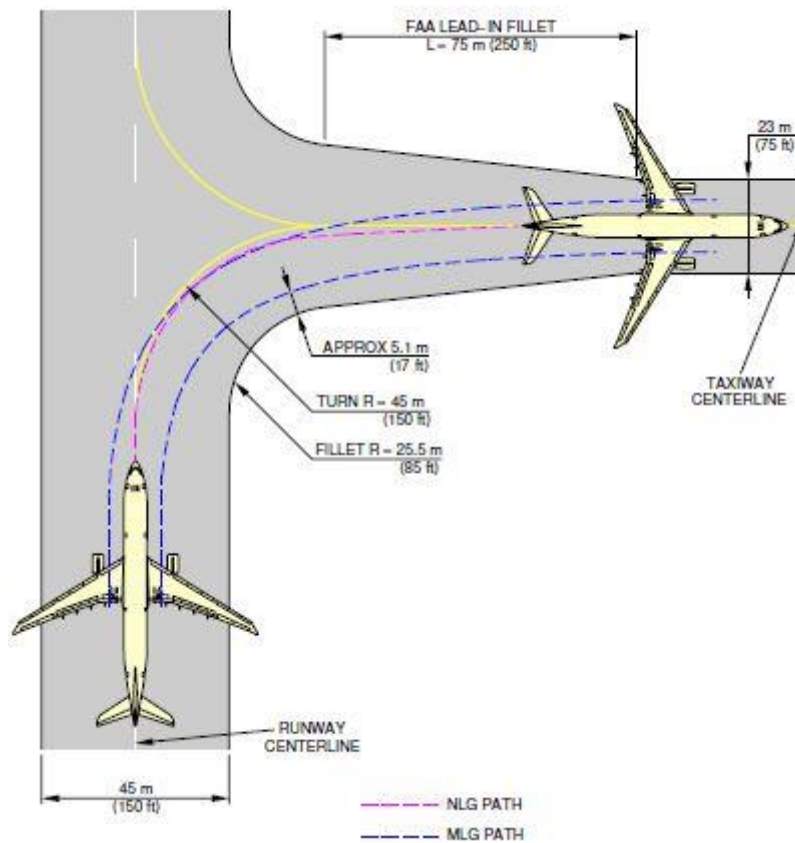


Figure 2 – 90 degree turn: runway to Taxi-way

1.7.3 Swept wing growth

The A330 aircraft, 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 gear¹.

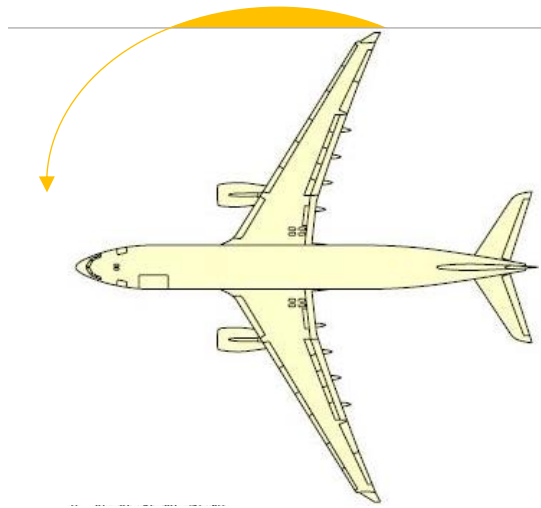


Figure 3 – Swept wing growth

1.8 Weather

Weather conditions at the airport at 0900 hours was reported as:

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

1.9 Aids to Navigation

Navigation was not a factor in this incident.

1.10 Communication

1.10.1 Marshalling

The detailed procedure for marshalling is stated in the “Airside Handling Manual, issue 3 of VIA”. Paragraph 3.2.2 describes the arrival process and requires the marshalling staff to be present 10 minutes before the arrival of an aircraft. It also requires wing walkers to be present before the arrival of the aircraft. It also requires the wing walkers to observe proper distances between the aircraft and nearby obstacles “especially on closed-quarters”.

In this serious incident two aspects of this procedure were not followed. Firstly there was one wing walker. Secondly the wing walker (who should walk ahead of the wing tip of the moving AirAsia) was positioned near the Port (Left hand) wing tip of the stationary Qatar Airways.

¹ https://www.skybrary.aero/index.php/Wing_Tip_Clearance_Hazard

1.11 Aerodrome Information

VIA is the main international airport in the Maldives. It is located on Hulhule Island approximately 2.8 km from the capital, Male'. The airport is at an elevation of 6 feet (2 m) above mean sea level. It has 1 asphalt runway designated 18/36 measuring 45 m × 3,200 m (148 ft × 10,499 ft).

1.11.1 Compliance with International Standards

The aerodrome was certified by the Maldives CAA as Code 4E on 3 October, 2010.

1.11.2 The International Apron and Taxi-ways

The international apron is a concrete apron with a PCN of 55, accessible via Taxi-ways A to E. Taxi-way C is 23 m wide with a PCN of 57. See Fig 4 for the layout of the runway, taxi-way, apron etc.

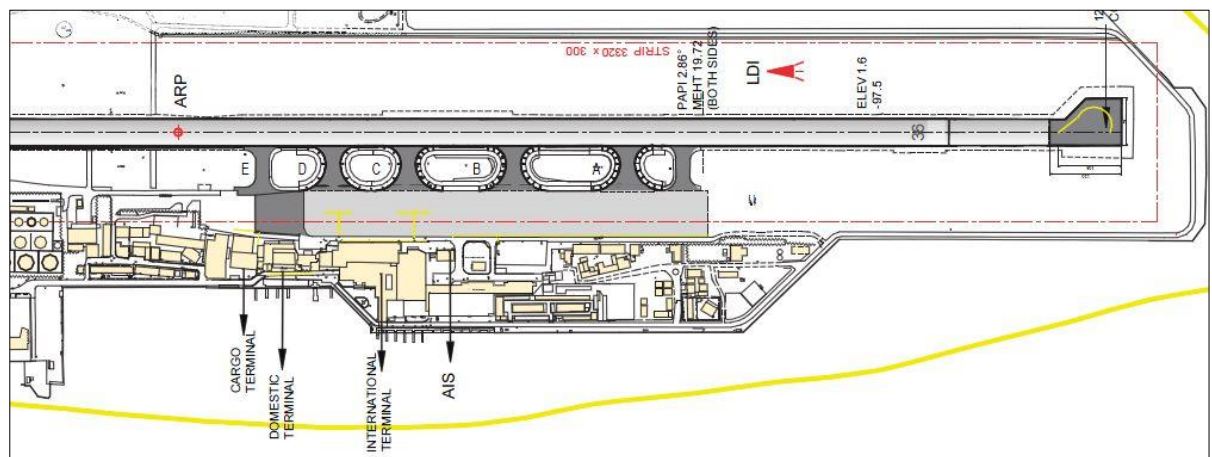


Figure 4: VIA international apron and associated Taxi-ways.

Surface movement guidance and control is through Taxi-way sign boards and lights at all intersections with Taxi-ways and runway.

1.11.3 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.*

1.11.4 Aircraft Parking Allocation

Aircraft parking positions are allocated by the VIA Operational Control Center (OCC). The general layout is controlled using a Microsoft Excel document. This practice is not documented in the "Airside Handling Manual" but inherited from the then obsolete "Ramp Services – Operations" SOP. 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 Taxi-way C between A7-ALL (flight number QR673) and another A330 (flight number SU 320).

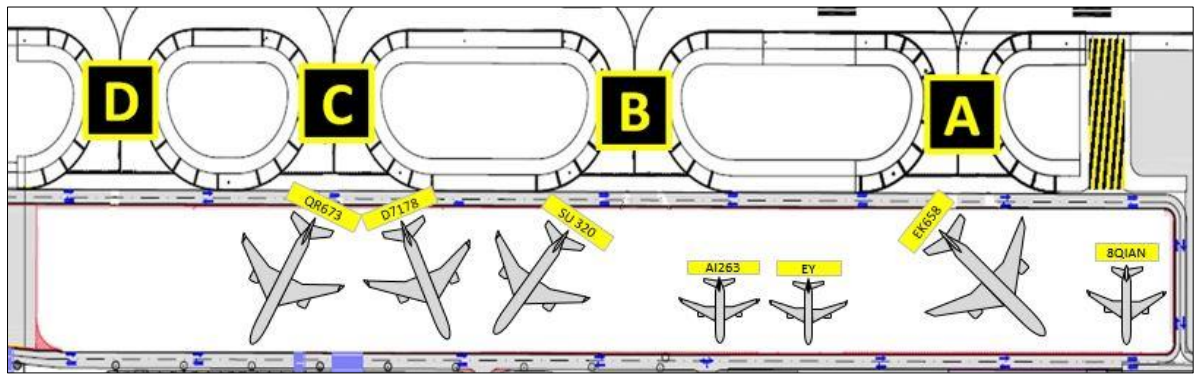


Figure 5 – Parking allocation for 9M-XXC

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 carried out solely based on the experience of the marshaller’ as the apron is not marked.

Given that 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” shown in figure 6 In this arrangement 10 aircraft are parked.

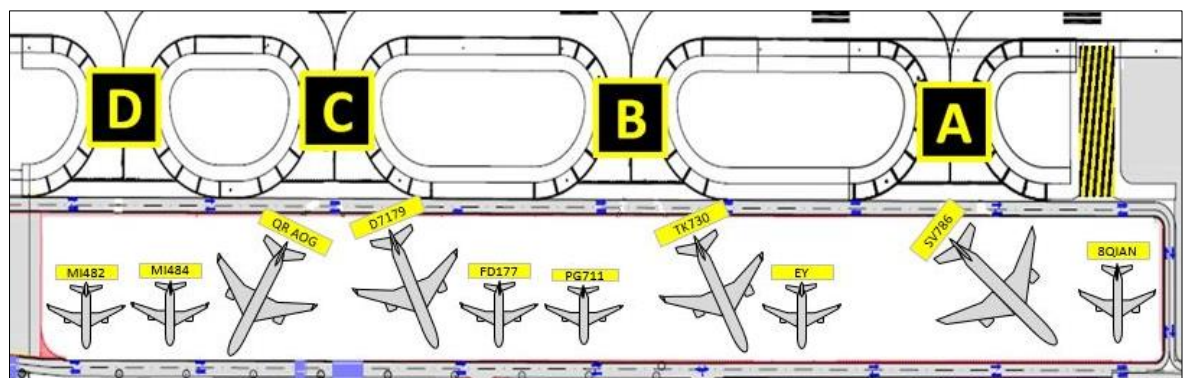


Figure 6 – Parking Allocation with the most aircraft

1.12 Recordings

1.12.1 CVR Recordings

CVR recordings from the aircraft 9M-XXC were provided by AirAsia X. The recordings indicate the cockpit environment was normal 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.

1.12.2 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 Taxi-way C. It enters Taxi-way C up to the Taxirunway holding position marking before starting the left turn. Moments after, it comes to a sudden halt. However, in this view the aircraft collision is concealed by the Qatar Airways aircraft.

The second video shows the parking area, just before the collision. The aircraft entry and most of the Qatar Airways aircraft are concealed in this view. The marshaller was not visible as he was blocked by the roof of the terminal. The wing walker could be seen at the port (Left hand) wing tip area of the Qatar Airways aircraft.

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

1.12.3 FDR Recordings

FDR recordings from the AirAsia aircraft were provided by AirAsia X. However, these were not analysed as it was considered not essential in investigating this incident.

1.12.4 Flight Data System

The AirAsia aircraft is fitted with a flight data system that, among other parameters, records the GPS position of the aircraft. This data was provided by AirAsia X. The mapping of this data together with the position of Qatar Airways aircraft (measured on ground) is shown below. Scale drawing of the aircraft is superimposed on this data to reconstruct the movement of Air Asia aircraft.

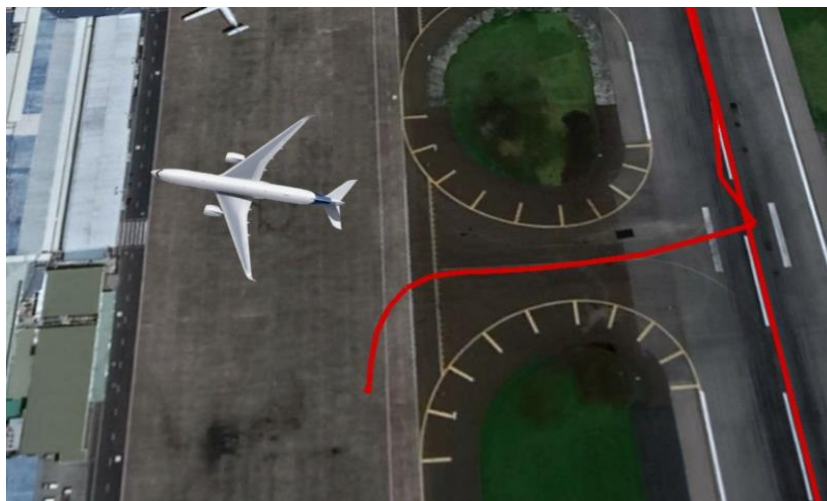


Figure 7 – The path (red line) taken Air Asia aircraft

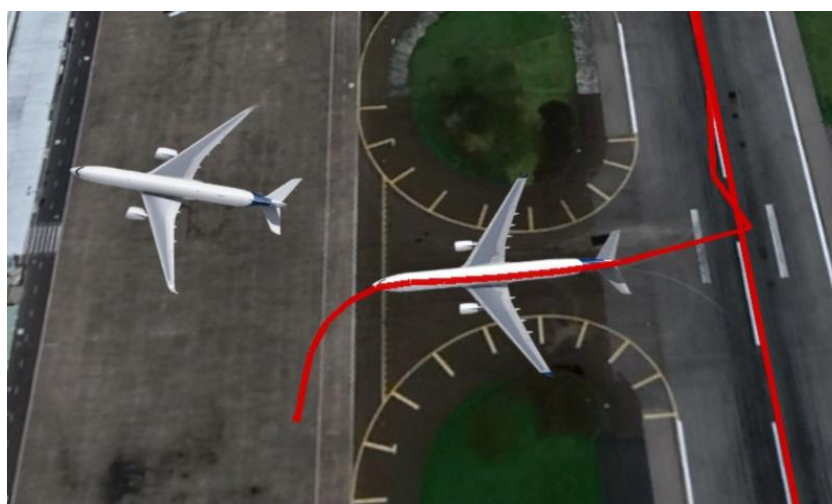


Figure 8 – Air Asia aircraft at Taxi-way C



Figure 9 – Air Asia aircraft making the left turn



Figure 10 – Position of both aircraft prior to collision



Figure 11 – Position of both aircraft at collision.

The red line in the above figures represent the movement of the aircraft from the Flight data System. It is evident from the mapping above, the starboard (right hand) wing of the Air Asia aircraft could not have cleared the Qatar Airways aircraft horizontal stabilizer.

1.13 Organisational Information

1.13.1 AirAsia 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 their operations.

The risk assessment identified, among other things, “congested Taxi-ways and aprons” as a hazard. This was given a “3B” score and reduced to a category “2B” with two mitigation actions. These were “flight crew should exercise extra vigilance when operating within the apron area, Taxi-way 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 included 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 is to be carried 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 to be followed when operating at VIA.

1.13.2 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 of VIA prior to starting 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.

The AICC requested a copy of the report from Qatar Airways but this request was declined as "ISAGO reports belong to the ground handling agent and are managed by IATA". The AICC then requested IATA for a copy of the report. This was provided with prohibitions on distribution of the report and publication of information contained in the report. Pertinent information contained in ISAGO report could not be included in this Report, as a result.

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.*

1.13.3 Velana International Airport (VIA)

MACL, the owner of VIA, is an IATA ISAGO service provider.

VIA is the main international airport in the Maldives and has seen significant growth spurred by the increase in tourist movements. 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 international apron at VIA measures 675 metres in length and 68 metres in width. There are no apron taxiways, marked aircraft stands with associated taxi-lanes and lead-in lines. The closest edge of this apron to the runway is located at a distance of 97 metres from the runway centreline and is connected to the runway by 4 perpendicular taxiways designated 'A', 'B', 'C' and 'D' each of which is 74 metres in length and 23 metres wide.

VIA had an exemption issued by MCAA to use the apron without the above markings. This exemption was valid until 31 December, 2017. All aircraft movements on the apron are guided by marshallers and wing walkers.

VIA is currently undergoing major upgrading to meet these regulatory requirements and cater to the increased traffic. This includes provision of a new runway, new Taxi-ways 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, 2017.

I.14 Additional Information

1.14.1 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:

[...]

Before granting an aerodrome certificate, the Director must be satisfied that

[...]

- 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.

3.13.6 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:

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

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 of preventing collisions between aircraft, and between aircraft and obstacles*
- b. regulate entry of aircraft into, and coordinate exit of 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.*

1.14.2 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 compliance with the recommendations by 31 December, 2017, 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 on the date mentioned in the initial issue of exemption, and neither the airport operator nor the CAA pursued any subsequent action(s) on the issue.

Compliance with recommendations 5.2.13 and 5.2.14 was not met by the agreed date of 31 December, 2017, or even up to the date of this serious incident.

Notably, all the requirements stated above, under this heading, in fact are recommendations set out in the ASC 139-5.

2 Analysis

Velana International Airport has limited apron space for large aircraft; hence the apron gets very congested during peak hours. In order to accommodate maximum traffic, aircraft parking is allocated according to demand at any given moment of the on-going operations. For this reason, aircraft stands are not marked. All aircraft movements and parking on the apron are being carried out only under the guidance of marshallers and wing walkers.

The international apron at Velana International Airport is 675 metres in length and 68 metres wide, with no apron taxiways and aircraft stands with associated taxi lanes and lead-in lines. The edge of this apron that is closest to the runway is located at a distance of 97 metres from the runway centreline and is connected to the runway by 4 perpendicular taxiways designated 'A', 'B', 'C' and 'D' each of which is 74 metres in length and 23 metres wide. These four taxiways and the limited width of the international apron are, most of the time, not conducive to the space required to manoeuvre and park wide-body aircraft in a uniformly standard manner.

The close proximity of the apron to the runway, the limited length of the four taxiways marked with centreline guidance, the narrow width of the international apron and the prevailing demand and capacity imbalance for parking space, makes it a very challenging task for ground staff, to guide large aircraft in and out, which is done purely on visual judgement.

In order to cater for the maximum traffic due to operational demands, VIA had an "Exemption" issued from MCAA to deviate from the Recommendations set forth in Chapter 5.2.13 and 5.2.14 of ASC 139-5; marking the aircraft stands on its Apron for aircraft parking in particular. However, this "Exemption" was not renewed on expiry since 31st December, 2017.

Aircraft parking positions are allocated by the VIA Operational Control Centre (OCC). The general layout for parking is controlled using a Microsoft Excel document. The Duty In-charge is responsible to brief the marshaller(s) as to where and how the aircraft should be parked in a given time, based on this allocation(s) made on the excel document.

A parking plan was generated for the arrival of AirAsia A330, among other aircraft. In this plan AirAsia A330 was to be parked between Qatar Airways A350 aircraft and another A330 aircraft (Aeroflot).

For handling the parking operation of the arriving AirAsia A330 aircraft a team of 1 Marshaller and 1 Wing Walker were assigned to guide the aircraft into the allocated parking position. The Marshaller was standing in front of the allocated parking position, while the Wing Walker was standing under the wing tip of the parked Qatar Airways A350 aircraft. From the Wing Walker's position, it is difficult to confirm if he could have clearly judged the wing tip clearance of the incoming AirAsia A330 aircraft from the parked Qatar Airways A350 aircraft.

The arriving AirAsia A330 aircraft was instructed by ATC to follow the Marshaller, after exiting the Runway through Taxiway "C". The aircraft was marshalled in by the Marshaller while the Wing Walker was assisting the Marshaller by signalling the clearance of the moving aircraft from the parked aircraft.

The investigations of the incident revealed that the incoming AirAsia A330 aircraft was taxiing in on a path that it could not have cleared its wing tip from the horizontal stabilizer of the parked Qatar Airways A350 aircraft.

The First Officer of AirAsia aircraft stated that it was only after the impact the wing walker showed the stop sign, although the wing walker stated that the Air Asia aircraft moved about 10 feet even after the stop sign was shown, and the Commander states that he turned the aircraft left at the instructions of the main marshaller, but the marshaller states that even after him signalling the aircraft to turn left, it continued to taxi in, along the path of the entry into the apron, before commencing the turn. It shall be acknowledged that there would be a reaction lag from both the marshaller and the pilot while the taxiing aircraft would still move under momentum before turning.

As per Cockpit Voice recordings the cockpit crew of the AirAsia A330 aircraft were discussing about the closeness of their aircraft to the parked Qatar Airways A350 aircraft. They were heard expressing concern over the close proximity of the two aircraft. When the AirAsia A330 crew felt a jolt, they stopped the aircraft and discussed if the Ground Crew (Marshalls) were showing the "Clear" signal.

According to the Marshaller, even though he was signalling the AirAsia A330 aircraft to turn left, the aircraft moved forward before starting to turn, and then signalled to "Stop" when the Wing Walker gave the "Stop" sign.

According to the Wing Walker when he judged that the incoming AirAsia A330 aircraft was too close to the parked Qatar Airways A350 aircraft, he showed the "Stop" sign, but the AirAsia A330 aircraft moved forward and came in contact with the Qatar Airways A350 aircraft.

At the time of the incident passengers were boarding the parked Qatar Airway A350 aircraft which was preparing for departure. The Commander of the Qatar Airways A350 aircraft who was in the cockpit felt the aircraft jolt. He came down to see what had happened and observed that the Starboard Winglet of the AirAsia A330 aircraft had struck the port side of the horizontal stabilizer of his aircraft damaging the trailing edge of the control surface. The Qatar Airways A350 flight had to be cancelled and the aircraft had to be repaired to make it airworthy.

The damage on the Winglet of the AirAsia A330 aircraft was classified as minor and therefore released for flight without immediate repair.

3 Conclusions

1. From the forgoing analysis it can be concluded that the primary reason for the collision was non adherence to the established marshalling procedures to shepherd in the aircraft to the allocated parking space available between two other large aircraft parked.

Reconstruction of the path followed by the AirAsia from Flight Data System installed on it and the position of the parked Qatar Airways aircraft (measured on ground), it is apparent that the wing of the Air Asia aircraft could not have been clear of the Qatar Airways aircraft horizontal stabilizer.

It is however, important to note that statements made regarding events of marshalling signals by the marshallers and flight crew members are inconsistent and could not be confirmed.

Probable causes;

1. Congested condition of the apron and Marshalling.

According to the parking plan generated for parking of AirAsia A330, it is evident that the apron was very congested. In this particular incident, only one marshaller and one wing-walker were found deployed to guide the taxiing aircraft into the allocated parking position as opposed to three required (one marshaller and two wing walkers) as per MACL Ramp Services SOP. Due to the limited available space to manoeuvre aircraft and the prevailing congestion on the apron, walking continuously with the wing of a moving aircraft was extremely difficult, though it is stated so in the MACL Ramp Services SOP.

2. Weak regulations and enforcement. ASC-139 and MCAR -139 documents published by MCAA do not explicitly mandate the airport operator to mark parking stands and lead-in lines on the apron and instead make recommendations. For the same reason, all regulations shall be clear, concise and consistent with the perceived objective(s) to be achieved.

CAA records confirm that an exemption was granted to VIA on the provision of aircraft stand markings and apron safety lines from the requirements of MCAR-139 and ASC-139. The Exemption was expired at the time of the incident.

4 Safety Recommendations

4.1 Recommendations to Airport Operator

- a. Ensure all regulatory requirements are met in full. Any deviations from the regulation(s) shall be supported by exemptions or concessions sought from CAA Maldives and kept current at all times.
- b. Ensure the required number of Marshalls and Wing Walkers are engaged at all times.
- c. Expand the existing CCTV camera system(s) to capture a greater coverage of all apron and runway movements.
- d. Consider the limited and confined parking space available for large wide-body aircraft and the prevailing demand and capacity imbalance when allocating aircraft operating slots at VIA.
- e. Review and revise the existing SOPs to reflect and match with the current practices relating to aircraft parking management at VIA.
- f. Run a recurrent training program for all marshalls and wing-walkers after the MACL Ramp Services SOP has been reviewed and revised.

4.2 Recommendations to MCAA

- a. Periodic audits are carried out at all airport for compliance with standards and regulations.
- b. To ensure all exemptions granted are kept current by the operators.
- c. Review contents of the MCAR -139 and ASC-139 and publish revised documents.

5 Appendices


5.1 List of Abbreviation

AICC	: Accident Investigation Coordinating Committee
ATC	: Air Traffic Controller
ATPL	: Air Transport Pilot License
ASC	: Air Safety Circular
AIP	: Aeronautical Information Publications
BEA	: Bureau d'Enquêtes et d'Analyses
CAA	: Maldives Civil Aviation Authority
CVR	: Cockpit Voice Recorder
EASA	: European Union Aviation Safety Agency
FDR	: Flight Data Recorder
IATA	: International Air Transport Association
ICAO	: International Civil Aviation Organization
ISAGO	: IATA Safety Audit for Ground Operations
Km	: Kilometer
LH	: Port (Left hand)
MACL	: Maldives Airports Company Limited
MCAR	: Maldives Civil Aviation Regulation
m	: Meter
OCC	: Operational Control Centre
PCN	: Pavement Classification Number
QAAI	: Qatar Air Accident Investigation
RH	: Starboard (right hand)
SMS	: Safety Management System
SOP	: Standard Operating Procedure
TWY	: Taxiway
VIA/VRMM	: Velana International Airport

5.2 Key stakeholders comments to the Draft Final Report

A copy of the draft final report was distributed to key stakeholders, namely ICAO, QAAI, AAIB Malaysia, BEA, MACL, MCAA and EASA for their comments. Comments were received from QAAI and AAIB Malaysia. MACL, BEA and EASA opted not to comment. No responses were received from the rest.

5.2.1 Comments from QAAI:



QAAI
وحدة التحقيق في حوادث الطيران
Air Accident Investigation Unit

QATAR AIR ACCIDENT INVESTIGATION
Al Sharq Tower, 13th floor
Al Aaliya Street, St. No. 840
Old Salata, Zone 18
P.O. Box 3000
Doha, State of Qatar

To : MALDIVES- Accident Investigation
Coordination Committee, Ministry of
Transport and Communication
11th Floor Velaanaage, Ameeru
Ahmed Magu
Malé 20096 Malé
Maldives

Date : 30/12/2020 **Reference** : 2019-0021 A7-ALL

Subject : Comments on preliminary report

Dear Sir, Madam,

It is with pleasure that I provide you comments on your draft final report 2018/01 regarding the investigation into the Serious incident with the Qatar Airways A7-ALL on 07/07/2018.

I have requested Qatar Airways to provide their comments on the report. The Qatar Airways comments will be attached separately for your consideration.

My comments include some of the comments of Qatar Airways where applicable. I will divide my comments in different parts a) General b) Operational and c) Safety Management

General.
Your report is very clear about the difficulty at the airport to handle the amount of traffic on the apron with limited capacity to park (larger) aircraft. Due to the variety of aircraft and the required flexibility it was decided to give an exemption of the "normal" requirements for marking and guidance on the taxiways, apron and stand. It is not clear what the assumptions have been at the moment that the exemption was provided.

Operational
I would like to propose to include some information about the outcome of the risk assessment as mentioned in para 1.14.2. The content of this risk assessment could provide valuable input for the analysis. The concept of operation where no use is made of "standard" taxiway, apron and stand markings does require additional skills from the marshallers. The question could be what the specific content of the Aircraft Marshalling Training is.

ref. QAAI letter HoU/Document4

Marshalling without appropriate markings immediately put the marshaller in a "single point of failure" situation.

Normally the Crew would also refer to the markings which then provides a "second pair of eyes" for the positional awareness. In this situation the marshaller is the only connection between the aircraft position, its movement and the surrounding obstacles. Because the marshaller also has to rely on the information from the wing walker, the information (directional and braking action) that actually reaches the cockpit is delayed and less accurate. The difficulty in the correct observation of the geometry of the aircraft and its surrounding obstacles and the delay in communication causes an inaccurate control of the position, steering control and brake application of the aircraft. The fact that the Crew does not have any positional reference makes them fully dependent on the correct interpretation of the wing walker who in this case also was not in the best place to observe the geometry of movement of the wing of the other aircraft. It is even doubtful whether a second wing walker would have added to the situation, his position would most probably have been on the other side of the Asian Aircraft and thus not able to contribute but just adding to the complexity for the Marshaller.

Safety Management

It is clear that the decision was taken to give the Airport an exemption from the use of appropriate markings. What is not clear in the report on which assumptions the risk assessment has been based and if the appropriate hazards have been identified, addressed and consequently mitigating measures have been identified and implemented.

If there is any question about the above please feel free to contact me.

Yours Sincerely,

Herry Klumper
Head of Qatar Air Accident Investigation (QAAI)

ATTACHMENT : Comments Qatar Airways.

ref. QAAI letter HoU/Document4

ATTACHMENT TO Letter 2019-0021 A7-ALL

COMMENTS QATAR AIRWAYS

Please refer the commentary as follows (*italic* are quotes from the MCAA report where indicated):

1. The investigation report is transparent in nature and the event could have been avoided if the previous, regulatory safety recommendations had been implemented.
2. Following statements are not relevant in the context of the incident:

'Qatar Airways holds IATA operational audit programme (IOSA) since 2003 and did not conduct its own audit of VIA prior to starting A350-900 operations. It relied on the IATA ISAGO programme.'

'The AICC requested a copy of the report from Qatar Airways but this request was declined as "ISAGO reports belong to the ground handling agent and are managed by IATA". The AICC then requested IATA for a copy of the report. This was provided with prohibitions on distribution of the report and publication of information contained in the report. Pertinent information contained in ISAGO report could not be included in this Report, as a result'

ISAGO is specific to GHA operating conformance, the quote that we have declined the request is not unreasonable from our side as this has no bearing or contribution to the incident. There is no reference to a risk assessment of A350 parking from a QR perspective (in terms of MOC). As an airline we would not normally conduct an 'audit' of an airport prior to commencing operations of a new aircraft type (unless it were A380, for example). The A350 has a similar footprint to B777 (which QR has operated into MLE historically) and therefore an 'audit' would not be particularly revealing of relevant in this regard. Furthermore as MLE has nil apron markings we would not be in a position to even recommend an appropriate parking position.

Furthermore, the executive summary does not include any reference to any previous, similar incidents – it would be beneficial for them to include a historical context to any similar events to determine whether there are any discernable trends and the risk treatment measures introduced previously.

3. Following are more pertinent to effectively treating the risk:

'VIA had an exemption issued by MCAA to use the apron without the above markings. This exemption was valid until 31 December, 2017 (lack of effective risk mitigation)'

'VIA is currently undergoing major upgrading to meet these regulatory requirements and cater to the increased traffic. This includes provision of a new runway, new Taxi-ways 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, 2017.'

3.13.6 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.*

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

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 compliance with the recommendations by 31 December, 2017, 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 on the date mentioned in the initial issue of exemption, and neither the airport operator nor the CAA pursued any subsequent action(s) on the issue.'

All of the above would indicate an SMS failure within the local CAA to mitigate a known risk to all carriers operating widebody aircraft into MLE

4. Analysis (root cause)

'In order to cater for the maximum traffic due to operational demands, VIA had an "Exemption" issued from MCAA to deviate from the Recommendations set forth in Chapter 5.2.13 and 5.2.14 of ASC 139-5; marking the aircraft stands on its Apron for aircraft parking in particular. However, this "Exemption" was not renewed on expiry since 31st December, 2017.'

A failure by the regulatory authority and airport operator to effectively mitigate a known risk by the assigned target date. If this had been implemented prior to the expiry date indicated then this event would not have occurred.

5. Conclusions

'From the forgoing analysis it can be concluded that the primary reason for the collision was non adherence to the established marshalling procedures to shepherd in the aircraft to the allocated parking space available between two other large aircraft parked'

I disagree, whilst marshalling had a significant role to play it is reliant on human intervention without any reference points or markings to assist (particularly for the movement of large aircraft) and relies entirely on judgement of the marshalling personnel.

6. Actual root cause:

'Weak regulations and enforcement. ASC-139 and MCAR -139 documents published by MCAA do not explicitly mandate the airport operator to mark parking stands and lead-in lines on the apron and instead make recommendations. For the same reason, all regulations shall be clear, concise and consistent with the perceived objective(s) to be achieved.'

CAA records confirm that an exemption was granted to VIA on the provision of aircraft stand markings and apron safety lines from the requirements of MCAR-139 and ASC-139. The Exemption was expired at the time of the incident.

This is more indicative of the root cause, a known issue which could have been rectified with greater regulatory enforcement.

7. Recommendations – I am aligned with the proposed further control measures/recommendations for both the airport operator and regulator, however I would suggest an additional inclusion be:

- Airport Operator and MCAA conduct a joint risk assessment on new wide body aircraft types and associated obstacle clearances prior to operation.

Rootcause:

Therefore, to conclude the root cause is lack of markings and visual cues are therefore reliant of competence and judgement of marshalling personnel.

5.2.2 Comments from AAIB Malaysia

Air Asia / Qatar Airways - Collision at VIA Airport.

Proposed insertions / amendments / deletions to AICC Final Report:

Note - Additions in red, deletions struck through.

2 Analysis

As per Cockpit Voice recordings the ~~cockpit crew~~ Commander of the AirAsia A330 aircraft indicated that he was relying on the marshaller and wing-walker. The cockpit crew could see that ~~were discussing about the closeness of~~ their aircraft was close to the parked Qatar Airways A350 aircraft. ~~They were heard expressing concern over the close proximity of the two aircraft.~~ When the AirAsia A330 crew felt a jolt, they stopped the aircraft and discussed if the Ground Crew (Marshalls) were showing the "Clear" signal.

According to the Cockpit Voice Recording, the co-pilot confirmed to the Commander immediately after the jolt was felt that he witnessed the ground staff give the clear sign to the cockpit crew. From the timing of this exchange, it is clear that the "stop" signal was not received by the cockpit crew until too late.

According to the Marshaller, even though he was signalling the AirAsia A330 aircraft to turn left, the aircraft moved forward before starting to turn, and then signalled to "Stop" when the Wing Walker gave the "Stop" sign.

According to the Wing Walker when he judged that the incoming AirAsia A330 Aircraft was too close to the parked Qatar Airways A350 Aircraft, he showed the "Stop" sign, but the AirAsia A330 aircraft moved forward and came into contact with the Qatar Airways A350 aircraft.

3 Conclusions

1. From the forgoing analysis it can be concluded that the primary reasons for the collision was congestion in the parking area and erroneous or poor signalling by the marshaller and wing-walker in guiding ~~non-adherence to the established marshalling procedure to~~ shepherd in the aircraft to the allocated parking space available between two other large aircraft parked.

Reconstructions of the path followed by the AirAsia aircraft from Flight Data System installed on it and the position of the parked Qatar Airways aircraft (measured on ground), it is apparent that wing of the AirAsia aircraft could not have been clear of the Qatar Airways aircraft horizontal stabiliser.

It is however, important to note that statements made regarding events of marshalling signals by the marshalls and flight crew members are inconsistent ~~and could not be confirmed.~~ The cockpit crew's version is corroborated by the Cockpit Voice Recorder but the marshaller's statements could not be confirmed.

Probable Causes

1. Congested condition of the apron and Marshalling

According to the parking plan generated for parking area of AirAsia A330, it is evident that the apron was very congested. In this particular incident, only one marshaller and one wing-walker were found deployed to guide the taxiing aircraft into the allocated parking position as opposed to three required (one marshaller and two wing-walkers) as per MACL ramp services SOP. Due to the limited available space to manoeuvre aircraft and the prevailing congestion on the apron, walking continuously with the wing of a moving aircraft was extremely difficult, though it is stated in the MACL ramp services SOP.

2. Weak regulations and enforcement

ASC-139 and MCAR-139 documents published by MCAA do not explicitly mandate the airport operator to mark the parking stands and lead-in lines on the apron and instead make recommendations. For the same reason, all regulations shall be clear, concise and consistent with the perceived objective(s) to be achieved.

CAA records confirm that an exemption was granted to VIA on the provision of aircraft stand markings and apron safety lines from the requirements of MCAR-139 and ASC-139. The Exemption was expired at the time of the incident. **Since there were no apron safety lines, there was heavier reliance on marshalling.**

3. Failure of Marshaller / Wing Walker to demonstrate situational awareness and correctly judge the space clearance between aircraft.

The Cockpit Voice Recorder recording from the AirAsia aircraft confirms that the cockpit crew relied on the marshaller and wing-walker. The cockpit crew stated that they were cleared to approach the parking stand by the marshaller and wing-walker. The marshaller judged there was sufficient space to manoeuvre the AirAsia aircraft from the taxiway to the designated parking position. However, reconstructions show that this was an erroneous judgment and that there could not have been sufficient clearance between the wing of the AirAsia aircraft and the horizontal stabiliser of the Qatar aircraft.

4 Safety Recommendations

4.1 Recommendations to Airport operator

- a. Ensure all regulatory requirements are met in full. Any deviations from the regulation(s) shall be supported by exemptions or concessions sought from CAA Maldives and kept current at all times.
- b. Ensure the required number of Marshallers and Wing Walkers are engaged at all times.
- c. Expand the existing CCTV camera system(s) to capture a greater coverage of all apron and runway movements.
- d. Consider the limited and confined parking space available for large wide-body aircraft and the prevailing demand and capacity imbalance when allocating aircraft operating slots at VIA.
- e. Review and revise the existing SOP's to reflect and match with the current practices relating to aircraft parking management at VIA.
- f. Run a recurrent training program for all marshallers and wing-walkers after the MACL Ramp Services SOP has been reviewed and revised, **including specific training for maintaining minimum safe distance between aircraft during manoeuvring, and procedures to ensure early warning and signals are provided to flight crews.**
- g. **Ensure that ground staff adhere to the airport operator's Ramp Services SOP and all requirements of service agreements with Carriers with respect to manoeuvring on the apron and ramp handling at VIA.**