AIRCRAFT SERIOUS INCIDENT FINAL REPORT

SI 08/14P

Air Accident Investigation Bureau (AAIB)

Ministry of Transport Malaysia

Airbus A330-200F, Registration 9M-MUC

at Astana International Airport, Kazakhstan

on 29 June 2014

Air Accident Investigation Bureau
Ministry of Transport
No. 26 Jalan Tun Hussein, Precinct 4
Federal Government Administration Centre
62100 PUTRAJAYA
Phone: +603 8892 1072
Fax: +603 8888 0163
e-mail: AAIB@mot.gov.my
Website: http://www.mot.gov.my/en

Issued On 27 April 2016

AIR ACCIDENT INVESTIGATION BUREAU (AAIB)
MALAYSIA

REPORT NO.: SI 08/14P

OPERATOR	**: MALAYSIA AIRLINES**
AIRCRAFT TYPE	**: AIRBUS 330**
NATIONALITY OF AIRCRAFT	**: MALAYSIA**
REGISTRATION	**: 9M-MUC**
PLACE OF OCCURRENCE	**: ASTANA INTERNATIONAL AIRPORT KAZAKHTAN**
DATE AND TIME	**: 29 June 2014 AT 1046 LT**

The sole objective of the investigation is the prevention of accidents and incidents. In accordance with Annex 13 to the Convention on International Civil Aviation, it is not the purpose of this investigation to apportion blame or liability.

All-time in this report is Local Time (LT) unless stated otherwise. LT is UTC +8 hours.

INTRODUCTION

The Air Accident Investigation Bureau of Malaysia

The Air Accident Investigation Bureau (AAIB) is the air accident and serious incident investigation authority in Malaysia and is responsible to the Minister of Transport. Its mission is to promote aviation safety through the conduct of independent and objective investigations into air accidents and serious incidents.

The AAIB conducts the investigation in accordance with Annex 13 to the Chicago Convention and Civil Aviation Regulations of Malaysia 2016.

It is inappropriate that AAIB reports should be used to assign fault or blame or determine liability since neither the investigation nor the reporting process has been undertaken for that purpose.

Unless otherwise indicated, recommendations in this report are addressed to the investigating or regulatory authorities of the State having responsibility for the matters with which the recommendations are concerned. It is for those authorities to decide what action is taken.

TABLE OF CONTENTS

SYNOPSIS

On 29 June 2014, Malaysia Airlines Airbus 330-200F with call-sign TK 6490 operating from Istanbul (IST) to Astana (TSE) landed on Runway 04 TSE at 0753 UTC. Astana Air Traffic Controller (ATC) cleared the crew to vacate the runway via Taxiway 'C', then to taxi via the apron to Gate 2. Entering the Apron from Taxiway 'C', there was an inner and outer taxi lane. The crew decided to taxi on the outer taxi lane to keep clear of the aircraft that was parked on the terminal. As the aircraft was taxing on the centre line of the outer taxi lane, the left wing of the aircraft hit a lamp-post and caused it to topple. This resulted in the number 6 slat leading edge damaged.

1.0 FACTUAL INFORMATION

1.1 History of the flight

On 29 Jun 2014, Malaysia Airlines Airbus 330-200F, registration number 9M-MUC, flew from Istanbul (IST) to Astana (TSE) with a flight time of 5 hours. The aircraft was wet leased to Turkish Airlines and operated under the call-sign TK 6490. Aircraft departed IST approximately 2 hours behind schedule due to delay that was caused by cargo loading and landed at TSE at 0753 UTC. The flight was conducted during daylight hours.

The sector was flown by the First Officer and he completed his briefing for the arrival before the Top of Descent point. From Astana International Airport Automated Terminal Information Service (ATIS), they received information that Runway 04 was in use at Astana International Airport. In his briefing, the First Officer mentioned that the expected taxi routing after landing would be to vacate the runway either using Taxiway ‘C’, ’B’ or even ‘A’, taxi along the parallel Taxiway ‘P’, making a right turn to Taxiway ‘H’ and then proceed to the parking bay, or subject to Air Traffic instruction. The crew stated that based on prior experience and knowledge operating into this airport on previous occasions, this taxi route was commonly used by ATC TSE to guide aircraft to the parking bays at or around Gate 2.

However, upon landing on Runway 04, Astana ATC cleared the crew to vacate the runway via taxiway ‘C’, then taxi on the apron to Gate 2. Figure 1 below shows the routing that was taken by the flight ((in green) after landing RW04 TSE and entering the apron taxiway. The parking Gate 2 also indicated (green arrow).

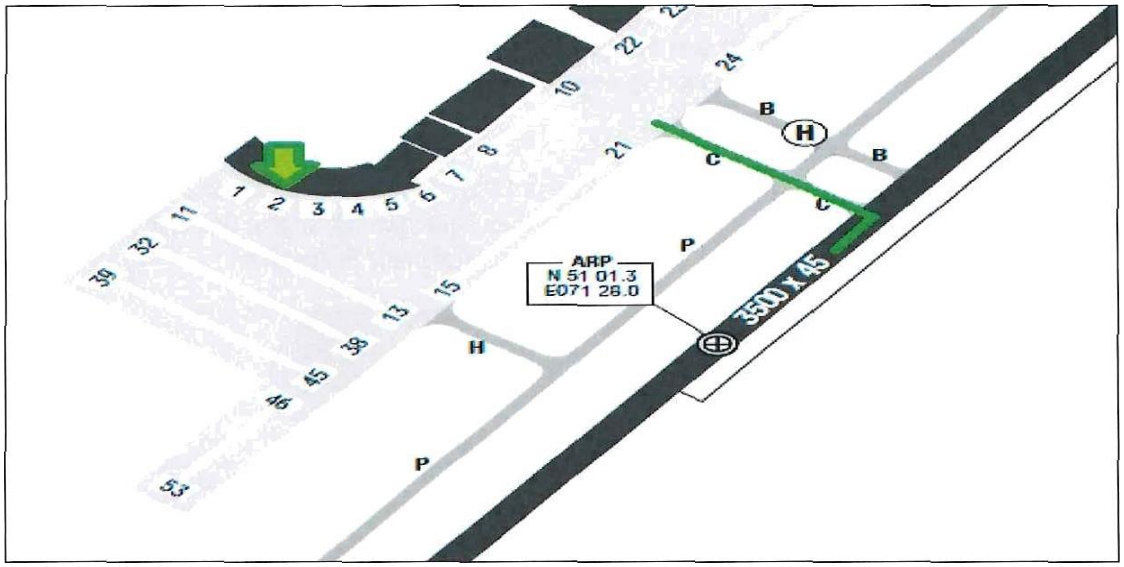

Figure 1: *Section of Lido AGC Of Astana Airport 24 April 2014*[1]

Upon entering the Apron area, the crew observed that there were 2 separate taxi lanes adjoining Taxiway 'C'; one leading towards the main terminal and the other towards the open bays across the terminal. These taxi lanes were not given any specific designation (name), either on the ground or on the airport charts that were provided. (see Figure 3).

Note: For the purpose of this report, the taxi lane that runs along the southern side of bays 15-21 (refer Figure 1) will be called the 'outer' apron taxi lane, while the taxi lane that runs between the Main Terminal bays (1-10) and the open bays 15-21 will be known as the 'inner' apron taxi lane.

As the crew were approaching the intersection between Taxiway 'C' and the 2 unnamed taxiways, they had noticed a wide-bodied aircraft located at around Gate 10 being pushed back. This appeared to pose as a potential obstruction should the crew proceed to taxi along the inner taxi lane. Incidentally, there were no aircraft parked in any of the bays between 15 and 21, thus giving the crew a perception of clear taxi path along the outer taxi lane.

The crew had not attempted to clarify with ATC Ground Controller on which taxi lane to use.

[1] LIDO Airport Ground Chart (AGC) did not depict the outer and inner lines on the apron.

Since there was no specific instruction from ATC on which taxi lane to use, and considering that there is no restrictions listed on the Airport Operational Information (AOI) with regards to ground movement of A330 aircraft on the apron taxi lanes, the crew decided to follow the outer taxi lane in order to keep clear of the aircraft at Gate 10.

During the interview, the crew mentioned that as they were turning into the outer lane, they saw the light pole on the left hand side of aircraft but were sure that there was sufficient clearance to clear the pole.

As the aircraft was taxiing on the centre line of the outer taxi lane, they felt a jolt and immediately stopped the aircraft.

The left wing of the aircraft had hit a lamp-post and caused it to topple. Apart from the light pole, the aircraft wing also came into contact with another smaller pole with a CCTV mounted. The CCTV was knocked off and the pole scratched the underside of the wing. The impact resulted in the number 6 slat leading edge being damaged. Refer Figure 2 below for view of the Apron area that was involved.

At this point, the crew were told by the Astana Ground Control to hold position and wait for a ‘Follow-me’ car to assist in the taxi. The crew then shutdown the engine and disembarked the plane and proceeded to the hotel after having their statement being taken.

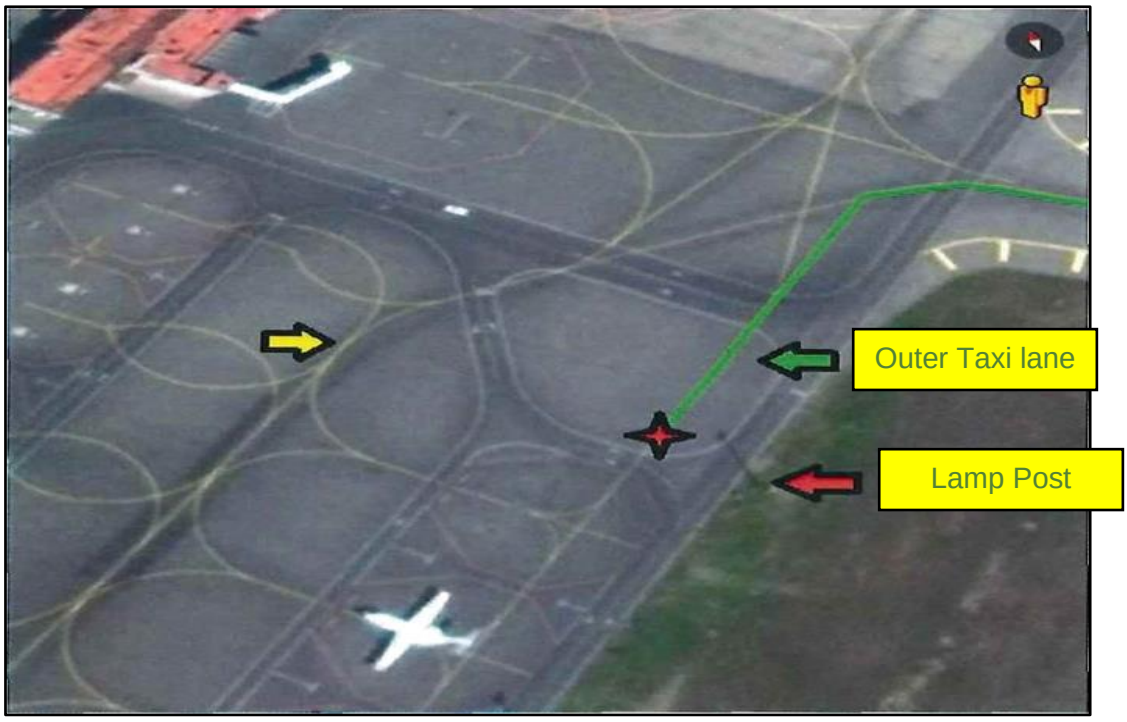

Figure 2: Map of Astana Airport's Apron sourced on 30 June 2014

Figure 3: Ground level view of taxiways branching outer and inner

1.2 Injuries to persons

Injuries	Crew	Passenger	Others
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor	Nil	Nil	Nil
None	Nil	Nil	Nil

1.3 Damage to aircraft

9M-MUC Number 6 slats damage

Figure 4: Left Wing No. 6 Stat Damage

Left underwing scratched by 2nd post (CCTV post)

Figure 5: Scratch marks on underside of left wing

1.4 Other damage

Light Pole is being knocked down and CCTV knocked off 2nd shorter pole.

Figure 6: Light pole lying on floor and CCTV pole slanted

1.5 Personal information

1.5.1 Captain

TK Posting started on	03 February 2014
Age	43 Years Old
Medical Certificate validity	31 October 2014
A330 Operational Date	22 March 2012
Total Flying Hours	11617:44 hrs (As of 29 May 2014)
Total Command on Type	1441:59 hrs
Last Base Check	21 January 2014
Last Line Check	08 February 2014
Instrument Rating Test	24 July 2013
Appointment as Instructor Pilot	Nil
Hours Flown Last 28 Days	48:56 hrs
Rest Period Prior to Incident	35:45 hrs

1.5.1 First Officer

TK Posting started on	05 February 2014
Age	29 Years Old
Medical Certificate validity	30 November 2014
A330 Operational Date	06 September 2012
Total Flying Hours	2748:19 hrs
Total Command on Type	927:46 hrs
Last Base Check	12 January 2014
Last Line Check	19 September 2014
Instrument Rating Test	14 July 2013
Appointment as Instructor Pilot	Nil
Hours Flown Last 28 Days	48:56 hrs
Rest Period Prior to Incident	35:45 hrs

Both crews were well rested before the incident; more than 24 hours at base (IST) and had operated into TSE prior to the incident.

1.6 Aircraft information

Type	Airbus 330-200F
Registration	9M-MUC

1.7 Meteorological information

```
UACC 290800Z 13004MPS 050V170 9999 SCT040 BKN230 26/12 Q1013 R04/0/0070 NOSIG RMK QFE728/0971
UACC 290700Z 10005MPS 9999 SCT033 BKN230 24/14 Q1013 R04/0/0070 NOSIG RMK QFE728/0971
UACC 290600Z 09002MPS 050V150 9999 FEW040 SCT140 23/16 Q1014 R04/0/0070 NOSIG RMK QFE729/0972
UACC 290500Z 05003MPS 9999 FEW043CB BKN110 20/16 Q1013 R04/2/0060 NOSIG RMK QFE729/0972
UACC 290400Z 03003MPS 9999 FEW040CB BKN090 19/15 Q1013 R04/2/0550 NOSIG RMK QFE729/0972
```

Figure 7: METAR/Weather at Astana Airport

Visibility was more than 10 kilometers in daylight and no significant adverse weather at the time.

1.8 Aid to navigation

Nil.

1.9 Communication

VHF Radio with Astana Ground Control

1.10 Aerodrome information

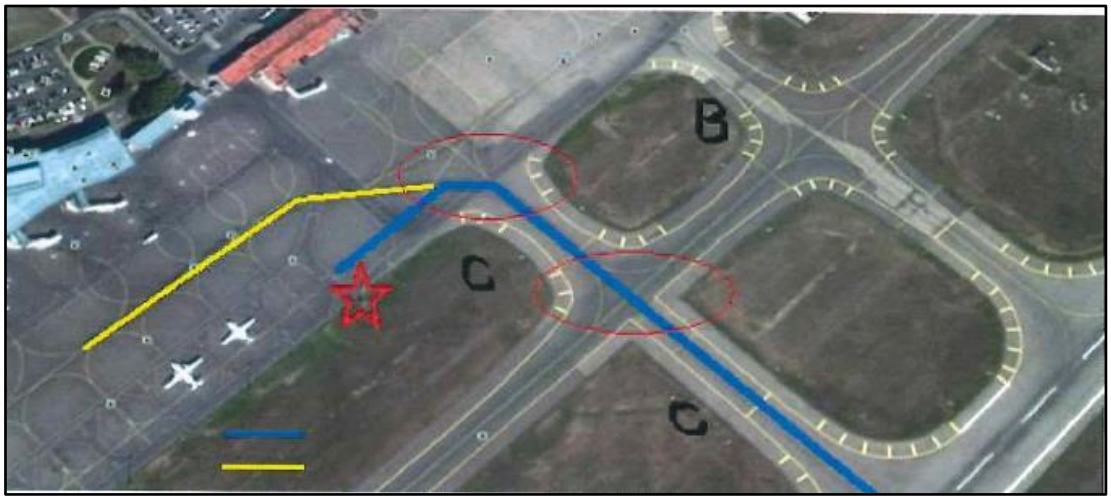

Figure 8: Google Earth view of Apron Area sourced on 30 June 2014

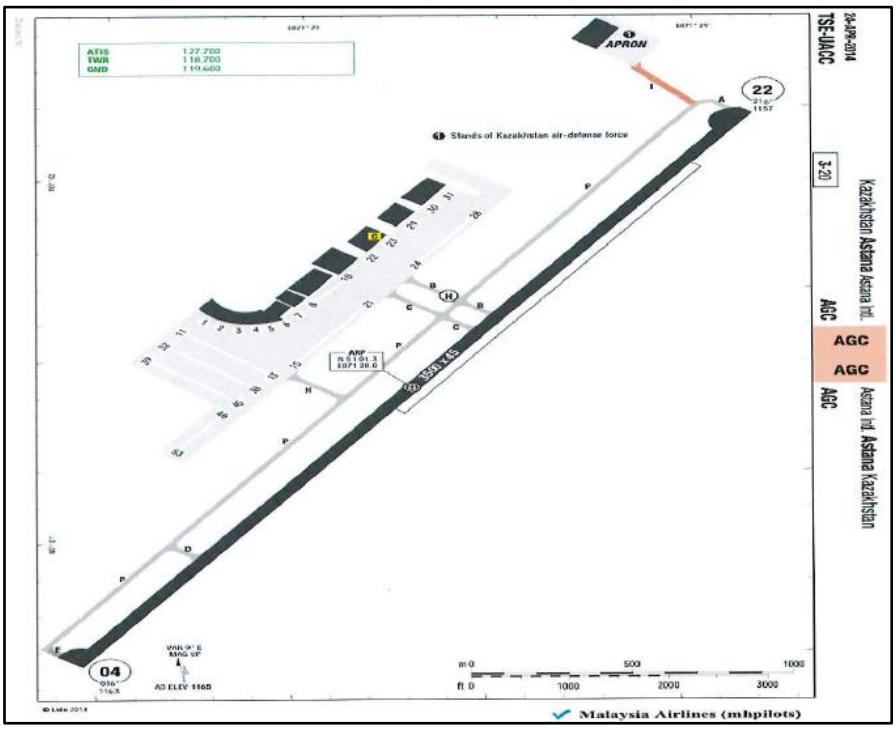

Figure 9: Astana Aerodrome Ground Chart 24 April 2014

The Aeronautical Information Publication (AIP) and aerodrome chart for Astana International Airport did not depict sufficient information when compared to the actual layout of the airport.

Based on the satellite image, the intersection between Taxiway ‘C’ and ‘P’ has no shoulder on the runway side and does not allow turning onto Taxiway ‘P’ when vacating the runway. LIDO chart however indicates that the taxiway shoulders are avail at this intersection and the prohibition of turns from Taxiway C towards Taxiway P is not highlighted.

As Taxiway ‘C’ joins the apron, there are multiple branches of taxiways that were not depicted on the charts. These taxiways are not named or labelled on the charts and on the ground. There is also no information provided with regards to taxiway limitations on the apron area.

The LIDO AOI section mentions that aircrafts parking at Bays 15-21 need to be towed in and the parking bay is limited to aircraft with a wingspan of 29 meters or less.

Astana International Airport is equipped with Ground Radar and also facilities for ‘Follow- Me’ car but both are only activated whenever the weather is below Approach Category 1 weather criteria.

1.11 Flight recorders

Both channels of the aircraft Voice Recorder extract were extracted and listened to. From the recordings, it was evident that both crews were in the midst of performing the After Landing Checklist when the collision occurred. There was no evidence to indicate that either crew saw the light pole. The ATC Ground Controller issued the instruction to "Hold Position" after the collision had occurred.

In addition, ATC transcript from ATC TSE was also provided for further analysis and conclusion. In this ATC transcript, the instruction by ATC TSE Ground Controller to "Hold position" was only given after the aircraft had contacted the lamp post.

However, ATC TSE issued a printed statement saying that the ATC controller had issued a “Hold Position” instruction to the pilots on recognizing that the aircraft was deviating from the cleared taxi route, prior to contacting the lamp post.

1.12 Wreckage and impact Information

Aircraft left wing came into contact with the light pole approximately 7.3 meters from the left wingtip. The aircraft continued forward approximately another 7 meters before coming to a stop.

The light pole is located 4.2 meters from the edge of the taxiway. The CCTV pole is located 5 meters after the light pole.

1.13 Medical information

Both crew Medical certifications in their licenses are current. Both of the crew were questioned if they were well after the incident by the Astana Authority. No urine or drug test was carried out while the crew were in Astana.

1.14 Fire

Nil.

1.15 Survival aspects

Not applicable.

1.16 Test and research

Nil.

1.17 Organisational and management information

The Operations Route manuals only had a write-up about landing on Runway 22 at Astana International Airport. There was no information on Landing on Runway 04.

The lack of information on the AIP and LIDO charts were not detected.

1.18 Additional information

Nil.

1.19 Useful or effective investigation techniques

Google Earth was used and it provided detailed view of the taxiway lines as the maps were fairly recent. The image provided by Google Earth is consistent with the actual taxiway layout at the time of occurrence, based on the new information inserted on the LIDO chart for Astana UACC AGC dated 31March 2016. Refer Appendix D

Malaysia Airlines Root Cause Analysis Technique (MARCAT) was used as a Root Cause Analysis tool to determine the Root Cause of the accident. Refer appendix.

2.0 ANALYSIS

2.1.1 Both the flight crew held valid licenses and were familiar with the A330-200F operation into and out of TSE aiport.

2.1.2 There were no evidence that the pilots were under any undue pressure or suffering from fatigue or stress related issues.

2.1.3 The visiblity at the airport was reported to be more than 10km. Furthermore, it was a daylight operation.

2.1.4 During the interview, both the crew mentioned that they had sighted the light pole during the turn into the outer taxiway. It was mentioned that they had verbalized the area to the left and right of the aircraft was clear of any obstacles. However, based on the CVR recordings, there was no specific mention of the light post made by either crew.

2.1.5 Both the crew could not confirm if they had received the required training on assessing wingtip clearances during the intitial A330 conversion course in 2012. There was no evidence of training being conducted on this. In additon, no recurrent training or assessement is currently done on avoiding wing tip

collison during taxi. These could have contributed towards flight crew's misjudgement on wingtip clearance resulting in contact with the light post.

2.1.6 LIDO charts that were provided did not outline the actual layout of apron taxi lanes on the AGC. There were numerous undesignated (unnamed) taxiways in the apron area that were not charted.

2.1.7 Reference to Figure 10 below, (box 1), there are no taxiway lines for turns onto Taxiway 'P' at the intersection of Taxiway 'C' and Taxiway 'P' on the side closest to the runway. The taxiway markings also do not allow left turn into Taxiway 'P'. This means that all aircraft vacating the runway using Taxiway 'C' will have to route via the apron. Aircraft vacating using Taxiway 'B' has the option of either turning left on Taxiway 'P' or continuing via the apron. (Box 2). This information is not shown on the LIDO AGC chart that was developed based on information from AIP for Astana International Airport.

Figure 10: Google Earth picture of taxiways B and C with taxi markings sourced on 30 June 2014

2.1.8 LIDO AOI section did not highlight any restrictions on the use of either the Inner or Outer apron taxi lane in relation to the specific aircraft types. Only the parking bay wingspan limitations were specified for Bays 15-21.

2.1.9 Route manual only mentions landing on Runway 22. There is also no mention of any possible area of ambiguity or 'Hotspot'. According to Air Astana personnel, RW 22 is used for landings at TSE approximately 70% of the time, while at the remaining period, RW04 would be used

2.1.10 Communcaiton between the pilots and ATC ground controllers were not sufficent to preclude any ammbiguities or unclear instructions during taxi manuevers.

2.1.11 Adequate monitoring of aircraft ground movement by ATC was not achieved to prevent indvertant taxiway incursion. The printed statement provided by ATC TSE inidcated that the ATC controller recognized the aircraft's deviation from the cleared taxi route and issued immediiate instruction to the crew to “Hold Position”. This however could not be corroborated against the CVR recording and ATC transcript, which clearly indicated that the ATC instruction to “Hold Position” was only issued after the aircraft had contacted the lamp post, based on the timings recorded on both the CVR and ATC transcript.

2.1.12 Based on the recordings captured on CVR, the incident took place as the crew were performing After landing Checklist. This suggests that the flight crew may have been distracted from the task of ensuring sufficient vigilance during grounds movement at safety critical areas (hot spots) around the airport. This includes avoiding taxiways incursions attributed by performaing non-essential tasks such as after landing procedures/checklist at inappropriate times.

2.1.13 There was a believe among the flight crew that were invlvoved that maintaining the centerline during taxi manuever would assure clearance from all fixed objects, unless it was documented that the taxiway is not suitbale for use by specific aircraft types. This was an improtant factor in the crew's decision to continue taxying along the outer taxiway, as highlighted in the CVR recording.

3.0 CONCLUSIONS

3.1 Findings

3.1.1 Taxiway restrictions were not considered based on available information on aerodrome charts.

3.1.2 Flight crew proceeded on taxiway not suitable for aircraft type.

3.1.3 Wingtip clearence misjudge.

3.1.4 Flight crew accepted ambiguous taxi clearance without proper confirmation or clarification.

3.2 Probable Cause

3.2.1 There was no taxiway restriction prescribed on either the Astana A.!P or the Aerodrome charts. Maximum wingspan limitation was stated only for the remote parking bay.

3.2.2 There was a lack of information on LIDO AGC which resulted in ambiguity.

3.2.3 There are numerous unnamed taxiways at Astana International Airport.

3.2.4 There was a mistaken belief by the flight crew that the aircraft will have enough separation from stationary object as long as they are on the taxiway centerline.

3.2.5 The flight crew was not fully aware of the proper obstacle clearance estimation during taxi.

3.2.6 The non-specific ATC instruction and lack of monitoring promotes the potential for error by flight crew.

4.0 Safety recommendation

4.1 It is recommended that the LIDO chart provider to amend the TSE AGC chart to reflect the restriction on the taxiway.

4.2 It is recommended that the Kazakhstan Authority is to update the Astana International Airport AIP with the relevant taxiways and routings.

4.3 It is recommended that the Kazakhstan Authority is to look at naming the various taxiways.

4.4 It is recommended that Malaysia Airlines is to update the information in the route manual to reflect the restriction on the apron taxiways.

4.5 It is recommended that Malaysia Airlines flight crew training is to include demonstration of position of the wing tip in relation to the pilot seat during the Initial Operating Experience during the conversion training. The training conducted must be documented to enable proper monitoring and assessment.

4.6 It is recommend that Malaysia Airlines Training Department is to emphasize wingtip clearance technique to all flight crew .

4.7 It is recommended that Malaysia Airlines Training Department is to ensure effective communication and proper application of Crew Resource Management during the Base Checks.

4.8 It is recommended that the Astana International Airport Air Traffic Control to enhance monitoring of aircraft ground movement.

INVESTIGATOR IN-CHARGE
Air Accident Investigation Bureau
Ministry of Transport