



Air Accident Investigation Sector

Serious Incident

-Final Summary Report-

AAIS Case N° AIFN/0001/2022

Runway Incursion

Aircraft Registration: A6-EQA and A6-EBY
Aircraft Type: Boeing 777-31H(ER) and 777-36N(ER)
Air Operator: Emirates Airlines
Place of Occurrence: Dubai International Airport
State of Occurrence: United Arab Emirates
Date of Occurrence: 9 January 2022



This Investigation was conducted by the Air Accident Investigation Sector of the United Arab Emirates pursuant to Civil Aviation Law No. 20 of 1991, in compliance with Air Accident and Incident Investigation Regulation, and in conformance with the provisions of Annex 13 to the Convention on International Civil Aviation.

This Investigation was conducted independently and without prejudice. The sole objective of the investigation is to prevent future aircraft accidents and incidents. It is not the purpose of this activity to apportion blame or liability.

The Air Accident Investigation Sector issued this Summary Report in accordance with national and international standards and best practices. Consultation with applicable stakeholders, and consideration of their comments, took place prior to the publication of this Report.

The Summary Report is publicly available at:

<http://www.gcaa.gov.ae/en/epublication/pages/investigationReport.aspx>

**The Air Accident Investigation Sector
The United Arab Emirates**

P.O. Box 6558

Abu Dhabi

United Arab Emirates

E-mail: aai@gcaa.gov.ae

Website: www.gcaa.gov.ae



Investigation Process

The occurrence involved Emirates Boeing 777 Aircraft, registration marks A6-EQA, operating flight number EK524.

The aircraft commenced take-off roll without clearance. At about 126 knots, the flight crew rejected the takeoff after air traffic controller instructions due to runway incursion by another aircraft.

The Air Accident Investigation Sector (AAIS) Duty Investigator (DI) was notified the next day of the occurrence by a call to the Hotline Number (+971 50 641 4667).

After the Initial Investigation phase, the occurrence was classified as 'serious incident'.

The scope of this Investigation is limited to the events leading up to the occurrence; no in-depth analysis of non-contributing factors was undertaken.

Notes:

1. Wherever the following words are mentioned in this Report with the first capital letter, they shall mean the following:
 - (Aircraft) – The rejected take-off aircraft operating flight number EK524
 - (Commander) – The commander of EK524
 - (Copilot) – The copilot of EK524
 - (Incident) – The serious incident that is the subject of this Summary Report
 - (Investigation) – The investigation into the circumstances of this serious incident
 - (Operator) – Emirates
 - (Report) – This Summary Report.
2. Photos and figures used in 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 addition of text boxes, arrows, or lines.

3. Unless otherwise mentioned, all times in this Report are given in 24-hour clock in Coordinated Universal Time (UTC), (UAE local time minus 4).
4. This structure of this Summary Report is adapted from the Final Report format outlined in Annex 13.

Factual Information

History of the Flight

On 9 January 2022, an Emirates Aircraft Boeing 777, registration marks A6-EQA, was scheduled to operate passenger flight number EK524 from Dubai International Airport (OMDB) to Rajeev Gandhi International Airport (VOHS) Hyderabad, India. There were 187 people onboard: 2 flight crewmembers, 12 cabin crewmembers, and 173 passengers.

The Commander was the pilot monitoring (PM), and the Copilot was the pilot flying (PF).

On the same day, another Emirates Boeing 777, registration marks A6-EBY, was scheduled to operate passenger flight number EK568 from OMDB to Bengaluru International Airport (VOBL), Bengaluru, India. There were 311 people onboard: 2 flight crewmembers, 15 cabin crewmembers, and 294 passengers. The commander was the PM and the copilot was the pilot PF.

EK524 was cleared to taxi via taxiway Zulu, then Zulu 16 to holding point Kilo 12 towards runway 30L before crossing the runway and taxi to holding point Mike 15A of runway 30R.

At 1759:19 UTC, when EK568 was taxiing east on taxiway Kilo, Air South (AIRS) controller instructed the crew to cross runway 30L via Kilo 12 after the landing of Spice Jet Boeing 737 aircraft that was on final approach.

After the landing, and at 1800:07, the stop bar lights went off and EK524 Aircraft commenced movement.

At 1800:14, AIRS controller instructed the crew to hold position and the stop bar lights turned red, but there was no response by the crew. The Commander stated that at the moment they

received the instruction to hold position, the stop bar lights were off, and thereafter he attempted to stop the Aircraft. He thought the nose of the Aircraft passed the stop bar whereas the nose landing gear was still behind when the Aircraft stopped.

At 1800:19, AIRS controller repeated the instruction to hold position and the crew confirmed.

At 1800:26, AIRS controller advised the crew that the stop bars were off then turned on after 60 seconds, as default. The crew replied that the stop bar lights were on and they called AIRS controller to switch them off in order to move, and AIRS controller switched it off accordingly. The crew stated to AIRS controller that stop bar lights were switched on after the Aircraft had stopped based on the second instruction to hold position.

At 1800:58, AIRS controller cleared the Aircraft to cross runway 30L behind the landing of Algeria Airbus 330 aircraft, and the flight crew read back the clearance correctly. The flight crew emphasized that they were still behind the stop bar. AIRS controller confirmed that he was

The Commander, as the PM, turned on the landing light as per the *SOP action*.

The airport surface movement radar showed the EK524 Aircraft crossed holding point Mike 15A and continued lining up on the runway at 1803:08.

At 18:03:35, the crew of the other aircraft (EK568) called AIRN reporting "Dubai tower good evening emirates five six eight heavy holding short runway three zero right mike five alpha." AIRN instructed the crew by stating "Emirates five six eight good evening mike five alpha cross runway three zero right expedite after crossing right november holding point november niner." The crew read back the AIRN controller instructions and commenced to cross runway 30R.

At 18:03:43 UTC, EK524 has lined up and the ground speed was indicating 11 knots based on the ground movement radar (GMR).

At 1804:04, while the Aircraft was accelerating at 97 knots ground speed, AIRN

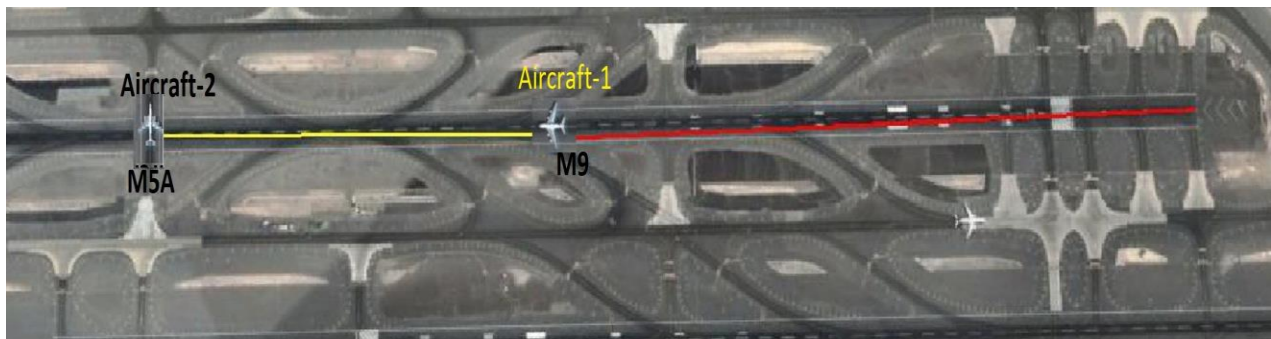


Figure 1. EK524 (Aircraft-1) and EK568 (Aircraft-2) on Runway 30R

monitoring the Aircraft on the surface movement radar and mentioned that he thinks it was a fault in their system.

At 1802:16, AIRS asked the flight crew if they are ready for departure, and the flight crew confirmed that. AIRS controller then cleared the Aircraft to taxi to holding point Mike 15A, and the flight crew read back the clearance correctly.

At 1802:37, AIRS controller requested the flight crew to contact Air North controller (AIRN) on frequency 118.75 MHz.

At 1802:46, the Commander contacted AIRN controller who instructed the crew to line up with runway 30R by stating "Emirates five two four line up runway 30 right.", and the Commander read back "Line up runway 30 right Emirates five two four."

noticed its roll and immediately instructed the flight crew to hold position, but the flight crew did not respond.

At 1804:10, AIRN repeated the instruction to the flight crew to stop immediately, and the flight crew did not acknowledge the instructions, but they started to stop the Aircraft. The Aircraft stopped at a position abeam taxiway Mike 9 at 1804:26, which was 1,000 meters short of Mike 5A, after reaching a maximum ground speed of 125 knots. (Figure 1)

After the Aircraft came to rest, AIRN contacted the crew to emphasize that they were not cleared for takeoff.

At 1806:23, AIRN controller handover commenced which contained the pertinent information on the traffic information but not on the rejected takeoff in specific.



At 1807:06, the Aircraft exited the runway as per AIRN instructions via November 4 to taxiway Papa.

AIRN controller handover was completed at 1807:12.

At 1810:33, Ground Movement Planner contacted the Airside Operations and requested a runway inspection on runway 30R after clearing, which was completed at 1819:13.

The Aircraft remained on the taxiway for 15 minutes for the crew to evaluate the occurrence with the maintenance control center before reporting ready for taxi.

Thereafter, the crew were cleared to taxi for departure in sequence and subsequently the Aircraft departed at 1834:15.

Damage to Aircraft

No damage was sustained by the Aircraft or by any property during the incident.

Personnel Information

Flight crew information

The Commander held an air transport pilot license (ATPL), issued by the United Arab Emirates General Civil Aviation Authority (GCAA). The license validity was until 26 June 2026. The class 1 medical certificate was valid until 31 December 2022. As a condition of his medical certificate, he was required to wear prescription glasses that correct for defective near vision.

The Copilot held an ATPL, issued by the GCAA with validity until 22 September 2026. The class 1 medical certificate was valid until 12 March 2022. As a condition of his medical certificate, the Copilot was required to wear prescription glasses that correct for defective distant vision.

The training records showed that both flight crewmembers had attended the Operator's required training.

Both flight crew stated that they were well rested before the flight and fit for the flight.

Air traffic controller

AIRN controller held an air traffic control license with a controller rating valid until 30 April 2023, and a class 1 medical certificate valid until 14 October 2022, with a condition which required to wear prescription glasses that correct for defective distant vision. The controller held a

level-6 English proficiency valid until 24 October 2024.

The roster of AIRN controller indicated that the Incident day was his second night shift after five days of duty. As per the controller's statement, he was fit for duty and was responsible for managing AIRN frequency at the time of the Incident.

AIRN Controller stated that he was busy with multi-tasks at the time when he issued crossing clearance to EK568 (the other aircraft). AIRN controller was relieved from duty immediately following the Incident, in accordance with the *Relief from Duty* requirements specified in the *Civil Aviation Regulation (CAR)*, Part VIII, Subpart 4.A.4.3.

Aircraft Information

General data

The Aircraft was certificated under the Boeing 777-300 type according to the certification specifications in the *Federal Aviation Regulations (FAR)* of the United States. Boeing manufactured a wide-body aircraft variant 777-31H equipped with two General Electric engines GE-90-115BL1. The Aircraft was manufactured in 2017 and was delivered to the Operator on 19 March 2017.

The time and cycles since new were 21,829 hours and 2,707 cycles, respectively. The last A-check was performed on 16 June 2021, at 2,369 hours and 302 cycles.

The Aircraft flight technical logs provided to the Investigation showed no technical defects prior to the Incident. There were no pending maintenance fault messages reported after the completion of the flight.

No technical anomaly was reported by the crew before or during the flight.

Meteorological Information

The meteorological conditions of OMDB prevailing around the time of the Incident are provided in table 1. The weather conditions were normal, visibility of above 10 km with no clouds and the air temperature was 20 degree Celsius with dew point 13 degrees Celsius. The atmospheric air pressure was 1018 millibars.

Table 1. OMDB meteorological conditions

Table 1. OMDB meteorological conditions	
Time	0180 UTC
Wind	10005 KT



Visibility	CAVOK (10 Km or more)
Clouds	Nil
Air Temperature	20 degrees Celsius
Dew Point	13 degrees Celsius
Pressure (Altimeter)	1018

Aerodrome Information

OMDB is the primary airport in Dubai. It is located 4.6 km east of Dubai and has two parallel runways, 12R/30L and 12L/30R. These are 4,447 meters and 4,351 meters long, respectively.

Construction Work

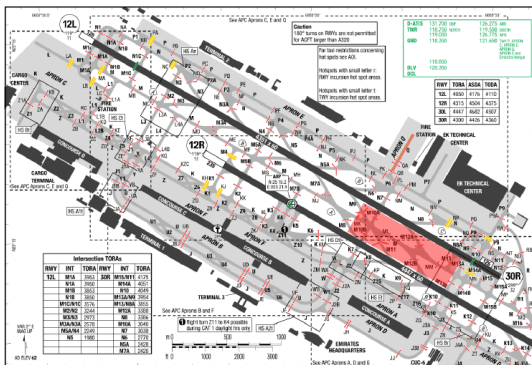


Figure 2. DXB maintenance work on taxiway Mike

As shown in figure 2 the highlight area in red, a significant area of taxiway Mike was blocked on the day of the Incident.

The aircraft taxiing for takeoff had to cross either the arrival runway 30L or the departure runway 30R, depending on which taxi route was taken, since the departure runway was 30R.

Flight Recorders

The Aircraft (operating flight number EK524) and the other aircraft (operating flight number EK 568) were fitted with a flight data recorder (FDR), a cockpit voice recorder (CVR), and a quick access recorder (QAR).

The flight recorders of both aircraft were successfully downloaded at Abu Dhabi Flight Recorder Laboratory (AD-FRL), and it was found that both CVR were overwritten as the flights continued as scheduled, and the recorders were off loaded after return to base. Both FDRs recorded data were relevant to the flights and the rejected takeoff data was credible.

Additional Information

Runway Incursion Classification

This Incident runway incursion is classified as Category B in accordance with the *CAR Part VIII Subpart 4, Attachment A*.

Runway incursion Category B is defined as:

“A runway incursion in which the separation decreases and there is significant potential for collision may result in a time-critical corrective/evasive response to avoid a collision.”

This includes a runway incursion occurring while a departing aircraft has commenced its take-off roll or an arriving aircraft has crossed the threshold.

Dependent and segregated runway modes of operation

Part 3 of the air navigation service provider (dans) *Manuals of Air Traffic Services (DMATS)* incorporates procedures and conditions that define the mode of operations applicable at the time of the Incident. *DMATS* states:

“5.2.3 During simultaneous operations on parallel instruments runways, one runway is used exclusively for arrivals and the other runway is used exclusively for departures. In this mode, the runways are operated independently of each other by separate Controllers.

5.2.3.1 Operating Conditions

If any of the following conditions occur, Segregated Runway Operations shall cease and operations shall revert to Dependent Runway Operations:

- A departure from full length runway 12R-M4.M5B/K1/K2 or runway 30R-N11/N12M15/M15A/
-”

The segregated mode of operations allows for a departure from runway 30R to be launched without considering an arrival to runway 30L as long as the required conditions have been adhered. The segregated mode of operation was ceased as per the condition that the departure of EK524 was a full-length runway from Mike 15A.

“5.2.3.2.2 Operational Impact

The operational impact of dependant mode is:

1. An Air Controller shall not give take-off clearance to an aircraft on the departure runway until a landing aircraft on the arrival runway is



landing assured i.e. main landing gear in contact with the runway or;

2. A departing aircraft must have commenced its take-off roll on the departure runway by the time the following arriving aircraft on the arrival runway reaches the following distance from touchdown:

Runway 30L - 2 nautical miles

Runway 12L - 2.5 nautical miles.”

The Aircraft was departing from taxiway Mike 15A, and therefore Dependent Runway¹ criterion was required to be applied. As per the procedure, AIRN did not pass the take-off clearance as there was arrival traffic on final at a distance of 2.5 nautical miles from runway 30L threshold.

ATC clearance procedures

In the part of issuing runway line-up clearance, the acceptable means of compliance published by the GCAA (AMC69) requires ATC controller to phrase the clearance as “Line up”, whereas ICAO *Document 4444* requires the clearance to be phrased as “Line up/line up and wait.”

Chapter 2, section 2.12 of AMC69 – *Conditional Clearances*, states:

2.12.1 Conditional phrases, such as “BEHIND LANDING AIRCRAFT”, or “AFTER DEPARTING AIRCRAFT” shall not be used for movements affecting the active runway(s), except when the aircraft or vehicles concerned are seen by the controller and the pilot. The aircraft or vehicle causing the condition in the clearance shall be the first aircraft/vehicle to pass in front of the other aircraft concerned. Conditional clearances shall not be given to vehicles.

2.12.2 In all cases a conditional clearance will be given in the following order and consist of:

- i. identification; (callsign)
- ii. the condition;
- iii. the clearance;
- iv. brief reiteration of the condition

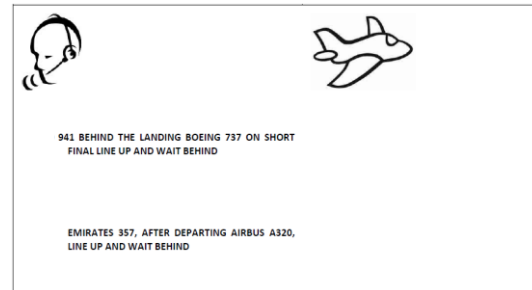


Figure 3. AMC 69 Controller instructions to aircraft pilots

3.5 PRE-DEPARTURE MANEUVERING

3.5.3 Aircraft report ready for departure – doesn't refer to just Line up in AMC69

3.5.3 Many types of aircraft carry out engine or other pre-take-off checks prior to departure

and are not always ready for take-off when they reach the runway holding point.

3.6 TAKE-OFF PROCEDURES

3.6.5 Line up for immediate take-off

3.6.5 For traffic reasons it may be necessary for the aircraft to take off immediately after lining up.” (Figure 2).

Document 4444, states:

“12.2.7 Conditional clearances

12.3.4.10 Preparation for take-off – This refers to Line up and wait.” (Figure 3).



12.3.4.10 PREPARATION FOR TAKE-OFF	a) UNABLE TO ISSUE (designator) DEPARTURE (reasons);
	b) REPORT WHEN READY [FOR DEPARTURE];
	c) ARE YOU READY [FOR DEPARTURE];
	d) ARE YOU READY FOR IMMEDIATE DEPARTURE;
	*e) READY;
... clearance to enter runway and await take-off clearance	f) LINE UP [AND WAIT];
	†g) LINE UP RUNWAY (number);
	h) LINE UP. BE READY FOR IMMEDIATE DEPARTURE;
... conditional clearances	i) (condition) LINE UP (brief reiteration of the condition);
... acknowledgement of a conditional clearance	*j) (condition) LINING UP (brief reiteration of the condition);
... confirmation or otherwise of the readback of conditional clearance	k) [THAT IS] CORRECT (or NEGATIVE) [I SAY AGAIN] ... (as appropriate);
	* Denotes pilot transmission.
	† When there is the possibility of confusion during multiple runway operations.
	‡ Provisions concerning the use of conditional clearances are contained in 12.2.7.

Figure 4. ICAO 4444 Conditional Clearances

Part 3 of DMATS states:

“5.2.9.1 HIGH INTENSITY RUNWAY OPERATIONS (HIRO)

To maximize runway capacity AIR North/South shall use conditional line-up clearances whenever possible.

5.2.13.1 Conditional Clearances

5.2.13.1 AIRCRAFT

a. If the issuance of a clearance depends on another aircraft or vehicle movement, then a conditional clearance may be issued for expeditious traffic handling. The clearance must relate to the immediately next aircraft, vehicle, or taxi movement. Conditional clearances must consist of the condition before the line up or crossing instruction.

b. The order and content of a conditional clearance shall be:

- Identification
- Condition
- Clearance
- Reiteration of the clearance.”

AIRN controller did not adhere to the DMATS conditional clearance procedures while passing instructions to EK524 flight crew to line up following by the EK568 crossing the active runway before the take-off roll.

NOTAM

The briefing package for the event flights contained the following:

NOTAM: 1A3301/21

SECN OF TWY M BTN TWY M9 AND TWY M13A, AND ASSOCIATED LINKS CLSD.

TWY M10A, TWY M10B, TWY M11, TWY M12A, TWY M12B AND TWY M13 CLSD.

EAST LINK OF TWY M9 ONTO TWY M CLSD.

EAST LINK OF TWY M8 ONTO TWY M CLSD.

EAST LINK OF TWY M7A ONTO TWY M CLSD.

WEST LINK OF TWY M13A ONTO TWY M CLSD.

WEST LINK OF TWY M13B ONTO TWY M CLSD.

PILOTS OF ACFT VACATING RWY 12L-30R VIA RAPID EXIT TWY M9 TO EXER CTN DUE TO

WORKSITE IN PROXIMITY.

REF UAE AIP SUP 68/2021 PHASE 10.

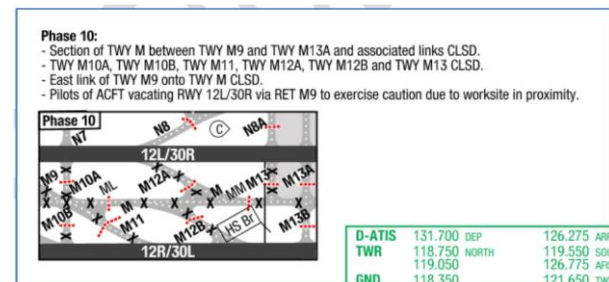


Figure 5. NOTAM Phase 10 information

Autonomous runway incursion warning system (ARIWS) or runway status lights system (RWSL)

ARIWS is a system which provides autonomous detection of a potential incursion or the occupancy of an active runway and a direct warning to a flight crew or a vehicle operator.

An ARIWS operates based on a surveillance system which is designed and sited to monitor the existing situation on a runway and which automatically transmits this information to warning lights located at both the runway take-off threshold and at selected runway entrances. The system provides warnings as follows:

- When an aircraft arriving at a runway is short final or one departing from the runway has



commenced its take-off roll, red warning lights at the runway entrances will illuminate, indicating that it is unsafe to enter or cross the runway.

- When an aircraft is on the runway threshold awaiting takeoff and another aircraft or vehicle enters or crosses the runway, red warning lights will illuminate at the threshold area, indicating that it is unsafe to commence the take-off roll.

There are two basic visual components of RWSL: (1) Runway entrance lights (REL); and (2) takeoff hold light (THL). Either may be installed, the two components are designed to be complementary to each other.

RWSL system is a fully automatic, advisory safety system which provides direct alerts to both vehicles and pilots independently of the normal traffic control system operated by ATC. Its objective is to reduce both the number and severity of runway incursions and thereby prevent runway collisions.

A graphic in figure 2 below is showing a typical application of the three 'baseline' elements of the RWSL system is shown below. In summary, the principles are that:

- RELs warn that it is unsafe to enter/cross a runway
- THLs warn that it is unsafe to take off from a runway
- RILs warn that it is unsafe to cross a runway intersection

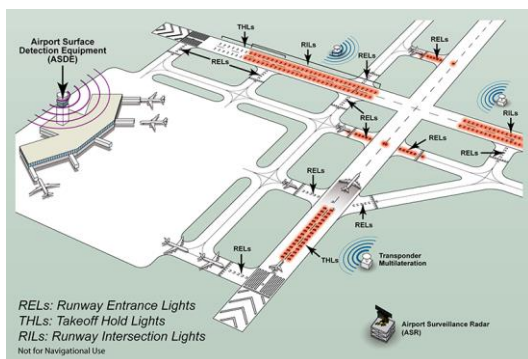


Figure 6. Runway Status Light

It is designed to be fully compatible with existing procedures. Early versions of the system had two elements, Runway Entrance Lights (RELs) and Take Off Hold lights (THLs). Runway Intersection Lights (RILs) were subsequently added and now the intention is to integrate the

three RWSL elements with the Final Approach Runway Occupancy Signal (FAROS) system which will provide runway occupancy alerting to aircraft on final approach indicating that it is unsafe to land by automatically changing the PAPIs from a steady illumination to an intermittent one.

Runway Inspection

As per the *DMATS*, part 3 – *Dubai Tower*:

“3.21.5.13 Runway Unfit for Use Due to Possible Contamination:

The runway shall be considered potentially contaminated and unfit for the use until an inspection is carried out and the runway is reported as serviceable if any of the following are reported or observed:

- A mechanical problem of any kind (brakes/gear/engine/flaps, etc.); or
- Abnormal mechanical operations; or
- A rejected take-off (unless RTF transmissions from the subject aircraft confirm the rejection was for non-mechanical reasons (e.g. paperwork, passenger not in their seat, configuration warnings, etc.)”

If the aircraft subject to one of the above is an arrival, only the portion of the runway from the threshold to point of vacated needs to be inspected.”

If the aircraft subject to one of the above scenarios is a departure, the entire runway shall be inspected if the aircraft becomes airborne, otherwise, only the portion of the runway from the departure point up to where the aircraft vacated the runway after rejected take-off needs to be inspected.”

DMATS also states:

“5.2.18 Cancelling Take-Off Clearance:

ATCOs are reminded that a rejected take off once the aircraft has reached a speed in excess of 80 knots can result in damage to the aircraft gear and brake system.”

The runway inspection was carried out shortly after the Aircraft had vacated the runway. The inspection did not reveal any foreign debris or contamination on runway 30R.

Flight crew operations manual (FCOM)



As per the *FCOM* procedures, the PM should communicate with the Tower controller for take-off clearance as per the table illustrated in figure 4.

Pilot Flying	Pilot Monitoring
Before entering the departure runway, verify that the runway and runway entry point are correct.	
	When entering the departure runway, set the STROBE light switch to ON. 777-200LR, -300ER, -300ER/ULR Notify the cabin crew to prepare for takeoff. 777F Notify the supernumeraries to prepare for takeoff.
Verify that the brakes are released. Align the airplane with the runway heading.	
Verify that the airplane heading agrees with the assigned runway heading.	
	When cleared for takeoff, set the LANDING light switches to ON.

Figure 7. Takeoff procedures

Analysis

Clearance to Cross the Runway

When the Aircraft was at the holding point Kilo 12 of runway 30L, AIRS controller instructed the crew to cross runway 30L behind the landing SpiceJet Boeing 737 on final approach.

The crew initiated to move of the Aircraft for the crossing of runway 30L at taxiway Kilo. While taxiing towards Kilo 12, AIRS controller instructed the crew to hold position and he turned on the stop bars, which led the crew to brake and stop the Aircraft. It revealed that the Aircraft stopped before the stop bars lights, even though the Commander was confused regarding the Aircraft's position.

AIRS controller mentioned to the flight crew that it was a system fault; however, as per the controller statement, the stop bar selection was manually selected by AIRS controller.

The flight crew mentioned to AIRS that they were concerned about whether or not they had crossed the stop bars. The crew also advised AIRS that they had referred to the Aircraft's ground manoeuvring camera as an aid for identifying the Aircraft position in relation to the stop bar, and accordingly, they confirmed that the nose landing gear did not cross the stop bar. The position was confirmed as well by AIRS from the GMR.

Clearance to Enter the Runway

The communication between AIRN controller and PM (Commander) was normal, and the

controller's instructions were read back by the PM timely.

AIRN controller instructed the crew to line up runway 30R and the PM read back the instructions correctly.

The flight crew stated during the Investigation that they confirmed that the runway was clear when the Aircraft was lining up and the take-off roll was commenced.

As per the Commander's statement, AIRS controller asked whether the flight crew was ready for departure. In this case, the Commander was confused since it was AIRS controller who asked the question and not AIRN controller. Based on the transcript, AIRN controller instructed the flight crew to line up and informed the flight crew that there was traffic at 2.5 nautical miles on the final approach for runway 30L. At this time, the Aircraft was crossing the holding point taxiway Mike 15A.

Approximately 30 seconds later, another aircraft (EK568) informed AIRN that the aircraft position was at holding short runway 30R at taxiway Mike 5A, which then cleared by AIRN to cross.

In addition, about the question "ready for departure" by AIRS, the Commander understood it as "ready for takeoff". Before initiating the takeoff, the Commander asked the Copilot whether they were cleared for takeoff, which was then confirmed by the Copilot. Hence, the Copilot initiated the takeoff. At that time, takeoff clearance was not yet provided.

The GMR images showed that at the time when the Aircraft lined up on runway 30L, the other aircraft (flight number EK568) had not entered the runway yet.

EK568 flight crew called AIRN at 18:03:35 reporting holding short runway 30R Mike 5 Alpha, and AIRN instructed to cross the runway and expedite after crossing right November, holding point November 9. The crew read back the instructions correctly and commenced to cross runway 30R.

At 1804:05, few seconds later to EK568 started to cross the runway, AIRN observed EK524 Aircraft initiated the roll and he immediately instructed to "[...] hold position." As there was no response, AIRN called immediately again and instructed to "[...] stop immediately." and there was no response. AIRN called for the third time stating "[...] you were not cleared to takeoff."



EK524 initiated high speed rejected takeoff procedures, the Aircraft eventually stopped at 1804:26 and the flight crew responded with a question sentence "We were not cleared for takeoff affirm[?]" and AIRN confirmed that. The Pilot was not sure that if they were cleared to take-off or not.

Flight Crew

The GMR playback and the FDR ground speed parameters revealed that the Aircraft started to move at 1801:50 from the holding point Kilo 12 to cross the runway 30L. AIRS controller contacted the crew at 1802:13 to confirm if they are ready for departure, and the crew confirmed. The crew stated this call gave them the impression that AIRS controller requires them to be ready for takeoff. This impression was supported by their perception that they could not see any traffic to delay them.

After the Aircraft crossed runway 30L, AIRS instructed to change the frequency from AIRS to AIRN, the flight crew acknowledged and established communication with AIRN.

AIRN instructed to line up runway 30R, and the crew replied by reading back the instructions. The flight crew stated that runway 30R was clear when they entered. At 1803:30 the Aircraft turned left to line up runway 30R. After line up, the Aircraft continued to roll.

According to the statement provided by the flight crew, after accomplishing the *before take-off checklist*, the PM activated the landing lights under the assumption that EK524 had received clearance for takeoff. However, in this particular situation, the activation of the landing lights did not serve as a protective measure.

In accordance to the recommendation of the Federal Aviation Administration of the United States (FAA), the landing lights would serve as an indication to outside airport environment participants, including ATC, that the aircraft is about to commence takeoff. The lights would virtually reduce the risk of runway incursions.

The Investigation determines that, although AIRN controller had never granted a take-off clearance to the crew, the crew commenced the take-off roll assuming that they had received the clearance and read it back. Since both pilots agreed that take-off clearance had been given, they assumed that there was no reason for re-confirmation. The landing lights, being switched on, did not work as a defense in alarming the crew of the other aircraft or AIRN.

The crew initiated the take-off roll and did not hear the traffic communication between the other aircraft (EK568) and AIRN who gave instructions to cross the same active runway 30R on which the Aircraft (EK524) was initiating the take-off roll.

The Investigation determines that the sequence of events that took place during crossing runway 30L, and the call from AIRS controller asking about being ready for departure, led the crew to sense some urgency and to have the assumption of being cleared for takeoff.

During the time when AIRN and EK568 were communicating, the EK524 flight crew was occupied with tasks related to initiating takeoff and making necessary announcements, which could have made it difficult for them to hear the radio communication between AIRN and EK568. Furthermore, there were no indications or signals for the EK524 flight crew to anticipate the presence of another aircraft crossing the departure runway, and they did not receive any prior warning from AIRN about an aircraft crossing ahead. The visibility on taxiway Mike was disrupted due to ongoing construction work, and the distance between EK524 and the crossing point at Mike 5A (approximately 2,000 meters) was long. These factors, in addition to the night time factor, hindered the EK524 flight crew's ability to visually detect the EK568 aircraft crossing.

Runway Inspection

The Investigation reviewed part 3 of *DMATS – Runway Unfit for Use Due to Possible Contamination*, and part 5 – *Cancelling Take-Off Clearance*, and determined that the procedures to conduct runway inspection after rejected takeoff were unclear to air traffic controllers as part 3 of *DMATS* stated that inspection is not required if the rejected takeoff is due to non-mechanical issues whereas part 5 stated that the high speed rejected takeoff above 80 knots could lead to mechanical failure in gears or brakes that require a runway inspection.

Conclusions

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.

- **Findings.** Statements of all significant conditions, events or circumstances in this Incident. The findings are significant steps in



this Incident sequence, but they are not always causal or indicate deficiencies.

- **Causes.** Actions, omissions, events, conditions, or a combination thereof, which led to this Incident.
- **Contributing factors.** Actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the Incident occurring, or mitigate the severity of the consequences of the Incident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil or criminal liability.

Findings

- (a) The Aircraft was certificated, equipped, and maintained in accordance with the requirements of the *Civil Aviation Regulations* of the United Arab Emirates.
- (b) The Aircraft was airworthy when dispatched for the flight, and there was no defect or malfunction detected that could have contributed to the Incident.
- (c) The flight crewmembers of both flights were licensed and qualified in accordance with the requirements of the *Civil Aviation Regulations* of the United Arab Emirates.
- (d) The flight crewmembers were well-rested prior to the flight and fit for the flight.
- (e) The EK524 Copilot was the pilot flying (PF) and the Commander was the pilot monitoring (PM).
- (f) AIRN controller was licensed and qualified in accordance with the requirements of the *Civil Aviation Regulations* of the United Arab Emirates.
- (g) The OMDB weather condition was not a contributory factor to the Incident.
- (h) The flight crew turned on the landing light and initiated the take-off roll from Mike 15A without AIRN take-off clearance.
- (i) Both EK524 flight crewmembers stated that AIRN provided take-off clearance. However, there was no evidence that such a clearance had been issued.
- (j) The EK524 flight crew was not aware that another aircraft (EK568) was crossing

runway 30R via holding point Mike 5A as per the clearance given by AIRN.

- (k) Part 3 of *DMATS* was inconsistent with part 5 in determining the requirements for runway inspection after rejected takeoffs.
- (l) The phraseology used by AIRN for granting the clearance was "line up". According to *DMATS*, AIRN controller was not required to state "line up and wait".
- (m) During the handover, AIRN handing over controller instructed the crew to line up and after completion of the handover the taking over controller cleared the Aircraft for takeoff.

Causes

The Air Accident Investigation Sector determines that the causes of EK524 flight crew to commence a take-off roll without clearance were:

- (a) When AIRS enquired the flight crew for readiness for departure, the crew perceived that as a clearance for takeoff from runway 30R.
- (b) When the flight crew switched the radio frequency to AIRN, they were granted a "clearance to line up" which was mistakenly perceived as "take-off clearance".
- (c) The flight crew were in assumption that takeoff clearance was given and they did not expect the crossing of EK568 on the active runway as it was not communicated or warned by ARIN to the EK524 crew.
- (d) The visibility of flight crew for the crossing aircraft was hindered by the long distance between the EK524 position and holding point Mike 5, the ongoing work, and night time.
- (e) The flight crew carried out a rolling takeoff and did not stop after lining up on runway 30R assuming that clearance to takeoff was given.
- (f) The flight crew did not monitor the communication between AIRN and the aircraft crossing runway 30R as they were engaged in accomplishing the *before take-off checklist*.

Safety Recommendations

Safety actions taken by the Operator



The following safety actions were taken by the Operator:

Safety Action 1:

The Operator arranged meetings with the air navigation service provider to review the current line-up phraseology and align it with best industry practices.

Safety Action 2:

The Operator is coordinating with the airport to discuss the benefits and feasibility of installing an Autonomous Runway Incursion Warning System.

Safety Action 3:

The Operator is reviewing the Management Pilot on Duty (MPOD) procedures to provide sufficient guidance on what information should be gathered and from which sources in order to assess the continuation of a flight after a safety event.

The Investigation is coordinating with the Operator to monitor the progress and outcome of these safety actions.

Summary Report Safety Recommendations

The Investigation determines that there were no systemic deficiencies or organizational factors identified. The following are the safety recommendations assigned to the involved parties.

Emirates

SR01/2024

The EK524 flight crew misperception of ATC instructions led them to incorrectly initiate a takeoff without clearance. The flight crew was occupied with accomplishing the *before take-off checklist* which hindered them from monitoring communication between the other aircraft (EK568) and AIRM. Consequently, the flight crew was not aware of the crossing EK568 aircraft.

It is recommended that Emirates addresses the risks associated with before takeoff activities and implements necessary mitigations through the crew resource management (CRM) scheme. Dividing the tasks between the PF and PM during the *before take-off checklist* accomplishment will improve the crew's situational awareness.

Dubai Air Navigation Services (dans)

SR02/2024

The Investigation identifies the inconsistency between parts 3 and 5 *DMATS* concerning runway inspection policies and procedures.

This inconsistency confuses the airport ground operations personnel and air traffic controllers, and creates a window of misinterpretation of safety requirements. This may cause a lack of awareness of the existence of foreign objects on the runway.

Therefore, it is recommended that dans reviews *DMATS* and eliminates inconsistencies in runway inspection policies and procedures.

Dubai Airports

SR03/2024

In spite of the Operator's procedures containing provisions relevant to the flight crew diligent communication with ATC instructions, it did not prevent this Incident.

The Investigation did not carry out a safety analysis that could have identified the trend of incidents of takeoff without clearance and whether there is an associative alert of such occurrences that warrants the need for mitigations other than operational procedures.

However, the Investigation recognizes the severity of the consequences of takeoff without clearance and believes that, as a last line of defense, a ground runway incursion detection system (that is independent from the aircraft airborne system) may introduce a risk mitigation.

Therefore, the Investigation recommends that Dubai Airports initiates a safety case study in coordination with the GCAA, dans, and Emirates for the need of enhancing the ground based alert systems that provides warnings and alerts of detected runway incursions to ATC controllers and flight crew.

This Report is issued by:

Air Accident Investigation Sector The United Arab Emirates

E-mail: aai@gcaa.gov.ae
Website: www.gcaa.gov.ae