

**SERIOUS INCIDENT REPORT 1/2011**

**ACCIDENT INVESTIGATION DIVISION**

Civil Aviation Department  
Hong Kong Special Administrative Region

Report on the Serious Incident of an Attempted Take-off on Taxiway

Flight FIN070 Airbus A340-300 OH-LQD

at the Hong Kong International Airport

on 26 November 2010

[27 November 2010 Local Time]

December 2011



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## **GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT**

|         |  |
|---------|--|
| A-SMGCS | Advanced Surface Movement Guidance and Control System  |
| AAHK    | Airport Authority Hong Kong                            |
| AGL     | Airfield Ground Lightings                              |
| AIP     | Aeronautical Information Publication                   |
| AMC     | Air Movements Control / Air Movements Controller       |
| ATC     | Air Traffic Control                                    |
| ATIS    | Automatic Terminal Information Service                 |
| ATMD    | Air Traffic Management Division                        |
| CAD     | Civil Aviation Department                              |
| CRM     | Crew Resources Management                              |
| CVR     | Cockpit Voice Recorder                                 |
| DFDR    | Digital Flight Data Recorder                           |
| EFB     | Electronic Flight Bag                                  |
| Finnair | Finnair Oyj  |
| FMA     | Flight Mode Annunciator                                |
| ft      | feet   |
| GMC     | Ground Movements Control / Ground Movements Controller |
| HKIA    | Hong Kong International Airport                        |
| ICAO    | International Civil Aviation Organisation              |
| ILS     | Instrument Landing System                              |
| LT      | Local Time   |
| lb      | Pound(s)   |
| km      | Kilometer(s)   |
| kt      | knot(s)  |
| m       | metre(s)   |

|      |                              |
|------|------------------------------|
| MAGS | Movement Area Guidance Signs |
| MHz  | Megahertz (frequency)        |
| ND   | Navigation Display           |
| NM   | Nautical mile(s)             |
| OI   | Operational Instruction      |
| PA   | Public Announcement          |
| PF   | Pilot-Flying                 |
| PFD  | Primary Flight Display       |
| PNF  | Pilot-Not-Flying             |
| RTO  | Rejected Take-Off            |
| RWY  | Runway                       |
| SMR  | Surface Movement Radar       |
| SOP  | Standard Operating Procedure |
| TWY  | Taxiway                      |
| UTC  | Co-ordinated Universal Time  |
| V1   | Take-off Decision Speed      |

**Notes:**

1. When abbreviations are used in this report, the full term is used in the first instance followed by the abbreviation in brackets.
2. All times in this report are in Co-ordinated Universal Time (UTC) unless otherwise stated.
3. Throughout this report, the use of the male gender (he/him/his) should be understood to include male and female persons.

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# ACCIDENT INVESTIGATION DIVISION

## CIVIL AVIATION DEPARTMENT

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### Investigation into the Serious Incident of an Attempted Take-off on Taxiway A by FIN070 at the Hong Kong International Airport on 26 November 2010

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Operator : Finnair Oyj (Finnair)  
Aircraft Type : Airbus A340-300  
Nationality : Finland  
Registration : OH-LQD  
Flight Number : FIN070  
Place of Incident : Hong Kong International Airport  
Latitude: 22 18 32N  
Longitude: 113 54 53E  
Elevation: 28 Feet (ft)  
Date and Time : 26 November 2010 at 1724 hours

#### SYNOPSIS

The incident occurred at 1724 UTC on 26 November 2010 (0124 on 27 November 2010 Local Time (LT)) at Hong Kong International Airport (HKIA), when one of the two parallel runways, namely the south runway (RWY 07R/25L), was closed for regular maintenance in accordance with the runway maintenance programme as published in the Hong Kong Aeronautical Information Publication (AIP). The north runway (RWY 07L/25R) remained operational with RWY 07L in use for both arrivals and departures. The weather was fine with a prevailing visibility of 10 kilometres (km).

FIN070 was a scheduled public transport flight from HKIA to Vantaa Airport, Helsinki, Finland. There were three crew members on the flight deck. In addition to the Captain and

the First Officer, there was a Relief Pilot who was in the first observer's seat. In accordance with company procedures, the Captain was responsible for taxiing and the aircraft proceeded to RWY07L Holding Point via Taxiway (TWY) B, a taxiway parallel to the north runway, as cleared by Air Traffic Control (ATC).

When FIN070 was approaching the RWY 07L Holding Point towards the western end of TWY B, the Air Movements Controller (AMC) cleared the aircraft for take-off. The aircraft took the normal right turn at the end of TWY B onto TWY A1 towards RWY 07L. However, before the aircraft reached the runway, it took a premature right turn onto TWY A, a taxiway parallel to and situated in between RWY 07L and TWY B. Upon entering TWY A and being aligned with the 07L orientation, it commenced a rolling take-off. This abnormal manoeuvre was detected by the Ground Movements Controller (GMC) on the Advanced Surface Movement Guidance and Control System (A-SMGCS), who promptly alerted the AMC. The AMC immediately instructed FIN070 to stop rolling. The aircraft came to a halt abeam TWY A5, approximately 1400 metres (m) from the western end of TWY A. (The aircraft track of FIN070 based on A-SMGCS recording is shown in Appendix A)

Although there was no injury to any person or damage to the aircraft or ground equipment, the aborted take-off resulted in hot brakes. After a period of cooling down of the brakes, the aircraft departed HKIA at 1814. The occurrence was classified as a serious incident as defined under Annex 13 to the Convention on International Civil Aviation. In view of its serious nature, the Chief Investigator of Accident ordered a detailed investigation to identify the causes leading to the incident with a view to preventing recurrence in future.

The following causal factors were identified:

- (i) A combination of sudden surge in cockpit workload and the difficulties experienced by both the Captain and the First Officer in stowing the Electronic Flight Bag (EFB) computers at a critical point of taxiing shortly before take-off had distracted their attention from the external environment that resulted in a momentary degradation of situation awareness.

- (ii) The Standard Operating Procedure (SOP) did not provide a sufficiently robust process for the verification of the departure runway before commencement of the take-off roll.
  
- (iii) The safety defence of having the First Officer and the Relief Pilot to support and monitor the Captain's taxiing was not sufficiently effective as the Captain was the only person in the cockpit trained for ground taxi.

The Investigation Team made six safety recommendations.

## **1. FACTUAL INFORMATION**

### **1.1 History of the Flight**

FIN070, Airbus A340-300, registration OH-LQD, was a scheduled public transport flight from HKIA to Vantaa Airport, Helsinki, Finland. At 1713 on 26 November 2010, GMC cleared FIN070 to taxi from Parking Stand E16 to TWY A1 Holding Point via TWY B. When the aircraft was passing TWY V, GMC instructed FIN070 to contact AMC on 118.2 MHz. At 1722, after confirming that FIN070 was ready for departure, AMC instructed the aircraft to expedite taxi and line up RWY 07L. At 1723, when the aircraft was approaching the western end of TWY B, AMC cleared FIN070 for take-off. At the end of TWY B, the aircraft took the normal right turn onto TWY A1 towards RWY 07L. Before the aircraft reached the runway, it took a premature right turn onto TWY A, a taxiway parallel to and situated in between RWY 07L and TWY B. When the aircraft was aligned with the 07L orientation, it commenced a rolling take-off on TWY A. On detecting the anomaly with the help of the A-SMGCS, the GMC alerted the AMC, who immediately instructed FIN070 to stop rolling. The aircraft came to a halt abeam TWY A5, approximately 1400 metres (m) from the western end of TWY A.

### **1.2 Injuries to Persons**

There was no injury to any person involved in the flight or to any third party.

### **1.3 Damage to Aircraft**

There was no damage to the aircraft.

### **1.4 Other Damage**

There was no other damage.

## 1.5 Personnel Information

### 1.5.1 Flight Crew

#### 1.5.1.1 Captain

|   |   |                                    |
|---|---|------------------------------------|
| Licence   | : | JAA Finland                        |
| Aircraft / Instrument rating                          | : | A340 valid till 30 November 2011   |
| English proficiency                                   | : | Level 5 valid till 30 April 2014   |
| Medical certificate                                   | : | Class One valid till 17 May 2011   |
| Date of last proficiency check                        | : | 6 November 2010                    |
| Date of last line check                               | : | 13 May 2009 valid till 31 May 2011 |
| Date of last emergency drills check                   | : | 23 September 2010                  |
| Date of last Crew Resources Management (CRM) training | : | 24 September 2010                  |
| Flying experience :                                   |   |                                    |
| Total all types                                       | : | 11,555.8 hours                     |
| Total on A340-300                                     | : | 1,310.6 hours                      |
| Total last 28 days                                    | : | 40.6 hours                         |
| Total last 7 days                                     | : | 15.8 hours                         |
| Total last 24 hours                                   | : | 0 hours                            |
| Last duty flight/flight time                          | : | 24 November 2010 / 9.8 hours       |

#### 1.5.1.2 First Officer

|                                     |   |                                      |
|-------------------------------------|---|--------------------------------------|
| Licence                             | : | JAA Finland                          |
| Aircraft / Instrument rating        | : | A340 valid till 31 December 2011     |
| English proficiency                 | : | Level 5 valid till 31 May 2014       |
| Medical certificate                 | : | Class One valid till 4 August 2011   |
| Date of last proficiency check      | : | 15 June 2010                         |
| Date of last line check             | : | 25 June 2009 valid till 30 June 2011 |
| Date of last emergency drills check | : | 26 October 2010                      |

|                              |   |                              |
|------------------------------|---|------------------------------|
| Date of last CRM training    | : | 21 October 2010              |
| Flying experience :          |   |                              |
| Total all types              | : | 2,784.2 hours                |
| Total on A340-300            | : | 468.4 hours                  |
| Total last 28 days           | : | 48.1 hours                   |
| Total last 7 days            | : | 9.8 hours                    |
| Total last 24 hours          | : | 0 hours                      |
| Last duty flight/flight time | : | 24 November 2010 / 9.8 hours |

### **1.5.1.3 Relief Pilot**

|  |   |   |
|--|---|---|
| Licence                                | : | JAA Finland                                       |
| Aircraft / Instrument rating           | : | A340 valid till 31 December 2011                  |
| English proficiency                    | : | Level 5 valid till 30 April 2014                  |
| Medical certificate                    | : | Class One valid till 12 June 2011                 |
| Date of last proficiency check         | : | 3 October 2010                                    |
| Date of last line check                | : | 17 September 2010 valid till<br>30 September 2012 |
| Date of last emergency drills<br>check | : | 4 October 2010                                    |
| Date of last CRM training              | : | 20 November 2009                                  |
| Flying experience :                    |   |   |
| Total all types                        | : | 3,549.4 hours                                     |
| Total on A340-300                      | : | 847.2 hours                                       |
| Total last 28 days                     | : | 47.1 hours  |
| Total last 7 days                      | : | 9.8 hours   |
| Total last 24 hours                    | : | 0 hours   |
| Last duty flight/flight time           | : | 24 November 2010 / 9.8 hours                      |

## **1.5.2 Air Traffic Controller**

### **1.5.2.1 Air Movements Controller**

|         |   |                       |
|---------|---|-----------------------|
| Licence | : | Hong Kong ATC Licence |
|---------|---|-----------------------|

ATC Ratings : Aerodrome Control Rating was obtained on 3 September 1999 with Certificate of Competence valid up to 30 September 2011.

Area Control Surveillance Rating (for TMS & TMW sectors) was obtained on 16 May 2001 with Certificate of Competence valid up to 31 March 2011.

Approach Control Surveillance Rating was obtained on 16 May 2001 with Certificate of Competence valid up to 31 March 2011.

Area Control (Procedural) Rating was obtained on 20 May 1997 but lapsed since May 2001.

Medical certificate : Class 3, valid till 30 April 2011.

#### **1.5.2.2 Ground Movements Controller**

Licence : Hong Kong ATC Licence

ATC Ratings : Aerodrome Control Rating was obtained on 12 May 2006 with Certificate of Competence valid up to 31 May 2012.

Approach Control Surveillance Rating was obtained on 12 November 2008 with Certificate of Competence valid up to 30 June 2012.

Medical certificate : Class 3, valid till 31 December 2011.

### **1.5.3 Training**

#### **1.5.3.1 Flight Crew**

The flight crew received appropriate training in operating the aircraft including night flying. However, according to Finnair, it is their company policy that only pilots-in-command are trained for ground taxi. Therefore, amongst the three flight crew members on board FIN070, only the Captain was trained to taxi the aircraft from the parking stand to the runway for departure. It was planned that upon lining up on the runway, the First Officer would take over control for a rolling take-off.

#### **1.5.3.2 Air Traffic Controllers**

The AMC joined the CAD as a Student Air Traffic Control Officer in 1994. Upon completion of the requisite ATC training, he attained his first ATC rating in Area Control in 1997. He subsequently qualified in Aerodrome Control in 1999 and Approach Surveillance Control in 2001. He is also a qualified on-the-job training instructor since 2003.

The GMC joined the CAD as a Student Air Traffic Control Officer in 2001. Upon completion of the requisite ATC training, he attained his first ATC rating in Aerodrome Control in 2006. He subsequently qualified in Approach Surveillance Control in 2008.

### **1.5.4 Rest Periods**

#### **1.5.4.1 Flight Crew**

The flight crew arrived HKIA in the previous flight FIN069 at 0733 on 25 November 2010. The same crew were scheduled to depart HKIA in FIN070 at 1715 on 26 November (0115 on 27 November LT). There were more than 30 hours between the two periods of

flight duties. All pilots indicated that they had been provided with adequate rest period between flight duties and were not being affected by fatigue.

#### **1.5.4.2 The Air Traffic Controllers**

The AMC and GMC commenced their duty on the day of the incident at 1330 (2130 LT) on 26 November 2010 after a 30½ hour rest period on completion of their previous shift ending 0700 on 25 November 2010. Both air traffic controllers indicated that they had been provided with adequate rest period between shifts and were not being affected by fatigue.

### **1.6 Aircraft Information**

#### **1.6.1 Aircraft Particulars**

|                                   |   |   |
|-----------------------------------|---|---|
| Manufacturer                      | : | Airbus  |
| Constructor's serial number       | : | 0921  |
| Aircraft type                     | : | A340-300  |
| Year of manufacture               | : | 2008  |
| Certificate of registration       | : | No.2049 issued on 30 May 2008   |
| Certificate of airworthiness      | : | No.2049 issued on 30 May 2008   |
| Airworthiness review certificate: |   | Re-issued on 11 March 2009<br>Extended on 11 May 2010<br>Valid till 30 May 2011 |
| Total airframe hours              | : | 13 881  |
| Total landings                    | : | 1 498   |

#### **1.6.2 Maintenance History**

|                           |   |                               |
|---------------------------|---|-------------------------------|
| Last C1-check             | : | performed on 3 December 2009  |
| Last A-check              | : | performed on 3 November 2010  |
| Last weekly/service check | : | performed on 25 November 2010 |

There was no outstanding deferred defect prior to the aircraft departure from Hong Kong on 26 November 2010.

### **1.6.3 Aircraft Weight and Centre of Gravity**

|  |                                |
|--|--------------------------------|
| Maximum take-off weight authorized       | : 606 271 pounds (lb)          |
| Aircraft take-off weight                 | : 592 402 lb                   |
| Maximum landing weight authorized        | : 423 287 lb                   |
| Aircraft centre of gravity (on take-off) | : 28.6% mean aerodynamic chord |

## **1.7 Meteorological Information**

The weather was fine with 2 oktas of cloud of operational significance and the cloud base was around 4500 ft. The prevailing visibility was 10 km. The 2-minute mean wind was 100 degrees at 7 m per second [13 knots (kt)].

## **1.8 Aids to Navigation**

All navigation aids, aerodrome marking and airfield lighting system were serviceable.

## **1.9 Communications**

All communication equipment in the Control Tower was serviceable and there was no report of defective radio communication system in the cockpit. Based on the ATC voice recording between ATC and FIN070, taxi and take-off instructions from ATC were transmitted, and duly acknowledged by the pilots, without any problem.

## **1.10 Aerodrome Information**

### **1.10.1 Aerodrome Layout**

The runway system at the HKIA consists of two parallel runways, namely the north runway, i.e., RWY 07L/25R, and the south runway, i.e., RWY 07R/25L. The two runways are both 3800 m long and 60 m wide.

At the time of the incident, the south runway was closed and the runway-in-use was the north runway in the 07 direction, i.e., RWY 07L. The north runway was served by two parallel taxiways, namely, TWY A and TWY B. These two taxiways have a width of 29 m with a shoulder of 15.5 m wide on either side. The distance between the centre lines of RWY 07L and TWY A is 192 m and that between the centre lines of TWY A and TWY B is 99 m. RWY 07L is linked to TWY A by 12 entry/exit taxiways numbered from west to east designated sequentially as A1 to A12. Stand E16, where FIN070 was parked before engine start-up, is a stand fronting the Passenger Terminal Building located on the eastern side of TWY B9. (See Appendix B)

### **1.10.2 Visual Aids**

The aircraft was pushed back from Stand E16 to TWY B9 after it was cleared to start up. As cleared by ATC, FIN070 taxied on TWY B9 northbound and then turned left westbound along TWY B until it reached the end of the taxiway, where it turned right onto TWY A1. Travelling northbound along TWY A1, FIN070 would have taxied pass the junction of TWY A, which is on its right perpendicular to TWY A1, before lining up on RWY 07L.

All taxiways at HKIA are marked with ICAO standard yellow taxiway centre line and edge markings, with green inset taxiway centre line lights and blue elevated taxiway edge lights. For each taxiway leading to the runway, there are also red inset stop bar lights across the width of the taxiway perpendicular to the centre line of the taxiway to guard against inadvertent incursion onto the runway at night. The stop bar lights were so designed to be default ON until manually selected OFF by the Aerodrome Controller e.g. upon giving clearance for an aircraft to enter the runway for departure. The stop bar lights would automatically revert to ON again after a period of 100 seconds when the aircraft should have gone well passed the stop bar and entered the runway. The runway is also marked with ICAO standard threshold marking, runway designation marking, touch

down zone marking, runway side stripe marking and with white inset centre line lights and white elevated edge lights. (See Appendix C for aerodrome marking layout and Appendix D for aerodrome lighting layout). It should be noted that the taxiway marking and the associated taxiway lights leading from TWY A1 northbound turning onto TWY A have been removed so as to provide additional safeguard against pilots inadvertently making a pre-mature turn onto TWY A instead of RWY 07L. (Table under paragraph 1.20.3 refers)

Subsequent inspection around the area of the incident indicated that all ground markings, airfield ground lightings (AGL) and movement area guidance signs (MAGS) along the taxi route conform to the Standards of Annex 14 to the Convention on International Civil Aviation.

### **1.11 Flight Recorders**

The aircraft concerned was installed with a Cockpit Voice Recorder (CVR) and a Digital Flight Data Recorder (DFDR) with recording durations of 2 hours and 25 hours respectively. Both recorders were intact and undamaged in the incident. The DFDR data were available and retrieved for analysis in this investigation, but the CVR data had been over-written as the aircraft subsequently departed after the incident. Records from the ATC Voice Recording System, A-SMGCS and the AGL were also retrieved for the purpose of the investigation.

### **1.12 Wreckage and Impact Information**

Not applicable.

### **1.13 Medical and Pathological Information**

There was no evidence to suggest that any pre-existing medical or physical condition of the flight crew or the Air Traffic Controllers contributed to the incident.

## **1.14 Fire**

There was no fire.

## **1.15 Survival Aspects**

Not applicable.

## **1.16 Tests and Research**

A series of trial taxi runs at the HKIA using an Airbus A330 aircraft around the incident area was conducted as part of the investigation to assess the visual conditions on the airfield at night time as viewed from the cockpit. A flight simulator session using the Airbus A340 simulator was also held to analyze the instrument display as seen by the pilots inside the cockpit while maneuvering in the vicinity of RWY 07L line-up position.

## **1.17 Organizational and Management Information**

### **1.17.1 Finnair**

1.17.1.1 Finnair holds an Air Operator's Certificate issued by the Finnish Civil Aviation Authority to operate the various aircraft types, including the Airbus A340 aircraft. As at 31 December 2010, Finnair has been operating regular flights to 63 destinations in 32 countries. Finnair started operating scheduled passenger services to Hong Kong since February 2002.

1.17.1.2 To facilitate pre-flight preparation, the Finnair's Airport Briefing for HKIA was made available to the crew through the company website and was available on the EFB database accessible onboard FIN070 (See Appendix E). Airport Briefings for a number of destination airports were prepared by the Finnair Flight Operations Department based on available documents such as AIP, Notice to Airmen, and operator observations during site visits.

The last update on the Airport Briefing for HKIA before the time of the incident was 16 November 2010, which contained no information concerning the hot spot (a location with a history or potential risk of collision or runway incursion, and where heightened attention by pilots is necessary) at the HKIA in the vicinity of TWY A and TWY A1, notwithstanding that information on the hot spot had already been published in the Hong Kong AIP since 9 April 2009.

### **1.17.2 Airport Authority Hong Kong**

1.17.2.1 The Airport Authority Hong Kong (AAHK) is a statutory body established in 1995 with a mandate to operate and manage the HKIA. The AAHK is wholly owned by the Government of the Hong Kong Special Administrative Region (HKSAR) and is governed by the Airport Authority Ordinance with its Board comprises a Chairman, CEO and a number of Board Members.

1.17.2.2 The design of HKIA including taxiway/runway configurations, surface marking, ground lighting and aerodrome signage at HKIA were based on the Standards and Recommended Practices as per Annex 14 to the Convention on International Civil Aviation.

### **1.17.3 Civil Aviation Department**

The Civil Aviation Department (CAD) of HKSAR Government is responsible for, among other things, provision of air navigation services within the Hong Kong Flight Information Region. The CAD also functions as the safety regulator of the HKIA. On 9 April 2009, the CAD, in consultation with the AAHK, published an AIP Supplement (Appendix F) reminding pilots to remain vigilant and maintain situation awareness at all times on the maneuvering area, and be particularly alert to the latent threat when taxiing in the area of the hot spot around the junction of TWY A and TWY A1.

## 1.18 Standard Operating Procedures (SOPs)

- 1.18.1 Finnair adopted the EFB concept in which standalone tablet computers are used in the cockpit for the display of aerodrome charts, charts for departure, arrival and enroute procedures and other quick reference material. On the flight deck of the subject aircraft, three tablet computers, one for each pilot, were available for access of information electronically. The pilots could select the appropriate charts such as aerodrome charts for pre-flight briefing and taxi orientation purposes. The operating pilots would normally put the computers on the sliding tables in front of the pilots' seats for easy reference whilst taxiing and the Relief Pilot in the first observer's seat would refer to the relevant charts of his choice at a position convenient to him.
- 1.18.2 According to the company SOP, the EFB computers in the cockpit should be stowed before completion of the Taxi Checklist. This is to be followed by a series of actions as listed below: -
- (a) the Captain to make a public announcement (PA) to inform all cabin crew to take their seats in preparation for take-off;
  - (b) pilots to stow the sliding tables;
  - (c) The pilot-not-flying (PNF) to select air-conditioning packs OFF at least 20 seconds before applying take-off thrust;
  - (d) hand over control if the right hand seat pilot is to be the pilot-flying (PF) for take-off; and
  - (e) completion of Line-up Checklist when clearance for line-up on the runway or take-off clearance was received
- 1.18.3 According to the company SOP, rolling take-off is recommended when possible, and that if the PF is in the right hand seat, he would set the thrust and then the left hand seat pilot (PNF) would keep his hand on the thrust levers until the aircraft reaches V1. The SOP also required the pilots to check for illumination of the correct Flight Mode Annunciator (FMA) indications on the Primary Flight Display (PFD) for: -

- (a) “**MAN FLX xx**” – (*xx is temperature assumed and manually selected by the pilot for generation of thrust*) indicating that the correct thrust for take-off is set;
- (b) “**SRS**” – the pitch mode to steer the aircraft along a path in the vertical plane;
- (c) “**RWY**” (or “blank”) – lateral guidance orders during take-off and initial climb out if a Localizer signal is available; or “blank” if no Localiser signal is available; and
- (d) both Flight Directors are ON for provision of flight guidance.

1.18.4 There was no requirement in the SOP for the pilots to call out FMA indications when the aircraft was on the ground.

## **1.19 Crew Interview**

- 1.19.1 After a period of delay due to industrial actions by cabin staff of the airline concerned, all three members of the flight crew involved in the incident returned to Hong Kong and were interviewed by the investigation team on 21 December 2010. Before the flight crew returned to Hong Kong for the interview, they were requested to provide written statements giving detailed account of the circumstances and sequence of events leading to the incident.
- 1.19.2 It was confirmed that the Captain in the left hand seat was the pilot responsible for taxiing the aircraft from the parking stand for departure. When the aircraft was turning from TWY A1 onto TWY A, which was mistaken as RWY 07L, the First Officer, who was in the right hand seat, took over control of the flight to commence the take-off roll. Both the Captain and the First Officer experienced inconvenience in stowage of the EFB computers at the time when the aircraft was turning right onto what was mistaken to be the line-up position.
- 1.19.3 The Captain was in the left hand seat and was responsible for taxiing the aircraft. During the turn, he had to make a PA to advise the cabin crew to take their seats, turned on the weather radar whilst looking out to

continue the taxi and called for the Line-up Checklist. The First Officer in the right hand seat experienced difficulties in stowage of the computer due to a water bottle inside the stowage bin while at the same time he had to turn the Packs Off as part of the SOP before completing the Line-up Checklist and to take note of the fuel on board just prior to setting thrust for take-off. The Relief Pilot was looking down during the turn trying to make sure that the computer was stowed and that there was no loose item on the tabletop on his right.

1.19.4 After entering TWY A, which was mistaken to be RWY 07L, both pilots stated that they saw the red stop bar lights perpendicular to the centre line but dismissed them as part of the lighting system leading to the displaced runway threshold. No queries were ever raised among the three pilots concerning the correct positioning of the aircraft. The Captain advised that he checked the aircraft's position on the Navigation Display (ND) that was set at 10 nautical mile (NM) range to ensure that it was indicating the correct runway heading before commencement of the rolling take-off.

## **1.20 Previous Occurrences of Attempted Take-off on TWY A**

1.20.1 There were three similar incidents of attempted take-off on TWY A previously recorded at the HKIA since its opening in 1998. In the first two incidents, the pilots realized their errors and aborted the take-off. In the third incident, the error was promptly detected by the air traffic controller who immediately instructed the pilot to stop the take-off roll.

1.20.2 The previous three incidents had been evaluated to identify the common circumstantial conditions of the occurrences. In all three cases, the incidents took place under the following conditions: -

- after mid-night;
- good visibility;
- during period of slack traffic when there was no time pressure to initiate the take-off;

- all ground equipment and lightings were serviceable;
- the aircraft taxied along TWY B to join TWY A1 for take-off;
- the take-off clearance was issued before the aircraft reached TWY A1.

1.20.3 Subsequent to the above incidents, a number of improvement measures had been implemented to enhance the guidance for taxiing aircraft around that area (Appendix G). These improvement measures are tabulated as follows:-

| <u>Improvement Measures</u>   | <u>Aims</u>  |
|---|--|
| <ul style="list-style-type: none"> <li>● Blocked off the green taxiway centre line lights from TWY A1 northbound to TWY A (2007) and installed an additional MAGS with a direction indicator for RWY 07L on the left hand side of northbound TWY A1 before TWY A (2008)</li> </ul>  | To enhance the guidance for aircraft taxiing from TWY B onto RWY 07L   |
| <ul style="list-style-type: none"> <li>● Removed the yellow taxiway centre line marking from TWY A1 northbound to TWY A and painted an additional TWY A identification marking near TWY A2 (2009)</li> </ul>  | To help prevent aircraft on TWY A1 northbound from turning prematurely onto TWY A  |
| <ul style="list-style-type: none"> <li>● The green taxiway centre line lights on TWY A was pre-set OFF in the eastbound direction from TWY A1 to A3; and installed a set of stop bar lights on TWY A between TWY A2 and A3, and a “no entry” MAGS (to advise no right turn entry from northbound TWY A1 to TWY A) on the left hand side of northbound TWY A1 before TWY A (2010)</li> </ul> | To minimise the possibility of making a premature turn onto TWY A and to provide additional visual warning to pilots in case of inadvertent entry into TWY A |

1.20.4 As an additional measure to mitigate the risk of recurrence, the area was designated as a hot spot and was promulgated in AIP Supplement A10/09 on 9 April 2009. The hot spot was incorporated into the Aerodrome Chart attached to the AIP Supplement and marked by a rectangular box, warning pilots to be particularly alert to the latent threat when taxiing in that area (Appendix F). The contents of AIP Supplement A10/09 have been subsequently incorporated into the Hong Kong AIP since 7 April 2011.

## **1.21 Trial Taxi Run**

1.21.1 To better appreciate the runway and lighting conditions as seen from the cockpit on the day of the incident, a series of trial taxi runs were carried out at the HKIA on the evening of 21 December 2010. The weather conditions on the day of the taxi runs were similar to those on the day of the incident. An Airbus A330, which has the same dimension and wheel height as an Airbus A340, was used to assess the visual conditions from the cockpit of FIN070. Also, the cockpit instrument displays on the Airbus A330, including the PFD and ND, are similar to those of an A340.

1.21.2 The purpose of the trial taxi runs was to visually inspect from the cockpit's perspective the adequacy of the taxiway lightings and visual aids leading to the line-up position onto the runway and to verify their compliance with the relevant ICAO standards. The taxi runs also served to identify if there were any external factors that might have misled the pilots in making a pre-mature right turn onto TWY A. A number of taxi runs were conducted by taxiing the aircraft along the parallel TWY B to join TWY A via A1. The opportunity was also taken to evaluate a procedure whereby the aircraft is to route along TWY B westbound for RWY 07L departure then to leave TWY B via A5 to join TWY A before continuing westbound to TWY A1 where a right turn would be made to line up on RWY 07L (See Appendix H). This procedure, if implemented, would eliminate the possibility of similar occurrence as the aircraft, upon exiting TWY A on a right turn, will position right on RWY 07L without having to cross any taxiway junction.

## 2. ANNALYSIS

### 2.1 Aerodrome Lightings, Ground Marking and Signage

- 2.1.1 Shortly after the incident, the duty Aerodrome Supervisor ordered a visual check on the lighting, taxiway marking and signage around the incident area and confirmed that all signage and markings were in good order and that all taxiway and runway lightings and their respective intensity control were serviceable. It was also confirmed that the taxiway lights, marking and MAGS providing visual guidance to pilots taxiing from TWY B onto TWY A1 leading to RWY 07L were all functioning normally.
- 2.1.2 Immediately after the turn from TWY B to TWY A1, there was, on the left hand side of northbound TWY A1, a signboard with a direction indicator for RWY 07L and a conventional “no entry” sign to advise against making a right turn from northbound TWY A1 to TWY A (See paragraph 1.20.3 and Appendix G). These MAGS were installed at a location before entering TWY A in order to give early guidance for aircraft taxiing for RWY 07L and to help prevent aircraft on TWY A1 northbound from turning onto TWY A. Coupled with the removal of the taxiway marking and taxiway centre line lights leading from TWY A1 onto TWY A, pilots are supposed to be guided visually onto RWY 07L after turning right from TWY B, unless the pilot deviates from the taxiway centre line lights and taxi along unlit and unmarked pavement area, as what had happened in this incident.
- 2.1.3 The trial taxi run conducted on the evening of 21 December 2010 confirmed that the stop bar lights were set to be default ON with the green centre line lights beyond the stop bar switched off. On deactivation of the stop bar lights by the air traffic controller, the green taxiway centre line lights beyond the stop bar leading to RWY 07L lit up.

- 2.1.4 It was further noted that with a taxiway identification mark on the pavement and a taxiway location sign on the left hand side grass area of the eastbound TWY A between TWY A2 and TWY A3 (See Appendix G), TWY A was well identified. The investigation team had critically reviewed the visual aids on the airfield around TWY A and TWY A1 and were satisfied that they provided adequate visual guidance to pilots and to safeguard against inadvertent entry into TWY A, unless important warning signals were not heeded. Specifically, the right turn from TWY A1 onto TWY A involved manoeuvring onto an initially unlit concrete pavement area, leading to an obvious taxiway with green centreline lights, blue edge lights and a red stop bar across TWY A, instead of a green threshold bar had it been on the runway.
- 2.1.5 During the interview, all pilots demonstrated their knowledge on the colour coding of the runway and taxiway lights i.e. runway centre line lighting being white and taxiway centre line light green and taxiway edge light blue. Their company procedure requires pilots to stop the aircraft on seeing red stop bar lights ahead and to clarify the clearance with ATC before moving forward. However, on this occasion, they did not clarify the clearance with ATC and started the take-off roll on the taxiway when there was a line of green centre line lights and a red stop bar lights ahead. It was probable that while on the right turn, the pilot were already committed to a rolling take-off and that the sudden surge in workload in the cockpit allowed little time for the pilots to react to the visual cues that might have prompted them of the mistaken position of the aircraft.
- 2.1.6 The Captain explained that he had the impression that upon lining up, the red stop bar lights ahead were part of the lighting system leading to the displaced runway threshold. In his previous experience of operations from small airfields in northern Finland where runways were often marked with edge lights only but with no centre line lights and that taxiing on a large area of dark concrete pavement was not unfamiliar to him. He would typically depart from intersections ahead of the normal threshold and the only lights he would see during the take-off roll were the runway edge lights and later

some runway end lights. As such, to take off in dim conditions was not unfamiliar to him. This might partly explain his action in making a premature right turn from TWY A1 onto TWY A even with the taxiway centre line lights and the taxiway centre line marking removed, thereby presenting a large patch of dark concrete area. With respect to the statement that the red stop bar lights on TWY A being dismissed as part of the lighting system leading to the displaced runway threshold, the First Officer also claimed that he noted the red lights but also had the impression that they were part of the lighting system leading to the displaced runway threshold lights.

## **2.2 The Incident Aircraft**

The aircraft involved had no outstanding deferred defect prior to departing Hong Kong on 26 November 2010. There was no evidence to suggest that the equipment or the maintenance status of the concerned aircraft had in any way contributed to the incident.

## **2.3 DFDR Data**

2.3.1 According to the DFDR data retrieved, together with the ATC radio transcript, the flight crew obtained the take-off clearance at 1723:14 and started the take-off roll at 1724:13. ATC instructed the flight crew to stop rolling at 1724:24 after the aircraft was found rolling on the taxiway. The crew stopped the take-off roll by moving the engine throttle levers to idle position at 1724:30.

2.3.2 The aircraft was completely stopped at 1724:44. The duration of the throttle levers at take-off position was about 17 seconds. The DFDR data indicated that the Rejected Take-Off (RTO) was initiated at 72 knots and the highest speed attained was 75 knots. It took 14 seconds for the aircraft to stop after initiation of the RTO.

2.3.3 The Ground Speed, the Throttle Lever Position (indicated by the Throttle Resolver Angle of the Throttle Lever) of engine No. 2, the actual N1 speed of engine No. 2 and the True Heading of the aircraft were plotted and shown in Appendix I.

2.3.4 Analysis of the subsequent actions taken by the flight crew in response to instructions from ATC to abort the take-off was considered prompt and appropriate.

## **2.4 Crew Rest and Fatigue**

The flight crew arrived HKIA in the previous flight FIN069 at 0733 on 25 November 2010. The same crew was scheduled to depart HKIA in FIN070 at 1715 on 26 November (0115 on 27 November LT). Taking into account the travelling time between the airport and the hotel, there was a total of more than 30 hours between the two periods of flight duties with adequate allowance provided for crew rest. All crew members indicated that they were sufficiently rested and that their performance had not been adversely affected by fatigue.

## **2.5 Pre-departure Planning and Crew Briefing**

2.5.1 The flight crew members were picked up at the hotel two hours prior to the estimated time of departure i.e. at 1515 and arrived at the aircraft at around 1550 with ample time for normal flight preparation.

2.5.2 When they obtained information from the Automatic Terminal Information Service (ATIS), the First Officer had to revise the runway to RWY 07L, as RWY 07R had previously been programmed as the departure runway in the Flight Management and Guidance System. The pilots stated that the take-off briefing did not include a detailed discussion on the hot spot. Although the pilots claimed to be aware of the presence of the hot spot at the HKIA, this was only mentioned briefly in the sense that it was located at

around the take-off point. Apart from that, there was neither further discussion nor did they notice the written explanation of the hot spot in the taxi chart as it was considered that hot spots were not uncommon at airports in many parts of the world. The lack of attention to the details of the hot spot prior to departure is indicative of an insufficient level of precaution to guard against misidentification of the entry onto RWY 07L.

2.5.3 In view of previous incidents in which departure aircraft mistook TWY A as RWY 07L and attempted to line up and take off on the taxiway, the Hong Kong CAD published an AIP Supplement on 9 April 2009 to highlight the designation of hot spot around the area of TWY A, TWY A1 and RWY 07L Holding Point. The AIP Supplement stated that in the past six years there had been three occasions at night when pilots had mistaken TWY A for RWY 07L and attempted to take off from the taxiway. The AIP Supplement also highlighted the improvement in the taxiway centre line marking and lightings. It was noted that such important information for avoidance of confusion between the runway and taxiway was not included in the company Airport Briefing, which was meant to enhance the awareness of pilots. Following the incident, the company Airport Briefing was subsequently revised on 21 December 2010 incorporating information on the hot spot at the HKIA. It is therefore considered that there is a need for the operator to strengthen document control to ensure that up-to-date safety significant information, such as aerodrome hot spot, is incorporated in the Airport Briefing on a timely basis.

2.5.4 It was noted that the company Departure Briefing included the taxi route to the departure runway as one of the items to be discussed during pre-flight briefing, paying special attention to aerodrome hot spot. However, on this occasion, the aerodrome hot spot was only briefly mentioned. Enhanced training for the flight crew with special emphasis on comprehensive coverage and the discussion of safety significant information pertaining to the flight during the pre-flight preparation stage would certainly help raise the level of safety awareness amongst the crew members.

## 2.6 Taxiing for Departure

### 2.6.1 The Captain

2.6.1.1 The pushback and taxi were uneventful. For orientation purposes, both pilots in the operating seats had their computers placed on the sliding tables to help orientation and to ascertain the taxi route as they taxi along to the A1 Holding Point. The Relief Pilot, having read the appropriate charts, decided to put the computer away early in the taxi phase. When taxiing along TWY B westbound abeam TWY A5 the pilots were instructed by ATC to expedite taxi. At that time of the night when there was not much ground traffic, such request had somehow puzzled the pilots as to the necessity of such an instruction. As the aircraft was already close to the maximum taxi speed of 30 knots, there was not much the Captain could do to further expedite.

2.6.1.2 The ATC instruction to expedite taxi was issued with the intention for FIN070 to depart ahead of an incoming arrival flight on approach to RWY 07L, which was at that moment approximately 18 NM from touchdown. Although the instruction to expedite taxi might have instilled a sense of urgency amongst the pilots, this kind of instruction is not an uncommon ATC operational practice in handling ground traffic in any major international airport and should not have induced undue pressure on the pilots concerned.

2.6.1.3 To prepare for take-off, the pilots in the operating seats had to stow the EFB computers that were placed on the sliding tables. The Captain, who had his left hand on the steering wheel manoeuvring the aircraft for a turn from TWY B to TWY A1, could only use his right hand to stow the computer into the operations manual stowage bin to his left. The awkward

movement in placing the computer into the stowage bin to his left using his right hand had distracted the Captain's attention from the external environment and for a short period of time he was deprived of the opportunity to look out for the taxiway or runway signage and lightings while the aircraft was negotiating the turn onto what was mistaken to be RWY 07L. Based on observations during a re-visit to a Finnair A340 cockpit, it was possible that the Captain might also encountered difficulties in stowage of the computer due to the left hand arm rest of the pilot's seat that could have obstructed the slotting of the computer into the manual stowage bin. During the turn, the Captain had to move the thrust levers with his right hand to adjust the thrust level to smoothly manoeuvre the aircraft on a 90° turn. As he had by then received take-off clearance, it was probable that the Captain suddenly found himself under a sense of urgency to take off and experienced a momentary surge in workload to complete the following required actions shortly before take-off: -

- (a) Overcome the awkward movement to stow the computer with his right hand and put it inside the operations manual stowage bin to his left and then to close the sliding table. He might also experience further difficulties as the left arm rest of the pilot's seat could possibly obstruct the stowage process;
- (b) Call for "Packs Off, Line up Checklist";
- (c) Make a PA by selecting the PA knob on the radio management panel and press the transmit button to advise cabin crew to take their seats for take-off;
- (d) Turn on the predictive windshear warning system which had the switch located near the rear of the centre pedestal; and
- (e) Handover control to the First Officer

2.6.1.4 To complete the actions for making a PA and turn on the predictive windshear warning system, the Captain, who was in control of the aircraft during the turn, would have to go “head down” momentarily to look for the relevant switches on the pedestal. He also had to adjust the thrust levers to control the aircraft for the turn with his right hand. This further distracted his attention from the external environment while completing the turn to line up on the runway. Based on the trial taxi run conducted by the investigation team using an Airbus A330, it was found that during the right turn, it was possible that the view of the pilot in the left hand seat could be partly obscured by the centre windscreen mullion. On manoeuvring the aircraft to line up, the Captain turned prematurely and entered TWY A instead of first proceeding via Holding Point A1 before lining-up on RWY 07L. The premature turn onto TWY A instead of RWY 07L had resulted in a much compressed time frame within which the pilots had to complete a series of pre-take-off actions prior to commencing the rolling take-off. Based on the recording of the A-SMGCS, the five departures that took off on RWY 07L prior to FIN070 on that evening took an average of 90 seconds from TWY B to line up on RWY 07L for a rolling take-off. However, the pre-mature turn made by FIN070 resulted in much reduced time available for the take-off manoeuvre by about 45 seconds, curtailing the time available by half. This is almost tantamount to doubling the workload at a critical time shortly before take-off. It was probable that the sudden surge in workload in the cockpit at the time when the Captain was making the right turn from TWY B onto TWY A1 and the action of having to stow away the computers at that critical point of taxiing had deprived the pilots the last opportunity to be alerted by a number of visual cues that might otherwise have prompted them of their mistaken position.

2.6.1.5 Although much work had been done to improve the ground marking, signage and lighting around that area, these visual aids

are only effective to those who have the time and opportunity to look out for them. Unfortunately, on this occasion, it was probable that the flight crew were pre-occupied and distracted by the high workload condition at the time. Under the circumstances, the recommended company procedure of making a rolling take-off, when possible, allowed little time for the pilots to cross check their position visually before applying take-off power.

## **2.6.2 The First Officer**

2.6.2.1 As the Captain was the pilot controlling the aircraft on the ground and responsible for taxiing, the First Officer's role was to monitor the taxi routing of the aircraft and maintain communication with ATC and to coordinate with other parties, as appropriate. According to information provided by the operator, it is their company policy that First Officers are not trained to taxi the aircraft. In the absence of any practical experience in taxiing the aircraft, it would be rather doubtful if the First Officer is fully capable of monitoring the Captain in the taxiing of the aircraft - a job which the First Officer had not been trained to do. However, as a member of the flight crew, the First Officer should help in monitoring the external environment and alert the captain of any anomalies observed during taxiing.

2.6.2.2 Upon obtaining information from the ATIS, the First Officer changed the departure runway from 07R to 07L and started the take-off briefing. When the aircraft was approaching TWY A5, in response to ATC enquiry, the First Officer reported ready for departure. ATC then instructed FIN070 to expedite taxi line-up RWY 07L. Take-off clearance was given shortly after passing abeam TWY A3. When such clearance was received, the First Officer immediately started to stow away the EFB computer placed on the sliding table. He lifted the computer and tried to put it inside the operations manual stowage bin to his right. But he soon found that there was a bottle of water inside the stowage bin leaving insufficient room to stow the computer.

A few seconds' delay was encountered and he finally managed to put the computer inside the bin whilst the aircraft was already on a right turn. During this period of stowage of the computer, he was looking down inside the cockpit. In the taxi runs that the investigation team conducted, it was noted that during the right turn, it was possible that the external view of the co-pilot could be partly obscured by the right hand windscreen mullion.

2.6.2.3 When the aircraft taxied passed abeam TWY A2, the Captain called for "Packs Off, Line-up Checklist". In response, the First Officer had to complete the following tasks to prepare the aircraft for take-off:-

- (a) take note of the fuel quantities in the tanks for recording in the technical log in accordance with the company procedures ;
- (b) turn off the two "pack switches" located on the overhead panel ;
- (c) take out the paper checklist to start the Line-up Check, then put the checklist away after completion of the checklist ;
- (d) get ready to assume control of the aircraft by placing his left hand on the thrust levers ; and
- (e) prepare for a rolling take-off by setting the thrust levers.

2.6.2.4 Upon completion of the above tasks, the First Officer looked out of the window when the aircraft had already lined up on what was believed to be RWY 07L. The premature turn from TWY A1 onto TWY A unfortunately meant that the aircraft had completed the turn to "line up" (sic) much sooner than what the crew would have expected had they lined up correctly on RWY 07L. This resulted in a much compressed time frame within which the pilots had to complete a series of pre-take-off actions prior to commencing the rolling take-off. Based on the information as described by the pilots, it was probable that the cockpit had changed rapidly from a somewhat relaxed atmosphere to one that was tense under a high workload condition. It was quite probable that the speed with which the right turn was made in the process of a rolling take-off, a combination of the surge in workload shortly before applying take-off power and the difficulties in

stowing the computers had significantly hampered the pilots' ability to detect the signage of TWY A and allowed little time for the pilots to react to any visual cues that could have alerted them of their incorrect position.

2.6.2.5 As some difficulties in the stowage of the EFB computers shortly before departure had been experienced by both the Captain and the First Officer, the arrangement in the usage and stowage of the computers in the cockpit, especially at a critical time of the flight, does not appear to be of sound ergonomic design. As soon as the EFB computers were stowed, there was no chart readily available for the pilots to make reference to. Although theoretically a paper copy of the aerodrome charts was available somewhere in the cockpit, in practice, the paper charts were rarely used. It is therefore considered worthwhile to carry out a safety assessment, particularly to study on the ergonomic aspect on the use of the EFB computers in the cockpit.

### **2.6.3 The Relief Pilot**

The Relief Pilot, who was sitting in the first observer's seat, described the taxi as normal and there was no sense of urgency. He had once had the airport chart displayed on the computer which was subsequently stowed away well before turning right to line up on the runway. When the take-off clearance was received, he looked down to his right to make sure that the computer was stowed and that there was no loose item on the tabletop to his right. After completing the line-up manoeuvre, he looked out of the window and saw the green taxiway centre line lights, to which he did not raise any queries, although in hindsight, he should have realized that runway centre line lights should be white. Though the SOP does not state clearly the duty of the Relief Pilot, all three pilots had the general understanding that the Relief Pilot had a role to monitor the operations, including during the taxiing phase. However, as the observer's seat is at the back of the cockpit with limited vision of the external environment, the Relief Pilot who had not been trained for ground taxi himself was obviously not in the best position to monitor the taxiing of the aircraft in an effective manner.

## 2.7 Take-off Roll

- 2.7.1 The last opportunity for the crew to detect the mistaken line-up position on TWY A instead of RWY 07L would have been the FMA indications on the PFD. In the company SOP, it stated the need for the pilot to check the FMA for “RWY” (or “blank”) i.e. to verify that the Instrument Landing System (ILS) signal of the relevant runway is received and that the aircraft is on the correct runway. To clarify the point concerning “RWY” (or “blank”) indication as stated in the company SOPs, the investigation team took the opportunity to verify this in the flight simulator.
- 2.7.2 By design, when the thrust levers were moved to flex détent for commencement of the take-off roll when the aircraft was on the runway with the ILS signal radiating, the FMA would indicate “RWY”. On the PFD, there would also be a green Ground Roll Guidance Command Bar indicating that the aircraft was correctly positioned for take-off on the runway where a localizer signal is received. When the thrust levers were moved to flex détent for take-off while the aircraft was on a taxiway or on a runway with no ILS signal radiating, the FMA would not display the “RWY” indication and the green Ground Roll Guidance Command Bar would not appear on the PFD. The indication of “RWY” and the presence of the green Ground Roll Guidance Command Bar were verified in a full flight simulator when the aircraft was positioned on RWY 07L for take-off. Conversely when positioned on TWY A where localizer signal was not available, both indications were absent.
- 2.7.3 The pilots stated that they had checked that upon lining up, the aircraft heading was aligned with the direction of the departure runway as specified in the company SOPs. However, it is obvious that the aircraft heading alone would not have been a reliable indication that the aircraft had actually lined up on the runway, as in this case where the aircraft had wrongly lined up on TWY A, which is parallel to the runway. At the time of the departure, the scale of the ND was reported to have been set to 10 NM range - the lowest possible setting to get the best indication of the departure path

and the runway symbol. On the centre of the ND there was an aircraft symbol representing the aircraft position on the ground or in the air and its relative position from the runway or any waypoint. When correctly lined up on the runway, the aircraft symbol would coincide with the runway symbol on the ND. But with the 10 NM range setting on the ND, the runway symbol would still be very small. When the aircraft mis-positioned on TWY A, the aircraft symbol on the ND that represents the position of the aircraft would be at the edge of the runway symbol because of the relatively short distance between the RWY 07L and TWY A. In the case of this particular flight, the aircraft symbol was over the edge of the runway symbol and it was very difficult for the pilots to discern the discrepancy. It is therefore considered that by checking the runway and aircraft symbol on the ND to ascertain that the aircraft had correctly lined up on the runway is unreliable and should not be accepted as an effective means to confirm the correct line-up position on the departure runway.

- 2.7.4 By the time when the Captain had lined up on the taxiway, the First Officer took over control and continued on a rolling take-off as recommended in the SOP. The First Officer set the thrust levers to flex détent for commencement of the take-off roll. At that critical time, it would be necessary for the Captain to ensure all engine parameters were normal for take-off. It was likely that, at that particular time, he focused his attention on the engine instruments and had not been sufficiently attentive in scanning the external environment. The First Officer would then need to check the FMA for the correct “RWY” indication at the early stage of the take-off run when the aircraft was at a low speed. However, the absence of the “RWY” indication and the green Ground Roll Guidance Command Bar on the PFD apparently had gone unnoticed. Without cross-checking and callout of the FMA changes, the flight crew lost the last opportunity to detect the discrepancy until instructed by ATC to abort the take-off. There is therefore the need to review the SOP with a view to enhancing the process for verification of the departure runway before commencement of the take-off roll.

## **2.8 The Company SOP**

2.8.1 The company SOP does not specify the requirements to call out any FMA illumination, but only requires the pilots to check for correct modes for the operations i.e. “MAN FLX xx”, “SRS”, “RWY” or “blank”, if not on runway. On this occasion, as the aircraft was wrongly positioned on TWY A, based on the design logic, the FMA would have indicated “MAN FLX xx”, “SRS”, and “blank”. A call out on the mode changes in the FMA would likely alert the pilots that the FMA indication was not normal and would possibly remind them to check on the correctness of the aircraft position. However, without the call out, all three pilots did not notice the irregularity.

2.8.2 At the time when the aircraft entered the hot spot, the visual cues available to them at that stage would be the taxiway centre line and edge lights, the absence of taxiway centre line light leading from TWY A1 to A and the MAGS on TWY A1 warning them not to turn onto TWY A. Upon entering TWY A, the red stop bar lights right ahead of the aircraft should have alarmed the pilots of their wrong positioning. But at that very moment, they were possibly busy preparing for the rolling take-off. It was probable that the situation awareness of the Captain and the First Officer had been significantly degraded due to the high workload conditions and the difficulties encountered in stowage of the computers.

## **2.9 Responsibilities of the Pilots on the Flight Deck**

The preparation for the flight and commencement of taxi was relatively routine in the beginning. The initial phase of the taxi was uneventful and the pilots were confident and comfortable in coping with the workload. The Relief Pilot’s involvement in the operations could be described as minimal since he was in a supporting role to monitor the operations and to assist the pilots as needed. There appeared to be no clear demarcation of responsibilities to fully utilise the availability of the Relief Pilot during the pre-departure phase. In view of his secondary role in the cockpit, he put the computer away well before the aircraft reached the western end of TWY B and was apparently not closely monitoring the

position of the taxiing aircraft. When the pilots in the operating seats also put away their computers, there was no aerodrome chart readily available for the crew to make reference to. Based on information provided, it appeared that the responsibility of the Relief Pilot was not clearly specified as to how he could have helped in relieving the workload of the operating pilots.

## **2.10 Crew Resources Management (CRM)**

2.10.1 At the time of the occurrence, there were three pilots in the flight deck. The Relief Pilot who was in the first observer's seat had put away the computer early in the ground taxi stage. Upon entering the hot spot and commencing a right turn onto TWY A, the operating pilots were in the process of stowing their computers and would not be able to make reference to the aerodrome chart therein. The action of stowage of the computers had certainly affected the performance and ability of the operating pilots in visually checking the external environment at a critical phase of the flight. Although the Relief Pilot should have a role to monitor the operations of the aircraft, including during the taxiing phase, however, as he was sitting in the observer's seat at the back of the cockpit with limited vision of the external environment, he would not be expected to be very effective in monitoring the taxiing process.

2.10.2 It is noted that while the Relief Pilots has a general duty of monitoring the work of the pilots, he has not been given any specific responsibilities during the pre-departure phase. CRM within the cockpit could well be described as less than optimum and that the responsibility of the Relief Pilot was not clearly specified. There was also an insufficient level of overall situation awareness, especially when considering that the pilots were not familiar with RWY 07L departure.

## **2.11 Human Factors**

2.11.1 The cockpit crew of FIN070 comprised the Captain, the First Officer and the Relief Pilot. As is typical in most cockpit crew complement, the Captain was the most experienced with a total of 11,555.8 flying hours on

all types, while the First Officer had only logged a fraction of that of the Captain (2784.2 hours on all types). Not only was there a steep gradient in terms of flying experience, the First Officer and the Relief Pilot had not been trained for ground taxi. Although theoretically they have the role to monitor the work of one another, the effectiveness of their monitoring role during the ground taxi phase was certainly questionable as they had not even been trained to do the job themselves. In the absence of any operational experience in taxiing the aircraft themselves, it was probable that the First Officer and the Relief Pilot did not fully appreciate the workload and mental process of the Captain during the taxi phase. It was possible that under the circumstances, the First Officer and the Relief Pilot's trustfulness on the expertise of the Captain, who was the only person competent to taxi the aircraft, had somewhat diluted their attention on the taxiing process being executed by the Captain.

2.11.2 The speed with which the aircraft taxied to line up on TWYA was not particularly high and should have provided ample time for the pilots to cope with the increased workload shortly before take-off. However, the situation was complicated by the difficulties encountered by both the Captain and the First Officer in stowing the EFB computers. Also, after the EFB computers were stowed, there was a short period of time when the pilots had no access to readily available charts to make reference to before positioning the aircraft onto the runway. While it is accepted that the EFB computers, function effectively as electronic flight operations manuals, serve to help pilots to access information quickly and easily, there are certain shortcomings in their deployment in the cockpit environment as highlighted above. The investigation team therefore consider that there is a need for the operator to review and improve upon the ergonomic aspect on the usage of EFB computers in the cockpit.

2.11.3 The recommended SOP for a rolling take-off amidst the hand-over of control from the Captain to the First Officer, and particularly in this case, the premature turn onto TWYA had significantly reduced the time available for the pilots to look out of the window from the cockpit and to react to a number of visual cues that might otherwise have alerted them of

the wrong positioning of the aircraft. While a rolling take-off should normally not be of any problem, however, under certain demanding workload situation, e.g. in the process of hand-over of control or departing on an unfamiliar runway, it may be advisable to stop the aircraft on the runway for a final check on the position of the aircraft vis-à-vis the external environment before applying take-off power.

- 2.11.4 During single runway operations, usually the regular flow of landing and departure traffic on the runway-in-use would have provided the pilots of the departure aircraft a good visual reference of the entrance to the departure runway by following the “footsteps” of the preceding occupant on the runway. However, in the absence of any landing aircraft within the last seven minutes before FIN070’s departure, there was no such “footsteps” to follow.
- 2.11.5 At the time of the incident, information pertaining to the aerodrome hot spot at the HKIA had not been incorporated into the Airport Briefing prepared by the company. Despite the pilots indicated that they were aware of the existence of the hot spot, this point was only briefly mentioned in terms of its location being at around the RWY07L take-off area and that they did not take note of the written explanation of the hot spot in the taxi chart. It was most probable that there was an insufficient level of attention to the hot spot as published in the Hong Kong AIP Supplement 10/09, which clearly warned pilots of the possible confusion in taxiing around the RWY 07L entry area. In this respect, it is recommended that the operator should strengthen their document control to ensure that up-to-date safety significant information, such as aerodrome hot spot, is incorporated into the Airport Briefing on a timely basis and that crew training in Threat and Error Management should also be enhanced.
- 2.11.6 After completion of the Line-up Checks and as soon as the aircraft entered TWY A, believing it to be RWY 07L, the First Officer assumed control of the aircraft and commenced the rolling take-off. Had there been a moment of pause and re-focusing on the runway identification by requiring the pilots to cross check the external environment through signage or

markings before applying take-off power, the occurrence could have been avoided. But on this occasion, the Captain's action was left unchallenged and a rolling take-off commenced.

## **2.12 ATC Operations**

- 2.12.1 In accordance with the regular runway maintenance programme as promulgated in the Hong Kong AIP, the south runway (RWY 07R/25L) was closed for scheduled maintenance at the time of the incident. The north runway remained operational and RWY 07L was in use for both arrivals and departures, as per normal practice under the prevailing weather conditions.
- 2.12.2 As requested by the pilot at 1711, the GMC cleared FIN070 to start up and push back from Stand E16. The aircraft was then cleared to taxi to TWY A1 Holding Point via TWY B. When the aircraft passed TWY V, the GMC instructed FIN070 to contact the AMC on 118.2 MHz.
- 2.12.3 While FIN070 was taxiing on TWY B, the AMC planned to release the aircraft ahead of an arrival on final approach. At 1722, after ascertaining from the pilot that the aircraft was ready for departure, the AMC instructed the pilot to expedite taxi and line up RWY 07L. The instruction was a normal ATC practice; but in this case it did not make any difference as the aircraft was already taxiing at a speed of 27 kt, which was close to the operator's recommended maximum taxi speed of 30 kt.
- 2.12.4 At time 1723, when FIN070 was about to pass abeam TWY A2 and approaching the end of TWY B, the AMC cleared the aircraft for take-off. After the issue of the take-off clearance, the AMC temporarily left his control position to fetch a glass of water from the water dispenser situated about 4 m away, while maintaining listening watch on the control frequency and visual surveillance of traffic under his control. Meanwhile, the aircraft continued to line up and turned at the end of TWY B onto TWY A1 towards RWY 07L. However, it then made a premature turn to the right onto TWY A and attempted to take off on the taxiway. The

GMC promptly detected the anomaly by referring to the A-SMGCS and alerted the AMC, who immediately instructed the pilot to stop rolling. The pilot complied with the instruction and stopped before passing abeam TWY A5, approximately 1,400 m from the western end of TWY A. It was fortuitous that the wrong positioning of FIN070 was quickly spotted and the attempted take-off was aborted in time. The incident therefore did not result in more serious consequence.

- 2.12.5 The Investigation Team considered that the issue of the take-off clearance before the aircraft had lined up on the runway was in full compliance with standard ATC operational procedures and should not have imposed additional pressure on the pilot in executing the take-off manoeuvre. Nevertheless, the incident could have been avoided had the take-off clearance been withheld until it was ascertained that the aircraft had completely crossed TWY A. In fact, such practice was adopted as an interim ATC procedure after a previous similar incident which occurred at the same location on 13 September 2008. This interim procedure was published by the Air Traffic Management Division (ATMD) and issued to ATC staff on 26 September 2008 in an Operational Instruction (OI), OI 62/08, which required the AMC to withhold the take-off clearance for RWY 07L until ascertaining that the departure aircraft had completely crossed TWY A by referring to the A-SMGCS or the Surface Movement Radar (SMR).
- 2.12.6 Upon completion of modification works on the AGL, including the installation of stop bar lights on TWY A, and improvement to airfield ground marking and signage in accordance with the recommendations in the investigation report of the 2008 incident, OI62/08 was cancelled on 15 October 2010, just slightly more than a month before this incident. As a prudent measure to prevent recurrence of similar incidents, the Investigation Team recommended soon after the FIN070 incident that the above interim ATC procedure be re-instated. OI 46/10 was accordingly issued on 29 November 2010, requiring the AMC to withhold the take-off clearance for RWY 07L until ascertaining that the departure aircraft has completely crossed TWY A by referring to the A-SMGCS or the SMR.

OI 46/10 also recommended the use of TWY A to access Holding Point A1 or A2, thus eliminating the possibility of lining up on TWY A.

### **3. CONCLUSIONS**

#### **3.1 Findings**

- 3.1.1 The pilots were properly licensed and were medically fit to perform their duties at the time of the incident.
- 3.1.2 The duty air traffic controllers were properly licensed with the appropriate ATC ratings and were medically fit to perform their duties at the time of the incident.
- 3.1.3 There was no evidence to suggest that the performance of the pilots and air traffic controllers was being adversely affected by medicine, alcohol or fatigue.
- 3.1.4 The scheduled duty hours of the pilots and air traffic controllers had allowed adequate rest periods and they had been sufficiently well rested.
- 3.1.5 The airworthiness status of the aircraft was in order and did not contribute to this incident.
- 3.1.6 Amongst the three pilots in the cockpit, only the Captain has been properly trained for ground taxi. As such, the Captain was responsible for taxiing the aircraft from the parking stand to the departure runway as per company policy.
- 3.1.7 Both the First Officer and the Relief Pilot were not trained to taxi the aircraft. They are therefore considered not most capable of monitoring the Captain during ground taxi – a job that they were not trained to do.
- 3.1.8 All communication equipment in the Control Tower was serviceable and there was no report of defective radio communication system in the cockpit.

- 3.1.9 The aerodrome surface marking, lighting, signage and visual aids were in compliance with the Standards and Recommended Practices as per Annex 14 to the Convention on International Civil Aviation and did not contribute to the incident.
- 3.1.10 The aerodrome lighting, taxiway marking and signage around the incident area were in good order and that all taxiway and runway lightings and their respective intensity control were all functioning normally.
- 3.1.11 AIP Supplement 10/09 dated 9 April 2009 highlighted the designation of the hot spot in the area around TWY A1, TWY A and RWY 07L reminding pilots to be vigilant of possible confusion when taxiing around that area.
- 3.1.12 At the time of the incident, the company Airport Briefing had not incorporated information concerning the presence of the hot spot at the HKIA.
- 3.1.13 The presence of the hot spot in the vicinity of the TWY A1, TWY A and A1 Holding Point had not been discussed in detail by the flight crew prior to departure of FIN070.
- 3.1.14 The ATMD issued OI (OI 62/08) to ATC personnel on 26 September 2008, which required the AMC to withhold take-off clearance until ascertaining that the aircraft had completely crossed TWY A by referring to the A-SMGCS or SMR. However, OI 62/08 was cancelled on 15 October 2010 upon completion of modification works on the AGL in accordance with the safety recommendations resulted from the previous investigation of a similar incident in 2008. Hence OI 62/08 was no longer applicable at the time of the incident.
- 3.1.15 The AMC issued take-off clearance to FIN070 when the aircraft was about to pass abeam TWY A2 approaching the western end of TWY B.
- 3.1.16 Difficulties were experienced by both the Captain and the First Officer in stowing the EFB computers into the respective manual stowage bins while lining up for take-off.

- 3.1.17 There was no evidence to suggest that the use of the EFB computers in the cockpit had been subject to thorough safety assessment and a sufficiently comprehensive study on the ergonomic aspects of their usage in the cockpit.
- 3.1.18 Given that the pilots were not familiar with RWY 07L departure, there was an insufficient level of overall situation awareness in the cockpit during the period when the aircraft was turning from TWY B to TWY A, when the EFB computers have already been stowed.
- 3.1.19 When FIN070 was on TWY A1 before turning onto TWY A, the flight crew made a premature right turn onto TWY A, having mistaken it as RWY 07L.
- 3.1.20 The combination of a sudden surge in workload and the recommended company procedure of making a “rolling take-off, when possible”, allowed little time for the pilots to cross check their position visually before applying take-off power.
- 3.1.21 Upon entering TWY A, the flight crew failed to be alerted by a number of visual cues, including a line of green taxiway centre line lights, blue edge lights and red stop bar lights ahead that should have prompted them of their mistaken position.
- 3.1.22 The company procedure for the verification of the departure runway by merely checking on the aircraft heading against that of the runway was unreliable.
- 3.1.23 The flight crew did not verify the position of the aircraft by referring to the external visual cues, the green Ground Roll Guidance Command Bar and the ILS localiser indication on the PFD before commencing the take-off roll.
- 3.1.24 The First Officer and the Relief Pilot’s role in monitoring the work of the Captain during the taxiing phase were not sufficiently effective. CRM within the cockpit was considered less than optimum and that the

responsibility of the Relief Pilot was not clearly specified.

- 3.1.25 Both the Captain and the First Officer noticed the red stop bar lights ahead on TWY A but, in the haste of a rolling take-off, having dismissed them as part of the lighting system leading to the displaced runway threshold, failed to stop the aircraft until instructed by ATC.
- 3.1.26 The attempted take-off on TWY A was promptly detected by the GMC with the help of the A-SMGCS. The AMC immediately instructed the pilot to abort the take-off.
- 3.1.27 The RTO was initiated at 72 knots and the highest speed attained was 75 knots. It took 14 seconds for the aircraft to stop after initiation of the RTO.
- 3.1.28 There was no damage to the aircraft. However, the abrupt braking action resulted in hot brakes requiring a period of cooling down before departing again.

## **3.2 Causal Factors**

The following causal factors were identified:

- 3.2.1 A combination of sudden surge in cockpit workload and the difficulties experienced by both the Captain and the First Officer in stowing the EFB computers at a critical point of taxiing shortly before take-off had distracted their attention from the external environment that resulted in a momentary degradation of situation awareness.
- 3.2.2 The SOP did not provide a sufficiently robust process for the verification of the departure runway before commencement of the take-off roll.
- 3.2.3 The safety defence of having the First Officer and the Relief Pilot to support and monitor the Captain's taxiing was not sufficiently effective as the Captain was the only person in the cockpit trained for ground taxi.

## 4. SAFETY RECOMMENDATIONS

It is recommended that:

### 4.1 Recommendation 2011-5

Finnair should strengthen document control to ensure that up-to-date safety significant information, such as aerodrome hot spot, shall be incorporated into the Airport Briefing on a timely basis. (Para 2.5.3 refers)

### 4.2 Recommendation 2011-6

Finnair should consider enhanced training for flight crew on pre-flight safety briefing; special precautionary procedures for taxiing in the vicinity of aerodrome hot spots and pilot response to visual cues and warning signals as part of Threat and Error Management training. (Para 2.5.4 and 2.11.5 refer)

### 4.3 Recommendation 2011-7

Finnair should review their SOPs with a view to reinforcing the verification of the departure runway prior to commencement of take-off roll. (Para. 2.7.4 and 2.8.1 refer)

### 4.4 Recommendation 2011-8

Finnair should review the company policy that only pilots-in-command are to be trained for ground taxi. (Para 2.11.1 refers)

### 4.5 Recommendation 2011-9

The Finnish Civil Aviation Authority should consider the need for operators using, or planning to use, EFB tablet computers in lieu of paper documents to, in accordance with safety management principles, conduct safety assessment and comprehensive ergonomic study on their usage in the cockpit vis-à-vis

pilots' workload at various phases of flight. (Para 2.6.2.5 and 2.11.2 refer)

#### 4.6 Recommendation 2011-10

Hong Kong ATC should reinstate the procedure for the issue of take-off clearance such that during night time operations, take-off clearance for RWY 07L should be withheld until ascertaining that the departure aircraft has either passed TWY A or entered RWY 07L. Alternatively, TWY A should be used as far as practicable for aircraft departing on RWY 07L, thus eliminating the possibility of mistaking TWY A as the runway. (Para 2.12.6 refers)

Reported by:

Mr. Colman S. C. Ng

Inspector of Accidents

Accident Investigation Division

Civil Aviation Department

Hong Kong Special Administrative Region

China

December 2011

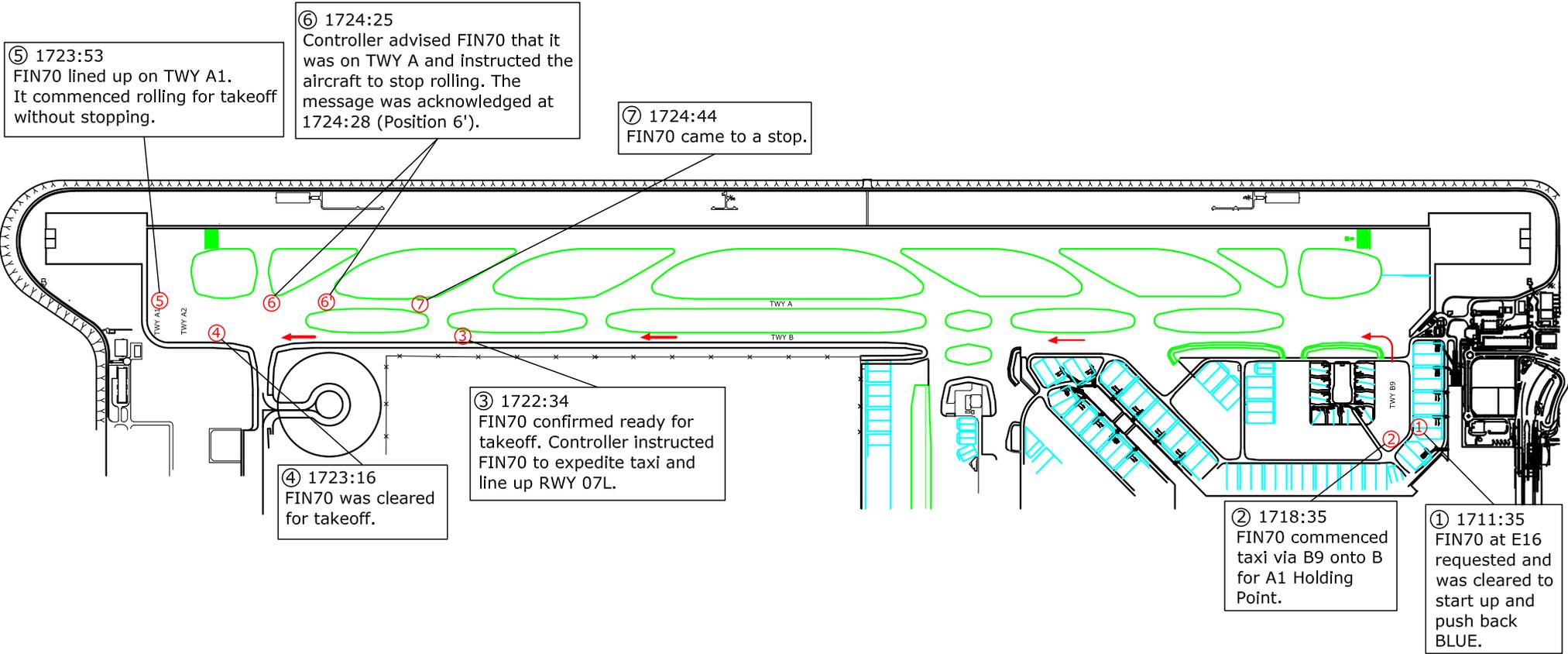
## **Acknowledgement**

The invaluable contributions and assistance offered by the following organizations in the investigation are gratefully acknowledged: -

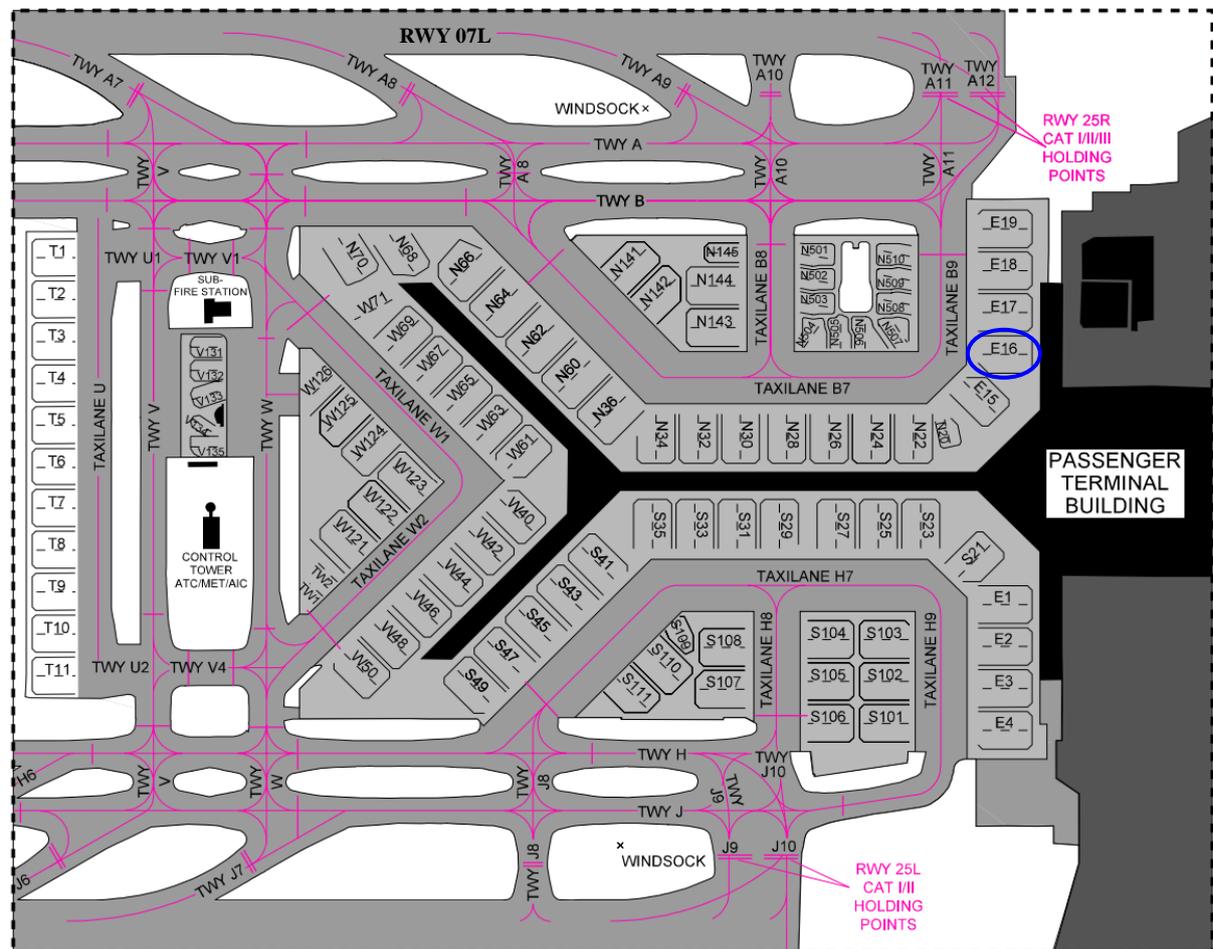
- Accident Investigation Board of Finland
- Airbus
- Airport Authority Hong Kong
- Bureau d'Enquetes et d'Analyses pour la securite de l'Aviation Civile
- Cathay Pacific Airways Limited
- European Aviation Safety Agency
- Finnair Oyj
- Finnish Civil Aviation Authority
- Hong Kong Government Flying Service
- Hong Kong Observatory

# Aircraft Track of FIN070 Based on A-SMGCS Recording

(ALL TIMES IN UTC)

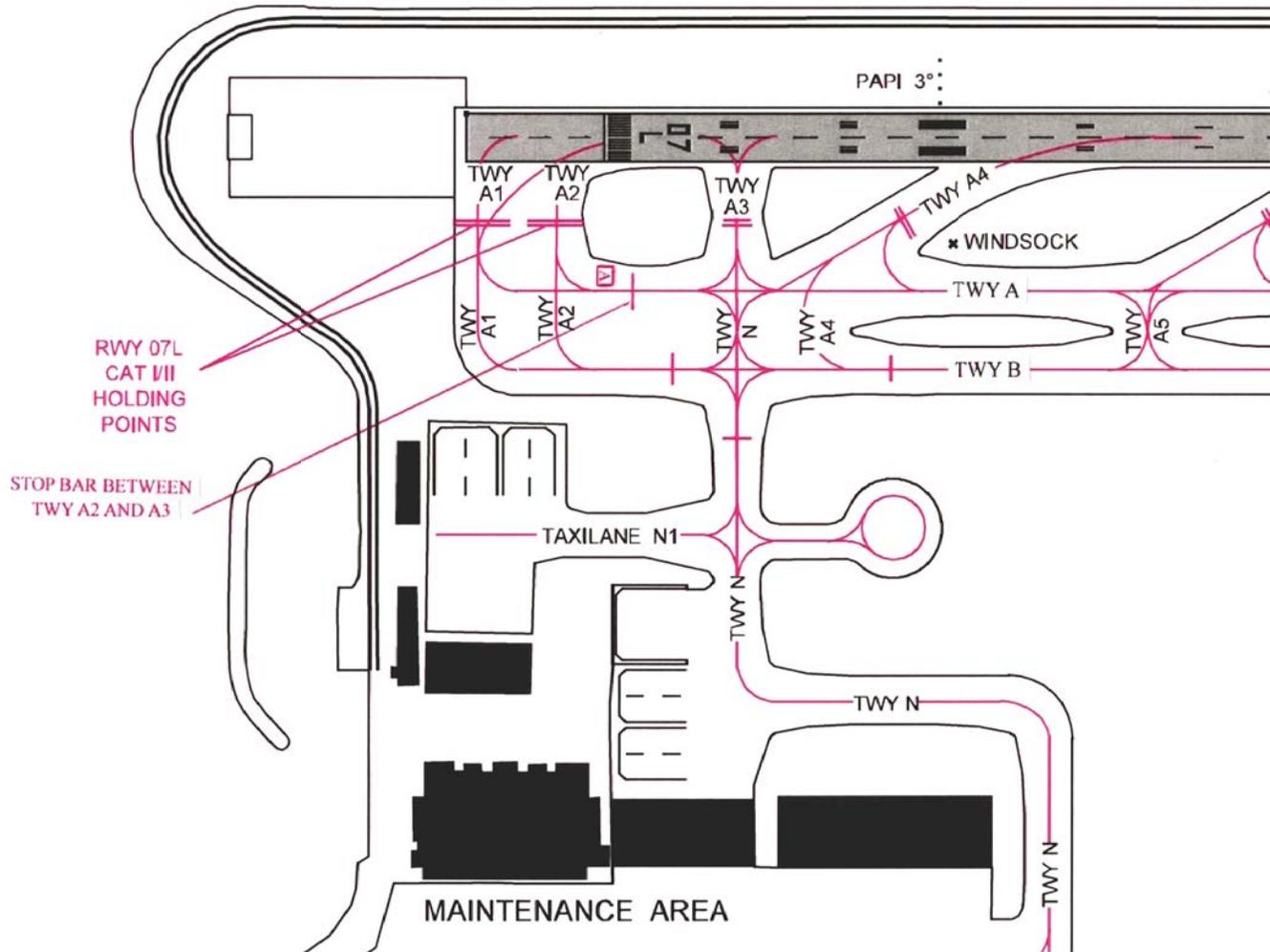


**Parking Stand E16 and the Adjacent Taxiways**

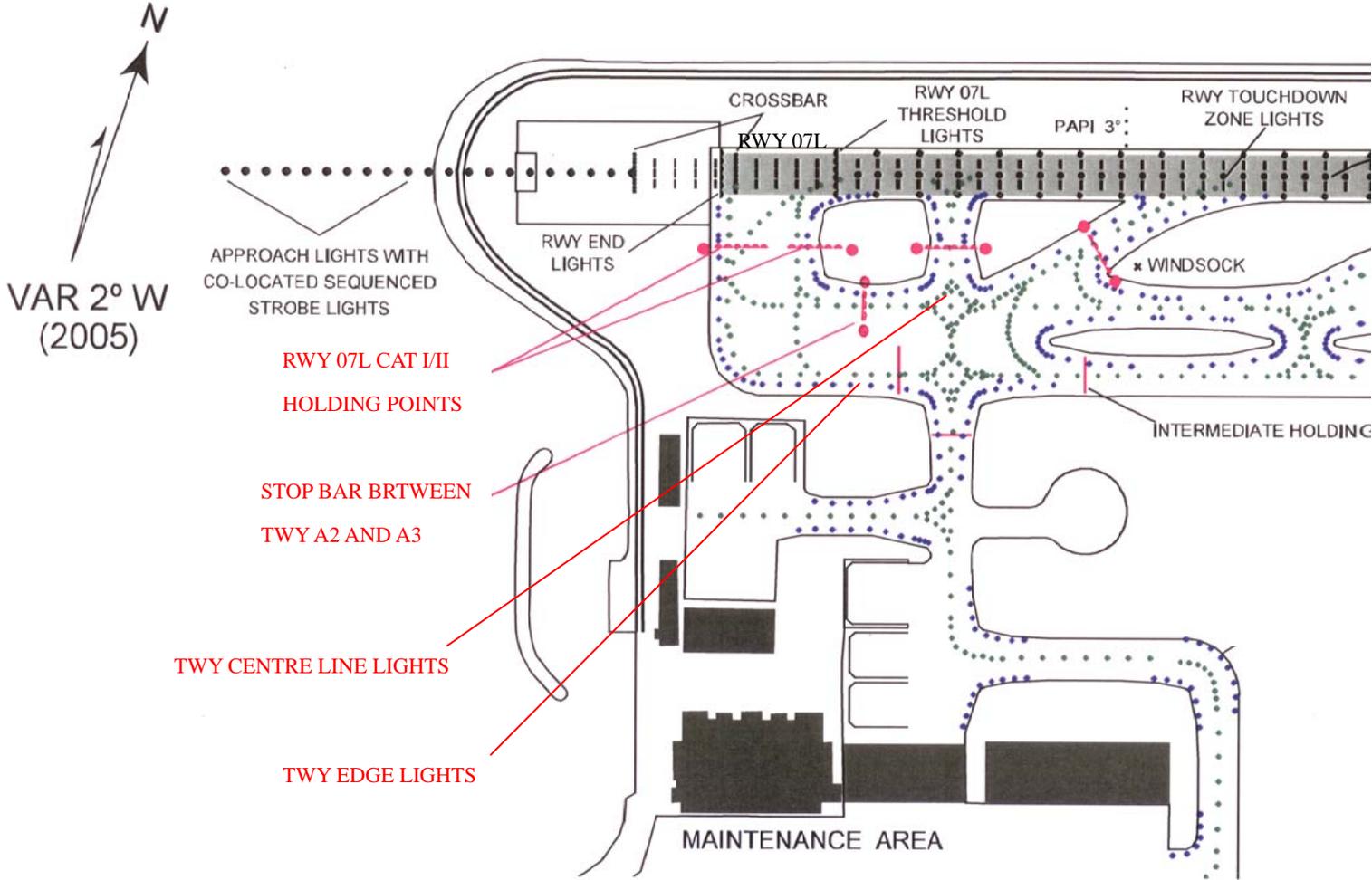


# Aerodrome Visual Marking in the Vicinity of TWY A1, TWY A2 and RWY 07L

VAR 2° W  
(2005)



# Aerodrome Lighting in the Vicinity of TWY A1, TWYA2 and RWY 07L



## Finnair's Airport Briefing

Revision 2.0 / 16.11.2010, ODB/T.Takki

# HKG – HONG KONG INTL – VHHH

## CAT 3A (RWY 25R)

### Class B Airport

The following advisory notes are for pilots' compliance and guidance. Always check briefing contents against latest NOTAMS, EAG eRM and other relevant documents

### 1. ROUTE INFO

#### 1.1 General

- Eastbound routes via Russia, Mongolia or Kazakhstan and China.
- Westbound routes via China, Mongolia and Russia.
- Airways **Y1, Y2, Y3, L888** in China
  - Available for aircrafts **LQB and LQC only**.
  - Minimum flight level on Y1, Y2 and L888 is 9200m.
  - Primary means of communication is CPDLC, VHF and HF as backup.
- Eastbound routes in China require Oxygen Escape routes, also Drift Down procedures for A330.
- Metric altimeter system in Russia, Kazakhstan and Mongolia different than in China.
- RVSM flight levels in China.
- Check latest information from:
  - OM-C / COUNTRY RAR
  - OM-C / COMPANY INFORMATION
  - CIS

#### 1.2 Communications

Basic principle is to obtain entry clearance latest 10 minutes prior to crossing each state boundary. Check OM-C Communication and Navigation Charts for correct frequencies and procedures for each country. Frequencies in different sources may vary. Use published Navigation Charts as primary source if in doubt. Check latest information from:

- OM-C / COMMUNICATIONS
- OM-C / COUNTRY RAR
- CIS

#### Russia:

- Entry clearance to Russia needed on **westbound flights**.
- Some control areas require 10 minutes separation due to missing radar coverage.

**Kazakhstan:**

- Entry clearance to Kazakhstan required.

**Mongolia:**

- Entry clearance to Mongolia required.
- 10 minutes separation required due to missing radar coverage.

**China:**

- Entry clearance to China from Mongolia, Russia and Kazakhstan required (not required from HKG to China).
- Datalink available on routes **Y1, Y2, Y3 and L888** east from waypoints: KCA and FKG
  - Send notification to Urumqi **ZWWW** 15 min before waypoint (KCA or FKG), check ADS armed
  - Transfer to Lanzhou **ZLLL** and Chengdu **ZUUU** should be automatic. If not, try new notification.
  - ATC phraseology: "Transfer to Urumqi control on datalink, monitor [HF frequency]".
  - Once CPDLC communication starts, send manual CPDLC position report.
  - If ADS connected, no other position reports required. Check that F-PLN does not include any other waypoints than airway points. If ADS not connected, send manual CPDLC position reports at compulsory waypoints.
  - In case of emergency
    - operate ADS in Emergency mode
    - establish voice communication by most efficient method (VHF / SATCOM)
    - SATCOM phone numbers and ACARS addresses
 

|           |        |         |
|-----------|--------|---------|
| ▪ Urumqi  | 441208 |         |
| ▪ Lanzhou | 441205 | LHWGWYA |
| ▪ Chengdu | 441202 | CTUGWYA |
  - Presentation on FANS communication in Asia can be found [here](#).

**Hong Kong:**

- Entry clearance from China required 3 or 5 minutes prior to entering Hong Kong airspace depending on the route.

**2. GENERAL****2.1 Geography**

- Located on island, high terrain nearby.

**3. RESTRICTIONS****3.1 Operating hours, curfew**

- Night time restrictions exist. Check NOTAMs and OM-C.

### 3.2 APU

- No restrictions for use APU.

## 4. HAZARDS / DEFICIENCIES

- Risk of microbursts, low level windshear and turbulence.
- Significant low level windshear and moderate to severe turbulence can be expected with easterly to southwesterly winds around 15 kts or greater.
- Check OM-C (Hong Kong) for further information.

## 5. WEATHER

### 5.1 GENERAL WARNING

5.1.1 Due to the proximity of the hilly terrain of Lantau Island to the south and east of Hong Kong Intl AD, significant low-level wind shear and moderate to severe turbulence can be expected along the approaches to and departures from both runways when winds blow off these hills, i.e. from east through southwest at about 15 KT or more. As the hills to the north are further away, they play a less significant role, but none the less can create local wind effects when strong winds blow off these hills, i.e. from northwest through northeast, at about 20 KT or more.

5.1.2 The terrain induced wind disturbances from nearby hills can be very small scale, sporadic and transient in nature. Whilst these wind disturbances may be small in physical dimension and correspond to only several seconds of flight time, significant headwind changes (i.e. runway orientated wind speed losses and/or gains being 15 KT or greater), can be expected as the aircraft flies through them. The sporadic and transient nature of the terrain-induced wind disturbances results in some aircraft experiencing wind shear and/or turbulence, whilst others do not, even though the broad meteorological conditions are the same. Successive aircraft which experience wind shear and/or turbulence may also encounter a different sequence of events.

5.1.3 Surface winds at the airport are generally not good indicators of the wind that may be experienced during the final phase of the approach. Winds at approximately 2000 FT may be a better representation of the prevailing wind conditions in the region. Generally, mean wind speed should decrease towards lower altitudes but isolated strong gusts may be expected. Wind direction would also change with altitude due to blocking of the general wind flow by nearby hills or in the presence of low-level temperature inversion which occurs mostly in the cool season (about half of the time or more from November to April). It is possible for the magnitude of wind shear and turbulence to increase towards final approach, resulting in deteriorating rather than improving conditions prior to touchdown.

### 5.2 EASTERLY THROUGH SOUTHWESTERLY WINDS

5.2.1 When prevailing winds are from the east through southwest and with a speed in excess of 15 KT, significant wind shear and moderate turbulence can be expected on the approaches to or on departure from both runways. Larger magnitude of wind shear and turbulence is possible when the wind speed is in excess of 30 KT. Because of the closeness to the hills of Lantau, the wind shear and turbulence are more significant over the southern runway (RWY 07R/25L).

5.2. Low-level wind shear and turbulence are expected to be more significant when the wind is from the direction 130° - 210°, especially in the presence of low-level temperature inversion or when the wind speed is more than 30 KT.

### **5.3 NORTHWESTERLY THROUGH NORTHEASTERLY WINDS**

5.3.1 Significant low-level wind shear and moderate turbulence can be expected when wind speeds exceed 20 KT, especially for approaches to RWY 25L/25R and along the departure and missed approach corridors from RWY 07L/07R as these approach/departure corridors are closer to the hills to the north as compared with approaches to RWY 07L/07R. Larger magnitude of wind shear and turbulence over these approach and departure corridors is possible if the wind speed exceeds 30 KT, especially in the vicinity of "LOTUS".

### **5.4 LAND-SEA BREEZE**

5.4.1 Land-sea breeze is not a strong wind phenomenon but it can create a complex wind field in the vicinity of the airport and it can cause a significant change in wind direction within a distance of a few kilometers along the approach/departure areas. If the sea breeze opposes the prevailing wind flow it can result in significant wind shear even in fine weather conditions.

### **5.5 LOW-LEVEL JETSTREAM IN COOL SEASON**

5.5.1 During a surge of the winter monsoon, strong low-level jets of northeasterly wind with speeds up to 50 KT occasionally affect the airport. Under such circumstances significant wind shear along the departure corridors of RWY 07L/07R can be expected.

## **6. ATC**

### **6.1 General**

- G/A procedures pretty complicated.
- ZGGG (Guangzhou) operationally best alternate.
- Alternates VMMC (Macau) and ZGSZ (Shenzhen) located in close vicinity. Also available RCTP (Taipei), RCKH (Kaohsiung) in Taiwan.
- Macau is class B airport due to complex offset approach and high terrain.
- If Macau is used as an alternate it is recommended to include the most probable APP in the destination APP briefing. After possible G/A the flight time to alternate is very short.
- Departure clearance available by datalink

### **6.2 Ground Operations**

- NIL specific.

### **6.3 RWY's**

- NIL specific.

### **6.4 SID/STAR**

- Arrival route for RWY07L/R will be significantly shorter than published (e.g. SIERA short vectors to final 07L) if weather and traffic situation allow. Possible short cut will typically be announced in a close vicinity of the airport and

- operations including cabin service must be planned accordingly.
- Departure routes include some demanding altitude restrictions that can be excluded with radar vectors.

## **7. WINTER OPERATIONS**

NIL specific

## **8. MISCELLANEOUS**

Gates normally used E15-E19.

-End of document -

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HONG KONG SPECIAL ADMINISTRATIVE REGION  
PEOPLE'S REPUBLIC OF CHINA  
AERONAUTICAL INFORMATION SERVICE

PHONE +852 2910 6174  
FAX +852 2910 1180  
AFS VHHHYOYX  
EMAIL aic@cad.gov.hk

(ISO 9001 CERTIFIED)  
AIR TRAFFIC MANAGEMENT DIVISION  
CIVIL AVIATION DEPARTMENT  
HONG KONG INTERNATIONAL AIRPORT

AIP Supplement  
A10/09  
9 April 2009

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**HONG KONG INTERNATIONAL AIRPORT**  
**DESIGNATION OF HOT SPOT**

**1. Introduction**

- 1.1 The ICAO definition of a hot spot is 'a location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary'. The designation of a hot spot is also applicable to runway and taxiway areas where there have been runway safety incidents relating to runway/taxiway confusion.
- 1.2 The Hong Kong International Airport design configuration, surface marking, ground lighting and aerodrome signage all comply with ICAO requirements. However in the past six years there have been three occasions at night of pilots mistaking Taxiway A for Runway 07L and attempting to take off from the taxiway. Therefore Hong Kong International Airport is designating this area as a hot spot to highlight this issue to all pilots.

**2. Location of Hot Spot**

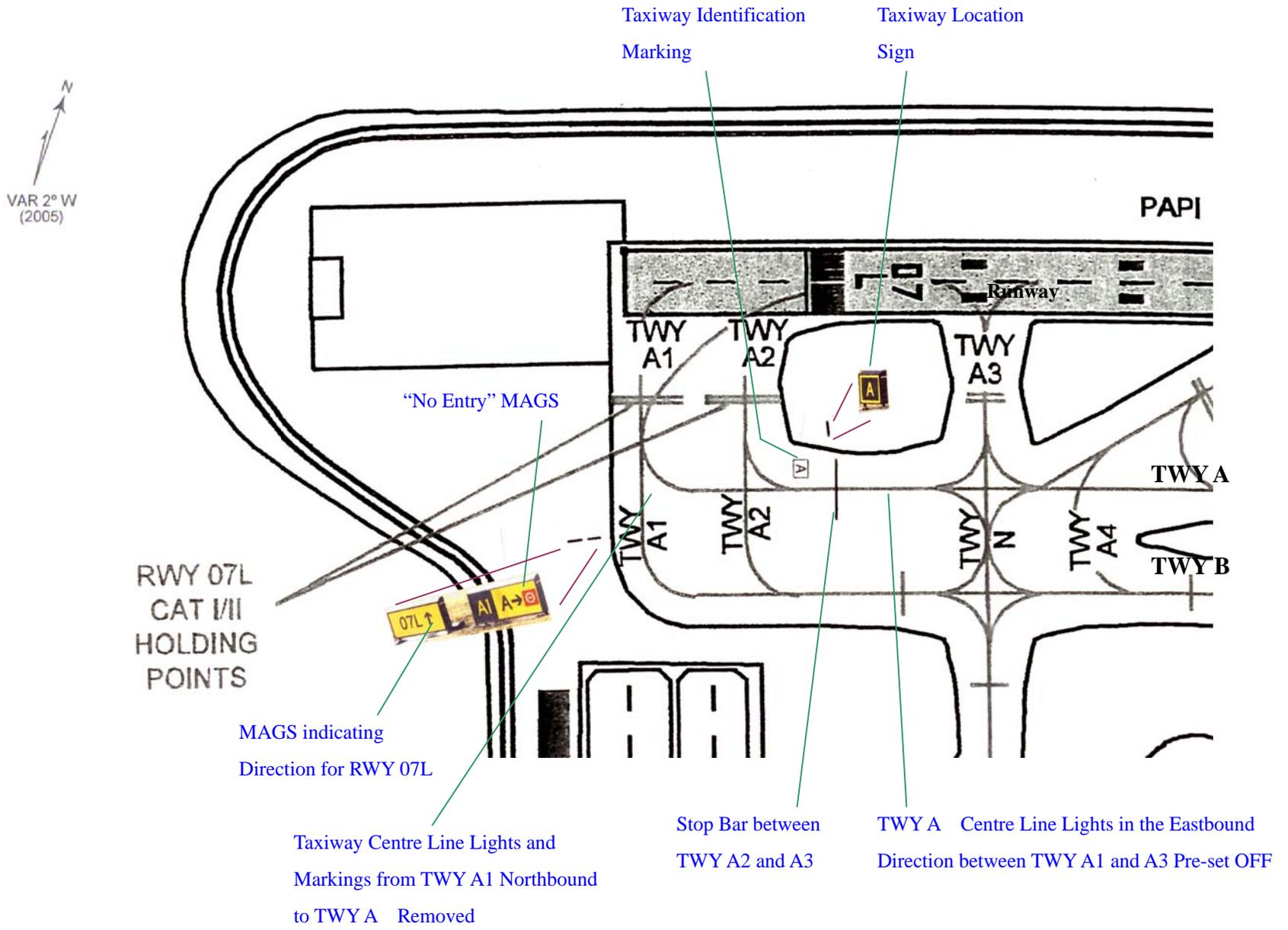
- 2.1 The location of the hot spot is the area around the junction of **Taxiway A1 and Taxiway A** (see attached airport chart).

**3. Further Information**

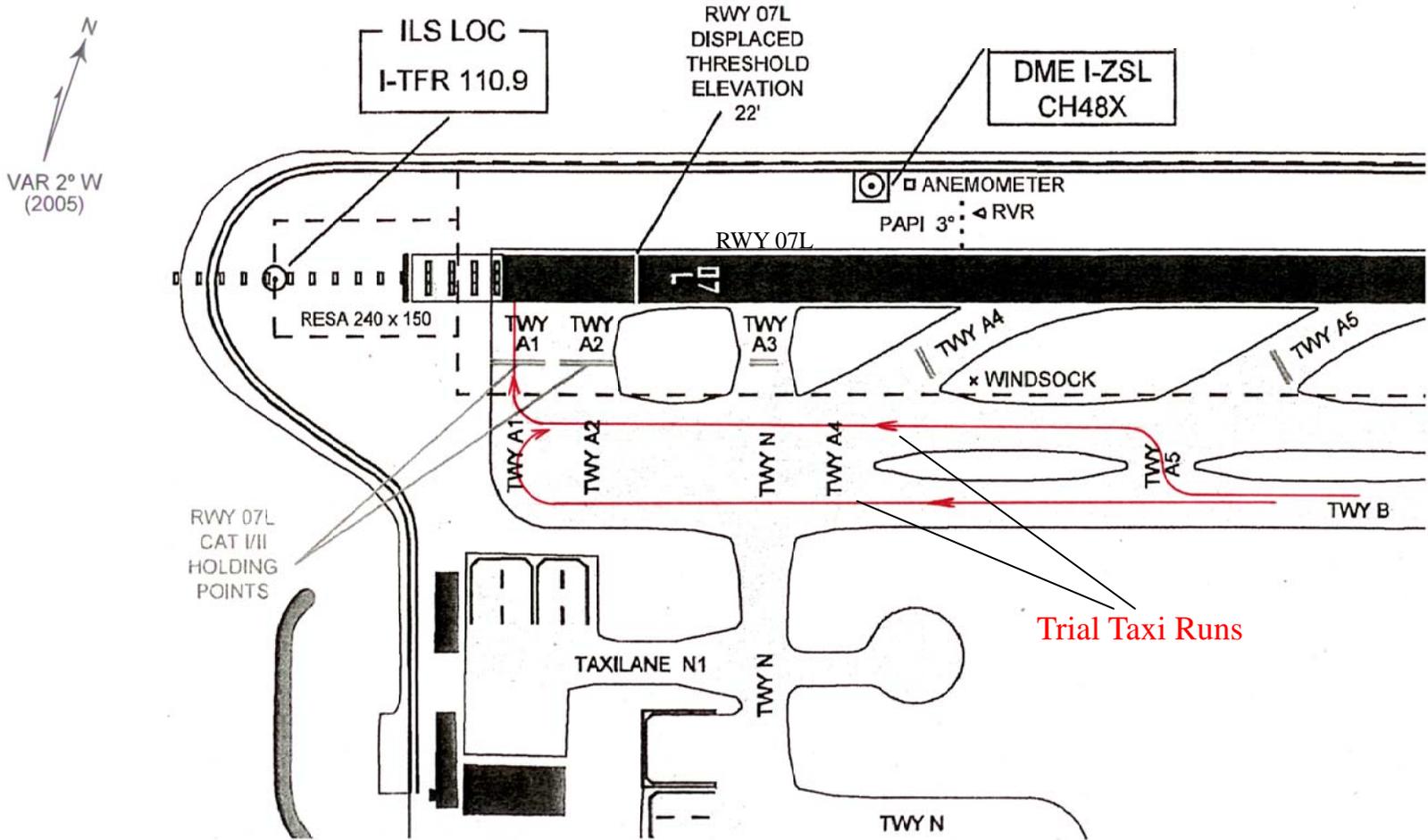
- 3.1 All three incidents occurred in the early hours of the morning to aircraft that were taxiing for departure on Runway 07L. On each occasion ATC gave taxi instructions to proceed via Taxiway B and Taxiway A1 to Runway 07L Holding Point. The pilots taxied to the end of Taxiway B and turned right on to Taxiway A1, but then continued the right turn on to Taxiway A and attempted to take-off thinking that they were on the runway whereas they were actually on the taxiway.
- 3.2 Subsequent to these incidents, the taxiway centreline visual marking (yellow line) and taxiway centreline lights (green lights) on the arc between Taxiway A1 and Taxiway A (south side) have been removed.
- 3.3 Pilots should remain vigilant and maintain situation awareness at all times on the manoeuvring area, and be particularly alert to the latent threat when taxiing in the area of the hot spot.
-



# Improvement to Guidance for Aircraft in the Vicinity of TWY A1, TWY A2 and RWY 07L



# Trial Taxi Run



**Engine Control and Aircraft Performance Status During Take-off Phase**

