

Technical report

IN-019/2024

Incident occurred on 19 June 2024 to aircraft ATR72-212A, registration CN-COE, operated by RAM Express, and Boeing 737-800, registration EI-DYC, operated by Ryanair, at Seville airport

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Disclaimer

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission regarding the circumstances of the accident that is the object of the investigation, its probable causes, and its consequences.

In accordance with the provisions of Article 5.4.1 of Annex 13 of the International Civil Aviation Convention, Article 5.6 of Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010; Article 15 of Law 21/2003 on Air Safety; and Articles 1 and 21.2 of RD 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent their recurrence. The investigation is not intended to attribute any blame or liability, nor to prejudge any decisions that may be taken by the judicial authorities. Therefore, and according to the laws specified above, the investigation was carried out using procedures not necessarily subject to the guarantees and rights by which evidence should be governed in a judicial process.

As a result, the use of this report for any purpose other than the prevention of future accidents may lead to erroneous conclusions or interpretations.

This report was originally issued in Spanish. This English translation is provided for information purposes only.

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ABBREVIATIONS

° ' "	Degree(s), minute(s) and second(s)
°C	Degree(s) centigrade
A-SMGCS	Advanced Surface Movement Guidance & Control System
AESA	Spanish Aviation Safety Agency
AIP	Aeronautical Information Publication
APP	Approach control
ASR	Air Safety Report
ATC	Air Traffic Control
ATPL(A)	Airline Transport Pilot Licence
CCTV	Closed-circuit television
CPL	Commercial Pilot Licence
CRM	Resource management on the flight deck
CRS	Certificate of Release to Service
CTR	Control Area
CVR	Cockpit voice recorder
DGAC	Directorate General of Civil Aviation - Morocco
IAS	Indicated airspeed
EICK	ICAO airport code for Cork
FDR	Flight data recorder
FH	Flight hours
FL	Flight level
ft	Feet
GMC	Annotation of ground movements control
GMMN	ICAO airport code for Casablanca
GS	Ground speed
h	hour(s)
hPa	Hectopascal(s)
IFR	Instrument Flight Rules
ILS	Instrument landing system
IMC	Instrument Meteorological Conditions
IR	Instrument rating
km	Kilometre(s)
kt	Knot(s)
LEZL	ICAO airport code for Seville
LVP	Low Visibility Procedures
m	metre(s)
METAR	Meteorological Aerodrome Report
MTOW	Maximum take-off weight

NM	Nautical miles
ICAO	International Civil Aviation Organisation
PAPI	Precision approach path indicator
PAR	Precision approach radar
PF	Pilot Flying
PFD	Primary Flight Display
PM	Pilot Monitoring
QAR	Quick Access Recorder
QFU	Magnetic orientation of runway
QNH	Altimeter subscale setting to obtain elevation while on the ground
RVR	Runway Visual Range
RWY	Runway
s	Seconds
SPECI	Special aerodrome weather report
TAF	Aerodrome forecast
TWR	Control Tower
UTC	Coordinated Universal Time
VMC	Visual meteorological conditions

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Aircraft No. 1:

Owner	RAM Express
Operator:	RAM Express
Aircraft:	ATR72-212A, registration CN-COE (Morocco)
People on board:	4 crew members and 44 passengers unharmed
Type of flight:	Commercial air transport – Regular – International – Passenger
Flight phase:	Rolling to the runway
Flight rules:	IFR

Aircraft No. 2:

Owner	Ryanair
Operator:	Ryanair
Aircraft:	Boeing 737--800, registration EI-DYC (Ireland)
People on board:	6 crew members and 173 passengers unharmed
Type of flight:	Commercial air transport – Regular – International – Passenger
Flight phase:	Take-off run
Flight rules:	IFR

Date and time of the incident:	19 June 2024, 12:09 UTC
Location of the incident:	Seville Airport - LEZL
Date of approval:	28/NOVEMBER/2025

Synopsis

Summary:

On Wednesday 19 June 2024, during the take-off run of the Boeing 737-800, registration EI-DYC, operated by Ryanair with call sign RYR3262, a runway incursion occurred by the ATR72-212A, registration CN-COE, operated by RAM Express with call sign RAM925.

The RAM925 stopped before the edge of the runway when the aircraft RYR3262 started its rotation, overflying the runway.

The crew and passengers of both aircraft were not injured and the aircraft did not experience any damage.

The investigation has determined that the runway incursion by RAM925 while RYR3262 was taking off was the result of the RAM925 crew's lack of adherence to taxi procedures.

Contributing factors to the incident are considered to be:

- The controller did not request RAM925 to stop before it reached the edge of the runway, as it taxied for 3 minutes 18 seconds of which 1 minute 2 seconds over undue areas.
- The non-existent directional and information signs from gate G3, taxiway "A".
- The change from VMC to IMC, which should have involved a change in the taxiway lighting configuration but was not implemented due to the delay in receiving the ordinary meteorological report (METAR).

Two safety recommendations are issued to the airport operator and the air traffic control.

1. FACTUAL INFORMATION

1.1. Incident review

On 19 June 2024, ATR-72-212A, registration CN-COE, operated by RAM Express was parked at stand 34 at Seville - LEZL (SVQ) airport in Spain ready to make a flight to Casablanca/Mohamed V - GMMN (CMN) airport in Morocco.

A total of 48 people were on board the aircraft, including four crew, two pilots and two cabin crew.

The flight crew consisted of a captain (PF) in the left seat and a first officer (PM) in the right seat.

Having completed the pre-flight checks, including planning the taxi route, and after starting both engines, at 12:05:33 h, the crew requested taxi clearance and were instructed by the control tower to taxi to the runway 27 holding point, via G3.

At the same time, B-737-8AS, registration EI-DYC operated by Ryanair with call sign RYR3262 and destination Cork - EICK (ORK) airport in Ireland, was approaching the holding point on runway 27. A total of 179 people were on board, including 6 crew, 2 pilots and 4 cabin crew.

RAM925 had started taxiing at very slow speed, merging into G3. According to the flight crew testimonies, the MASTER CAUTION and ICING alert came on, but they considered this to be a false indication as the temperature was 18°C. They then momentarily switched on the weather radar to assess the conditions they would encounter during the take-off.

At 12:07:46 h, during the taxi of RAM925, the control tower cleared RYR3262 to the requested heading¹ 290° and to take off on runway 27, starting the take-off run.

Meanwhile, RAM925 continued to taxi slowly straight ahead, merging onto E1, instead of turning left onto taxiway A, on course for the runway 27 holding point.

Weather conditions were VMC with a thunderstorm warning, but while RAM925 was taxiing, visibility was reduced by a thunderstorm with heavy rain crossing the field. Conditions changed to IMC.

According to the RAM925 crew, the first officer saw white lights in front of him. Aware that they were close to the edge of the runway, he told the captain to stop.

Simultaneously, the control tower observed RAM925 heading towards runway 27 on E1 and instructed it to hold its position, indicating that it had made a mistake during taxi and had entered the "no entry" runway E1. At that time, at 12:08:57 h², RAM925 reached the right edge of runway 27 from E1 and RYR3262 started its rotation at approximately E2. RAM925 stopped on the edge of runway 27, perpendicular to the runway, at the precise moment when the crew of RYR3262 (listening on frequency to the instruction to RAM925 to stop) was circling over the runway at E1. The controller indicated that he had instructed RAM925 to hold its position as it was about to make an incursion onto the runway and at that point it was impossible to stop aircraft RYR3262 as it had exceeded the non-return speed.

¹ The QFU of Seville runway 27 is 271°. That is, the aircraft requested to turn right after take-off.

² All times indicated in the report, unless otherwise stated, shall be UTC.

RYR3262 completed its take-off and continued its flight normally. According to the information provided by the flight crew, at no time did they see RAM925 on the runway.

The tower controller, in the single position, was at all times in visual control of the traffic on the apron, taxiway and runway.

RAM925 was instructed to leave the runway along E2 to "A" to HP3 to the head of runway 27 for take-off. The crew of RAM925, on leaving the runway, requested to return to the stand due to technical problems. The tower then requested the apron services guide it to the stand where it remained until it finally deplaned at 13:12 h, taking off without incident for Casablanca airport.

The crews and passengers of both aircraft were not injured and there was no damage to the aircraft or the airport facility.

1.2. Injuries to persons

Injuries to persons on board the ATR72-212A (RAM925)

Injuries	Crew	Passengers	Total in the trajectory	Other
Fatal				
Serious injuries				
Minor injuries				
Unhurt	4 ³	44	48	
TOTAL	4	44	48	

Injuries to persons on board the Boeing 737-800 (RYR3262)

Injuries	Crew	Passengers	Total in the trajectory	Other
Fatal				
Serious injuries				
Minor injuries				
Unhurt	6 ⁴	173	179	
TOTAL	6	173	179	

1.3. Damage to the aircraft

There was no damage to the aircraft.

1.4. Other damage

There was no damage to third parties.

³ 2 flight deck crew and 3 cabin crew members

⁴ 2 flight deck crew and 4 cabin crew members

1.5. Personnel information

1.5.1. Information on cabin crew

1.5.1.1. Information on the crew of the ATR72-212A(RAM925)

The captain, who was acting as PF at the time of the incident, was 53 years old, held an ATPL(A) airline transport pilot licence issued by the Colombian aviation authority on 11/07/2011, validated by the Moroccan aviation authority valid until 30/04/2025, with PIL ATR-42/PIL ATR-72 pilot-in-command type ratings.

He had a Class 1 medical certificate valid until 04/10/2024 and his level of English language proficiency was 4, valid until 26/07/2024.

His total experience was 12,418 FH, of which 10,500 FH were on type and 5,000 FH as captain. He had flown with the operator since 2023. He flew on the same day of the incident from 09:27 to 10:51 h (CMN-SVQ) and before that, considering the rest periods required by the regulations in force, two days before the incident with a total of 5:20 FH in 3 flights.

According to their statement, ATC authorised them to taxi to runway 27 via G3. During the taxi, weather conditions deteriorated and visibility decreased. They taxied from the stand in a straight line and entered HS1, where they stopped immediately and followed ATC instructions to maintain their position. They were then allowed to enter the runway and return backwards from E2 to G7. Due to the incident, they returned to the stand, delaying the departure of the flight.

The first officer of the aircraft, who was acting as PM at the time of the incident, was 41 years old, held an ATPL(A) airline transport pilot licence issued by the Moroccan aviation authority on 10/10/2019, with type ratings including ATR42/72 first officer and instrument rating valid until 31/08/2024.

The first officer held a Class 1 medical certificate valid until 31/03/2025 and his level of English language proficiency was 6 with unlimited validity.

His total experience was 1,565 FH and 355 FH on type.

He flew the same day of the incident from 09:27 to 10:51 h (CMN-SVQ) with the captain and had previously flown a total of 5:25 hours in 2 flights two days before the incident, with the rest periods required by the regulations in force.

The PM confirmed the information provided by the captain on the event.

According to the information provided by the operator, both captain and first officer had flown to LEZL on 4 occasions prior to the event.

1.5.1.2. Information on the crew of the Boeing 737-800 (RZR3262)

The 35-year-old captain, who was acting as PF at the time of the incident, held an ATPL(A) airline transport pilot licence issued by the Irish Aviation Authority (IAA) on 20/08/2018, with type ratings on other B737 300-900 and instrument ratings valid until 28/02/2025.

He held a Class 1 medical certificate valid until 27/03/2025 and his level of English language proficiency was 6 with indefinite validity.

His total flight experience was about 7,000 FH, of which approximately 6,500 FH were on type. He had been flying the route for 6 years without incident.

According to the captain's statement, when they were on the take-off run, the rain in the middle of the runway was heavy, only the runway axis lights were visible and when they were almost rotating, they heard on radio frequency 118.105 ATC indicating to CN-COE to stop in position. When they were in the air, ATC asked them if they had seen it, to which they replied that they had not. ATC informed them that a runway incursion had occurred and would report it.

The 28-year-old first officer who was acting as PM at the time of the incident held a CPL(A) airline transport pilot licence, issued by the Irish Aviation Authority (IAA) on 04/11/2023, with type ratings including B737 300-900 and instrument rating valid until 31/01/2025.

The first officer held a Class 1 medical certificate valid until 22/07/2024 and his level of English language proficiency was 6 with indefinite validity.

His total flying experience was 1644:32 FH, of which 134:47 FH were on type. As for his LEZL experience, it was from April 2024.

According to his statement, the first officer indicated that for him it was a line training flight and the captain was the pilot at the controls, which is entirely consistent with the captain's account of the event.

1.5.2. Information on air traffic control personnel

1.5.2.1. Executive Service Controller

The executive controller on duty at the time of the incident was in the single position. He had worked at LEZL since 14/03/2018.

He had an air traffic controller licence issued by AESA, valid and in force with the ratings required by the LEZL unit, expiring on 14/03/2025. His English language level was ICAO level 4 with an expiry date of 30/09/2024. He held a Class 3 medical certificate expiring 04/04/2025.

According to the information provided by the controller on duty, at the time of the incident he was working in the single position and the authorisations given to the traffic involved in the event were the standard instructions; RAM925 was instructed to taxi to the holding point on runway 27 via gate 3 (in accordance with the AIP from stand 34 where the aircraft was located), the taxiing by this crew was correct; and then RYR3262 was authorised to enter and align on runway 27, with the aim of asking Seville APP to release this aircraft and for the crew to indicate whether they required any type of diversion from their SID. APP approved the departure of RYR3262 and then cleared it for take-off.

According to his testimony, the controller at all times continued to look towards the runway. To his left, he observed RAM925 entering the runway through taxiway E1, with its nose on the runway and slightly to the east and instructed it to hold its position. The crew, reading it back correctly, although their English was not very good from their point of view, indicated to the controller, that they believed they had not

encroached on the runway. According to the controller's information, this was the first runway incursion he could recall occurring at that point.

Meanwhile, as he indicated, RYR3262 was already on an advanced take-off run, rotating approximately past E3, overflying RAM925 at E1, and not seeing the runway incursion.

According to the controller, following the incident, the crew of RAM925 were instructed to taxi down the runway to clear taxiway E2, although they struggled to understand what to do. Later, this crew requested to return to the stand. The taxiing speed of RAM925, according to his perception, was normal.

As for the prevailing weather he recalled that conditions were VMC and that the next METAR arrived a little late, already indicating a visibility of 3 km and cloudy at 2500 ft AGL (BKN025), hence IMC. There was no heavy rain. Some take-off traffic requested diversions on the departure route due to weather conditions.

In order to change the lighting configuration, the controller must move from his control position, which makes the task difficult. The controller indicated that in his view the beacon panel (SMP) was working worse and worse.

At the time of the incident, the controller confirmed that only he and a student controller who was studying, but not in training, were in the tower.

1.5.2.2. Head of Operational Safety of the control tower

According to his statement regarding the beacon panel (SMP), there is a project to replace the lighting panel on the Seville tower with a *tablet*, so that they do not have to move from the control position but has been delayed for more than 2 years. This *tablet* would ensure that they do not lose sight of the traffic in their airspace (CTR) and situational awareness.

The current system is becoming increasingly unreliable. The last estimated date of installation was June 2024, but this has not yet been confirmed.

As regards the lighting that was on at the time of the incident, it was the lighting in "day mode" configuration, i.e. runway, approach and PAPI lights.

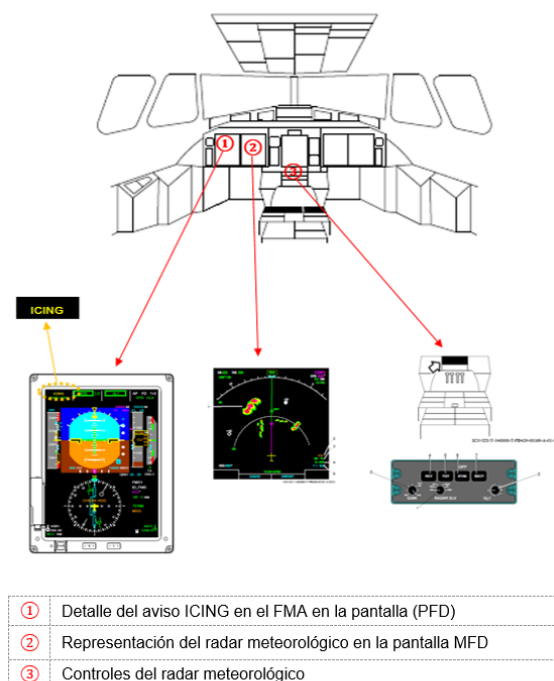
The Head of Operational Safety in the control tower confirmed that the information regarding the 12 Z METAR publication that significantly changed the weather conditions from VMC to IMC conditions was slow to arrive from the meteorological office and therefore the lighting configuration was not changed at the time of the event.

1.6. Aircraft information

1.6.1. Information on the ATR72-212A(RAM925)

The ATR72-212A 600, registration CN-COE and s/n: 960, built in 2011, with a MTOW of 23,000 kg, is powered by two Pratt & Whitney PW127M turboprop engines, s/n: PCE-EA0161 with 8,231 FH and 7,459 cycles, and s/n: ED0519 with 18,372 FH and 16,802 cycles.

At the time of the incident, the aircraft had total flight hours of 21,582 hours and 19,612 cycles. The last maintenance check carried out was on 16/05/2024, type A, when the aircraft had 21,404 FH and 19,458 cycles. The last major overhaul was performed on 22/03/2023 when it had 20,390 FH and 18,553 cycles.



①	Detalle del aviso ICING en el FMA en la pantalla (PFD)
②	Representación del radar meteorológico en la pantalla MFD
③	Controles del radar meteorológico

Figura 1: Representación de la cabina de vuelo

The aircraft, operated by RAM Express, was registered with the Directorate General of Civil Aviation (DGAC) of the Kingdom of Morocco and had a valid airworthiness certificate and airworthiness review certificate valid until 17 May 2025.

A representation of the flight deck is included in Figure 1 to facilitate the understanding of the crew visualisation.

According to the flight crew, the MASTER CAUTION and the ICING alert⁵ came on, which they considered to be a false indication as the temperature was 18°C.

They then momentarily switched on the radar to assess the weather ahead of them and what they would encounter during the departure.

Figure 1 highlights the position of the ICING alert on the PFD (FMA) display and the location of the weather radar and its controls, the attention to which would require the pilot to lower his head.

The aircraft at the time of the event was with flaps 15.

1.6.2. Information on the Boeing 737-8AS (RZR3262)

The Boeing 737-8AS, registration EI-DYC and s/n: 36567, was built in 2008 and registered by the competent aviation authority of Ireland⁶ on 10/03/2008. Two CFM56-7B26/3 CFM engines are installed, with a MTOW of 66,990 kg. In the turbulent wake classification, this aircraft is considered medium class.

The aircraft was registered on the Irish IAA active registration register. The aircraft, operated by Ryanair and owned by Ryanair Designated Activity Company had an airworthiness certificate issued on 10/03/2008 and an airworthiness review certificate issued on 04/03/2024 when the aircraft had 48588 FH, valid until 04/03/2025.

At the time of the incident, the aircraft had 50050 flight hours and 29,094 cycles. Its last maintenance overhaul at a Part-145 approved facility was performed according to the CRS on 12/04/2024.

⁵ ICING alert: an amber ICING alert is generated on the FMA and EWD, alerting the flight crew that ice detector probe detects accumulation of ice on the aircraft. On land, heavy rain may generate the activation of this alert despite not being in icing conditions as indicated in FCOM DSC 30.2 *Ice detector*.

⁶ IAA: IRISH AVIATION AUTHORITY

1.7. Weather information

The ordinary and special meteorological reports issued for Seville airport (LEZL) on 19/06/2024, in the period from 10:30 h to 13:30 h UTC including the time of the incident, were as follows:

- METAR LEZL 191030Z 16005KT 100V200 8000 -DZ FEW015 SCT025 BKN040 19/14 Q1016 NOSIG

At 10:30 Z an ordinary report was issued, the wind was 5 kt and the wind direction was 160°, variable between 100° and 200°. Visibility was 8000 metres with drizzle, low cloud at 1500 ft, scattered at 2500 ft and the cloud ceiling at 4000 ft. The temperature was 19°C and the dew point was 14°C. The QNH was 1016 hPa without significant change.

- SPECI LEZL 191118Z 31003KT 230V360 3000 RA FEW015 SCT020 BKN030 18/15 Q1016 NOSIG

A special report was issued at 11:18 Z, with a wind speed of 3 knots and a wind direction of 310°, varying between 230° and 360°. Visibility was 3000 metres in rain, with low cloud at 1500 ft, scattered at 2000 ft and the cloud ceiling at 3000 ft. The temperature was 18°C and the dew point was 15°C. The QNH was 1016 hPa without significant change.

- METAR LEZL 191130Z 33004KT 290V010 7000 -RA SCT020 BKN030 18/15 Q1016 RERA NOSIG

The ordinary report at 11:30 Z, the wind was 4 kt and the wind direction was 330°, variable between 290° and 010°. Visibility was 7 km in light rain, with scattered clouds at 2000 ft and a cloud ceiling at 3000 ft. The temperature was 18°C and the dew point was 15°C. QNH was 1016 hPa, recent rain and no significant change.

- SPECI LEZL 191139Z VRB02KT 7000 TSRA SCT020CB BKN030 18/15 Q1016 NOSIG

A special report was reissued at 11:39 Z, with a wind speed of 2 knots and a variable wind direction. Visibility was 7 km with a thunderstorm with precipitation, scattered clouds at 2000 ft with cumulonimbus and cloud ceiling at 3000 ft. The temperature was 18°C and the dew point was 15°C. The QNH was 1016 hPa without significant change.

- **METAR LEZL 191200Z 33006KT 300V360 3000 +TSRA SCT020CB BKN025 18/15 Q1016 NOSIG**

The ordinary report at 12:00 Z, the wind was 6 kt and the wind direction was 330°, variable between 300° and 360°. Visibility was 3000 metres and heavy thunderstorm with precipitation, scattered cumulonimbus based clouds at an altitude of 2000 ft, broken clouds and a cloud ceiling at 2500 ft. The temperature was 18°C and the dew point was 15°C. The QNH was 1016 hPa and without significant change.

This regular weather report issued at 12:00 UTC introduced a significant change in conditions, as from that time onwards the airport was in instrument meteorological conditions (IMC), as the visibility was 3000m.

- METAR LEZL 191230Z 20003KT 150V290 6000 R27/1400U R09/1900U +TSRA FEW014 SCT020CB BKN035 17/16 Q1016 NOSIG

The ordinary report at 12:30 Z, the wind was 3 knots and the wind direction was 200°, variable between 150° and 290°. Visibility was 6 km, runway visual range (RVR) for runway 27 was 1400 m and increasing while for runway 09 it was 1900 and increasing and heavy thunderstorm with precipitation, few clouds at 1400 ft, scattered clouds at 2000 ft with cumulonimbus and cloud ceiling at 3500 ft. The temperature was 17°C and the dew point was 16°C. The QNH was 1016 hPa and without significant change.

- SPECI LEZL 191244Z 11004KT 080V160 9999 -RA VCTS FEW015 SCT030CB BKN040 19/17 Q1016 RETSRA NOSIG
At 12:44 Z a special report was issued, with a wind speed of 4 knots and a wind direction of 110°, variable between 80° and 160°, visibility of 10 km or more, with rain and thunderstorm near the airport. Few clouds at 1500 ft, scattered clouds at 3000 ft with cumulonimbus and cloud ceiling at 4000 ft. The temperature was 19°C and the dew point was 17°C. The QNH was 1016 hPa and indicates that thunderstorms and rain had occurred in the last two hours. No significant changes.
- METAR LEZL 191300Z 10006KT 070V140 9999 -RA VCTS FEW020 SCT030CB BKN040 19/16 Q1016 RETSRA NOSIG
At 13:00 Z an ordinary report was issued, with wind speed 6 knots and wind direction 100°, variable between 70° and 140°, visibility 10 km or more, with rain and thunderstorm near the airport. Few clouds at 2000 ft, scattered clouds at 3000 ft with cumulonimbus and cloud ceiling at 4000 ft. The temperature was 19°C and the dew point was 16°C. The QNH was 1016 hPa and indicates that thunderstorms and rain had occurred in the last two hours. No significant changes.
- METAR LEZL 191330Z 24013KT 210V280 9999 VCTS FEW020 SCT035CB 22/15 Q1015 NOSIG
At 13:30 Z an ordinary report was issued, with wind speed 13 knots and wind direction 240°, variable between 210° and 280°, visibility 10 km or more, with rain and thunderstorm near the airport. Few clouds at 2000 ft, scattered clouds at 3500 ft with cumulonimbus and cloud ceiling at 4000 ft. The temperature was 22°C and the dew point was 15°C. The QNH was 1015 hPa and without significant change.

It is concluded that at the time of the incident at around 12:00 UTC (the event took place at 12:08 h), these reports show wind conditions of variable wind direction from 2 kt to north-westerly to northerly winds at 6 kt; visibility between 3000 and 7000 m; moderate to heavy thunderstorms and showers with scattered cloud cover at 2000 ft with cumulonimbus formation; with cloud base between 2500 and 3000 ft; temperature of 18°C, dew point temperature of 15°C and pressure (QNH) of 1016 hPa.

With regard to the Aerodrome Forecast Report, TAFs were issued at 02:00 UTC, 08:00 UTC, amended at 09:27 UTC and at 11:41 UTC with the following information:

- TAF AMD LEZL 191141Z 1911/2009 VRB03KT 9999 FEW035 TX23/1915Z TN13/2006Z BECMG 1911/1914 21010KT PROB40 TEMPO 1911/1917 4000 SHRA FEW030CB PROB30 TEMPO 1911/1917 3000 TSRA SCT030CB BECMG 1918/1920 VRB03KT
Between 11:00 UTC on the day of the incident and 09:00 UTC the following day, the wind was expected to be 3 knots of varying strength and direction. Visibility was forecast to be 10 km or more, with little cloud at 3500 ft. The maximum forecast temperature was 23°C at 15 Z and the minimum forecast temperature was 13°C at 06 Z. Switching between 11:00 UTC and 14:00 UTC to 10 knots wind strength and 210° direction with 40% probability, temporarily between 11:00 UTC and 17:00 UTC, the visibility was reduced to 4000 m with rain showers, few clouds at 3000 ft with cumulonimbus and a 30% probability that temporarily between 11:00 UTC and 17:00 UTC the visibility was reduced to 3000 m with thunderstorm and scattered clouds at 3000 ft with cumulonimbus. Changing between 18:00 UTC and 20:00 UTC at an intensity of 3 knots and variable direction.

According to the RAM Express ASR, the weather conditions at the time of the event were wind direction 300° and intensity 5 kt. Visibility of 3000 m with scattered clouds based at 2500 ft. QNH of 1016 hPa and temperature: 18°C. It was daylight, the runway was wet and rain was a significant phenomenon.



Photographs 1: CCTV footage showing the position of both aircraft during the time of the incident.

Therefore, in the spatial and temporal domain where the incident took place, moderate to heavy thunderstorms and showers were present, locally and temporarily reducing runway visibility. See photographs 1 showing the limited visibility due to rain captured by the airport's CCTV cameras at the time of the event.

1.8. Navigational aids

All navigation systems functioned correctly.

1.9. Communications

This section lists the records of the most significant oral communications for the investigation between ATC personnel and the aircraft involved; RAM925 and RYR3262. No radar data is available in the manoeuvring area as Seville airport does not have an A-SMGCS radar.

- At 11:59:06 h, the local controller of the Seville tower instructed RYR3262 to taxi to the holding point on runway 27, through gate G8, which was correctly read back by the crew.
- At 12:05:05 h, the crew of RYR3262 informed the tower that they were reaching the runway 27 holding point and ready for departure. The controller then informed them to stay short on the runway.
- At 12:05:16 h, the controller instructed RYR3262 to enter the runway and line up while maintaining their position, informing them to advise him if any deviation was required due to the weather. This was correctly read back by the crew.
- At 12:05:33 h, the crew of RAM925 informed ATC that they were ready to start taxiing; 6 seconds later, 12:05:39 h, the controller instructed them to taxi to the holding point on runway 27 via Gate 3 ("*RAM925 taxi holding point runway 27 via Gate 3*"). This was incompletely read back 6 seconds later (12:05:45 h) by the crew ("*Taxi runway 27 via Gate3 RAM925*"), as they indicated that they were taxiing to runway 27, when in fact the controller instructed them to taxi to the holding point on runway 27. Upon incomplete RAM925 read back, the tower did not rectify or correct the crew.
- At 12:07:25 h, 40 seconds after the last communication of RAM925's incomplete read back with TWR, the crew of RYR3262 requested ATC clearance for heading 290°. The controller immediately coordinated with the approach, who approved the departure on this course.
- At 12:07:46 h, the controller authorised RYR3262 to take off on runway 27, heading 290°, and at 12:07:53 h the crew correctly read this back.

- At 12:08:57 h, the controller detected the incorrect position of RAM925 and instructed it to maintain its position.

From RYR3262's read back (12:07:53 h) until the tower detected RAM925's incursion (12:08:57 h), instructing it to hold its position, 1 minute 4 seconds elapsed.

- At 12:09:13 h, the controller informed the crew of RAM925 that they were on the runway, and that they should have turned left onto taxiway A. The crew requested confirmation. The controller confirmed that they were on the runway while the other aircraft, RYR3262, was on the take-off run.
- At 12:09:42 h, the controller asked the crew of RYR3262 after completing their take-off if they had seen what had happened. The crew responded negatively and the controller informed them that RAM925 had caused a runway incursion on taxiway E1. The controller then transferred the RYR3262 with LEZL approximation.
- At 12:10:31 h, the controller instructed RAM925, still on the runway, to turn left and clear the runway at the first intersection on its left, across taxiway E2. The crew indicated that they were not on the runway and read back that they would complete a *backtrack* to abandon on the runway at the first left. The controller corrected the crew by indicating that they had crossed the (non-existent) stop bars at E1 while RYR3262 overflew them. The controller had to correct them again on two occasions as the crew did not understand the instructions being transmitted by ATC.
- At 12:11:36 h, the controller informed the crew of RAM925 that the runway lights were on so he could have seen these lights.
- At 12:12:54 h, the crew of RAM925 notified ATC that they were clearing taxiway E2 and would then continue along the taxiway to the holding point on runway 27.
- At 12:13:00 h, the controller reminded this crew that, if they were unfamiliar with the airport, they should have notified the tower that they did not know the procedures and indicated that a collision may have occurred.
- At around 12:13 h, a changeover took place in the Seville tower, with another controller taking up his post. Subsequently, the crew of RAM925 reported that they were cancelling their flight plan and returning to their stand, so ATC coordinated the whole procedure with the airport signaller to guide them to the stand.

1.10. Airport information

Seville Airport (LEZL), or San Pablo Airport, is located in southern Spain, 10 km northeast of Seville between the city limits of Seville and Rinconada. The coordinates of its reference point are: 37° 25' 04,80" North and 5° 53' 35,18" West.

Managed by Aena, it has an asphalted runway with orientation 09/27, TORA length of 3362 m and width of 45 m, with an elevation of 34 metres above sea level. The runway has a taxiway called "A" with a width of 23 m and 28 m at the HP4 holding point, parallel to the runway, and has four identified critical locations or *hot spots*: HS1, HS2, HS3 and HS4. On both sides of the taxiway there are 11.5 m wide asphalt strips.

Runway: 27

Approach: Precision CAT I, 900 m LIH. (2)

PAPI (MEHT): 3° (15.53 m/51 ft). (1)

Threshold: Green with wing bars. LIH.

Touchdown zone: No.

Runway centre line: 3364 m: 2464 m white + 600 m red/white + 300 m red. LIH. (2)
Distance between lights: 15 m.

Runway edge: 3364 m: 2764 m white + 600 m yellow. LIH.
Distance between lights: 45 m.

Runway end: Red. LIH.

Stopway: No.

Remarks: (1) Not suitable for use by code letter F aircraft: AN124, A380-800 and B747-8.
(2) LED lighting.

Figure 4: Approach and runway lighting

OTHER LIGHTING, SECONDARY POWER SUPPLY

ABN/IBN: No.

WDI: 1 near THR 09, 1 near THR 27, 1 near TWY A4. LGTD.

TWY lighting: Centre line (1), EXC S2 and HP5. Edge: S2 and HP5. LIH.

Apron lighting: Floodlighting poles.

Secondary power supply: Engine generators that provide a maximum, switch-over time of 1 second for the visual aid systems and a maximum of 15 seconds for the terminal buildings and apron lighting.

Remarks: (1) LED lighting.

Figure 5: Other lighting, taxiways and platforms (*EXC: Except. LIH: Light intensity high)

The following is the taxiway route allocation for runway 27 in service, see Figure 6:

PRKG	ENTRADA POR ENTRY BY	SALIDA POR EXIT BY
01	GATE G4 o // or GATE G5	GATE G4
02	GATE G5	GATE G8
03 a // to 09	GATE G5 o // or GATE G8	GATE G8
10 a // to 19	GATE G5, GATE G6 o // or GATE G8	GATE G8
15A, 16A	GATE G6 o // or GATE G8	GATE G8
15B	GATE G6, GATE G7 o // or GATE G8	GATE G8
20 a // to 23	GATE G6 o // or GATE G8	GATE G8
24	GATE G7	GATE G8
25	GATE G5	GATE G8
33	GATE G3	GATE G3
32	GATE G3	GATE G3 o // or GATE G4
31	GATE G3	GATE G4
30	G4 o // or G5	GATE G4
34, 36, 38	GATE G2	GATE G3
35, 37, 39	GATE G2	GATE G1
40 a // to 44 y // and AG	GATE G1	GATE G1

Figure 6: Taxiway 27 taxiway allocation

The AIP, therefore, does not give information on which standard route to follow to the head-end, but only assigns the taxiing route indicating the entry and exit gates according to the stand. In the case of the event from stand 34, it is indicated that the exit is to be through gate G3. Although reduced visibility was not declared in the case of the incident, it is appreciated that further instructions are provided in the low visibility procedures (LVP) section⁷:

"2.2.4. Taxi routes in LVP:

Exit through the appropriate gates at each parking position in accordance with general taxiing procedures and TWY A to HP1 or HP2 for RWY 09 in service and HP3 or HP4 for RWY 27 in service."

1.10.1. Critical points or locations

ICAO document 9870 "Manual on the Prevention of Runway Incursions", ed.1, 2007, an extract of which is shown below, defines "hot spot" (HS) as:

"A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary."

The document explains that aerodrome plans showing critical locations should be regularly checked for accuracy, revised as necessary, and published in the Aeronautical Information Publication (AIP).

Once the hotspots have been identified, strategies are put in place to try to mitigate the risk, such as:

- a) awareness campaigns;
- b) additional visual aids (signs, markings and lighting);
- c) use of alternative routings;
- d) construction of new taxiways; and
- e) the mitigation of blind spots in the aerodrome control tower."

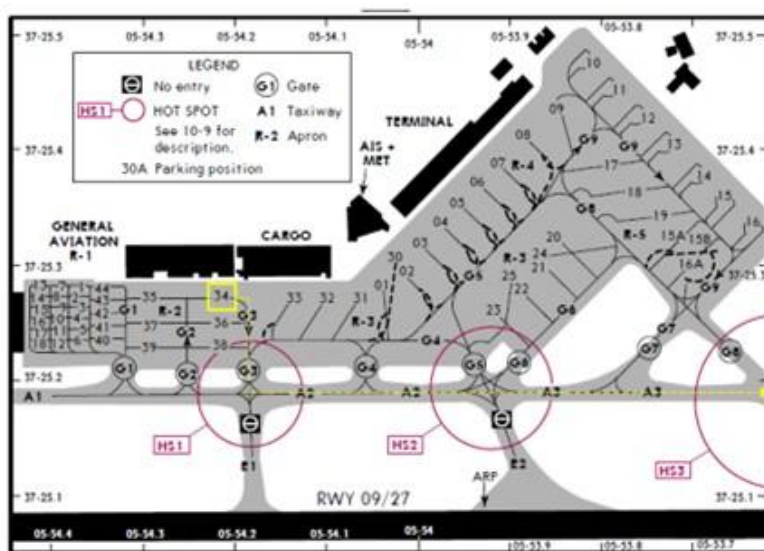


Figure 7: Authorised taxiway from stand 34 to holding point 27 in yellow.

The aircraft in the event, RAM925, which was parked at stand 34, taxied through gate "G3" and instead of turning left onto taxiway A, continued straight ahead on E1. This point is classified as critical location 1 (HS1) as shown in Figures 7 and 8.

The AIP states in the AD2-LEZL GMC that at hot spot HS1, located at the exit of gate G3, at the exit of the apron, it is not allowed to continue straight ahead. In the airport plan, Figure 8, it is highlighted with a red circle, how at the departure of the apron at all critical locations, HS1, HS2 and HS3, it is not allowed to continue straight ahead. The chart used by the crew, the Jeppesen 10-9 card, also indicates this (see Section 5.1. in Annex 5).

⁷ According to the AIP they apply when the RVR or horizontal visibility in the manoeuvring area is either less than 550m.

According to the legend in Figure 8, the yellow highlights correspond to taxiways that are runway entrances/exits, although in E1, E2 and E3, they include a "no-passing" icon, but not in E5. This indicates that these lanes are runway exit lanes only, not entry lanes, and are marked with NO ENTRY painted on the pavement in white letters on a red rectangle background.

In particular, critical location HS1 was marked with:

- Two NO ENTRY signs on the ground in E1 (Photos 4), and,

- two above-ground no entry signs on either side of E1 with illumination to be switched on when the lighting configuration requires it.

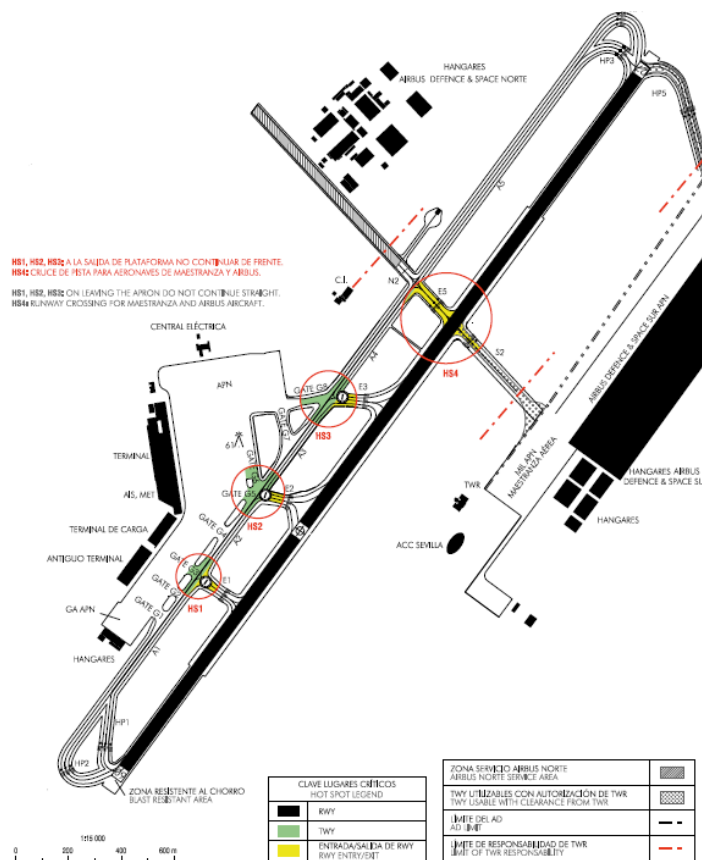


Figure 8: Extract from the map of Seville airport with the critical locations marked with a red circle.



Photograph 3: Taxiway E1 Exit/entry through gate G3



Photographs 4: From gate G3, access marked "NO ENTRY".

1.10.2. Taxiway and runway lighting

On taxiways E1, E2 and E3 there are no stop bars, only at the entry waiting points on both runways. It should be noted that these lanes are only runway exit lanes, never entry lanes.

With regard to the lighting of E1 (where RAM925 entered), as confirmed by the airport manager, it consisted of the following:

- It does not have stop bar lights, according to the manager, precisely because it is NO ENTRY, it only has a waiting point sign.
- It has axle lights, but only in the runway exit direction and location sign E1 in the runway exit direction, as it is a runway exit only lane.

During the investigation it was found that, at the time of the incident, the lighting configuration was that corresponding to the "day mode" configuration applied before 11:00 h, which corresponds to having the runway lights, the PAPI system lights and the approach lights on, but not the taxiway or movement area lights. The "day mode" setting is also not associated with the switching on of other visual aids such as illuminated vertical prohibition signs.



Photographs 5: Holding point signal at E1

It was found that, at the time of the incident, according to the evidence provided, the runway lights (axis and edge), PAPI and approach lights were indeed on and at the appropriate intensity. All other taxiway lights, visual aids of vertical signs, etc., were not lit.



Photograph 6: Information signs to the left of the platform exit through gate G3

At exit G3, on the left hand side there is a destination information sign (with lighting available) indicating the direction to runways 09 and 27 in yellow, see Photo 6, and a location sign indicating the current taxiway, G3.

It was noted that there is no anti-intrusion lighting on E1, but that there are horizontal signs on both sides of the taxiway and vertical prohibited signs with illumination.

1.10.3. Airport signage in the area of the incident

Signage in the area where the incident occurred is detailed in Photograph 7⁸. At the exit of gate G3 the information panels are location and destination. There is no sign indicating that taxiway A can be accessed.

Access to taxiway E1 is marked with no crossing signs on both sides of the taxiway and NO ENTRY signs on the pavement. A few metres further on, the holding point is painted, although it does not have stop bar lights or runway guard lights.

⁸ Note *: It has not been possible to update the zenithal image, there are now two no entry signs as can be seen in Photographs 4, instead of just one as shown in the image.

Note **: The location sign E1 is painted in the direction of runway departure.

At the time of the incident, the panels were not illuminated, nor were the taxiway A lights.



Photograph 7: Airport signage in the area where the runway incursion occurred.

1.11. Flight recorders

The aircraft involved in this incident had data and voice recorders (FDR and CVR), from which the recorded data could be extracted and analysed.

In the case of RAM925, the FDR was type FA2100 from manufacturer L3HARRIS p/n: 2100-4245-60 and the CVR was L3HARRIS type FA2100 and p/n: 2100-1225-60; both in this case and in the case of RYR3262, copies of the quick access memory, QAR, were provided from which the most relevant parameter information could be extracted.

From the available records, the following information is of interest for analysing the event, arranged in time order:

- 12:07:55 h, RAM925 entered E1 at a speed (GS) of 3kt.
- 12:07:59 h, RYR3262 read back tower clearance for take-off.
- 12:08:01 h, RAM925 started to cross the NO ENTRY marking at a speed (GS) of 4kt.
- 12:08:13 h, RYR3262 started the take-off run.
- 12:08:53 h, RYR3262 commenced aircraft rotation, at which time the pilot acted on the control column.
- 12:08:55, RAM925 started to slow down and RYR3262 started to climb as the altitude increase registered on the radio altimeter and the vertical speed started to become positive.
- 12:08:57 to 12:08:59, the tower instructed RAM925 to hold position.
- 12:08:58, RYR3262 was in air-to-air mode according to ground-to-air indicator records.
- 12:09:03, RYR3262 overflew aircraft RAM925 at about 50ft⁹ and at a speed (GS) of 174kt.

The following findings were obtained from the information analysed and the video recordings of the airport's CCTV system:

- The maximum recorded speed (GS) of RAM925 at E1 was 6kt.
- The tower did not give full taxi instruction to RAM925.
- RAM925 spent 1 minute on E1 without the tower noticing its presence in an improper area and, therefore, without instructing a stop.
- At the time of the incident, the controller was managing two other aircraft in addition to the two involved, one of them was instructed to go to the stand and the other was pushing back.
- Heavy rain and thunderstorms were reported at the time of the event, with reduced visibility.



Figure 9: Recreation of the trajectories of RYR3262 and RAM925 at the time of the event.

⁹ The height at which RYR3262 overflew the RAM925 has been calculated taking into account that radio altimeter height records are recorded every two seconds. Thus, at 12:09:02 h, 40 ft was recorded and at 12:09:04 h, 90 ft, with a height of RAM925 of 25 ft.

1.12. Information on the aircraft damage

The aircraft involved in the incident were not damaged.

1.13. Medical and pathological information

No evidence was found that the performance of the flight crew members and air traffic control personnel was affected by physiological or incapacitating factors.

1.14. Fire

Not applicable.

1.15. Survival aspects

Not applicable.

1.16. Tests and investigations

The following are the trajectories of the aircraft involved in the event during the period covered by the event according to available information and records.

1.16.1. Trajectories of RAM925 and RYR3262

At 12:05:33 h, the flight crew of RAM925, located on stand 34, requested taxi clearance and were instructed by the tower to taxi to the runway 27 holding point, via G3. In Figure 10, the authorised trajectory has been marked with a dashed yellow line.

The aircraft taxied to G3 and instead of turning left along taxiway "A" towards runway 27, it entered the NO ENTRY E1 lane, over the short holding line and stopped just short of the runway edge.

The actual trajectory of RAM925 is marked in Figure 10 with a red dashed line.

At 12:07:46 h, the control tower cleared RYR3262 to the requested heading 290°, and to take off on runway 27, commencing the take-off run. While this was taking place, RAM925 continued to taxi slowly straight ahead, merging onto E1, instead of turning left onto taxiway A, at holding point 27 (12:08:26 h).

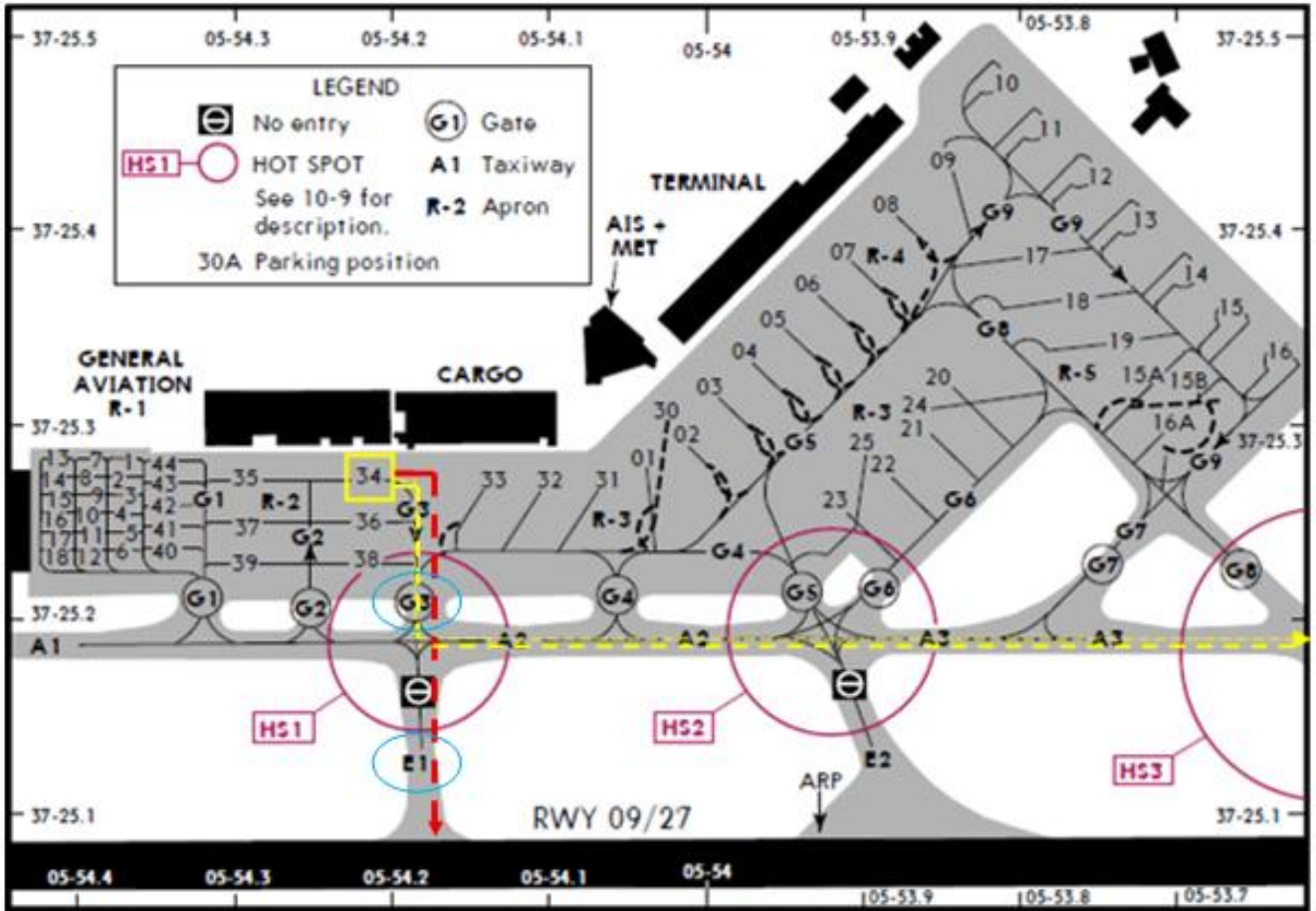


Figure 10: Authorized taxiing path (yellow) and actual path (red) from stand 34 to the holding point for runway 27.

At E2, RYR3262 started the rotation (12:08:56 h), overflying RAM925 that had stopped at E1, at the edge of the runway.



Figure 11: Representation of the position of both aircraft at 12:08:26 h



Figure 12: Representation of the position of both aircraft at 12:08:56 h

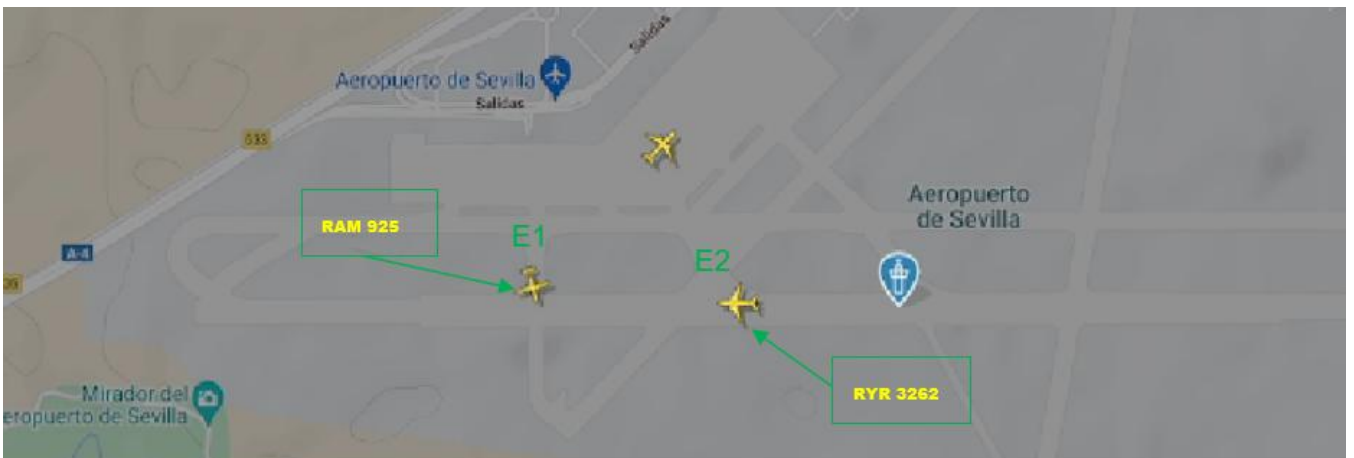


Figure 13: Representation of the position of both aircraft at 12:08:59 h

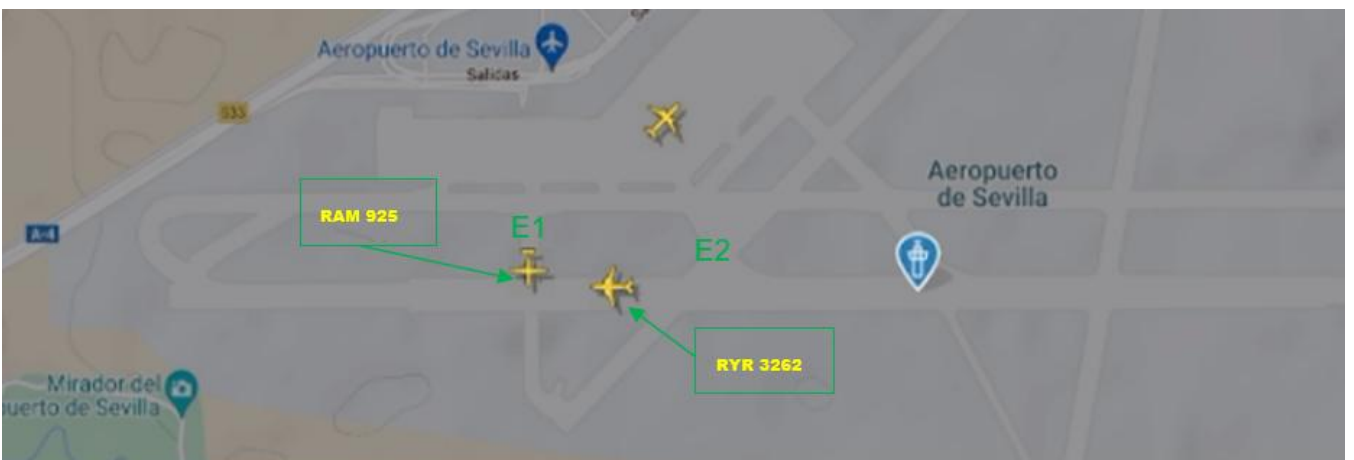


Figure 14: Representation of the position of both aircraft at 12:09:09 h

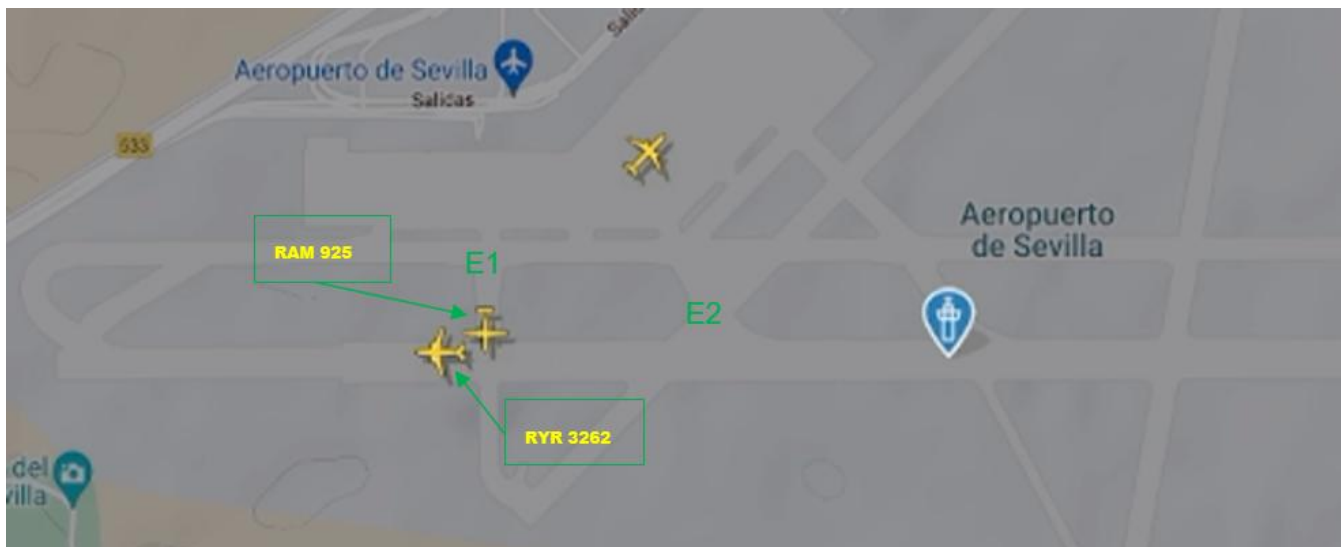


Figure 15: Representation of the position of both aircraft at 12:09:10 h

1.17. Organisational and management information

1.17.1. Information on air operators

The operator of the ATR72-212A, registration CN-COE with call sign RAM925 was RAM Express and the operator of the Boeing 737-800, registration EI-DYC with call sign RYR3262 was Ryanair.

Both operators held a valid and current AOC for the commercial carriage of passengers by air.

Since the runway incursion was performed by the RAM Express aircraft, its performance has been analysed taking into account the following information from the operations manual:

- MO-A paragraph 14.2.2.1. provides information and instructions for pilots during the taxiing phase, including those aimed at avoiding runway incursions:

"A head-down situation during taxi should be limited to the minimum possible. When the pilot who is not taxiing is focused on the cockpit instruments, they cannot monitor the progress of the aircraft. Before performing head down manoeuvres, the other pilot should be alerted so that the pilot navigating can focus on maintaining navigational accuracy and situational awareness."

(...)

Actions for flight crews to prevent runway incursions include the following, carried over from Appendix D of the EAPPRI¹⁰ best practice for operators and flight crews:

- Good planning of ground operations can reduce the workload during taxiing. Flying and its associated risks start with preparation.
- Good situational awareness is the top priority during taxiing. All crew members must be involved. Avoid bending over, lowering your head.

¹⁰ EAPPRI: European Action Plan for the Prevention of Runway Incursions. It is an action plan integrated into ICAO's Global Action Plan for the Prevention of Runway Incursions (GAPPRI), with specific recommendations for Europe with actions in all states and regions to reduce runway incursions, including the development of implementation strategies, data collection and collaboration between aviation authorities.

- The application of CRM "Crew Resource Management" principles during taxiing is as important as in the other phases of flight.

(...)

In Paragraph 14.4 on flight planning in preparation meetings:

"Plan the execution of checks and actions to be performed during taxiing to avoid distractions in the cockpit when approaching risk areas. Pay particular attention to temporary situations, such as work in progress, other unusual activities and recent changes in the airport layout."

Following the event, the next day, the operator debriefed the crew and assigned them the following training:

- CRM course
- *RWY and Surface OPS* course and *RWY incursion prevention*.
- Then online training with LTC and *line check*.

The measures taken by the operator are considered to be adequate.

1.17.2. Information on the air navigation manager

The air navigation manager at Seville airport, SAERCO, had a valid and current manager's certificate.

He confirmed, according to his records, that the RAM Express aircraft entered the runway on E1, which is an exit taxiway and therefore passed a "NO ENTRY" sign and that the Ryanair aircraft overflew the RAM Express aircraft.

LUMINANCIA	ALCANCE VISUAL	APROXIMACION	PAPI	BORDE RODADURA	EJE RODADURA BARRAS PARADA
		ZONA DE CONTACTO UMBRAL EXTREMO EJE PISTA BORDE PISTA			
DÍA	A < 800	5	5	3	5
	800 < A < 1600	5	5	3	5
	1600 < A < 4000	5	5	1	5
	A > 4000	4	5	1	5
CREPÚSCULO	A < 800	5	4	3	5
	800 < A < 1600	5	4	2	5
	1600 < A < 4000	4	4	2	4
	A > 4000	3	4	1	3
NOCHE	A < 800	4	3	1	4
	800 < A < 1600	3	3	1	3
	1600 < A < 4000	3	3	1	3
	A > 4000	2	3	1	2

Figura 16: Configuración de iluminación

According to the Annex to the Operating Manual of the LEZL control tower unit, in Section 1.4.1, it indicates that the configuration of the runway lights according to the phase of the day and the visual range at each moment is as shown in Figure 16.

During the incident, the visibility according to the METAR at 12:00 UTC was 3000 m. In that daytime configuration, in addition to the runway lights, the taxiway edge and taxiway axis lights should also be on, however, it was found that only the runway lights were on.

Section 1.7 of the Annex to the Seville Control Tower Unit Operating Manual states that stop bars shall be used if weather conditions are IMC, as follows:

1. For as long as these conditions remain.
2. Their use shall be restricted to aircraft movement and, therefore, during periods when there is no aircraft movement and/or no aircraft movement is foreseen, they shall remain switched off, as shall all other lights. In the event that only arrivals are planned, the stop bars shall remain switched off and the runway and taxiway lights shall remain switched on.

3. The use of stop bars shall be limited to those corresponding to the holding point of the runway in use.

The stop bars light up to indicate that all traffic must stop and will go out to indicate that traffic may proceed. Stop bars are located crosswise on taxiways at the point where traffic is to be stopped and consist of red lights spaced across the taxiway.

According to the European Action Plan on Prevention of Runway Incursions Manual, EAPPRI 3.0, Appendix N, where cases of runway incursions are established, it identifies the incident as a case of runway incursion since the RAM925 aircraft entered the E1 lane without authorisation resulting in an improper presence on the runway.

1.17.3. Information on the airport service provider

The airport service provider of Seville airport was AENA. At the time of the incident there were no active NOTAMS according to available AIS information.

The airport service provider confirmed that E1 does not have stop bar lights as it is a NO ENTRY, it only has a "holding point sign", but it does have taxiway axis lights, but only in the direction of runway departure and mandatory NO ENTRY signs.

At the time of the incident, it was confirmed that only the runway lights were on, but not the taxiway lights.

1.18. Additional information

1.18.1. Information on applicable regulations

Consideration has been given to Appendix B on "Best Practices on the Flight Deck" of ICAO Document (Doc. 9870 AN/463), "Manual on the Prevention of Runway Incursions" and in particular the Eurocontrol EAPPRI on Runway Incursions, whose recommendations of application to the event and of relevance to the investigation are included below.

1.18.1.1. Recommendations of the European action plan for the prevention of runway incursions

With reference to APPENDIX D of the EAPPRI on best practices for operators and flight crews, a key point to prevent runway incursions is to implement better preventive measures during the taxiing phase by taking appropriate measures to adapt the workload of the flight crew on the ground. The taxiing phase should be considered as a "critical phase of flight" and it is therefore recommended to adopt the concept of a sterile flight deck during taxiing. A reduced workload will allow more attention to be paid to the taxiing phase and allow for up-to-date and accurate position and situational awareness.

The situational awareness section of this appendix recommends as good practice that pilots should at all times during taxiing be "head up" looking straight ahead, for continuous vigilance during the taxi phase. The taxiing pilot should orient themselves primarily by external references with the aid of signs and ground markings and the other pilot should continuously give verbal, navigational information, monitoring the taxi clearance when operations are in progress.

The main actions for flight crews to avoid runway incursions recommended in this appendix have been transferred to the RAM Express operations manual in their entirety, such as:

- Good planning of ground operations can reduce the workload during taxiing. Flying and its associated risks start with preparation.
- Good situational awareness is the top priority during taxiing. All crew members must be involved. Avoid bending over, lowering your head.
- The application of CRM "Crew Resource Management" principles during taxiing is as important as in the other phases of flight.

In relation to the air navigation service provider, paragraph 1.5.2 b. of the EAPPRI refers to indicating the maximum clearance limit (e.g. runway holding point or intermediate holding point) and, in the case of a complex or excessively long taxi route, using progressive taxi instructions to reduce the workload of the pilot/driver of the vehicle and the possibility of confusion. In the case of the event, the clearance instructions could have been more complete given the uniqueness of the trajectory to be followed by the aircraft from stand 34, point HS1 and the deteriorated weather conditions.

In relation to APPENDIX J of the EAPPRI, the use of aeronautical ground lighting to protect the runway, such as stop bars and runway guard lights, is recommended. The use of stop bars and runway guard lights at all runway holding points is recommended in all weather conditions (24 hours a day) to help prevent runway incursions. It is also recommended to assess the need to install additional lights, in a uniform manner, to improve the visibility of an existing stop bar by adding a pair of overhead lights at each end of the stop bar that are visible to aircraft approaching the stop bar position, allowing improved visibility for pilots and drivers in the manoeuvring area. In addition, it is also recommended to install them where the stop bar lights embedded in the pavement may be obscured from the pilot's view, e.g. by snow or rain or where a pilot may have to stop the aircraft in a position close to the lights such that the aircraft structure itself may obstruct their view.

1.19. Useful or effective investigation techniques

No special investigation techniques were used.

2. ANALYSIS

The event was identified as a runway incursion by aircraft RAM925, authorised to begin taxiing from stand 34 towards runway 27, when aircraft RYR3262, at the head of the same runway, was authorised to take off. RYR3262 completed its take-off and flew over RAM925.

The event was considered to be a runway incursion when RAM925 was found to be unduly present in the protected area of runway 27, stopping at the end of lane E1 perpendicular to the runway, on the edge of its right-hand side.

2.1. Weather conditions

Both the official weather forecast records and those used by the crews of the aircraft involved, as well as the airport CCTV system records, confirm that at the time of the incident the most significant weather phenomenon was heavy rain and thunderstorms; the wind direction was 300°, with an intensity of 5 kt; the horizontal visibility was 3000 m, with scattered cloud cover at 2000 m, cumulonimbus formation and cloud base at 2500 ft; the temperature was 18°C, dew point 15°C and pressure (QNH) 1016 hPa. As for the brightness, it was daylight and the runway was wet.

Therefore, in the spatial and temporal domain where the incident took place, moderate to heavy thunderstorms and showers were present, locally and temporarily reducing runway visibility.

During taxiing, the crew of RAM925 checked the weather with the weather radar which, together with the identification of an ICING alert, caused them to focus their attention and eyes in the cockpit for a few moments as they continued to taxi slowly. Both crew members assessed the alert as false, which indeed proved to be the case, as the confirmed temperature was 18°C.

When weather conditions deteriorate during any phase of flight, including taxiing, the crew must be able to identify the risks that such deterioration may entail. During pre-flight planning, the crew must consider possible actions to be taken in the event of a sudden deterioration of weather conditions, and ensure the safety of the flight.

In the case of the event, weather conditions deteriorated during taxiing, without impeding the viability of the flight. The crew of RAM925 were aware of the forecast confirming the presence of thunderstorms and rain and at no time did they consider delaying departure. They started taxiing at low speed as a precaution, which was correct, but overconfidence in the knowledge of the runway access taxiways, distraction in the cockpit, deteriorating visibility when crossing the critical point HS1 and possible difficulty in seeing the wet pavement markings allowed the runway incursion.

The ordinary meteorological report (METAR) which was published at 12:00 UTC and which introduced a significant change to instrument meteorological conditions (IMC), with a visibility of 3000 metres, implied that the daytime light configuration should have been updated to the new conditions, turning on both edge and axis taxi lights. This was not done as, according to tower information, this report arrived late, as there was some delay between its publication and the time when the tower was aware of it, which meant that the configuration was not updated. If the taxiway lights had been on, presumably this would have helped the crew of the RAM925 aircraft to differentiate between the taxiway and runway areas within the manoeuvring area.

2.2. ATC authorisation and communications

The controller, in a single position, managed the two aircraft involved in the incident, RAM925 at stand 34, and RYR3262, waiting at the head of runway 27 ready to take off. Without any applicable NOTAM notice, the control tower was at all times in visual control of the traffic on the apron, taxiway and runway. The lighting configuration selected was day mode, which involved having only the axis and runway edge lights on, but not the taxiway lights.

At 12:05:33 h, the crew of RAM925 informed ATC that it was ready to start taxiing at the same time as RYR3262 approached the holding point on runway 27. Six seconds later, the controller instructed RAM925 to "taxi to runway 27 holding point through gate 3".

Although this instruction was clear, it is considered to be incomplete, as it did not indicate that they were to proceed along taxiway A, which would have allowed them to insist on the need to approach it on the left before reaching E1. The controller probably assumed that the layout of the airport was sufficiently well known to the crew, as they must have studied it during flight planning, but did not take into account other possible circumstances, such as the deteriorating weather situation in the presence of heavy rain that reduced horizontal visibility, the possible reflection of the wet pavement, and the fact that from the aircraft's position at stand 34, the aircraft was crossing a critical point, HS1, defined as such due to its potential risk of events.

If the controller had given progressive instructions, first instructing to taxi to G3, then turn left at A, towards holding point 27, etc., it might have contributed to the crew's concentration on taxiing. Presumably the controller's attention was primarily focused on RYR3262 to instruct it to take off, momentarily abandoning his view of RAM925.

Although the crew indicated that during flight planning, they had noted that they were to taxi down taxiway A towards the runway, the controller should have instructed "taxi to A", although neither the AIP literature nor the Jeppesen chart consulted by the crew contains this. It was only indicated in the taxiing section in the low visibility procedures, which did not apply to the incident.

Six seconds later, at 12:05:45 h, the crew of RAM925 read back "taxiing to runway 27 via gate 3". This read back was incomplete as they indicated that they were taxiing to runway 27, when in fact the controller told them to taxi to the holding point on runway 27. Upon incomplete read back from RAM925, the controller did not rectify or correct what the crew said. It is the responsibility of the air traffic controller to verify that the read back is complete and accurate, if any omissions occur, these shall be objected to by the controller.

At 12:07:46 h, during the taxi of RAM925, the control tower cleared RYR3262 to the requested heading 290° and take-off on runway 27, commencing the take-off run. The controller was probably more focused on the clearance of RYR3262 than on correcting RAM925's incomplete read back.

Simultaneously, after clearing RYR3262 for take-off, he observed RAM925 heading towards runway 27 on E1. Although RAM925 was crossing E1 at very low speed, the small length of this lane allowed RAM925 to reach the runway edge in just over a minute, the time taken by the controller to stop watching RYR3262 and focus on RAM925, his next aircraft, in exactly 1'10" as at 12:08:57 h, RAM925 reached the right edge of runway 27 from E1 and RYR3262 began its rotation at approximately E2. When the controller became aware that RAM925 had incurred onto runway 27, it was no longer possible to abort the take-off of RYR3262 as it was rotating.

The controller immediately instructed RAM925 to hold its position, indicating that it had made a mistake during taxi and had entered the "no entry" E1 runway.

The controller's action from that moment on was to insist to the crew of RAM925 on the error committed, as the crew did not seem to be aware of what had happened. After clarifying the situation, he directed the aircraft back to its stand without incident.

It is considered that the controller's actions should have adapted proactively to the change in the meteorological situation, with impaired visibility at the time of the event and the particularity of the route that RAM925 had to pass through a critical point without lighting. Although the METAR changing the flight weather conditions to IMC was delayed, his visual management allowed him to appreciate the decrease in visibility and thus make the decision to turn on the taxiway lights and instruct apron traffic in greater detail. He should also have ensured, as it is his responsibility, that the instructions given were correctly understood, ensuring adequate read back.

The controller's workload managing the two aircraft involved in the event and two others, one which he had instructed to go to the stand and the other which was pushing back, is considered not to have been high and could not have contributed to the controller's performance.

2.3. RAM925 Crew and Movements

When RAM925 requested taxi instruction, the crew of RYR3262, notified that it was reaching the holding point, ready to depart, and was instructed by ATC to line up on runway 27.

It was found that just as RAM925 was taxiing into G3, at very slow speed, there was a thunderstorm with very heavy rain. According to the testimonies of the crew at that precise moment, the MASTER CAUTION and ICING alert came on. Both crew members, captain and first officer, focused on these alerts, lowering their heads towards the central panel of the cockpit, ignoring the exterior taxiway signs to conclude that these alerts were a false indication as the temperature was 18°C.

The indication was indeed false and no malfunction was identified. This type of alerts was known to the crew, but in any case, the first officer, and not both, should have dealt with it. They then scanned the weather radar, which must have been more time-consuming and distracting than the warnings. None of the crew noticed the (unlit) signs and lane signs crossed while taxiing. Presumably, both could have been looking into the cockpit as the aircraft slowly taxied. It can also be assumed that the heavy rain could have hindered the proper visibility of the signs: both the painted signs on the ground due to the accumulation of water and the mirror effect on the pavement, and the side signs at height, with no lighting on, due to the curtain of water from the heavy rain, with the added effect that the taxiway lights were not lit either, only the runway lights.

The crew also failed to notice the holding point signs; at E1 the holding point has no guard lights or stop bar installed. Had they existed, they could have helped to better visualise the taxiing area in situations of impaired visibility due to rain.

According to the crew, they properly planned the taxi and were aware of the presence behind gate G3 of a critical point, the HS1 passage to the "no entry" lane E1, and that access to the runway had to be via taxiway "A".

The reality is that the distraction of the captain and first officer, both focused on the cockpit screens, the weather radar scan, with their heads down, prevented them from looking outside, ignoring and therefore the red NO ENTRY sign on the identifying the possible ICING problem and pavement, which was in perfect condition, was not noticed. The route is short and a few seconds of distraction by lowering the head is enough to miss the signs, but if the study of the route during the taxiing phase had insisted highlighted on the particularity of the access to the runway, even if the visibility decreased with the rain and there were alerts on the screen, the situational awareness of the crew would have allowed them to be particularly attentive to take the correct lanes, reducing the safety risk at critical points.

It is considered that the crew was not sufficiently focused on the taxi phase, not giving it the importance and awareness it deserves. As a consequence of their overconfidence and distraction, they ignored the permanent external observation that they should have had, especially in the conditions of the event with the impaired visibility, the wet runway and the layout of the airport with very short access and taxiways with multiple critical points and NO ENTRY accesses. They missed the external indications. The lack of lighting was also a factor. It should be noted that neither these NO ENTRY entrances nor any of the information panels were illuminated in any way at the time of the incident.

On the other hand, ATC identified the runway incursion and informed the crew, but the crew disagreed that it had occurred and did not consider that they had reached the edge of the runway. Furthermore,

they were not aware that RYR3262 was taking off, although both aircraft, RAM925 and RYR3262, were on the same frequency in communication with ATC. RAM925 did not consider that the take-off clearance of RYR3262 could affect them, as they considered that they were on the correct taxiway. It is considered that the RAM925 crew did not have a proper situational awareness of what was going on around them.

According to the controller's personal assessment, the crew's level of English was not very good. However, the English language certification of the controller and crew was the same, adequate, and is not considered to have contributed to the incident, but the crew's distraction led to a loss of situational awareness that led them to fail to identify where they were.

The crew must listen to the frequency with ATC and other traffic at all times. They should try to visualise all other traffic in the vicinity, they should know which runways lie between the aircraft's current position and its final destination, paying particular attention to all clearances and transit instructions issued involving those runways.

Crew of RAM925 did not have a correct situational awareness of what was going on around them, although both RAM925 and RYR3262 were on the same frequency in communication with ATC.

The crew confirmed that they were familiar with the airport, although they were used to parking in a different area of the airport, at different stands. It is considered that communications with the controller were conducted using standardised phraseology and with an appropriate level of linguistic competence.

It is considered that there was an inadvertent breach of ATC clearances by the crew due to a loss of situational awareness, whereby the pilots thought they were at one location on the aerodrome when in fact they were at another.

The crew was adequately trained and had taken the legally required rest periods, the workload in the cockpit was normal, and therefore no incapacitating or contributing factor is considered to have been present in any of the pilots in relation to these circumstances.

It is considered that the deteriorating weather conditions may have contributed to the appropriate taxiway not being followed and consequently to their lack of situational awareness from that moment onwards; distraction by lowering their heads after the ICING alerts and consulting the weather radar was probably the cause of their inadvertent overshooting of the NO ENTRY signs.

On the other hand, the controller's instructions were followed at all times, although unintentionally disregarded, and the instruction to hold their position, stopping the aircraft, as soon as the controller urged them to do so, was carried out.

2.4. RYR3262 Crew and Movements

The crew of RYR3262 performed a normal taxi and take-off without incident, following ATC instructions and authorisations with the appropriate read backs.

When the aircraft was starting its rotation on runway 27, at E2, the crew did not notice the presence of RAM925 on E1, so it flew over it just as it RAM925 stopped on the edge of the runway. The crew of RYR3262, in any case, even if they had been aware of the inappropriate presence of RAM925, would not have been able to abort the operation, given that it exceeded the non-return speed, initiating the rotation of the aircraft.

The crew of RYR3262 were not aware of the incident until the controller informed them by radio that it would be reported appropriately.

3. CONCLUSION

3.1. Findings

- Meteorological:
 - Weather conditions at the time of the incident were heavy rain and moderate to heavy thunderstorms with impaired visibility on the runway.
 - The ordinary meteorological report (METAR) issued at 12:00 UTC changed the flight weather conditions from visual to instrument meteorological conditions (IMC), as the visibility was 3000 metres.
- Airport:
 - The taxiways and runway markings were in accordance with the applicable regulations and are visible to pilots and drivers of vehicles travelling airside at the airport. The "NO ENTRY" signs, painted in red on the pavement, were in a good state of repair.
 - The taxiways were not lit, only the runway.
- RAM925:
 - Taxied from stand 34 through G3 continuing along E1 and past the "NO ENTRY" sign, to the edge of the right hand side of runway 27. The taxiing speed was adequate considering the heavy rain and wet runway conditions.
 - It made a runway incursion on runway 27 while RYR3262 was flying over it as it began its take-off rotation.
 - According to the crew statement, both the captain and first officer turned their attention to the central panel of the flight deck when the ICING MASTER CAUTION alerts appeared and during the weather radar scan.
- Air traffic control:
 - The controller provided the RAM925 crew with an incomplete taxi instruction. The crew made an incorrect read back and the controller did not ensure that the pilot's read back was in accordance with the authorisation given and correct him.
 - At 12:08:57 h, the controller detected that RAM925 had passed the taxiway E1 holding point markings, instructing it to hold its position, when the aircraft had already passed the "NO ENTRY" marking on the tarmac on exit lane E1. From the instruction to start taxiing of RAM925 until it is urged to stop, 3 minutes 18 seconds elapsed during which time RAM925 was taxiing for 1 minute 2 seconds in the wrong area.
- Aeronautical Information Publication:
 - The information published in the AIP does not give specific and detailed information on the standard route to be followed to the runway head, including taxiway A in the instruction.
- Neither of the two crews involved were aware of the incursion onto runway 27 by RAM925.

3.2. Causes

The investigation has determined that the runway incursion by RAM925 while RYR3262 was taking off was the result of the RAM925 crew's lack of adherence to taxi procedures.

Contributing factors to the incident are considered to be:

- The controller did not request RAM925 to stop before it reached the edge of the runway, as it taxied for 3 minutes 18 seconds of which 1 minute 2 seconds over undue areas.
- The non-existent directional and information signs from gate G3, taxiway "A".
- The change from VMC to IMC, which should have involved a change in the taxiway lighting configuration but was not implemented due to the delay in receiving the ordinary meteorological report (METAR).

4. RECOMMENDATIONS

During the course of the investigation, RAM Express reported that it had taken several safety measures, such as debriefing the crew and re-training them through CRM courses, RWY and Surface OPS, RWY Incursion Prevention and LTC line training and line check.

These measures were considered adequate and it was not considered necessary to recommend any additional safety recommendations to this operator.

In addition to these actions, it has been considered appropriate to issue the following safety recommendations addressed to the airport operator, the agency responsible for the aeronautical information publication, and the air traffic control:

REC 50/25: It is recommended that SAERCO provide its tower ATC personnel at LEZL airport with specific courses on runway incursions, with special attention to continuous surveillance during taxiing operations, taking into account situations of impaired horizontal visibility and changes in visual and instrumental flight meteorological conditions.

REC 51/25: It is recommended that AENA at LEZL airport install directional signage identifying taxiway "A" at the exit of apron gates G1, G2, G3, and G4 to unambiguously identify the designation and direction of the taxiway at intersections (HS1, HS2, HS3 and HS4).

According to information provided by AESA during the comment period for the draft of this report, it has been decided to include in this section some measures adopted by the airport operator following participation in the Local Runway Safety Committees and AESA's collaboration in their monitoring, as these are considered appropriate measures to mitigate the factors that contributed to the incident. These measures are:

- Taxiway E1 will be converted into a runway access road. The latest information available to AESA indicates that the project is currently in the drafting phase. The start date is projected for June 2026, with completion expected in September/October 2026.
- Access prohibition barriers will be installed in the specific exit taxiways of runways E2 and E3. The latest information available from AESA indicates a start date in June 2026 and an end date in September 2027.

- In addition, the airport operator issued an operational circular stating: “When field conditions require the use of aerodrome lights, the lights of the entire maneuvering area will be switched on.”

On the other hand, regarding what is indicated in section 1.5.2.2, it is reported that the change of the SMP of Seville, which includes the installation of the segregated bar control console in TWR (tablet), was approved by AESA on August 26, 2025. It is currently in service during a demonstration period, during which monitoring is being carried out to verify the correct operation.