الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY

United Arab Emirates

Air Accident Investigation Sector

Incident

- Final Report -

AAIS Case N°: AIFN/0015/2013

Helicopter Collision with Jetblast Fence during Taxi

Operator: Falcon Aviation Services
Type: Agusta 109S
Registration Mark: A6-MSM
Place of Occurrence: Al Ain International Airport
State of Occurrence: United Arab Emirates
Date of Occurrence: 31 December 2013

Air Accident Investigation Sector
General Civil Aviation Authority
The United Arab Emirates

Incident Brief

GCAA AAI Report No.:	AIFN/0015/2013
Operator:	Falcon Aviation Services
Aircraft Type and Registration:	Agusta 109S, A6-MSM
MSN	22019
No. and Type of Engines:	Two engines, PW207C
Date and Time (UTC):	31 December 2013, 0700
Location:	Al Ain International Airport
Type of Flight:	Transport (Passenger)
Persons On-board:	2
Injuries:	None

Investigation Objective

This Investigation is limited to the aspects related to the Aircraft Collision with other Object on Ground; no in-depth analysis of non-contributing factors was undertaken.

This Investigation is performed pursuant to the UAE Federal Act No. 20 of 1991, promulgating the Civil Aviation Law, Chapter VII, Aircraft Accidents, Article 48. It is in compliance with the UAE Civil Aviation Regulations, Part VI, Chapter 3, in conformity with *Annex 13 to the Convention on International Civil Aviation* and in adherence to the *Air Accidents and Incidents Investigation Manual*.

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.

Investigation Process

The occurrence involved an Agusta 109S, registration A6-MSM, and was notified to the General Civil Aviation Authority (GCAA) by phone call to the Duty Investigator (DI) Hotline Number +971 50 641 4667.

After the Initial/On-Site Investigation phase, the occurrence was classified as an 'Incident'.

An Investigation Team was formed in line with the ICAO Annex 13 obligations of the United Arab Emirates (UAE), being the State of Occurrence.

Notes:

1 Whenever the following words are mentioned in this Report with the first letter Capitalized, it shall mean:

- (Helicopter)- the helicopter involved in this Incident.
- (Airport)- Al Ain International Airport.
- (Investigation)- the investigation into this Incident.
- (Incident)- this investigated Incident.
- (Report)- this Incident Investigation Report.

2 Unless otherwise mentioned, all times in this Report are 24-hour clock in Coordinated Universal Time (UTC), (UAE Local Time minus 4).

3 Photos used in the text of this Report are taken from different sources and are adjusted from the original for the sole purpose to improve clarity of the Report. Modifications to images used in this Report are limited to cropping, magnification, file compression, or enhancement of color, brightness, contrast or insertion of text boxes, arrows or lines.

Synopsis

On 31 December 2013, at approximately 0225 UTC, an Agusta 109S helicopter, registration A6-MSM, was scheduled to operate a private (VIP) flight, Falcon 55, from Al-Bateen Executive Airport, Abu Dhabi, to Al Ain International Airport, Al Ain.

While Falcon 55 was taxiing inbound, it taxied straight ahead towards a jetblast fence situated on the edge of the ramp to the right hand side of the Helicopter. The Tower Controller contacted the crew and informed them that the Helicopter might have approached very close to the jetblast fence.

The crew confirmed to the Tower that the helicopter had contacted the jetblast fence.

The tips of the main rotor blades struck the jetblast fence causing damage to all four main rotor blades. When the Commander realised that the main rotor had struck the jetblast fence, he immediately shut down the engines.

The causes of the impact incident were the inappropriate taxiing procedures followed by the crew and the crew had insufficient situational awareness.

One safety recommendation is addressed to Falcon Aviation Service to enhance the crew training including the external peripheral during helicopter ground movement for taxiing and parking phases. One safety recommendation is addressed to Al Ain International Airport to improve the level of ATC visual watch of manoeuvring/taxiing areas during aircraft ground movement.

Abbreviations and Definitions

AAIS	Air Accident Investigation Sector
ATPL	Air Transport Pilot License
CoA	Certificate of Airworthiness
CoR	Certificate of Registration
GCAA	General Civil Aviation Authority of the United Arab Emirates
hrs	Hours
IFR	Instrument Flight Rules
M	Meter(s)
METAR	A format for reporting weather information
MSN	Manufacturer Serial Number
NM	Nautical Miles (distance unit)
No.	Number
PH	Pilot Handling
PIC	Pilot-in-Command
QNH	The barometric altimeter setting that will cause the altimeter to read airfield elevation when on the airfield.
TSN	Time Since New-flight hours
UAE	The United Arab Emirates
UTC	Coordinated Universal Time
VFR	Visual Flight Rules

Contents

1. Factual Information

1.1 History of Flight

On 31 December 2013, at approximately 0225 UTC, a Helicopter Agusta 109, registration A6-MSM owned and operated by Falcon Aviation Services (FAS), was scheduled to operate flight Falcon 55, from Al-Bateen Executive Airport, Abu Dhabi, to Al Ain International Airport, Al Ain. The Helicopter was certified as a "Transport (Passenger)" operation for both visual and instrument flight rules (VFR and IFR). The flight was operated under visual meteorological conditions (VMC), and the crew was aware of the meteorological information along the route, and at the destination.

The Pilot Flying (PF) was operating the controls of the helicopter from the right hand seat, while the Pilot Monitoring (PM) was handling communications with ATC from the left hand seat. The flight was uneventful.

Upon arrival at Al Ain International Airport, at approximately 0249 UTC, Falcon 55 contacted Al Ain ATC advising their arrival. ATC informed Falcon 55 that they were to follow another helicopter, call sign LIVA 2012, and instructed Falcon 55 to continue inbound and to standby for clearance to cross the active runway. Falcon 55 confirmed continuing inbound. Then ATC asked Falcon 55 to confirm that they had LIVA 2012 in sight, and to confirm the number of people onboard. The crew confirmed visual with the aircraft ahead and that there were two VIPs onboard for stand nine. The same two VIP persons, were the crew of the Helicopter.

At 02:51 the Tower Controller cleared Falcon 55 to cross the active runway, landing taxiway Charlie, airtaxi into the main apron, and park on the shoulder. The crew acknowledged the instruction: "Follow Charlie to stand nine."

Then, at 02:52 ATC instructed Falcon 55 to continue to taxi inbound via taxiway Lima to the shoulder area, and then to park at the main apron. The crew acknowledged the instructions correctly.

Falcon 55 crossed the active runway and landed on taxiway Charlie. Falcon 55 then taxied into the main ramp, continuing inbound via taxiway Lima, to park on the shoulder of the assigned stand 09.

While Falcon 55 was taxiing inbound, it taxied straight ahead towards the jetblast fence, the Helicopter taxiing track did not follow the lead-in line, Taxiway Lima (Figure 1), but crossed the lead-in line to the right hand side for more than 30 meters towards Jetblast fence, at that time the ATC did not informed the crew that they are two closed to the Jetblast fence. At 02:55 UTC ATC contacted the crew and informed them that the Helicopter might have approached very close to the jetblast fence situated on the edge of the ramp to the right hand side of the Helicopter.

The crew advised ATC that the helicopter had contacted the jetblast fence.

The tips of the main rotor blades struck the jetblast fence causing severe damage to the all four main rotor blades. When the Commander realised that the main rotor blades had struck the jetblast fence, he immediately shut down the engines.

The Commander stated that the flight had been normal and upon arrival at Al Ain, taxi instructions were provided by ATC for bay 9 on the apron. In this area of the apron, there were two Boeing 747 aircraft and one helicopter parked on the edge of the apron.

After Falcon 55 crossed the main runway, it taxied onto taxiway 'Lima' and then onto the main apron. Falcon 55, then taxied around the edge of the apron area and onto the tarmac apron edge, as the helicopters are usually parked adjacent to the Boeing aircraft.

While taxiing, the crew maneuvered too close to a metal engine run up area jetblast fence situated on the edge of the apron area. The co-pilot was unable to warn the commander of the close proximity of the fence in time, and the tips of the main rotor blades struck part of the metal fence. There was a marshaller at the end of the apron but due to his distant position from the Helicopter, neither of the pilots was aware of his signals.

After the occurrence, the Helicopter was taxied away from the obstruction under marshalling signals and positioned opposite the Boeing aircraft, and the crew shut down the engines normally.

The airport marshaller stated that the Helicopter landed on taxiway Lima in the maneuvering area, taxied straight ahead towards the jetblast fence (engine run-up frame), then crossed the lead-in line to the right hand side for more than 30 meters towards Jetblast fence.. As he saw that, the marshaller became concerned that the Helicopter would hit the engine run-up area jetblast fence. Accordingly, he was giving signals to the helicopter crew to turn left. The marshaller was not visible to the commander, but he was visible to the co-pilot.

The Helicopter started to turn slightly to the left, but was not following the marshaller's signals. After the main rotor had struck the fence, as observed by the marshaller, the Helicopter continued to taxi and then followed the marshaller's signals after it struck the jetblast fence. The jetblast fence was located 15 meters from the edge of the Apron. The helicopter parked on the shoulder of bay 9.

Figure 1 illustrates the "Lima" taxi line relative to the jetblast fence

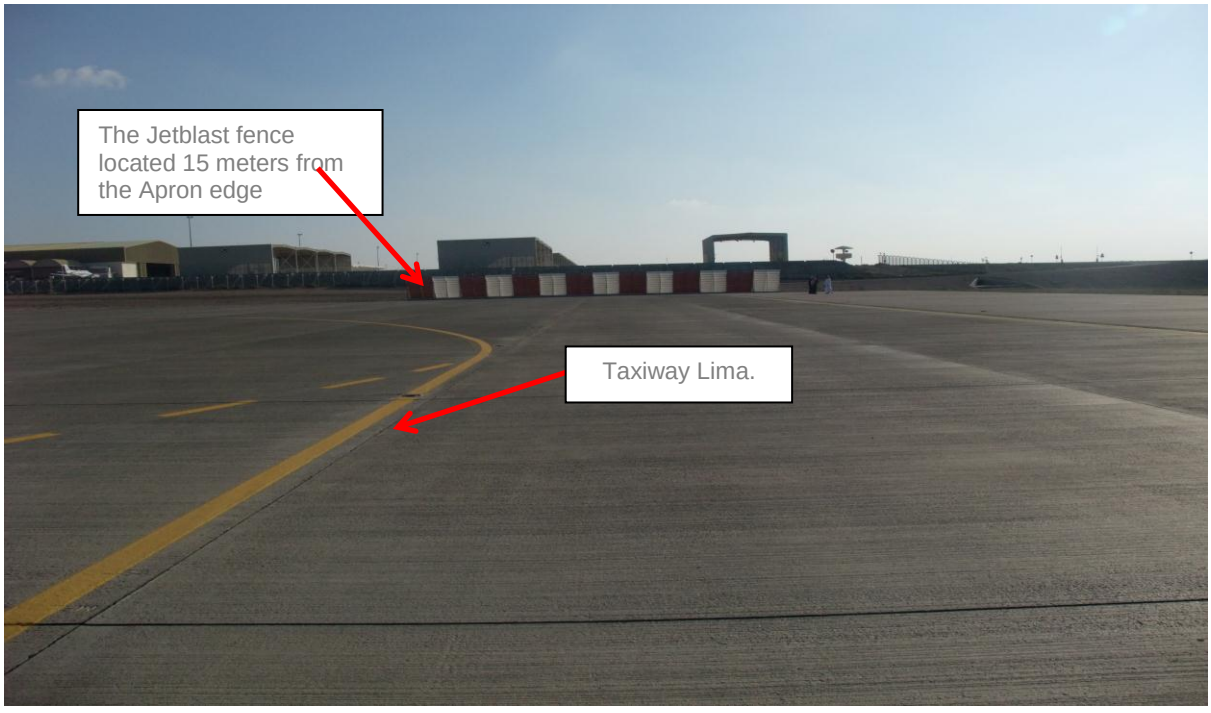

Figure 1. Apron area including jetblast fence, taxiway Lima and ramp

1.2 Injuries to Persons

No injury to any occupant was reported.

Table 1 shows the injuries to persons.

Table 1. Injuries to persons

Injuries	Flight Crew	Cabin Crew	Other Crew On-board	Passengers	Total On-board	Others
Fatal	0	0	0	0	0	0
Serious	0	0	0	0	0	0
Minor	0	0	0	0	0	0
None	2	0	0	0	2	0
TOTAL	**2**	**0**	**0**	**0**	**2**	**0**

1.3 Damage to Aircraft

The four blades of the main rotor sustained damage to a depth of 10 centimetres span wise, tip to root.

1.4 Other Damage

The jetblast fence sustained minor damage

1.5 Personnel Information

1.5.1 The commander

- The commander held a private pilot license issued by the GCAA on 12 February 2008 for the Bell 206, AW139, and A109S aircraft.

The medical file of the commander did not reveal any degraded pilot capacity due to medical reasons.

1.5.2 The co-pilot

The co-pilot held a valid Air Transport Pilot License (ATPL) with a valid medical certificate without degraded pilot capacity due to medical reasons.

1.5.3 The marshaller

The marshaller attended his most recent training in October 2011.

1.6 Aircraft Information

1.6.1 Helicopter general data

Table 2 illustrates general information related to the helicopter based on the records provided to the Investigation.

Table 2. Helicopter data	
Manufacturer:	Agusta SpA
Model:	A109S
MSN:	22019
Date of manufacture:	6 June 2006
Nationality and registration mark:	A6-MSM
Name of the owner:	Private
Name of the operator:	Falcon Aviation Service
Certificate of Airworthiness (CoA)	
Number: Valid to:	FAS/13 January 2014
Certificate of Registration (CoR)	
Number: Valid to:	108/08 No expiry date
Time since new (TSN)	1552 hours
Cycles since new (CSN)	3448

1.6.2 Engine data

Table 3 illustrates general information related to the engines.

Table 3. Engine data		
Engine type:		Turboshaft
Manufacturer:		Pratt & Whitney Canada
Model:		PW207C
No. 1 engine:		
	Serial number (S/N)	PC-E BH 0045
	TSN	1552
	TSO	Not applicable
No. 2 engine:		
	Serial number (S/N)	PC-E BH 0044
	TSN	1552
	TSO	Not applicable

1.6.3 Main rotor data

Table 4 illustrates general information related to the main rotor.

Table 4. Main rotor data	
Rotor type:	4-blades elastomeric hub with hydraulic lead lag dampers
Manufacture:	Agusta SpA
model:	109-0112-02-103
Serial number (S/N):	N56

TSN:	1552 hours

1.6.5 Weight and balance

The weight and balance of the Helicopter was not a factor in this Incident.

1.7 Meteorological Information

The Forecast for 31 December 2013, between 0600 and 0700, for Al Ain International Airport showed:

METAR OMAL 310600Z 14010KT CAVOK 18/07 Q1023 NOSIG=
METAR OMAL 310700Z 16011KT CAVOK 20/07 Q1023 NOSIG=

The wind speed was 10 to 11 knots, from 140 to 160 degrees, no clouds, clear visibility, temperature between 18 to 20 °C, dew point 7 °C, and QNH 1023 hpa[1].

Reviewing the data contained in the METAR reports, as received from the National Center of Meteorology & Seismology (NCMS), Ministry of Presidential Affairs, there were no records of significant meteorological conditions in the area at the time of the incident. In addition there were no pilot reports indicating any significant meteorological event.

On 31 December 2013, sunrise was at 0305 and sunset was at 1342.

The Incident flight operated in daylight.

1.8 Aids to Navigation

Ground-based navigation aids, onboard navigation aids, aerodrome visual ground aids and their serviceability were not a factor in this occurrence.

1.9 Communications

All communications between Air Traffic Services (ATS) and the crew were recorded by ground based automatic voice recording equipment for the duration of the flight. The quality of the crew's recorded transmissions was good.

1.10 Aerodrome Information

Al Ain International Airport is a GCAA certificated airport, located 8 NM from Al Ain City, capable of IFR/VFR 24 hour operation.

The Airport elevation is 869 ft, equipped with one asphalt runway 01/19 with concrete ends. The elevation of runway 19 is 257 m (842 ft), Takeoff Run Available (TORA) is 4,000 m (13,123 ft), and Takeoff Distance Available (TODA) is 4,400 m (14,435 ft). The Accelerate-Stop Distance Available (ASDA) is 4,000 m, Landing Distance Available (LDA) is 4,000 m (13,120 ft), and the width is 45 m (148 ft). The true and magnetic bearings are 187°/186° respectively, with 1.3°E magnetic variation. The runway slope is variable over the whole length from 0.62% to 0.07%.

The taxiway guidelines at the apron area were of a conspicuous color, but the Helicopter, when turning and continuing to taxi, deviated towards the apron edge where the jetblast fence is located.

(CAR PART IX, APPENDIX 8, 8.6.5.1)

[1] Barometric pressure adjusted to sea level

1.11 Flight Recorders

The Helicopter was not equipped with flight recorders, nor was it required to be.

1.12 Wreckage and Impact Information

The Helicopter was intact. Rotor impact witness marks were left on the jetblast fence.

1.13 Medical and Pathological Information

No medical or pathological investigations were conducted as a result of this occurrence, nor were they required.

1.14 Fire

There were no signs of fire.

1.15 Survival Aspects

Not applicable to this investigation, as no injuries were reported.

1.16 Tests and Research

No testing or research was required to be conducted as a result of this occurrence.

1.17 Organizational and Management Information

1.17.1 Aerodrome Information

Al Ain International Airport is a GCAA certificated airport located 8 NM from Al Ain City, capable of IFR/VFR 24 hrs operation.

The Airport's elevation is 869 ft, equipped with one asphalt runway 01/19 with concrete ends. The elevation of RWY 19 is 257 m (842 ft), Takeoff Run available (TORA) is 4,000 m (13,123 ft), Takeoff Distance Available (TODA) is 4,400 m (14,435 ft), Accelerate-Stop Distance Available (ASDA) is 4,000 m and Landing Distance Available (LDA) is 4,000 m, and the width is 45 m (148 ft). The true and magnetic bearing are 187°/186° respectively, with 1.3°E magnetic variation. The runway slope is variable over the whole length from 0.62% to 0.07%. 1.3°E.

Appendix A illustrates the layout of the Airport.

1.17.2 Operator Information

The operator is a charter airline and commenced operations in 2006 and is based in Abu Dhabi, Al Bateen Executive Airport, United Arab Emirates. The operator is certified for the carriage of passengers by the UAE General Civil Aviation Authority (GCAA) and operates a fleet of helicopters and business jets.

The current Operator's *Operations Manual* stated that:

"8.2.2.4. Ground Operations

(a) Whenever a helicopter is to be positioned on the ramp, whether under tow or under its own power, the assistance of marshallers should be obtained if there is any doubt about the clearances available for maneuvering. Once on the hard standing, positioning of the helicopter should represent the best available compromise between the requirements of

the heliport and/or air traffic control authorities, the prevailing wind direction, and the proximity to buildings and other aircraft."

1.17.3 Al Ain Airport Authority

The Airport Authority promulgated a *Standard Operation Procedure Manual (SOP)* for aircraft marshalling, reference, SOP/AAIA/OPS-002 dated December 2010,

Paragraph IV of the SOP, under the title *Procedures for Aircraft Marshalling* stated that: "Once aircraft turns on the lead in line and in contact with marshaller, the ATC shall release the aircraft to continue with marshaller for guidance to the stopping position."

The investigation team requested the airport authority to provide an annual training plan for their staff but the airport authority did not provide the requested document.

1.19 Useful or Effective Investigation Techniques

No new investigation techniques were used during this Investigation.

2. Analysis

2.1 Ground movement of the Helicopter.

2.1.1 Section 4 of Al Ain International Airport "*SOP- Procedures for Aircraft Marshalling"* stated that: 'Once aircraft turns on the lead in line and in contact with marshaller, the ATC shall release the aircraft to continue with marshaller for guidance to the stopping position."

The occurrence happened after landing and the Helicopter turned onto the lead-in line, but ATC had not yet released the Helicopter to follow the marshaller for guidance to the parking position.

Therefore, the investigation believes that the aircraft was still under active ATC monitoring, which required ATC to continue to communicate with the crew, until giving the crew the instruction to continue under the guidance of the marshaller.

At the time of the contact the ATC had clear vision to monitor the Helicopter and did not informed the crew that they are too close to the Jetblast fence.

There was a stand lead-in line for the taxi phase, but the commander did not follow it, and the helicopter movement was towards the jet blast fence, which was located 48 m from the lead-in line. The Helicopter deviation towards the edge of the apron where the metal fence was located indicated that neither the commander nor the co-pilot was visually observing the taxiing. This resulted in the Helicopter main rotor blades contacting the jet blast fence which located to the right of the Helicopter's direction of movement.

The investigation determined that although ATC was watching the movement of the helicopter, the controller did not respond to the movement of the Helicopter that taxing away from the lead-in line direct towards the jetblast fence.

As the Helicopter landed on taxiway Lima in the maneuvering area, taxiing straight ahead towards the jetblast fence, and then crossed the lead-in line to the right hand side for more than 48 meters towards Jetblast fence, without any reaction from the ATC side., the Investigation believes that, the Air Traffic Controller did not maintain a continuous visual observation of the helicopter as it maneuver on the apron area.

2.1.2 As the flight was VFR, and the visibility was very clear, the jetblast fence should be visible to the Helicopter crew. Neither the pilot nor the copilot were not have an external peripheral view appropriate to normal taxiing practice.

2.2 The location of the jetblast fence

The Civil Aviation Regulation CAR PART IX, APPENDIX 8, 8.6.5.1 stated that:

An Aircraft stand shall provide the following minimum clearances between an aircraft using the stand and aircraft on another stand, any adjacent building, and other objects:

Code Letter	Clearance
A	3 m
B	3 m
C	4.5 m
D	7.5 m
E	7.5 m
F	7.5 m

The actual distance from the edge of the Apron to the jetblast fence was 15 meters. This distance is more than the required minimum clearances.

The investigation believe that the jetblast fence location was not a factor to this occurrence.

3. Conclusions

3.1 General

From the evidence available, the following findings, causes and contributing factors were made with respect to this Incident. These shall not be read as apportioning blame or liability to any particular organization, or individual.

To serve the objective of this Investigation, the following sections are included in the conclusions heading:

- **Findings-** are statements of all significant conditions, events or circumstances in this Serious Incident. The findings are significant steps in this Serious Incident sequence but they are not always causal or indicate deficiencies.
- **Causes-** are actions, omissions, events, conditions, or a combination thereof, which led to this Serious Incident.
- **Contributing factors-** are actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident or incident occurring, or mitigated the severity of the consequences of the accident or incident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil or criminal liability.

3.2 Findings

3.2.1 The flight crewmembers were licensed and qualified for the flight in accordance with the existing requirements of the GCAA.

3.2.2 The Helicopter was certified, equipped and maintained in accordance with the existing requirements of the GCAA.

3.2.3 The Helicopter was airworthy when dispatched for the flight.

3.2.4 Examination of the maintenance records did not reveal any evidence of pre-existing Helicopter structural or mechanical anomalies that could have contributed to the Incident.

3.2.5 The taxiway lines were of a conspicuous color.

3.2.6 The Helicopter crossed the lead in line of Bay nine (Taxiway lima) at a distance of more than 48 meters, moved too close to the jetblast fence.

3.2.7 The crew did not have an external peripheral view appropriate to normal taxiing practice.

3.2.8 The airport authority did not provide the investigation with any training plan for their staff.

3.2.9 Although the Helicopter was visible to the Tower controller that it was taxiing away from the ground guide line, he did not contribute to stop the Helicopter before the main rotor struck the jetblast fence.

3.2.10 The weather conditions were not contributory to the Incident.

3.3 Causes

The Air Accident Investigation Sector determines that the causes of the Helicopter's main rotor impact with the jetblast fence were:

3.3.1 Inappropriate taxiing procedures followed by the crew.

3.3.2 The crew had insufficient situational awareness

4. Safety Recommendations

4.1 Final Report Safety Recommendations

The safety recommendations listed in this Report are proposed according to paragraph 6.8 of *Annex 13 to the Convention on International Civil Aviation*[2], and are based on the conclusions listed in heading 3 of this Report; the GCAA expects that all safety issues identified by the Investigation are addressed by the receiving States and organizations.

4.1.1 Falcon Air Services:

SR65/2015

Enhance the crew training including the external peripheral during helicopter ground movement for taxiing and parking phases.

4.1.2 Al Ain international Airport:

SR66/2015

Improve the level of ATC visual watch of manoeuvring/taxiing areas during aircraft ground movement.

Air Accident Investigation Sector
General Civil Aviation Authority
The United Arab Emirates

[2] Paragraph 6.8 of *Annex 13 to the Convention on International Civil Aviation* states: 'At any stage of the investigation of an accident or incident, the accident or incident investigation authority of the State conducting the investigation shall recommend in a dated transmittal correspondence to the appropriate authorities, including those in other States, any preventive action that it considers necessary to be taken promptly to enhance aviation safety'.