AAI Case Reference: 05/2011

AIR ACCIDENT INVESTIGATION DEPARTMENT

FINAL

AIR SERIOUS INCIDENT INVESTIGATION REPORT

AIRCRAFT SUBSTANTIAL DAMAGE AFTER COLLISION WITH PAPI LIGHT DUE TO RUNWAY CONFUSION

CL600-2B19
A6-BNH
Gama Aviation FZC
Dubai International Airport,
United Arab Emirates
9th May, 2011

General Civil Aviation Authority
of
United Arab Emirates

OBJECTIVE

This investigation is performed in accordance with the UAE Federal Act № 20 of 1991, promulgating the Civil Aviation Law, Chapter VII, Aircraft Accidents, Article 48, and in conformity with ICAO Annex 13 to the Chicago Convention.

The sole objective of this investigation is to prevent aircraft accidents and incidents. It is not the purpose of this activity to apportion blame or liability.

LIST OF ABBREVIATIONS

AAI	:	Air Accident Investigation Department
ATC	:	Air Traffic Control
ATS	:	Air Traffic Service
CVR	:	Cockpit Voice Recorder
GCAA	:	General Civil Aviation Authority
Kts	:	'Knot'- a unit of speed equal to one nautical mile per hour
m	:	meters
SMR	:	Surface Movement Radar
SSFDR	:	Solid State Flight Data Recorder
UAE	:	The United Arab Emirates
UTC	:	Coordinated Universal Time
VCR	:	Visual Control Room

1. FACTUAL INFORMATION

1.1 HISTORY OF THE FLIGHT

On May 9th, 2011, at approximately 1535 UTC, a Bombardier Aerospace CL600-2B19, registration A6-BNH, was cleared for pushback out of Bay E36 in Dubai International Airport for a flight from Dubai, United Arab Emirates to Dammam, Saudi Arabia with two flight and one cabin crewmembers.

The Aircraft started to taxi towards the assigned takeoff runway (RWY) 30L. The taxi plan was to reach RWY 30L through Taxiway P, to N9, crossing RWY 30R, taxiway M and then M20, the taxi went uneventful, the "Taxiing Checklist" was completed along Taxiway P on the way to RWY 30L.

The Aircraft was instructed by the tower controller to stop a while hold at the runway holding position and wait for a taking off Boeing 737 and landing Boeing 777.

After approximately 1 minute and 22 seconds at the runway holding position, the Aircraft received the line-up instructions from the tower controller, each of the two pilots checked his side for clearance, the captain called-out for the "Before Takeoff Checklist", and the Aircraft started to move towards the runway at approximately 15:39:51 UTC[1].

At 15:40:00, the "Before Takeoff Checklist" was started, the checklist items were read by the co-pilot, while the actions were performed and read back by the captain. The checklist was completed while entering the runway.

After entering the runway, the Aircraft kept rolling until stopped before the runway threshold where it was mistakenly lined up with the right runway edge line instead of lining up with the runway centreline.

At 15:40:43, the Aircraft's controls were transferred to the co-pilot.

At 15:40:52, the Aircraft was cleared for takeoff, four seconds later the captain called "three zero left" to which the co-pilot responded the same.

At 15:41:01, the thrust levers were advanced and the Aircraft started to accelerate.

Seven seconds later, two bumping sounds were heard in seven seconds apart. The second sound was acknowledged by the two pilots.

The Aircraft continued the acceleration, at 15:41:23 the captain called-out "80 kts" which was checked and affirmed by the co-pilot.

At approximately 15:41:26, 90 kts, the right wing of the Aircraft collided with the runway nearest PAPI[2] light unit when the captain immediately called for "stop". Shortly thereafter, the aircraft engines thrust levers were retarded and the Aircraft started to decelerate.

The Aircraft vacated the runway via Taxiway P and parked at C19 where the crew disembarked normally with no injuries.

[1] Sunset time at that date was 1451 UTC.

[2] The **P**recision **A**pproach **P**ath **I**ndicator (**PAPI**) is a visual aid that provides guidance information to help a pilot acquire and maintain the correct approach (in the vertical plane) to an aerodrome or an airport. RWY 30L at Dubai International Airport contains four PAPI light units near to each of its two edges.

1.2 INJURIES TO PERSONS

Table 1- Injuries to Persons				
Injuries	**Crew**	**Passengers**	**Total in Aircraft**	**Others**
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	3	0	3	0
TOTAL	3		3	0

1.3 DAMAGE TO AIRCRAFT

Because of impacting the PAPI light unit, the right wingtip leading edge was deformed, the wingtip fairing lower skin was torn, the right strobe light and its fixing bracket detached.

The front right wing spar sustained a minor dent.

Figure 1 depicts a general view to the Aircraft damage.

Figure 1- General view of the Aircraft damage

1.4 OTHER DAMAGE

The right runway nearest PAPI light unit was stripped off.

1.5 PERSONNEL INFORMATION

Table 2- Flight crew qualifications and experience		
	Pilot in command	**Co-pilot**
Gender	Male	Male
Date of birth	29/01/1962	21/12/1960
Foreign licence number and validity	309480, 01/08/2014	UK/CP/263169E/A, 17/07/2013
UAE licence number and validity	36574, 06/07/2018	38587, 24/11/2018
UAE licence category and rating	ATPL, CL604/605, CRJ 100	CPL, CRJ 100
Class and date of last medical	Class 1, 06/06/2010	Class 1, 03/10/2010
Flying experience		
Total all types	12275	2650

Total Command on all types	6350	550
Total on type	3800	145
Total last 30 days	29.5	29.5
Total last 24 hours	9.2	9.2
All classroom training and checking	OPC/LPC, due on 30/09/2011	OPC/LPC, due on 30/09/2011
Line and proficiency check	Due 14/12/2011	Due 07/04/2012
English language proficiency	Level 6	Level 4, reassess on 04/03/2012
Previous rest and duty period		
Off duty	05/05/2011- 1720 UTC	05/05/2011- 1720 UTC
On duty	09/05/2011- 1330 UTC	09/05/2011- 1330 UTC

1.6 AIRCRAFT INFORMATION

Manufacturer: Bombardier Aerospace, Canada

Type: CL600-2B19

MSN: 8069

Registration: A6-BNH

State of Registration: The United Arab Emirates

C of R Date of Issue: November 29th, 2010

C of A Date of Issue: December 16th, 2010

The records did not reveal airworthiness anomalies that might lead to such an occurrence, the records also showed that the Aircraft was certificated, equipped, and maintained in accordance with the UAE Civil Aviation Regulations and no mechanical discrepancies were entered in the technical logbook prior to the flight.

1.7 METEOROLOGICAL INFORMATION

Not a factor

1.8 AIDS TO NAVIGATION

Not a factor

1.9 COMMUNICATIONS

Not a factor

1.10 AERODROME INFORMATION

1.10.1 Runways

Dubai International Airport has two runways: 30L/12R and 30R/12L. RWY 30L was constructed three years ago and equipped to serve the CAT I operations. Low Visibility Operations ("LVO") are limited on this runway.

The length of RWY 30L is 4090 m and its width is 60 m, the runway has two continuous white lines at its two edges and uniformly spaced stripes along its centerline.

Two sets of bi-directional lights are installed at the two edges, the color of lights changes along the runway, in general, the colors are white, amber and red. RWY 30L edge lights begin before the threshold and extend thereafter. The spacing between the edge lights is 60 m, the first 3720 m are white, and the last 600 m are amber lights, such arrangements of lighting indicate that RWY 30L is a full landing-availability runway.

On the other hand, RWY 12R has a displaced landing threshold as indicated by red lights fixed to the first 720 m of the edge, the lights become white in the second 3000 m portion, the last 600 m lights are amber to indicate the approach to the runway end.

Both 12R and 30L centerline lights are white bi-directional, 15 m spacing, first 3420 m white, next 600 m alternate white/red and last 300 meters red. This white/red then all red color coding is to provide a clear indication to pilots when they are approaching the end of the runway.

Lead-in lines and green centre lights extend from Taxiway M20 into RWY 30L and meets with its centreline. The Investigation revealed that getting confused while entering the runway from taxiway M20 would be most unlikely if the lead-in lights and/or white marks are tracked properly.

On the day of the Incident, and for permitting the Aircraft to enter RWY 30L, the tower controller switched off M20 stop bar, lead-in lights came ON with 10% intensity, no failed lamps on stop bar or lead-in light segments were reported.

The lighting intensity report showed that during the period from 1500 to 1550 UTC, RWY 30L edge lights were ON, at 3% intensity, and the runway centerline lights were also ON, at 3% intensity

1.10.2 Surface Movement Radar ("SMR")

The Airport is equipped with SMR for monitoring the manoeuvring area, RWY 30L is included in the survey range of the radar, and the display is located in the control tower.

According to the Civil Aviation Regulations, Part IX, paragraph 4.20.8, surface movement radar for the manoeuvring area should be provided at an aerodrome when intended for use in Runway Visual Range conditions less than a value of 300 m or in the absence of visual observation of all or part of the manoeuvring area from an aerodrome control tower. Paragraph 4.20.9 adds that the surface movement radar, when provided, shall be utilized to monitor the movements of aircraft and vehicles on the manoeuvring area, provide directional information to pilots and vehicle drivers as necessary, and provide advice and assistance for the safe and efficient movement of aircraft and vehicles on the manoeuvring area. Paragraph 4.20.10 states that surface movement radar for the manoeuvring area shall be provided at aerodrome when traffic density and operating conditions are such that regularity of traffic flow cannot be maintained by alternative procedures and facilities.

Paragraph 8.10.2.1 of ICAO Doc. 4444 states that "the use of SMR should be related to the operational conditions and requirements of the particular aerodrome (i.e. visibility conditions, traffic density and aerodrome layout)".

Paragraph 8.10.2.2 adds:

"SMR should be used to augment visual observation of traffic on the manoeuvring area and to provide surveillance of traffic on those parts of the manoeuvring area which cannot be observed visually.

The information displayed on an SMR display may be used to assist in:

(a) monitoring of aircraft and vehicles on the manoeuvring area for compliance with clearances and instructions;

(b) determining that a runway is clear of traffic prior to a landing or takeoff;

(c) providing information on essential local traffic on or near the manoeuvring area;

(d) determining the location of aircraft and vehicles on the manoeuvring area;

(e) providing directional taxi information to aircraft when requested by the pilot or deemed necessary by the controller. Except under special circumstances, e.g. emergencies, such information should not be issued in the form of specific heading instructions; and

(f) providing assistance and advice to emergency vehicles".

In paragraph 8.10.2.3, where SMR is used, aircraft may be identified by one or more of the following procedures:

(a) by correlating a particular position indication with:

  i. an aircraft position visually observed by the controller;

  ii. an aircraft position reported by the pilot; or

  iii. an identified position indication displayed on a situation display;

(b) by transfer of identification when authorized by the appropriate ATS authority; and

(c) by automated identification procedures when authorized by the appropriate ATS authority".

The ATC Local Air Traffic Service Instructions manual does not require the use of the surface movement radar as a primary reference to monitor the movement of aircraft on the maneuvering area.

1.11 FLIGHT RECORDERS INFORMATION

Both flight recorders (SSFDR and CVR) were removed next day to the Incident and then transported to the AAI's Flight Recorders Lab located at the GCAA's headquarters in Abu Dhabi.

The identification plate of the SSFDR showed that its part number was 2100-4043-00 and serial number was 000550012. The CVR part and serial numbers were 2100-1200-00 and 000403027, respectively.

Both recorders were in good conditions, their attached batteries were tagged with inspection stickers showing that their next inspection dates were still not due.

The recorders were opened and downloaded at the Flight Recorders Lab in the GCAA's headquarter at Abu Dhabi, all extracted recordings and parameters were used to analyse the flight sequence.

1.12 WRECKAGE AND IMPACT INFORMATION

The Aircraft was intact except the right strobe light and its bracket detachment

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

The medical lab test did not reveal any psychoactive material in the blood samples of both flight crewmembers.

1.14 FIRE

None

1.15 SURVIVAL ASPECTS

The crew disembarked the Aircraft normally.

1.16 TESTS AND RESEARCHES

For the purpose of simulating the Incident, a taxi test was performed on June 2nd, 2011 with similar conditions prevailing at the time of occurrence, lights intensity and taxi path. The aspects of the test were to check the flight deck visibility and the lighting of environment surrounding the airport from the point of stand departure to the holding position as well as line up position.

A GCAA team was composed and split into two groups; one group went onboard the testing aircraft[3], the other group stationed at the control tower to observe the aircraft movement from the VCR view.

A Follow-me car was also dispatched to follow the testing aircraft at an efficient safety distance. The task of the team was to collect observations on the movement of the testing aircraft. The onboard group recorded the testing trip by a video camera, the group of the follow-me car took photos and videos whereas the group of the control tower documented the testing aircraft movement by taking notes and photos.

The test was done twice to infer two scenarios, the first scenario was to enter into RWY 30L via Taxiway M20 and line up with the runway edge line, the second was to enter the runway via Taxiway M20 and line up with the runway centreline.

The test revealed no physical or marking distraction along the taxi path from the departure point up to the runway. On the other hand, floodlights, fixed at a position directly opposite to the stop bar, were emitting intensive light that might be of some influence on eyesight in cases of long waiting at RWY 30L stop bar (figures 2a and 2b).

[3] The testing aircraft was Bombardier CL604 with almost similar cockpit view to the Incident Aircraft.

Figure 2a- Cockpit view showing the way towards the stop bar

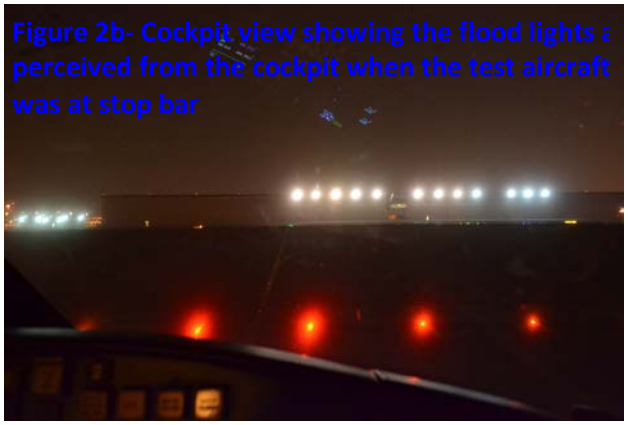

Figure 2b- Cockpit view showing the flood lights a perceived from the cockpit when the test aircraft was at stop bar

From the perspective of the VCR, the test revealed that the long aerial distance from VCR to RWY 30L threshold (4090 m), the steep sight angle, the imbroglio of lights and further confusion caused by the nearby car roads lights, were all factors that could obstruct the VCR sight ability on aircraft lining up with RWY 30L.

The test aircraft position, in relation to the runway centre and edge lines, was observed at the SMR display.

1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION

1.17.1 Operation's Manual

According to Part B15 of the Operation's Manual, paragraph 2.3.4 (*Taxiing*), the manual assigns the taxiing duties as per table 3 below.

Table 3- Assigned duties in Taxiing

HANDLING PILOT	MONITORING PILOT
Taxi the aircraft and complete all checks. Call for Before Take-Off checklist down to the line.	Request Taxi.
Maintain a lookout.	Monitor Taxi and read Before Take-Off challenge and response checklist down to the line. Copy ATC Clearance and discuss.
Maintain listening watch on frequency.	
Review take-off brief, if no change call "Departure as briefed", review to include weather radar and terrain, Performance, Emergency Turn, Departure, Stop Altitude. (PEDS).	
	Call "Before Take-Off checklist down to the line complete".

In paragraph 2.3.5 (Take-Off and Initial Climb), the manual assigns the duties in takeoff and initial climb as per table 4 below.

Table 4- Assigned duties in Take-Off and Initial Climb[4]	
HANDLING PILOT	**MONITORING PILOT**
Call for Before Take-Off checklist below the line.	Obtain ATC line-up clearance. Carry out flow procedure.
Check approach clear	Read Before Take-Off checklist below the line. Confirm approach clear and runway Clear
Taxy Aircraft into position. Carry out (FATS) Check. Flaps, Airbrakes, Trims, Speeds.	Obtain Take-Off clearance.
Announce "Take-Off". Advance Thrust Levers to vertical position.	Confirm and announce "Engines Stable".
Advance Thrust Levers towards Take-Off Power, call "Set Take-Off thrust"	Fine Tune thrust levers to take-off power, call "take-off thrust set". Start stopwatch. Call "Speed alive on all three ASI"s".
Call "My thrust levers" when set.	Monitor engine instruments and all flight instruments Call "80 knots".
Confirm 80 Knots, respond "Check"	Call "V1", "Rotate".
…….	

The "Before Takeoff Checklist" includes the items listed in table 5.

Table 5- Before Takeoff Checks	
Lights and Strobes…….As Required	PLT [5]
FUEL, XFLOW……..MAN/Off	PLT
IGNITION/ANTI-ICE……As Required	PLT
Flight Attendant…… ..Advised	PLT
Transponder/TCAS……ON/As Required	PLT
Radar……As Required	PLT
Terrain Display <0040>……As Required	PLT
CAS……..Checked and Cleared	BOTH[6]

In paragraph 2.4.3 (*Areas of Responsibility- Task Sharing)*, the operating procedures and flight crew duties are assigned according to:

- *"Area of Responsibility Concept"* [7], which are areas of the cockpit panels and consoles that are operated by a specific pilot.

[4] The checklist illustrated in this table does not show all the items in the original list as depicted in the Operation's Manual, Part B15, section 2.3, page 4

[5] PLT- Pilot in Command

[6] BOTH- Both crewmembers

- "The mission phase". Pre- and post-flight duties are shared between the Pilot-in-Command and the Co-Pilot, while in-flight phases are shared between the Handling Pilot (HP) and the Monitoring Pilot (MP), or both pilots. [8]

According to the mission phase, pre- and post-flight duties are shared between the Pilot-in-Command and the Co-Pilot, while in-flight phases are shared between the HP and the MP, or both pilots. All the normal procedures are to be carried out using the "challenge and Response" technique.

The actions in this case are carried out according to the procedures checklist; the MP does the in-flight reading of the items while the co-pilot does the on-ground reading. The exception to this is the bold items where both pilots are expected to respond i.e. they both confirm that they have seen the selected item(s)".

Whenever a co-pilot is handling the aircraft, the captain may take control at any time, clearly indicating that he has done so.

Regarding the rejected takeoff, paragraph 2.3.6 of the Manual, it is the captain's responsibility to stop the aircraft using rudder fine steering and/or tiller as appropriate.

1.18 ADDITIONAL INFORMATION

The "Before Takeoff Checklist" was completed while entering RWY 30L. The Checklist was called-out by the captain, read by the co-pilot, performed and read back by the captain. At that time, the captain was the HP.

According to the co-pilot interview, he was assumed to have controls once the Aircraft is lined up on the runway centreline. The co-pilot added that he slowly advanced the thrust levers and started takeoff run, he asked the captain to set thrust to the required N1 setting.

As heard in the CVR recording, the captain called out for the 80 kts, and the co-pilot read back the reading. When the Aircraft impacted the PAPI light, the captain called for "stop" and he aborted the takeoff. The sequence of events from the beginning of the takeoff roll indicated that the controls were handed to the co-pilot from the captain at the beginning of roll until the captain has called to stop and subsequently aborted the takeoff.

The CVR contained the first transfer (from the captain to the co-pilot) whereas there was no recording pertaining to the second transfer after the impact was realised by the captain.

1.19 USEFUL AND EFFECTIVE INFORMATION

None

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[7] The Manual defines the "Areas of responsibility" as areas of the cockpit panels and consoles that are operated by a specific pilot. These areas exist for the sake of crew co-ordination and a pilot must always advise the other pilot if he is intending to operate something at the other pilot's Area of Responsibility.

[8] According to the Operation's Manual, Part B15, the following definitions apply:

Handling **P**ilot **("HP")-** The HP will be the pilot manipulating the controls of the aircraft. This designation will apply to either the PIC or the First Officer, depending on who is controlling the aircraft.

Monitoring **P**ilot **("MP")-** The MP will be the pilot not actively flying the aircraft by manipulating the controls. This designation will apply to either the PIC or the First Officer, depending on who is controlling the aircraft.

2. ANALYSIS

The rest period was adequate, and the Incident occurred in the initial flight phases, there were no clues that fatigue was affecting the crew performance.

During taxiing and entering the runway, the MP, who was the co-pilot, did not realise the abnormal situation and he did not advise for correcting the Aircraft positioning. Even though both pilots were having opportunity to re-evaluate the Aircraft misalignment when the Aircraft stopped before the runway threshold waiting for the takeoff clearance, the crew were busy in transferring the control without realising that the Aircraft was not lined up to the centreline.

When the Aircraft started to move to the runway from the holding position, the crew started to perform the before-takeoff checklist.

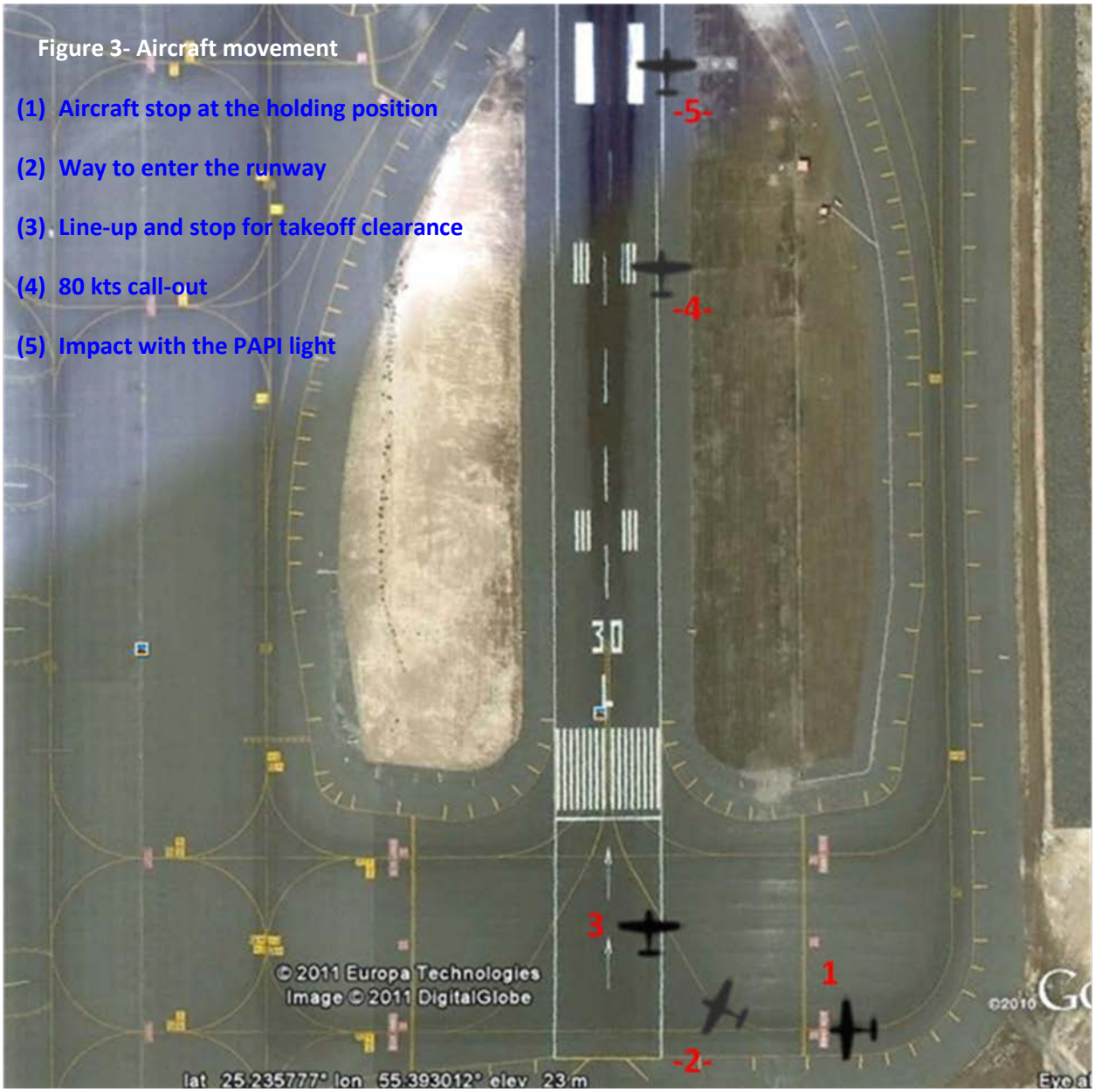
During the Aircarft stoppage before the runway threshold, to the right of the runway edge line; two sets of runway lightings would have appeared to the crew, i.e. the centre and left edge lights, the non existence of the right row of lights did not bring the attention of the crew. In addition, the fact that the runway edge line is solid whereas the centreline is dashed line would have brought further clues to the crew to differentiate between both lines. There was no indication that the crew peripheral vision was burdened by weather, darkness or aircraft front windshield visibility obstructions.

In “task-sharing” concept, the pre- and post-flight duties are shared between the captain and co-pilot, while in-flight phases are shared between the HP and the MP, or both pilots, therefore the captain shall always pay his attention to the tasks of taxiing the aircraft, keeping continuous lookout, and watch communications. Since the Aircraft tiller steering is only available at the console of the left seat, the HP in the taxiing phase shall always be the captain. By the same logic, the aircraft controls shall always remain to the left seat until the line-up.

The movement of the aircraft shall include close peripheral capturing of the aircraft environment and visual references and aids. In this Incident, the crew did not capture the situation and the monitoring capability was lost. When the Aircraft stopped for a while before the runway threshold waiting for takeoff clearance, the crew were preparing their minds to switch controls, it seems that their concentration was not on the Aircraft surrounding situation rather than looking ahead for the takeoff roll.

The period, from the point of Aircraft stoppage at the runway holding position until the Aircraft started the takeoff, could be divided into three time segments. During each segment, the crew were busy on activities that deviated from their primary tasks on runway entry which took away their attention to the situation of the Aircraft in relation to the runway’s lines and/or lights (see figure 3):

- The first time segment was when the Aircraft was waiting for a preceding landing of B777 aircraft; the crew were busy with monitoring the landing aircraft since they should determine the safe time of entering the runway (Position 1 in figure 3);
- The second time segment was while the Aircraft was moving towards the runway, entering and taxiing until it stopped before the threshold; the crew were busy with performing the “Before Takeoff Checklist” (Position 2 in figure 3); and
- The third time segment was when the Aircraft stopped before the runway threshold waiting for takeoff clearance; the crew were busy for obtaining the takeoff clearance and transfer of control (Position 3 in figure 3).



Although the company procedure in the "Before Takeoff Checklist" was according to the minimum standards of the Civil Aviation Regulations and recognised SOP, the procedure could not protect the crew to mistakenly line-up the Aircraft.

On the other hand, taxiway to runway lead-in lines and lights were obvious enough. If they were tracked properly, they would have led the Aircraft to the runway centreline.

The 1 minute 22 seconds of waiting at the hold position might not be long time enough to affect the crew eyes sight by the high intensity floodlights in front of the RWY 30L stop bar, but the investigation could not determine whether longer times might affect crew eyes' performance.

The long aerial distance between the VCR to RWY 30L threshold, the steep sight angle, the lights pollution affecting the VCR view; might render the use of the SMR during critical situations such as the line-up phase a beneficial expedient.

3. CONCLUSIONS

3.1 FINDINGS

(a) The crewmembers were possessing pilot crew licenses issued by the GCAA in accordance with the UAE Civil Aviation Regulations, Part II, Chapter 2.

(b) The Aircraft was properly certificated and maintained.

(c) The transfer of control between the captain and co-pilot happened two times: one from the captain to the co-pilot at the beginning of the takeoff roll, and the other from the co-pilot to the captain after the "stop" call-out. In both cases, the transfer of control was not conforming with the Operations' Manual, Part B, in that:

1. the terms used in the first transfer were not consistent with those in the Manual; and
2. the second transfer was not explicit.

(d) The Operation's Manual does not include a check item of the meaning "check the aircraft position in relation to the runway centre line".

(d) The taxiway and runway marking lines and lights were in compliance with the Civil Aviation Regulations, Part IX and in conformance with the Standard Practices of Annex 14 to the Chicago Convention.

(e) The intensity of the runway and taxiway lightings had no influence on the cockpit runway visibility.

(f) The test aircraft was seen on the monitor of the Airport Surface Movement Radar in reference to the runway centreline.

(g) Neither the Civil Aviation Regulations nor the ATC Local Air Traffic Service Instructions manual mandates the tower controller to use the SMR is such conditions. The Standard Practices set forth in ICAO Annex 14 and ICAO Doc. 4444 do not require the use of the SMR as a primary reference to monitor the movement of aircraft on the maneuvering area.

(h) The instructions of the tower controller were clear, well read and listened to by the crew.

3.2 PROBABLE CAUSE

The Air Accident Investigation Department determines that the probable cause of the Serious Incident was the impact with the runway nearest PAPI light after incorrect line-up with the runway edge line instead of centerline. The incorrect line-up was due to the crew confusion between the runway center and edge lights.

Contributing factor to the Serious Incident was that neither of the two pilots realised the misalignment situation due to that their situational awareness was overwhelmed by activities not enabling them to have adequate peripheral vision outside the cockpit.

3.3 SAFETY CONCERNS

Floodlights affect on waiting crew at RWY 30L holding positions might have a positive relation with the waiting time period.

4. SAFETY RECOMMENDATIONS

4.1 Safety Recommendations related to Findings, Probable Cause and Contributing Factors

The Air Accident Investigation Department recommends that:

The Operator should-

SR 12/2011

Enhance his procedure to ensure that situational awareness of the pilots is more coherent with the actual case; pilots' lookout should be more relying on peripheral vision with minimised distraction by other cockpit activities that could be done at different times and situations.

SR 13/2011

Enhance his policy and procedure to assure proper transfer of controls between the captain and co-pilot.

The Air Traffic Control Management should-

SR 14/2011

Forward advisory material to tower controllers highlighting the availability the SMR as an augmentation tool for the surveillance of aircraft and vehicles on the manoeuvring areas, particularly when the method of direct visual surveillance may be insufficient to ensure correct positioning or safe operation of aircraft or vehicles and based on the controller's situation's risk assessment.

4.2. Safety recommendation related to Safety Concerns

The Air Accident Investigation Department recommends that:

Dubai Airports Company-

SR 15/2011

Conducts a safety risk assessment on the influence of the floodlights on the crew sight ability.

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