الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY

United Arab Emirates

Air Accident Investigation Sector

Incident

-Final Report-

AAIS Case Nº: AIFN/0011/2013

Aircraft Contact with Jetblast Fence during Pushback

Operator:	Emirates Airline
Make and model:	Boeing 777-300
Nationality and Registration:	The United Arab Emirates, A6-ENK
Place of occurrence:	Stand G17, Dubai International Airport
State of Occurrence:	The United Arab Emirates
Date of occurrence:	19 October 2013

Synopsis

The Aircraft, a Boeing B777-300, registration A6-ENK, operating a scheduled Emirates Airline passenger flight number EK089 from Dubai to Geneva on 19 October 2013, contacted a jet blast fence and light pole during pushback off Stand G17 at Dubai International Airport, causing damage to the lower aft fuselage and dislodgement of two static discharge wicks from the starboard horizontal stabilizer.

An Aircraft was parked on the adjacent Stand G18 and the Pushback Operator (PBO) judged that he would have to turn the Aircraft on Stand G17 to the left early during the pushback to ensure that there was no contact between the aircraft wing tips.

Before the pushback commenced, the Headset Mechanic (HM) had joined the PBO in the tug cab and he remained there until the pushback and pull forward stopped. From their position in the tug cab, neither the PBO nor the HM were able could observe the aft fuselage or tail area of the Aircraft.

After the Aircraft had been pushed approximately 10 to 15 feet along the stand centerline, the PBO started to turn the Aircraft to the left, off the stand centerline. As the push continued to the left, the Aircraft was brought onto a collision course with a jetblast fence which was protecting a service roadway located at the edge of the ramp. The aft fuselage contacted the jetblast fence and overrode it, and then the right hand horizontal stabilizer struck a light pole located on the far side of the service roadway.

The lower aft fuselage sustained damage and two static discharge wicks were dislodged from the right hand horizontal stabilizer. A section of the upper deflector vane of the jet blast fence was damaged, and the light pole, located on the opposite side of a service road that runs behind the jet blast fence, was bent.

The pushback crew did not notice that the Aircraft had contacted the jet blast fence and the light pole, and the flight crew were unaware of any problem. The Aircraft was pulled forward to the engine start position, disconnected from the tug, and commenced to taxi.

A ground handling agent Operator, who was driving a lower deck loader vehicle along the service road adjacent to Stand G17, witnessed the Incident and alerted airline personnel to the problem. The flight crew were advised and the Aircraft was taxied to Stand G04, where the passengers and crew disembarked. There were no injuries to those onboard and the Aircraft was withdrawn from service.

The Investigation concluded that the Incident occurred because the PBO did not remember the details of the non-standard pushback procedure for Stand G17 as a period of approximately nine weeks had elapsed between the time that he had read the non-standard procedure, and the first occasion on which he was required to use the procedure.

In addition to the safety actions already taken by the involved parties, this Report includes one safety recommendation addressed to ground handling agent.

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

Incident Brief

GCAA AAI Report No.:	AIFN/0011/2013
Operator:	Emirates Airline
Aircraft Type and Registration:	Boeing 777-300, A6-ENK
MSN	38991
No. and Type of Engines:	Two Turbofan, GE90-115BL1
Date and Time (UTC):	19 October 2013, 0607
Location:	Stand G17, Dubai International Airport,
Type of Flight:	Commercial Passenger Flight
Persons Onboard:	243
Injuries:	None

Investigation Objective

This Investigation is performed pursuant to the UAE *Federal Act No 20 of 1991*, promulgating the *Civil Aviation Law, Chapter VII- Aircraft Accidents, Article 4*. 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 details were submitted by the Operator to the Air Accident Investigation Sector (AAIS) Duty Investigator Hotline.

After an Initial field evaluation, the occurrence was classified as an 'incident' and the Investigation that is the subject of this Report commenced.

Notes:

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

- (Aircraft) - the aircraft involved in this incident.
- (Investigation) - the investigation into this incident
- (Incident) - this investigated incident

- (Report) - this incident Final Report

2 Unless otherwise mentioned, all times in this Report are 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 of improving the 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.

Abbreviations

AAIS	The Air Accident Investigation Sector of the United Arab Emirates
AAN	Airside Advisory Notice
C of A	Certificate of Airworthiness
C of R	Certificate of Registry
DA	Dubai Airports (the operator of Dubai International Airport)
ETD	Estimated Time of Departure
GCAA	General Civil Aviation Authority
GHA	Ground Handling Agent
HM	Headset Mechanic
ISAGO	IATA Safety Audit for Ground Operations
LH	Left Hand
LT	Local Time of the United Arab Emirates
MSN	Manufacturer Serial Number
No./Nº	Number
PBO	Pushback Operator
RH	Right Hand
RWY	Runway
TSM	Technical Support Manager
UAE	United Arab Emirates
UTC	Universal Time Coordinated

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1. Factual Information

1.1 History of the Flight

1.1.1 The Pushback

The Aircraft, a Boeing 777-300, registration A6-ENK, was scheduled to operate an Emirates Airline flight (EK089) from Dubai International Airport (OMDB), to Geneva International Airport (LSGG), on 19 October 2013.

The Aircraft was pushed back from Stand G17 at 0607UTC. Before the pushback commenced, the Headset Mechanic (HM) joined the Pushback Operator (PBO) in the tug cab and he remained there until the push and pull forward stopped. From their position in the tug cab, neither the PBO nor the HM could observe the aft fuselage or tail area of the Aircraft.

After the Aircraft had been pushed approximately 10 to 15 feet along the stand centerline, the PBO started to turn the Aircraft to the left, off the stand centerline.

As the Aircraft continued to pushback and turn to the left, the aft fuselage contacted a jetblast fence and overrode it, and then the right hand horizontal stabilizer struck a light pole located on the far side of a service roadway, which ran behind the jetblast fence. Neither the PBO nor the HM were aware that the Aircraft had contacted the jetblast fence. After contacting the jetblast fence and the light pole, the Aircraft was then pulled forward and aligned with taxiway Juliet 5, at a point on the ramp approximately in line with Stand G20 (figure 1).

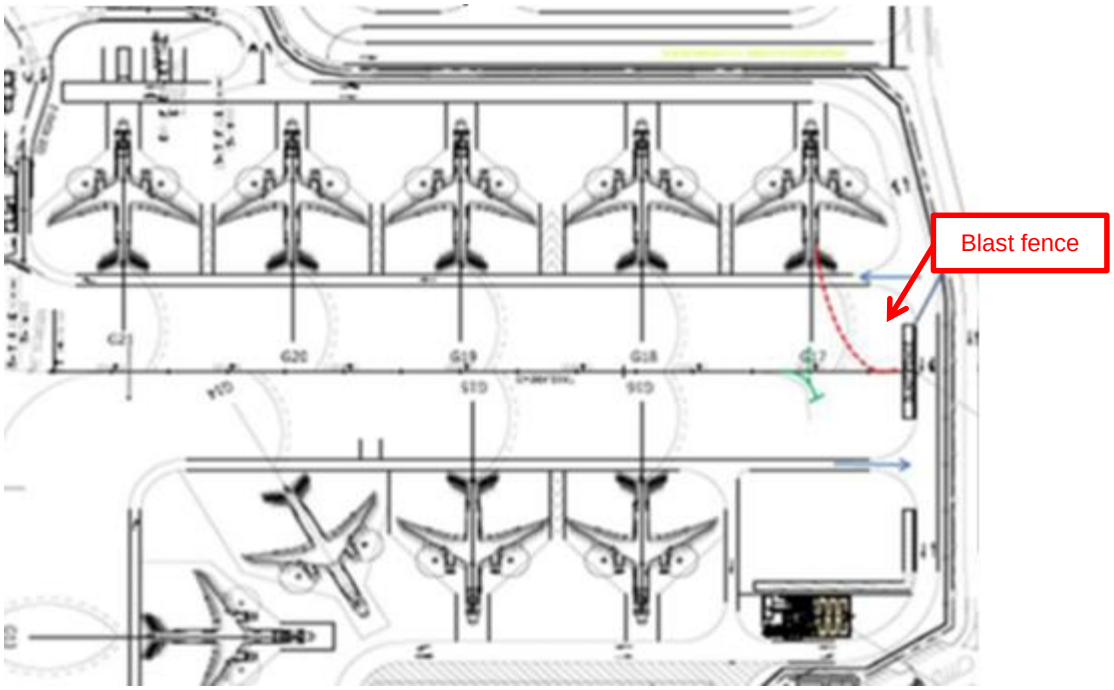

Figure 1. Configuration of the Golf Stands showing red, nose gear stop green, and the location of the jetblast fence

The pushback crew were not aware that the Aircraft had contacted the jetblast fence. The driver of a lower deck loader, which was proceeding along the service road which ran behind the jetblast fence, witnessed the Aircraft contacting the jetblast fence. He stopped his vehicle and attempted unsuccessfully to attract the attention of the pushback crew.

After contacting the jetblast fence and the light pole, the Aircraft was then pulled forward and aligned with taxiway Joliette 5 at a point on the ramp approximately in line with Stand G20 (figure 1). When the Aircraft stopped on the taxiway, the HM left the tug cab to remove the by-pass pin and he showed the pin to the flight deck crew. By this time, the witness to the occurrence had advised an Emirates Airline dispatcher that the Aircraft had struck the jetblast fence. The dispatcher advised the operator's Operations Control Center (OCC) of the situation. The dispatcher also advised the HM that the Aircraft might have sustained damage. Both engines were running at this time and this restricted the ability of the HM to move from his position at the nose of the Aircraft. The HM conducted a visual inspection from his position. He concentrated his attention on inspecting the wingtips and the extent of the fuselage that was visible to him. He did not see any damage. The tug was then disconnected, and the Aircraft commenced to taxi.

The contact with the jet blast fence and the light pole resulted in damage to the lower aft fuselage of the Aircraft and the dislodgement of two static dischargers from the starboard horizontal stabilizer. The jetblast fence and the light pole were also damaged.

The operator's OCC, having been made aware of the Incident, contacted the flight crew and advised them of the need to have the Aircraft inspected. The Aircraft was taxied to Stand G04 where the passengers and crew disembarked.

1.2 Injuries to Persons

No injuries were reported by the occupants of the Aircraft or the ground crew.

Table 1. Injuries to persons

Injuries	Flight crew	Cabin crew	Other Crew Onboard	Passengers	Total Onboard	Other
Fatal	0	0	0	0	0	0
Serious	0	0	0	0	0	0
Minor	0	0	0	0	0	0
None	4	15	0	224	243	0
TOTAL	**4**	**15**	**0**	**224**	**243**	**0**

1.3 Damage to Aircraft

The Aircraft sustained damage to the aft fuselage in the region of frame station (STA) 2174 and stringers (STGR) 42R and 43R (figures 2, 3 and 4). Two static dischargers were dislodged from the starboard horizontal stabilizer (figure. 5).

Figure 2. Damage to aft fuselage

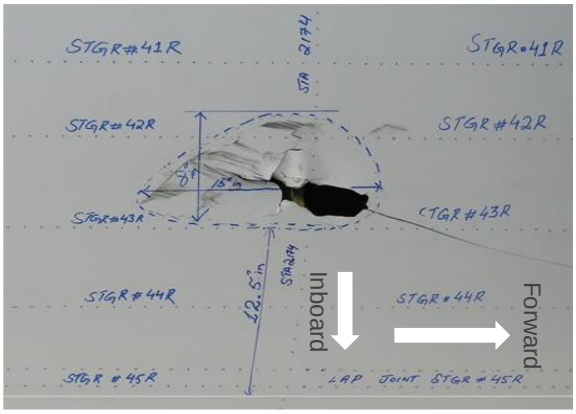

Figure 3. Detail and location of fuselage damage

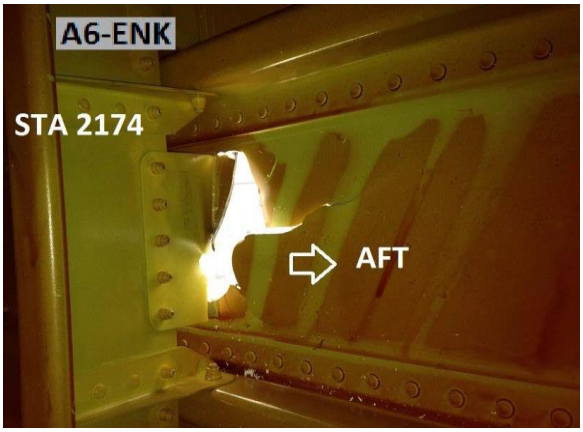

Figure 4. Internal view of fuselage damage

Figure 5. Two static dischargers missing from starboard horizontal stabilizer

1.4 Other Damage

A section of the upper deflector vane of the jet blast fence was damaged (figure 6) and a light pole located on the opposite side of a service road that runs behind the jet blast fence was bent (figure 7).

Figure 6. Damage to blast fence

Figure 7. Service road light pole

1.5 Personnel Information

The flight crew and ground crew were properly qualified and licensed.

1.5.1 The Headset Mechanic

The HM qualified as a Licensed Aircraft Engineer in 2005. He had eight years' experience in aircraft pushback operations. There were no signs or reports of fatigue.

The shift pattern of the HM for the previous week was:

Two mornings (0600LT to 1800)

Two nights (1800 to 0600) and

Four days off

The HM resumed duty at 0600LT on the day of the Incident and had reported to Stand G17 at 0645 for the scheduled 0855 departure of the Aircraft. The HM was responsible for communications with the cockpit during the pushback, and he acted as liaison between the cockpit and the PBO.

The HM was not aware of the pushback instructions given to the PBO. The *TSM 2002/2013- Pushback Instruction Memo,* issued by management was not shared with Emirates Airline Engineering.

1.5.2 The Pushback Operator

The PBO had ten years' experience in pushback operations. The PBO held a valid airport driver permit, which was endorsed for aircraft pushback and towing. The operator stated that he had sufficient rest during his off duty period and that he was not fatigued. He had resumed duty after his scheduled two days off.

The shift pattern of the PBO for the previous week was:

Three morning shifts (0600LT to 1200; 0700 to 1700),

Two night shifts (1800 to 400) and two days off

The PBO started duty at 0600LT on the day of the Incident and had completed four tows before being assigned to push the Aircraft off Stand G17.

This was the first occasion that the PBO had pushed an aircraft off Stand G17. The PBO's training records indicated him to be a competent driver. The PBO was responsible for the pushback and pull forward of the Aircraft to the engine start position.

1.6 Aircraft Information

1.6.1 Aircraft Data

Table 2. General Aircraft data

Make and Model:	Boeing 777-300
MSN:	38991
Registration:	A6-ENK
State of Registry:	The United Arab Emirates

Certificate of Airworthiness (C of A)

Issuing Authority:	The General Civil Aviation Authority, the United Arab Emirates
Issue date:	17 October 2012
Valid until:	Until revoked by the GCAA
Engines:	Two Turbofan, CFMI CFM56-7B27E

1.6.2 General Arrangement – Boeing B777-300ER

The Boeing B777-300ER (figure 8) is the largest version of the B777 type. The overall length of the aircraft is 242 feet and the wingspan is 212 feet. This version of the B777 first flew in 2004.

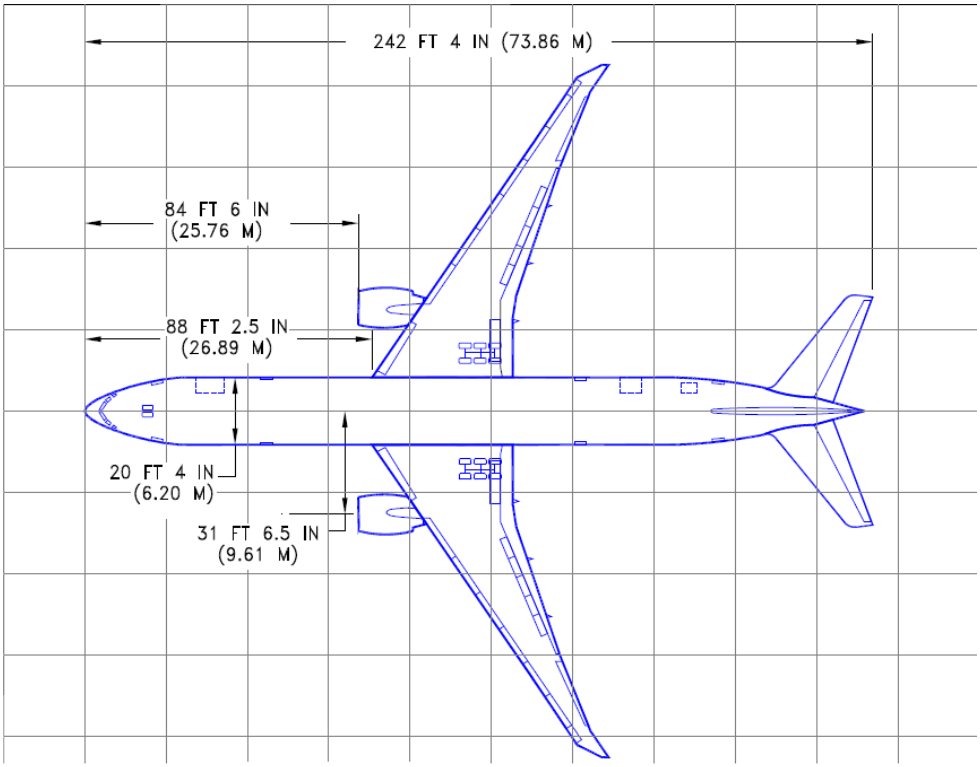

Figure 8. General arrangement – Boeing B777-300

1.7 Meteorological Information

Table 3 shows the METAR Report at the time of the Incident.

Table 3. METAR report

Wind:	320°/24kts
Weather	CAVOK
OAT	25 °C

There were no significant meteorological conditions in the area at the time of the Incident.

The Incident took place in daylight.

1.8 Aids to Navigation

Not relevant.

1.9 Communications

All Aircraft and ground communications systems functioned normally.

1.10 Aerodrome Information

The Golf Stands at Dubai International Airport were new stands at the time of the Incident, having been commissioned in August 2013. The Aircraft was positioned on Stand G17. A standard pushback procedure was used for all Golf Stands, with the exception of Stand G17.

The published procedure for Stand G17 at the time of the incident stated: "Aircraft pushing back from G17 to do a straight pushback on to no man's land until the aircraft nose wheel reaches to white T mark and pull forward straight on to J5 abeam of G18 or G19 for the start up as advised by ATC through head set man."[1]

The final instruction of the procedure was "Please be guided accordingly and required to adhere to the above instruction at all times without fail."

Stand G17 at Dubai International Airport is compliant with the International Civil Aviation Organization (ICAO) published Code E minimum clearance distance of 7.5 meters when an aircraft is parked on Stand G18.

1.11 Flight Recorders

Not applicable.

1.12 Wreckage and Impact Information

Not relevant.

1.13 Medical and Pathological Information

No medical problems were reported by either the HM or PBO.

1.14 Fire

Not relevant.

1.15 Survival Aspects

Not relevant.

1.16 Tests and Research

No tests or research were performed during this Investigation.

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[1] "No man's land" is a hatched area of the ramp, directly facing Stand G17

1.17 Organisational and Management Information

1.17.1 General

Aircraft pushbacks at Dubai International Airport are carried out according to procedures devised by the Engineering Department of the Operator and the Ground Handling Agent (GHA). The procedures subscribe to the policies and procedures published by the Airport Authority.

The pushback procedure for Stand G17 was a non-standard procedure as Stand G17 is located in a relatively confined area of the ramp. The procedure was designed to ensure clearance was maintained between the aircraft and obstructions during pushback and pull forward.

1.17.2 The Operator

Emirates Airline is based in Dubai, the United Arab Emirates, and commenced operations in 1985. The Operator is certified for the carriage of passengers by the UAE General Civil Aviation Authority (GCAA). The Operator's Engineering Department is responsible for the technical aspects of pushbacks of its aircraft at Dubai International Airport.

1.17.2.1 Operator's Engineering Department pushback procedure

The Operator's Engineering Department procedure (*EPM-11-06 Arrival/Departure/Headset Procedures*) stated that the HM must maintain a safe distance between himself and the moving machinery. The procedure did not specifically state that the HM should not be seated in the tug cab during pushback.

During the pushback operation, the HM was seated in the cab of the pushback tug. He was seated facing forward (facing the direction of travel of the tug).

The HM was not aware of the pushback procedure, or the route to be used by the PBO. The Technical Support Manager's memo (*TSM 2002/2013*) instruction, issued by the GHA, had not been shared with the Operator's Engineering Department.

The HM was not aware of the non-standard pushback instructions regarding Stand G17, nor was he aware of the current *Airside Advisory Notice (AAN)*. The HM stated that he had never seen or received any AAN issued by Dubai Airports.

1.17.3 Ground Handling Agent

Dnata is the GHA at Dubai International Airport responsible for ground operations. Among its activities, the GHA is responsible for the provision of equipment and personnel for aircraft pushbacks at the airport.

The company operates an ISO 9001 Quality Management System, and has successfully undergone the IATA Safety Audit for Ground Operations (ISAGO).

1.17.3.1 GHA non-standard pushback procedure for Stand G17

The GHA pushback procedure (*TSM 2002/2013*) stated that "Aircraft pushing back from G17 to do a straight pushback on to no man's land until the aircraft nose wheel reaches to white T mark and pull forward straight on to J5 abeam of G18 or G19 for the start up as advised by ATC through head set man."

A recommendation of the joint hazard assessment conducted by the Operator's Engineering Department and the GHA Safety Department was to paint a dashed line, extending from the end of the Stand centerline, to a T stop mark. As per the procedure, the PBO was to

push the aircraft straight back along the stand centerline and then follow the painted dashed line (figures 9 and 10) leading to the white T stop mark. This information was omitted from the documented procedure.

Figure 9. Correct orientation of the aircraft at the end of the push off Stand G17. The fuselage aft of the wings overhangs the hatched area opposite Stand G17

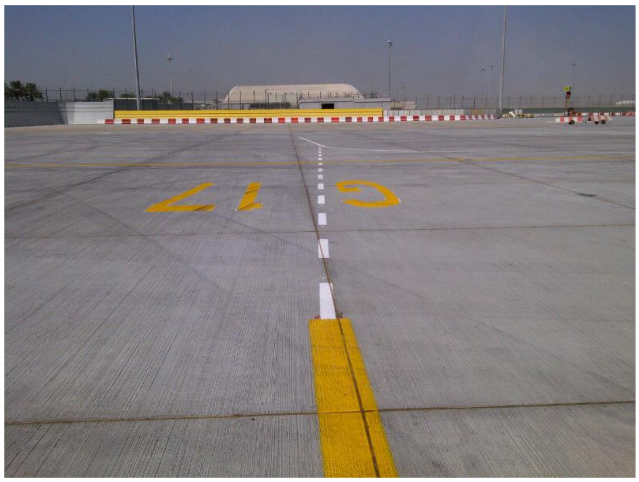

Figure 10. View of broken white pushback line extending from the G17 stand centerline to a T-stop mark. The jetblast fence is on the left hand side of the stand in this view

1.18 Additional Information

There was no other factual information that was relevant to the circumstances leading up to the occurrence.

1.19 Useful or Effective Investigation Techniques

The Investigation was conducted in accordance with the *Legislation and Civil Aviation Regulations* of the United Arab Emirates, and with the AAIS approved policies and procedures, and in accordance with the *Standards and Recommended Practices of Annex 13 to the Chicago Convention*.

2. Analysis

2.1 General

The Investigation into this Incident collected data from various sources for the purpose of determining the causes and contributing factors.

This section of the Report explains the contribution of each investigation aspect to the occurrence of the Incident and to the severity of the consequences. The analysis also contains safety issues that may not be contributory to the Incident but are significant in adversely affecting safety.

This section discusses the following aspects:

- Pushback and Pull Forward of the Aircraft
- The Pushback Operator (PBO)
- The Headset Mechanic
- Non-standard Pushback Procedure–Stand G17

Nothing in this section is to be understood as apportioning blame or liability.

2.2 Pushback and Pull Forward of the Aircraft

This was the first pushback that the PBO had carried out from Stand G17. Before commencing the pushback, the PBO inspected the stand and he observed that there was a Boeing 777-300 on the adjacent Stand (G18). The PBO formed the opinion that he would need to push A6-ENK to the left as the Aircraft was pushed off Stand G17 in order to ensure that the wingtip would clear the wingtip of the Boeing 777-300 on Stand G18.

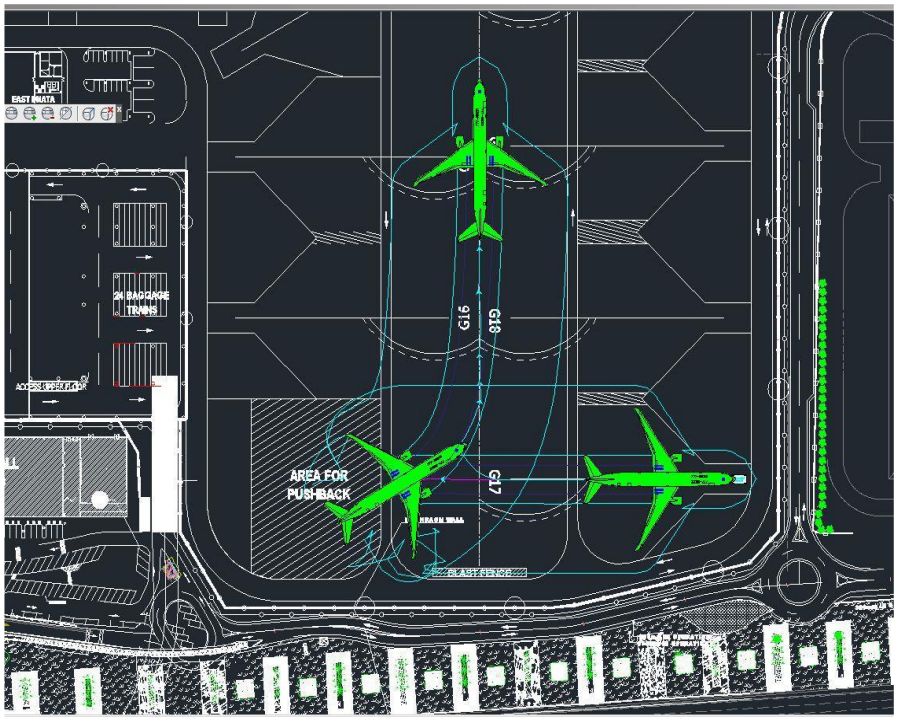

Figure 11. Approved pushback sequence off Stand G17 into the hatched area directly behind Stand G17, and then pull forward to the engine start line

The approved pushback procedure for Stand G17 required that the Aircraft be pushed back until the nose gear reached a painted white T-stop mark on the extended broken stand centerline (figures 10 and 11). The Aircraft was then to be pulled forward to the vicinity of taxiway Juliet 5.

The PBO had read the pushback procedures for the Golf Stands shortly after they were published on 29 August 2013. He could not recall the details of the non-standard pushback procedure for Stand G17 as a period of 9 weeks had passed between the time that he had read the procedure, and the day of the Incident. The documented pushback procedure did not refer to the dashed line or the T-stop mark, and the PBO was not aware of the line, or the T-stop mark. The pushback procedure did not require the presence of Wingwalkers.

Before the pushback commenced, the HM joined the PBO in the tug cab and he remained there until the Aircraft was pulled forward to the engine start line. The view of the aft fuselage and tail area of the Aircraft from the tug cab was restricted due to the position of the tug forward of the nose gear, and the length of the Aircraft. After the Aircraft had been pushed approximately 10 to 15 feet off the stand hammerhead marking, the PBO started to turn the Aircraft to the left, off the stand centerline. In his judgment, this change of direction was necessary to clear the wingtip of the aircraft parked on Stand G18. Had the push been carried out so that the Aircraft was pushed straight back along the stand centerline, as per the procedure, there would be no danger of contacting the wingtip of the aircraft on Stand G18.

As the Aircraft continued to push and turn to the left, it was brought onto a collision course with the jetblast fence (figure 12). The aft fuselage of the Aircraft struck the jetblast fence and overrode it, and then the starboard horizontal stabilizer struck a light pole located on the opposite side of a service roadway, which ran behind the jetblast fence.

The B777-300 aircraft is one of the largest civil aircraft in service and has an overall length of 242 feet. It was not possible for the PBO or HM, who were both seated in the tug cab, to see the aft fuselage and to judge accurately the distance from any obstacle. Their awareness of the position of the aft fuselage was degraded by their distance from the aft fuselage due to the length of the Aircraft and also that the structure of the Aircraft obscured their vision of the aft fuselage, due to their position in the tug cab. The risk analysis carried out prior to the start of operations on Stand G17 did not identify a need for Wingwalkers to assist the PBO.

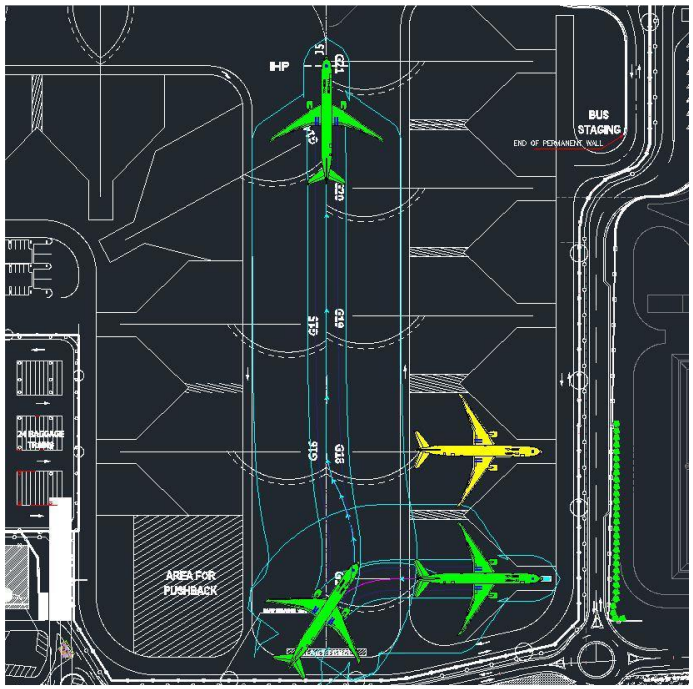

Figure 12. Actual pushback sequence of A6-ENK

After contacting the jetblast fence and the light pole, the Aircraft was then pulled forward and aligned with taxiway Juliet 5 at a point on the ramp approximately in line with Stand G20. The HM left the tug cab to observe the engine starts. At this time, the dispatcher advised the HM that the Aircraft may have sustained damage during the pushback.

The HM conducted a visual inspection from his position at the nose of the Aircraft, but he did not see any damage. As both engines were running, the HM was restricted as to his freedom of movement to observe the aft fuselage and tail area of the Aircraft. He observed the wings, wingtips and as much of the fuselage as possible and did not see any damage. He then removed the by-pass pin, and showed the pin to the flight crew. The tug was then disconnected and the Aircraft commenced to taxi.

2.3 The Pushback Operator (PBO)

The PBO was employed by the Ground Handling Agent (Dnata). He stated that this was the first time that he had carried out the pushback of an aircraft off Stand G17. On previous occasions, he had carried out two successful pushbacks off Stands G19 and G20.

The PBO stated that he was aware of a memo on pushback procedures for the Golf Stands, and that he had read information pertaining to the Golf Stands, but he was unable to recollect details of the non-standard pushback procedure for Stand G17. He stated that he was not aware of the dashed line from the edge of the yellow stand centerline to the T stop mark.

Whilst he was driving to Stand G17 from Stand G03, The PBO noticed the hatched area on the ramp opposite Stand G17 and adjacent to Stand G16. When he arrived on Stand G17, he conducted a walkaround and found the area to his left (walking from nose to tail) of the Aircraft was restricted and that Stand G18, which was to his right, was occupied by a B777-300 aircraft.

During his walkaround, he observed that on the far end of the hatched area, there were stand blocks. According to the PBO, the hatched area and the stand blocks behind indicated that this area was restricted for movement or parking of both aircraft and vehicles. The hatched area was not restricted for aircraft pushing back from Stand G17. The non-standard pushback procedure for this stand requires the aircraft to be pushed back along the stand centerline and the extended broken centerline to a stop mark. This results in the aft fuselage and port wing of the aircraft overhanging the hatched area.

In an attempt to clear the aircraft parked on the adjacent Stand G18, and not in adherence with the procedure instruction to push straight back, the PBO initiated a left turn after pushing the Aircraft approximately 10 to 15 feet along the stand centerline. He carried out this maneuver to ensure wingtip clearance with the aircraft on Stand G18, and to allow him to swing and straighten the Aircraft on taxiway Juliet 5. This maneuver was not in line with the documented pushback procedure for Stand G17, nor was it necessary to ensure wingtip clearance with the aircraft on Stand G18. Stand G17 at Dubai International Airport is compliant with the ICAO Code E minimum clearance distance of 7.5 meters when an aircraft is parked on Stand G18.

Seated in the tug cab, the PBOs' view of the aft fuselage and tail section was limited and the left turn directed the Aircraft towards the blast fence. This was evident from the main gear tire marks (figure 13), as all other pushbacks from Stand G17 had been straight back following the stand centerline.

The contact of the aft fuselage with the jet blast fence resulted in the fuselage being punctured, and the dislodgment of a section of the upper vane of the jet blast fence. Following contact with the blast fence, the Aircraft overrode the blast fence and the right hand horizontal stabilizer contacted a light pole, which was located on the opposite side of the service road which ran behind the jet blast fence. This contact dislodged two horizontal stabilizer static discharge wicks and bent the light pole.

Figure 13. A6-ENK main gear tire marks

Neither the HM, PBO, nor the flight crew, were aware of the fact that the Aircraft had contacted the jet blast fence.

The driver of a vehicle (a lower deck loader), which was travelling along the service road, observed the aircraft aft fuselage contacting the jet blast fence. The driver stopped his vehicle and attempted to attract the attention of the HM and PBO to alert them to the incident. Since both the PBO and HM were focused on carrying out the pushback neither noticed the witness to the incident signaling to them, as their attention was fully focused on maneuvering the aircraft, and their span of vision was limited.

The witness attempted to attract the attention of the pushback team while he was standing on the operator deck of the lower deck loader. After failing to gain the attention of the pushback team, the witness immediately reported the Incident to an Emirates Airline Dispatcher who contacted the Operations Control Center (OCC). The OCC contacted the flight crew by ACARS[2] and advised them that the Aircraft may have been damaged. The Aircraft was brought to a stop and visually inspected. The damage was observed and the Aircraft was taxied to Stand G04 where the passengers and crew disembarked.

Since a road blocker had not been assigned, and was not required by the procedure, no one was positioned behind the Aircraft as part of the pushback crew who could have alerted the PBO or HM to the potential for contact between the Aircraft and the jet blast fence.

2.4 The Headset Mechanic

During the pushback and pull forward, the HM sat in the tug cab, facing the direction of the push. The operator's engineering procedure, *EPM-11-06 Arrival/Departure/Headset Procedures* stated: "The mechanic must maintain a safe distance between himself and the moving machinery during the pushback operation." The procedure did not specifically state that the HM should not be seated in the cabin.

[2] ACARS is the Aircraft Communications Addressing and Reporting System. This is a datalink system used to transmit messages between the aircraft and ground stations

The HM had good visibility of the forward fuselage, wings, wingtips, and engines from his position in the tug cab, but he was unable to see the aft fuselage or tail area. The HM stated that the visibility limitations would be similar if he was also accompanying the pushback tug on foot during the pushback.

The HM acts as a liaison between the flight deck and the PBO. He had been involved in previous pushbacks of Airbus 330 and Boeing 777 aircraft from Stand G17 and had not encountered any similar incident. The HM relied on the PBO, who was the only person who was aware of the non-standard pushback instructions and was responsible for the pushback of the aircraft. The HM is also not aware of the pushback instructions given to the Dnata personnel. The *TSM 2002/2013* instruction memo issued by management was not shared with Emirates Engineering.

According to the Manager Line Maintenance, Emirates Engineering, responsibilities during aircraft pushbacks are:

- "Commander of the aircraft is in charge of the pushback.
- The technician (HM) is responsible for communication between the flight deck and the tug driver (PBO) to ensure the aircraft is moved according to the instructions given to him from the flight deck.
- The tug driver (PBO) is responsible for the positioning of the aircraft to the correct location following standard aerodrome rules and instructions from the headset man (HM).
- Wingwalkers are to make sure the aircraft is clear of obstacles when the (sic) moving of (sic) the aircraft."

The HM stated that he was not aware of the non-standard procedures regarding pushbacks from Stand G17, and that he was not aware of the current *Airside Advisory Notice (AAN)*. The HM also stated that he had never seen or received any *AAN* issued by Dubai Airports. This information was not provided to the HM as his defined duty during pushback operations was to act as a liaison between the cockpit and the PBO. It was not part of his responsibility to be aware of pushback non-standard procedures.

2.5 Non-standard Pushback Procedure–Stand G17

The non-standard push-back procedure for Stand G17 had been drafted by Dnata. A risk assessment had been performed by the ground handling company management.

The pushback procedure contained no requirement for a briefing between the HM and the PBO prior to commencement of the pushback. Clear lines of responsibility and delineation of duty were not adequately established in the pushback procedures of either the Emirates Airline Engineering or Dnata ground handling manuals. There was no established leadership in the pushback team between the PBO and the HM who both work in cooperation without a clearly defined hierarchy.

The non-standard pushback procedure did not require Wingwalkers who would have had an overall view of the position of the aircraft, particularly as the Aircraft neared obstacles in the restricted maneuvering area.

The procedure did not include any pictorial or visual aid to assist the PBO in the pushback from Stand G17. The markings that indicated the extended stand centerline, along which the Aircraft should have been pushed, were painted with a white broken line and terminated at a white T stop mark. There was no reference in the *ANN* to these markings.

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 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 Incident.
- **Contributing factors-** are actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of this Incident occurring, or mitigated the severity of the consequences of this 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 Aircraft was certified, equipped, airworthy, and maintained in accordance with the current *Civil Aviation Regulations* of the United Arab Emirates.

3.2.2 Stand G17 at Dubai International Airport is compliant with the ICAO Code E minimum clearance distance of 7.5 meters when an aircraft is parked on Stand G18.

3.2.3 The Pushback Operator (PBO) and the Headset Mechanic (HM) were properly qualified and licensed for their positions.

3.2.4 The Aircraft contacted a jet blast fence and a light pole during pushback from Stand G17 at Dubai International Airport.

3.2.5 The Aircraft sustained damage to the aft fuselage and two static dischargers were dislodged from the right hand horizontal stabilizer as a result of contacting the jetblast fence and the light pole.

3.2.6 The jetblast fence sustained damage to a section of the uppermost deflector vane and the light pole was bent.

3.2.7 The Incident flight was the first pushback that the PBO had carried out from Stand G17, a stand where the use of a non-standard pushback procedure is required.

3.2.8 The PBO was not familiar with the non-standard pushback procedure for Stand G17, as a period of nine weeks had elapsed between his reading of the procedure, and the first occasion on which he was called upon to use the procedure.

3.2.9 The non-standard pushback procedure did not require a briefing between the HM and the PBO prior to commencement of the pushback.

3.2.10 The non-standard pushback procedure for Stand G17 did not require the presence of wing walkers, even though the stand was located in a constricted area of the ramp, and required the use of non-standard pushback procedures.

3.2.11 Clear lines of responsibility and delineation of duties were not adequately established in the pushback procedures of either the Operator's *Engineering Procedural Manual* or the GHA *Ground Handling Manual*.

3.2.12 There was no defined leadership position in the pushback team between the PBO and the HM who both worked in cooperation, but without a clearly defined hierarchy.

3.2.13 The PBO started to turn the Aircraft to the left off the stand centerline after the aircraft had been pushed approximately 10 to 15 feet, as he mistakenly believed that contact with the wing tip of the B777-300 aircraft on Stand G18 could occur if the Aircraft was pushed along Stand G17 centerline.

3.2.14 A review of the rosters of the PBO and HM, and evaluation of information provided by them during interview, indicated that fatigue was not a factor in this Incident.

3.2.15 During the pushback, the HM was seated in the pushback tug cab, which, due to the length of the Aircraft, restricted the situational awareness of both the HM and PBO as to the position of the Aircraft aft fuselage in relation to the jetblast fence.

3.2.16 The flight crew were unaware that an incident had occurred during pushback, until they were advised of the occurrence by Emirates Airline Operations Control Center (OCC).

3.3 Causes

The Air Accident Investigation Sector determines that the causes of the Aircraft impact with the jetblast fence were:

3.3.1 The use of pushback actions that differed from the risk-assessed non-standard pushback procedure for Stand G17.

3.3.2 The use of actions that were not compliant with the set procedure was due to the fact that this was the first occasion on which the Pushback Operator used the non-standard procedure in practice, after having read the procedure nine weeks before the day of the Incident.

3.3.3 The situational awareness of the Headset Mechanic and the Pushback Operator as to the proximity of the Aircraft to the jetblast fence during the pushback was affected by their inability to observe the aft fuselage of the Aircraft from their position in the tug cab.

3.4 Contributing Factors to the Incident

Contributing factors to the Incident were:

3.4.1 No control system, such as read and sign, existed to ensure that the Pushback Operator’s had read and familiarized themselves with the non-standard pushback procedures specified for pushbacks off Stand G17.

3.4.2 The Pushback Operators were not required to receive familiarization training for operations on Stand G17, or other stands requiring non-standard pushback procedures, prior to engaging in actual pushback operations on those stands.

3.4.3 No distinction was made at Dubai International Airport between stands requiring non-standard pushback procedures and those where normal procedures are applicable.

4. Safety Recommendations

4.1 General

The 'Safety Recommendations' listed in this Report are proposed according to paragraph 6.8 of *Annex 13 to the Convention on International Civil Aviation*, and are based on the "Conclusions" listed in heading 3 of this Report. The AAIS expects that all safety issues identified by the Investigation are addressed by the receiving States and organizations.

4.2 Safety Actions Taken

The following safety actions were taken by the Operator, Ground Handling Agent, and Dubai International Airport very shortly after the Incident occurred:

4.2.1 Safety Actions taken by the Operator:

4.2.1.1 The Emirates *Engineering Procedural Manual* was updated to clearly define the role and responsibility of the Headset Mechanic (HM), and a NOTE was inserted indicating that the HM will not ride in the tug cab.

4.2.2 Safety Actions taken by the Ground Handling Agent:

4.2.2.1 A laminated copy of the *Airside Safety Alert (ASA-06-V1)*, which describes the obstacle pushback requirements, was placed in all pushback tugs.

4.2.2.2 A *'Read & Sign'* document was issued related to the memo that states the importance of awareness of obstacles during pushback and the additional safety requirements related to the same.

4.2.2.3 The GHA's views and suggestions pertaining to the safe pushback requirements from Stand G17 were shared with Dubai Airports, prior to the re-opening of the stand following the Incident.

4.2.2.4 As Stand G17 leaves minimal margin for error, the memo *TSM 2002/2013* regarding 'New Golf Stand Pushback Guidelines' was made clear, easy to read and understand, and includes the background (reason) for the non-standard procedure.

4.2.2.5 *TSM 2002/2013* includes the requirement of the pushback operator to follow the dashed line extending from the stand centerline.

4.2.2.6 Audio/visual training aids have been developed to familiarize personnel with the non-standard pushback from Stand G17.

4.2.2.7 PBO's are trained and signed off for non-standard pushback operations from Stand G17. This also includes all other non-standard pushback from parking stands at Dubai International Airport.

4.2.2.8 A copy of the non-standard pushback operations for all the aircraft parking stands has been placed in the pushback tugs as a quick reference.

4.2.2.9 A Wingwalker is required for pushbacks from Stand G17 and all other stands requiring non-standard push back procedures from parking stands at Dubai International Airport.

4.2.2.10 The recommendations of the hazard identification and risk analysis study conducted prior to opening of the Golf Stands have been reviewed to ensure that additional protections have been considered to avoid any future incident.

4.2.2.11 Details of this Incident have been shared with all pushback operators and through a newly established *'Read & Sign'* mechanism, in order to prevent a recurrence of a similar incident.

4.2.3 Safety Actions taken by Dubai International Airport:

4.2.3.1 *AAN ASA-03-14-V2* was issued to highlight all non-standard pushback stands at Dubai International Airport.

4.2.3.2 An additional stop mark, extended white line and unidirectional reflectors, have been provided to enhance pushback markings.

4.2.3.3 The Operator's Engineering Department has been included in the process consultation list for new stands that require non-standard procedure pushback operations.

4.2.3.4 Specific mention of non-standard procedure pushback requirements will be included in *AANs* in future.

4.2.3.5 It has been agreed that, wherever possible, emphasis will be placed on trials to be made for non-standard procedure pushback stands.

4.2.3.6 The documents and system requirements include the need for 'specific handling agent instructions', for new stands with non-standard pushback requirements."

4.3 Final Report Safety Recommendations

The Air Accident Investigation Sector recommends that:

4.3.1 Dnata

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Examine the possibility that risk analyses applied to stands that require a non-standard pushback procedure consider whether to establish a maximum period between the completion of training and familiarization of the Pushback Operator with the procedure, and the first actual use of the procedure by each Pushback Operator (PBO).

This Report is issued by:

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